

**BW - \_\_\_\_004\_\_\_\_**

# **ANNUAL REPORTS**

**Chavez, Carl J, EMNRD**

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**From:** Wayne Price <wayneprice@q.com>  
**Sent:** Tuesday, May 21, 2019 1:21 PM  
**To:** Chavez, Carl J, EMNRD  
**Cc:** Wayne Price  
**Subject:** [EXT] BW-04 Annual Report  
**Attachments:** Wasserhund BW-04 2018 Ann Report w-append .pdf; ATT00001.txt

Dear Carl,

Please find enclosed the 2018 Annual report. The sign copy has been placed in the mail.



**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

ANNUAL CLASS III WELL REPORT FOR 2018

Wasserhund Inc.

Buckeye Brine Station

OCD Permit BW-04

*Expiration Date: November 08, 2018*

*Permit under review for renewal by OCD*

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

May 05, 2019

Submitted By: Price LLC on behalf of Wasserhund Inc Principal Mr. Jon Gandy.



Wayne Price-LLC \_\_\_\_\_

Jon Gandy \_\_\_\_\_

**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: “Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.”) Permit Expires November 08, 2018.

During the 2018 year there was no major remedial work on the brine well. General housekeeping was routinely performed and inspections were conducted for awareness of the BW-04 permit conditions. (A copy of the most recent OCD approved Discharge Plan permit BW-04 is included for reference in **Appendix “A”**).

**Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 “Monthly fluid injection and brine production volume, including the cumulative total carried over each year”

Monthly, Yearly and Lifetime Injection and Production Volumes:

Enclosed in **Appendix “B”** is the injection and production and a comparison chart of injected water to produced water with comments.

**Bullet Point 4- “Injection Pressure Data.”**

(Permit condition 2.J.4 “Injection Pressure Data”

Maximum and Average Injection Pressure:

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 260-280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

Antidotal evidence may suggest older brine wells have a tendency to have a lower frac gradient over time. For this reason Wasserhund will not exceed 315 psig on the casing when operating or testing the formation. The tubing pressure should not exceed 369 psig.

Wasserhund Inc. has set the maximum pump pressure for injection into the tubing at 340 psig. If pumping down the casing the maximum pressure shall not exceed 315 psig.

**Special Note:** This is a change from previous years and a special Brine Well Maximum Test Pressure Calculator is included in **Appendix “D”** for reference. The new frac gradient for this well is set at .65 psi/ft.

#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 “A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.”)

Please find attached in **Appendix “C”** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2018 year and analyzed by Hall Environmental, Albuquerque NM. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tank. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 “Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.”)

A 4-hour Cavern Mechanical Integrity Test (MIT) was successfully ran and passed on November 28, 2016 and subsequently approved by OCD.

Pursuant to the permit conditions this test was not due until 2018. Therefore, the next five-year test will be scheduled for November of 2021, unless otherwise required by OCD for good cause shown or permit condition requirement.

Please find in **Appendix “D”** a copy of the approved C-103, test chart with meter calibration notes.

#### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulus and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulus, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 "Results of any leaks and spill reports;")

There were no reportable leaks and spills in 2018.

The loading areas are concrete with spill containers under the hose connections that are designed to catch de-minimus drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 "An Area of Review (AOR) update summary;")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix "E"**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix "E"**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 322 feet (R = 161 ft) up-dated for 2018, a 10:1 safety factor is applied that equates to about 1610 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2018 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1610 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1610 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been recompleted in the Abo formation.

Braden test were performed in 2017 and 2018.

This well has been transferred to Unitex Oil & Gas LLC in September 2018.

Conclusions: Well held Bradenhead Test.

Corrective Actions and Recommendation: This well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. In 2016 and 2017 this well passed an OCD Braden-head survey witnessed by OCD.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has

concluded that failures, such as “catastrophic collapses”, have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “***inverted cone***” ***i.e. base located at the top***. The volume of the cavern is calculated using the lifetime brine production volumes and using a “*rule of thumb*” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.77 million barrels of brine produced as of December 2018. The maximum diameter was calculated to be approximately 322 feet with a corresponding D/H ratio of .153 updated for the 2018 year.

Comparing the current D/H ratio of .153 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately four times.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence-monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the*

*subsidence.*

*Wasserhund Inc did submit a plan in last year's reports to meet the requirement of the rule.*

**Special Request: This facility currently does not have subsidence monitors installed and Wasserhund Inc. respectfully request waiver of this requirement until further evaluation can be completed or closure of the site commences.**

This request is based on the fact the well continues to exhibit good Cavern Mechanical Integrity, very low D/H ratio, and the fact the radius of the Cavern does not encroach upon any buildings, wells, or public ROW's. Currently there have been no subsidence issues noted or experienced.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:**

The 2013 annual report included a Solution Cavern Characterization Plan using a combination of calculated results and experimenting with various geophysical methods, including actually performing an "Induced Current Method".

To date, the geophysical method proposed has only been partially successful and due to the high cost of other methods, an accurate cavern size or shape has not been delineated.

We currently are not aware of any one single tool that can accomplish this requirement. The Carlsbad old I&W well is an example where many methods were used and the exact cavern shape is estimated using a consensus of several very expensive methods. When OCD required sonar testing, it also was not totally successful.

To integrate the actual size and shape in bedded salt may be virtually impossible, especially if trying to compare the volume with the calculated volume.

The best method still appears to be the "Worst Case" cone calculation method.

OCD had not provided guidance on this issue in the past and Wasserhund Inc. would like to participate in a study group concerning how to accomplish this feat economically.



**Special Note:** In an E-mail dated April 3, 2018 OCD (Mr. Carl Chavez Environmental Engineer) notify Wayne Price LLC that a study group was not being planned, but OCD is now accepting the Cone Calculation method when an additional well log is supplied supporting the calculation. OCD sent an example and is included in Appendix “F”.

Since the BW-04 well never had any logs run, a well log was obtained from a nearby well and annotated to reflect the geophysical characterization of the area lithology. In addition a well bore schematic is included for reference and a mass balance has been calculated and the results are included in **Appendix ‘F’**.

The mass balance compares the measured salt removed to the calculated salt removed. The comparison was within 1%, which satisfies permit condition 2.

Wasserhund Inc. would like to point out that the OCD example showed a cone with the base at the bottom, while Wasserhund has always used a cone with the base inverted to present the Worst Case analysis of a roof collapse.

Both methods will work, but the D/H critical calculation has to use the inverted base to obtain the proper D/H ratio.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

**Special Note: Wasserhund Inc. requests a minor modification of the permit requirement 3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

*And a **Minor Modification** to permit requirement 2.B.2.b, which has similar language to above, but sets a variance between 90% to 110%. This requirement seems to fit the Wasserhund BW-04 better, but there are still times that the monthly variance can be out side of this range, while there is no immediate issue at hand.*

*Generally the Annual variance does fall into the 90%-110% range.*

**Dear Jim Griswold-NMOCD Environmental Bureau Chief and Carl Chavez Environmental Engineer.**

As you know, this topic has been discussed and kicked around for a long time. The current permit requirements do not take into account many factors that can cause the

normal variance to be under or over the requirement of 110%-120% and outside of the range of 90% to 110%, notwithstanding some anomaly.

The theoretical 115% ratio came about using the rule of thumb from the “Old Wilson” report that 1 barrel of 10 lb. brine causes a cavity increase of approximately one cubic foot. If you back calculate, this equates to a salt density of about 90 lbs./ft<sup>3</sup>.

Many deeper brine wells such as the Wasserhund BW-04 well probably has a higher salt density, possibly even up to 100-120 lbs./ft<sup>3</sup>. Thus, it requires less fresh water to make 10 lb. brine water, which lowers the Fresh Water/Brine Water ratio.

As long as the brine well can make a quality brine and does not experience any unexpected loss in pressure, the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement puts some operators in a continuous violation and interruption of operations.

Of course notwithstanding, if you have a well that produces for extended periods of time, or starts to pressure up, then you know you may have communicated to a pressure zone, or, if the well loses circulation and/or pressure, then immediate action should be taken and notification to the agency made.

The point to be made here is that the permit required parameters are a trailing indicator not a leading indicator. Of course a continued pattern that deviates from the statically norm (emphasis on norm for a particular well) would be cause for concern. However, this concern may or may not, be an indication of possible collapse, which appears to be OCD’s main emphasis for the monitoring.

Currently the permit could reads as follows:

The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the normal ratio of Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

**The point here is that each operator should determine the normal range for their specific well and relay that to the agency in the annual report.**

**Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 “A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;”)*

See *Bullet Point #2* for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee’s cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

**Appendix “G”** contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

**Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 “Annual Certification in accordance with Permit Condition 2.B.3. “**2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.”)*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

*(Permit condition 2.J.14 “A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;”)*

The BW-04 Wasserhund Inc. Buckeye facility currently does not have groundwater monitoring at this site.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 “The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD’s Environmental Bureau.”)

The operator hereby submits a PDF file on flash drive and a hard copy can be supplied upon request.

## Appendix “A”

- Discharge Plan BW-04-Expires November 11, 2018-  
“Under Review for Renewal.”

**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

**DISCHARGE PERMIT BW-4**

**1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.



5. Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.



**3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

**3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures of cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

**3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts



## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water



*Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)*

March 13, 2018

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 4th Qtr 2017

OrderNo.: 1802994

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 2/19/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 12:40:00 PM

**Lab ID:** 1802994-001

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9964	0			1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	180	50		mg/L	100	2/27/2018 7:38:46 PM	R49418
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	590	20.0	*	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.79		H	pH units	1	2/22/2018 1:24:54 PM	R49344

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 1 of 7
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 12:45:00 PM

**Lab ID:** 1802994-002

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.174	0			1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>CJS</b>
Chloride	170000	10000	*	mg/L	2E	3/8/2018 2:08:28 AM	A49635
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	260000	2000	*D	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.92		H	pH units	1	2/22/2018 1:29:21 PM	R49344
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	80000	2000		mg/L	2E	3/5/2018 3:14:06 PM	36678

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 2 of 7
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 2:35:00 PM

**Lab ID:** 1802994-003

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9961	0			1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	78	5.0		mg/L	10	2/27/2018 8:16:01 PM	R49418
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	653	20.0	*	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.95		H	pH units	1	2/22/2018 1:33:36 PM	R49344

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 7
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 2:45:00 PM

**Lab ID:** 1802994-004

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.039	0			1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	30000	1000	*	mg/L	2E	3/4/2018 2:52:53 PM	R49545
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	62800	2000	*D	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.76		H	pH units	1	2/22/2018 1:37:41 PM	R49344
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	20000	500		mg/L	500	2/27/2018 7:52:12 PM	36678

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 4 of 7
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

Client: Wasserhund Inc

Project: Buckeye Tatum 4th Qtr 2017

Sample ID	MB-36678		SampType:	MBLK		TestCode:	EPA Method 200.7: Metals				
Client ID:	PBW		Batch ID:	36678		RunNo:	49369				
Prep Date:	2/22/2018		Analysis Date:	2/23/2018		SeqNo:	1593856		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	

Sodium	ND	1.0								
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Sample ID	LLLCS-36678	SampType:	LCSLL	TestCode:	EPA Method 200.7: Metals					
Client ID:	BatchQC	Batch ID:	36678	RunNo:	49369					
Prep Date:	2/22/2018	Analysis Date:	2/23/2018	SeqNo:	1593862	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Sodium	ND	1.0	0.5000	0	104	50	150			
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Sample ID	LCS-36678	SampType:	LCS	TestCode:	EPA Method 200.7: Metals					
Client ID:	LCSW	Batch ID:	36678	RunNo:	49369					
Prep Date:	2/22/2018	Analysis Date:	2/23/2018	SeqNo:	1593863	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Sodium	48	1.0	50.00	0	96.2	85	115			
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### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

**Client:** Wasserhund Inc  
**Project:** Buckeye Tatum 4th Qtr 2017

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R49418</b>	RunNo:	<b>49418</b>					
Prep Date:		Analysis Date:	<b>2/27/2018</b>	SeqNo:	<b>1596952</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R49418</b>	RunNo:	<b>49418</b>					
Prep Date:		Analysis Date:	<b>2/27/2018</b>	SeqNo:	<b>1596953</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	98.2	90	110			

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R49545</b>	RunNo:	<b>49545</b>					
Prep Date:		Analysis Date:	<b>3/4/2018</b>	SeqNo:	<b>1601219</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R49545</b>	RunNo:	<b>49545</b>					
Prep Date:		Analysis Date:	<b>3/4/2018</b>	SeqNo:	<b>1601220</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.3	90	110			

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>A49635</b>	RunNo:	<b>49635</b>					
Prep Date:		Analysis Date:	<b>3/7/2018</b>	SeqNo:	<b>1604753</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>A49635</b>	RunNo:	<b>49635</b>					
Prep Date:		Analysis Date:	<b>3/7/2018</b>	SeqNo:	<b>1604755</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	96.7	90	110			

### Qualifiers:

- |   |   |
|---|---|
| * Value exceeds Maximum Contaminant Level.              | B Analyte detected in the associated Method Blank           |
| D Sample Diluted Due to Matrix                          | E Value above quantitation range                            |
| H Holding times for preparation or analysis exceeded    | J Analyte detected below quantitation limits                |
| ND Not Detected at the Reporting Limit                  | P Sample pH Not In Range                                    |
| PQL Practical Quantitative Limit                        | RL Reporting Detection Limit                                |
| S % Recovery outside of range due to dilution or matrix | W Sample container temperature is out of limit as specified |

# QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

Client: Wasserhund Inc

Project: Buckeye Tatum 4th Qtr 2017

Sample ID	MB-36606	SampType:	MBLK	TestCode:	SM2540C MOD: Total Dissolved Solids					
Client ID:	PBW	Batch ID:	36606	RunNo:	49262					
Prep Date:	2/19/2018	Analysis Date:	2/20/2018	SeqNo:	1589272	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-36606		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	36606		RunNo:	49262				
Prep Date:	2/19/2018		Analysis Date:	2/20/2018		SeqNo:	1589273		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1000	20.0	1000	0	100	80	120				

## Qualifiers:

- |   |   |
|---|---|
| * Value exceeds Maximum Contaminant Level.              | B Analyte detected in the associated Method Blank           |
| D Sample Diluted Due to Matrix                          | E Value above quantitation range                            |
| H Holding times for preparation or analysis exceeded    | J Analyte detected below quantitation limits                |
| ND Not Detected at the Reporting Limit                  | P Sample pH Not In Range                                    |
| PQL Practical Quantitative Limit                        | RL Reporting Detection Limit                                |
| S % Recovery outside of range due to dilution or matrix | W Sample container temperature is out of limit as specified |



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: www.hallenvironmental.com

## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1802994

RcptNo: 1

Received By: Erin Melendrez 2/19/2018 10:55:00 AM

Completed By: Erin Melendrez 2/19/2018 11:39:52 AM

Reviewed By: *SR 02/19/18*

*MW 2/19/18*  
Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐

2. How was the sample delivered? Client

### Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐

4. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐

5. Sample(s) in proper container(s)? Yes ☒ No ☐

6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐

7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐

8. Was preservative added to bottles? Yes ☒ No ☐ NA ☐

9. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒

10. Were any sample containers received broken? Yes ☐ No ☒

11. Does paperwork match bottle labels? Yes ☒ No ☐

(Note discrepancies on chain of custody)

12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐

13. Is it clear what analyses were requested? Yes ☒ No ☐

14. Were all holding times able to be met? Yes ☒ No ☐

(If no, notify customer for authorization.)

# of preserved  
bottles checked  
for pH:

*2*  
( $<2$  or  $>12$  unless noted)

Adjusted? *yes*

Checked by: *SR*

### Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:

Date:

By Whom:

Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

16. Additional remarks: *for metals analysis: added 5 HNO<sub>3</sub> to 002B and 004B*

*held for 24 hrs prior to analysis*

*@ 1520 on 2/19/18*

### Cooler Information

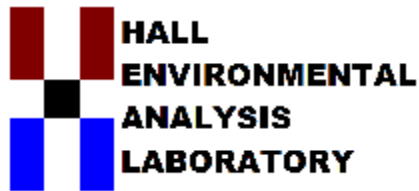
Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.1	Good	Not Present			

## Chain-of-Custody Record

[illegible]

Any sub-contracted data will be clearly noted on the analytical report. This serves as notice of this possibility. Any sub-contracted data will be clearly noted on the analytical report.





Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

August 06, 2018

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 2nd QTR 2018

OrderNo.: 1807B43

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 7/20/2018 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued August 02, 2018.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', with a stylized flourish at the end.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1807B43**

Date Reported: **8/6/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh BW-04

**Project:** Buckeye Tatum 2nd QTR 2018

**Collection Date:** 7/18/2018 1:55:00 PM

**Lab ID:** 1807B43-001

**Matrix:** AQUEOUS

**Received Date:** 7/20/2018 10:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9989	0			1	7/24/2018 2:31:00 PM	R52939
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	160	5.0		mg/L	10	7/30/2018 3:29:45 PM	R53085
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	537	20.0	*	mg/L	1	7/25/2018 4:22:00 PM	39368
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.78		H	pH units	1	7/25/2018 2:41:01 PM	R52997

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 1 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1807B43**

Date Reported: **8/6/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine BW-04

**Project:** Buckeye Tatum 2nd QTR 2018

**Collection Date:** 7/18/2018 2:00:00 PM

**Lab ID:** 1807B43-002

**Matrix:** AQUEOUS

**Received Date:** 7/20/2018 10:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.195	0			1	7/24/2018 2:31:00 PM	R52939
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	190000	5000	*	mg/L	1E	7/30/2018 4:06:59 PM	R53085
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	319000	2000	*D	mg/L	1	7/25/2018 4:22:00 PM	39368
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.85		H	pH units	1	7/25/2018 2:45:31 PM	R52997
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	100000	5000		mg/L	500	7/30/2018 5:05:24 PM	39430

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1807B43**

Date Reported: **8/6/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh BW-22

**Project:** Buckeye Tatum 2nd QTR 2018

**Collection Date:** 7/17/2018 6:00:00 PM

**Lab ID:** 1807B43-003

**Matrix:** AQUEOUS

**Received Date:** 7/20/2018 10:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9740	0			1	7/24/2018 2:31:00 PM	R52939
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	80	5.0		mg/L	10	7/30/2018 4:44:13 PM	R53085
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	675	20.0	*	mg/L	1	7/25/2018 4:22:00 PM	39368
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.96		H	pH units	1	7/25/2018 2:49:32 PM	R52997

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1807B43**

Date Reported: **8/6/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine BW-22

**Project:** Buckeye Tatum 2nd QTR 2018

**Collection Date:** 7/17/2018 6:05:00 PM

**Lab ID:** 1807B43-004

**Matrix:** AQUEOUS

**Received Date:** 7/20/2018 10:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.044	0			1	7/24/2018 2:31:00 PM	R52939
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	28000	5000	*	mg/L	1E	7/30/2018 5:21:27 PM	R53085
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	60400	2000	*D	mg/L	1	7/25/2018 4:22:00 PM	39368
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.09		H	pH units	1	7/25/2018 2:53:29 PM	R52997
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	18000	200		mg/L	200	7/26/2018 2:03:43 PM	39414

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1807B43

06-Aug-18

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2018

Sample ID	MB-39414		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: 39414		RunNo: 52993					
Prep Date:	7/25/2018		Analysis Date: 7/26/2018		SeqNo: 1742128		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-39414		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 39414		RunNo: 52993					
Prep Date:	7/25/2018		Analysis Date: 7/26/2018		SeqNo: 1742642		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	145	50	150			

Sample ID	LCS-39414		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: 39414		RunNo: 52993					
Prep Date:	7/25/2018		Analysis Date: 7/26/2018		SeqNo: 1742643		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	49	1.0	50.00	0	97.5	85	115			

Sample ID	MB-39430		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: 39430		RunNo: 53021					
Prep Date:	7/26/2018		Analysis Date: 7/27/2018		SeqNo: 1744777		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-39430		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 39430		RunNo: 53021					
Prep Date:	7/26/2018		Analysis Date: 7/27/2018		SeqNo: 1744778		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	72.7	50	150			

Sample ID	LCS-39430		SampType:	LCS		TestCode:	EPA Method 200.7: Metals				
Client ID:	LCSW		Batch ID:	39430		RunNo:	53021				
Prep Date:	7/26/2018		Analysis Date:	7/27/2018		SeqNo:	1744779		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	52	1.0	50.00	0	105	85	115				

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quantitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1807B43

06-Aug-18

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2018

Sample ID	MB		SampType: mblk		TestCode: EPA Method 300.0: Anions					
Client ID:	PBW		Batch ID: R53085		RunNo: 53085					
Prep Date:			Analysis Date: 7/30/2018		SeqNo: 1746411		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSW		Batch ID: R53085		RunNo: 53085					
Prep Date:			Analysis Date: 7/30/2018		SeqNo: 1746412		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	96.0	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1807B43

06-Aug-18

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2018

Sample ID	1807B43-001ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	Buckeye-Fresh BW-	Batch ID:	R52939	RunNo:	52939					
Prep Date:		Analysis Date:	7/24/2018	SeqNo:	1739759	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9997	0						0.0801	20	

### Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1807B43

06-Aug-18

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2018

Sample ID	MB-39368		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	39368		RunNo:	52975				
Prep Date:	7/24/2018		Analysis Date:	7/25/2018		SeqNo:	1741018		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-39368		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	39368		RunNo:	52975				
Prep Date:	7/24/2018		Analysis Date:	7/25/2018		SeqNo:	1741019		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1020	20.0	1000	0	102	80	120				

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: www.hallenvironmental.com

## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1807B43

RcptNo: 1

Received By: Isaiah Ortiz 7/20/2018 10:45:00 AM

Completed By: Michelle Garcia 7/20/2018 2:19:36 PM

Reviewed By: ENM 7/20/18

CB: IO 7/20/18

### Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐  
2. How was the sample delivered? Courier

### Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐  
4. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐  
5. Sample(s) in proper container(s)? Yes ☒ No ☐  
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐  
7. Are samples (except VOA and ONG) properly preserved? Yes ☐ No ☒  
8. Was preservative added to bottles? Yes ☒ No ☐ NA ☐  
9. VOA vials have zero headspace? Yes ☐ No ☐ HNO<sub>3</sub> No VOA Vials ☒  
10. Were any sample containers received broken? Yes ☐ No ☒  
11. Does paperwork match bottle labels? Yes ☒ No ☐  
(Note discrepancies on chain of custody)  
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐  
13. Is it clear what analyses were requested? Yes ☒ No ☐  
14. Were all holding times able to be met? Yes ☒ No ☐  
(If no, notify customer for authorization.)

# of preserved  
bottles checked  
for pH:

2  
( $<2$  or  $>12$  unless noted)

Adjusted? yes

Checked by: IO

### Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

16. Additional remarks:

For samples -002 and -004 poured off 100mL into 250mL plastic. Added Approx. 0.5mL HNO<sub>3</sub> to samples -002B ad -004B for acceptable pH, held for 24 hours prior to analysis. IO 7/20/18

### 17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	0.3	Good	Yes			





Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

November 05, 2018

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: BW 04 Buckeye BW 22 Tatum 3rd Qtr 2018

OrderNo.: 1810989

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 10/18/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1810989**

Date Reported: **11/5/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh BW-22

**Project:** BW 04 Buckeye BW 22 Tatum 3rd Qtr 2

**Collection Date:** 10/15/2018 3:35:00 PM

**Lab ID:** 1810989-001

**Matrix:** AQUEOUS

**Received Date:** 10/18/2018 8:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9948	0			1	10/22/2018 1:34:00 PM	R55069
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	82	5.0		mg/L	10	10/18/2018 11:34:11 PM	R55004
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	666	20.0	*	mg/L	1	10/28/2018 5:55:00 PM	41117
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.97		H	pH units	1	10/22/2018 1:25:08 PM	R55064

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1810989**

Date Reported: **11/5/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine BW-22

**Project:** BW 04 Buckeye BW 22 Tatum 3rd Qtr 2

**Collection Date:** 10/15/2018 3:40:00 PM

**Lab ID:** 1810989-002

**Matrix:** AQUEOUS

**Received Date:** 10/18/2018 8:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.024	0			1	10/22/2018 1:34:00 PM	R55069
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	18000	5000	*	mg/L	1E	10/19/2018 12:12:46 AM	R55004
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	36700	2000	*D	mg/L	1	10/28/2018 5:55:00 PM	41117
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.62		H	pH units	1	10/22/2018 1:29:34 PM	R55064
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	8500	500		mg/L	500	11/1/2018 2:01:48 PM	A55348

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1810989**

Date Reported: **11/5/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye Fresh BW-04

**Project:** BW 04 Buckeye BW 22 Tatum 3rd Qtr 2

**Collection Date:** 10/15/2018 4:35:00 PM

**Lab ID:** 1810989-003

**Matrix:** AQUEOUS

**Received Date:** 10/18/2018 8:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9962	0			1	10/22/2018 1:34:00 PM	R55069
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	150	5.0		mg/L	10	10/19/2018 12:25:38 AM	R55004
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	528	20.0	*	mg/L	1	10/28/2018 5:55:00 PM	41117
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.79		H	pH units	1	10/22/2018 1:33:40 PM	R55064

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1810989**

Date Reported: **11/5/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye Brine BW-04

**Project:** BW 04 Buckeye BW 22 Tatum 3rd Qtr 2

**Collection Date:** 10/15/2018 4:55:00 PM

**Lab ID:** 1810989-004

**Matrix:** AQUEOUS

**Received Date:** 10/18/2018 8:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.166	0			1	10/22/2018 1:34:00 PM	R55069
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	150000	5000	*	mg/L	1E	10/19/2018 1:04:12 AM	R55004
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	296000	2000	*D	mg/L	1	10/28/2018 5:55:00 PM	41117
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.85		H	pH units	1	10/22/2018 1:37:35 PM	R55064
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	72000	1000		mg/L	1E	10/29/2018 2:48:32 PM	41155

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1810989

05-Nov-18

Client: Wasserhund Inc

Project: BW 04 Buckeye BW 22 Tatum 3rd Qtr 2018

Sample ID	MB-41155		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: 41155		RunNo: 55178					
Prep Date:	10/23/2018		Analysis Date: 10/25/2018		SeqNo: 1834501		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-41155	SampType:	LCSLL	TestCode:	EPA Method 200.7: Metals					
Client ID:	BatchQC	Batch ID:	41155	RunNo:	55178					
Prep Date:	10/23/2018	Analysis Date:	10/25/2018	SeqNo:	1834502	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	110	50	150			

Sample ID	LCS-41155		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: 41155		RunNo: 55178					
Prep Date:	10/23/2018		Analysis Date: 10/25/2018		SeqNo: 1834503		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	52	1.0	50.00	0	103	85	115			

Sample ID	MB-A		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: A55348		RunNo: 55348					
Prep Date:			Analysis Date: 11/1/2018		SeqNo: 1841831		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-A		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: A55348		RunNo: 55348					
Prep Date:			Analysis Date: 11/1/2018		SeqNo: 1841833		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	131	50	150			

Sample ID	LCS-A		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: A55348		RunNo: 55348					
Prep Date:			Analysis Date: 11/1/2018		SeqNo: 1841835		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	49	1.0	50.00	0	97.1	85	115			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quantitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1810989

05-Nov-18

Client: Wasserhund Inc

Project: BW 04 Buckeye BW 22 Tatum 3rd Qtr 2018

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R55004	RunNo:	55004					
Prep Date:		Analysis Date:	10/18/2018	SeqNo:	1829001	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R55004	RunNo:	55004					
Prep Date:		Analysis Date:	10/18/2018	SeqNo:	1829002	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	94.7	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1810989

05-Nov-18

Client: Wasserhund Inc

Project: BW 04 Buckeye BW 22 Tatum 3rd Qtr 2018

Sample ID	MB-41117		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	41117		RunNo:	55105				
Prep Date:	10/22/2018		Analysis Date:	10/28/2018		SeqNo:	1831634		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-41117		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 41117		RunNo: 55105					
Prep Date:	10/22/2018		Analysis Date: 10/28/2018		SeqNo: 1831635		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	997	20.0	1000	0	99.7	80	120			

Sample ID	1810989-001ADUP		SampType:	DUP		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	Tatum-Fresh BW-22		Batch ID:	41117		RunNo:	55105				
Prep Date:	10/22/2018		Analysis Date:	10/28/2018		SeqNo:	1831639		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	667	20.0						0.150	5	*	

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

## Sample Log-In Check List

Client Name: **WASSERHUND INC**

Work Order Number: **1810989**

RcptNo: **1**

Received By: **Victoria Zellar**

10/18/2018 8:35:00 AM

*Victoria Zellar*

Completed By: **Ashley Gallegos**

10/18/2018 10:36:25 AM

*AJ*

Reviewed By: **ENH**

**10/18/18**

labeled by: **IO 10/18/18**

### Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

### Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
4. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☒ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☐ No ☒
8. Was preservative added to bottles? Yes ☒ No ☐ NA ☐
9. VOA vials have zero headspace? Yes ☐ No ☐ See remarks  
No VOA Vials ☒
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
13. Is it clear what analyses were requested? Yes ☒ No ☐
14. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved  
bottles checked  
for pH: **2**  
( $\leq 2$  or  $>12$  unless noted)

Adjusted? **YES**

Checked by: **IO 10/18/18**

### Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
By Whom: \_\_\_\_\_ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person  
Regarding: \_\_\_\_\_  
Client Instructions: \_\_\_\_\_

16. Additional remarks:

For Metals analysis poured off approx 200mL from --002 & -004 and added 0.4mL HNO<sub>3</sub> to 002B & 004B for acceptable pH, held for 24 hours prior to analysis

### 17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.0	Good	Yes			





February 13, 2019

WAYNE PRICE

WASSERHUND INC.

P.O. BOX 2140

LOVINGTON, NM 88260

RE: BUCKEYE BRINE STATION BW-04

Enclosed are the results of analyses for samples received by the laboratory on 02/01/19 9:10.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (\*). For a complete list of accredited analytes and matrices visit the TCEQ website at [www.tceq.texas.gov/field/ga/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/ga/lab_accred_certif.html).

Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Total Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Cardinal Laboratories is accredited through the State of New Mexico Environment Department for:

Method SM 9223-B	Total Coliform and E. coli (Colilert MMO-MUG)
Method EPA 524.2	Regulated VOCs and Total Trihalomethanes (TTHM)
Method EPA 552.2	Total Haloacetic Acids (HAA-5)

Accreditation applies to public drinking water matrices for State of Colorado and New Mexico.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Celey D. Keene

Lab Director/Quality Manager

**Analytical Results For:**WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:Reported:  
13-Feb-19 13:21

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FRESH WATER TANK	H900374-01	Water	28-Jan-19 17:00	01-Feb-19 09:10
BRINE WATER TANK	H900374-02	Water	28-Jan-19 17:10	01-Feb-19 09:10

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:Reported:  
13-Feb-19 13:21**FRESH WATER TANK**  
**H900374-01 (Water)**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
---------	--------	-----	--------------------	-------	----------	-------	---------	----------	--------	-------

**Cardinal Laboratories****Inorganic Compounds**

Chloride*	160		4.00	mg/L	1	9020111	AC	06-Feb-19	4500-Cl-B	
pH*	8.16		0.100	pH Units	1	9020107	AC	01-Feb-19	150.1	
Specific Gravity @ 60° F	1.006		0.000	[blank]	1	9020112	AC	01-Feb-19	SM 2710F	
TDS*	518		5.00	mg/L	1	9013005	AC	05-Feb-19	160.1	

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



**Analytical Results For:**WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:Reported:  
13-Feb-19 13:21**BRINE WATER TANK****H900374-02 (Water)**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
---------	--------	-----	--------------------	-------	----------	-------	---------	----------	--------	-------

**Cardinal Laboratories****Inorganic Compounds**

Chloride*	89000		4.00	mg/L	1	9020111	AC	06-Feb-19	4500-Cl-B	
pH*	7.10		0.100	pH Units	1	9020107	AC	01-Feb-19	150.1	
Specific Gravity @ 60° F	1.109		0.000	[blank]	1	9020112	AC	01-Feb-19	SM 2710F	
TDS*	147000		5.00	mg/L	1	9013005	AC	05-Feb-19	160.1	

**Green Analytical Laboratories****Total Recoverable Metals by ICP (E200.7)**

Sodium*	50500		250	mg/L	250	B902063	AES	11-Feb-19	EPA200.7	
---------	-------	--	-----	------	-----	---------	-----	-----------	----------	--

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260

Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:

Reported:  
13-Feb-19 13:21

### Inorganic Compounds - Quality Control

#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

#### Batch 9013005 - Filtration

##### Blank (9013005-BLK1)

Prepared: 30-Jan-19 Analyzed: 01-Feb-19

TDS ND 5.00 mg/L

##### LCS (9013005-BS1)

Prepared: 30-Jan-19 Analyzed: 05-Feb-19

TDS 191 mg/L 204 93.6 80-120

##### Duplicate (9013005-DUP1)

Source: H900304-07

Prepared: 30-Jan-19 Analyzed: 01-Feb-19

TDS 474 5.00 mg/L 394 18.4 20

#### Batch 9020107 - General Prep - Wet Chem

##### LCS (9020107-BS1)

Prepared &amp; Analyzed: 01-Feb-19

pH 7.03 pH Units 7.00 100 90-110

##### Duplicate (9020107-DUP1)

Source: H900359-01

Prepared &amp; Analyzed: 01-Feb-19

pH 11.8 0.100 pH Units 11.9 0.931 20

#### Batch 9020111 - General Prep - Wet Chem

##### Blank (9020111-BLK1)

Prepared &amp; Analyzed: 01-Feb-19

Chloride ND 4.00 mg/L

##### LCS (9020111-BS1)

Prepared &amp; Analyzed: 01-Feb-19

Chloride 104 4.00 mg/L 100 104 80-120

##### LCS Dup (9020111-BSD1)

Prepared: 01-Feb-19 Analyzed: 06-Feb-19

Chloride 104 4.00 mg/L 100 104 80-120 0.00 20

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:Reported:  
13-Feb-19 13:21**Inorganic Compounds - Quality Control****Cardinal Laboratories**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

**Batch 9020112 - General Prep - Wet Chem****Duplicate (9020112-DUP1)**

Source: H900369-01

Prepared &amp; Analyzed: 01-Feb-19

Specific Gravity @ 60° F	1.004	0.000	[blank]	1.004	0.0359	20
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Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

WASSERHUND INC.  
P.O. BOX 2140  
LOVINGTON NM, 88260

Project: BUCKEYE BRINE STATION BW-04  
Project Number: 2018-19 4TH QTR  
Project Manager: WAYNE PRICE  
Fax To:

Reported:  
13-Feb-19 13:21

### Total Recoverable Metals by ICP (E200.7) - Quality Control

#### Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B902063 - Total Rec. 200.7/200.8/200.2</b>										
<b>Blank (B902063-BLK1)</b>										
Prepared & Analyzed: 11-Feb-19										
Sodium	ND	1.00	mg/L							
<b>LCS (B902063-BS1)</b>										
Prepared & Analyzed: 11-Feb-19										
Sodium	3.18	1.00	mg/L	3.24		98.0	85-115			
<b>LCS Dup (B902063-BSD1)</b>										
Prepared & Analyzed: 11-Feb-19										
Sodium	3.18	1.00	mg/L	3.24		98.2	85-115	0.171	20	

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Notes and Definitions**

ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C Samples reported on an as received basis (wet) unless otherwise noted on report

---

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



**CARDINAL**  
Laboratories

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

Send Results to [wayneprice@g.com](mailto:wayneprice@g.com)

[illegible]

**PLEASE NOTE:** Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: wayne Price-Price LLC		Date: 2-1-19		Received By: Samara Oldakyz		Phone Result: <input type="checkbox"/> Yes <input type="checkbox"/> No Add'l Phone #:	
		Time: 0910				Fax Result: <input type="checkbox"/> Yes <input type="checkbox"/> No Add'l Fax #:	
Relinquished By:		Date:		Received By:		REMARKS: Send results to wayneprice@q.com	
		Time:					
Delivered By: (Circle One)				Sample Condition		CHECKED BY:	
Sampler - UPS - Bus - Other:				Cool Intact		(Initials)	
-0.4c #97				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		TO	

## Appendix “D”

- C-103
- 2016 MIT Chart
- Recorder Calibration
- Brine Well Maximum Test Pressure Calculator

Submit 1 Copy To Appropriate District Office  
District I - (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II - (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III - (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV - (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
Revised July 18, 2013

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

WELL API NO. 30-025-26883
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 25-26883
7. Lease Name or Unit Agreement Name Eidson Brine Station, BW-004
8. Well Number 1
9. OGRID Number 130851
10. Pool name or Wildcat

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other Brine Well	
2. Name of Operator Wasserhund, Inc.	
3. Address of Operator P.O. Box 2140, Lovington, NM 88260	
4. Well Location Unit Letter M : 567.4 feet from the South line and 161.7 feet from the West line Section 31 Township 16S Range 35E NMPM County Lea	
11. Elevation (Show whether DR, RKB, RT, GR, etc.)	

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: Integrity Test <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

See Attached Chart

2015 DEC -2 A 3:21  
RECEIVED

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Jon Gandy TITLE Secretary/Treasurer DATE 11/29/16

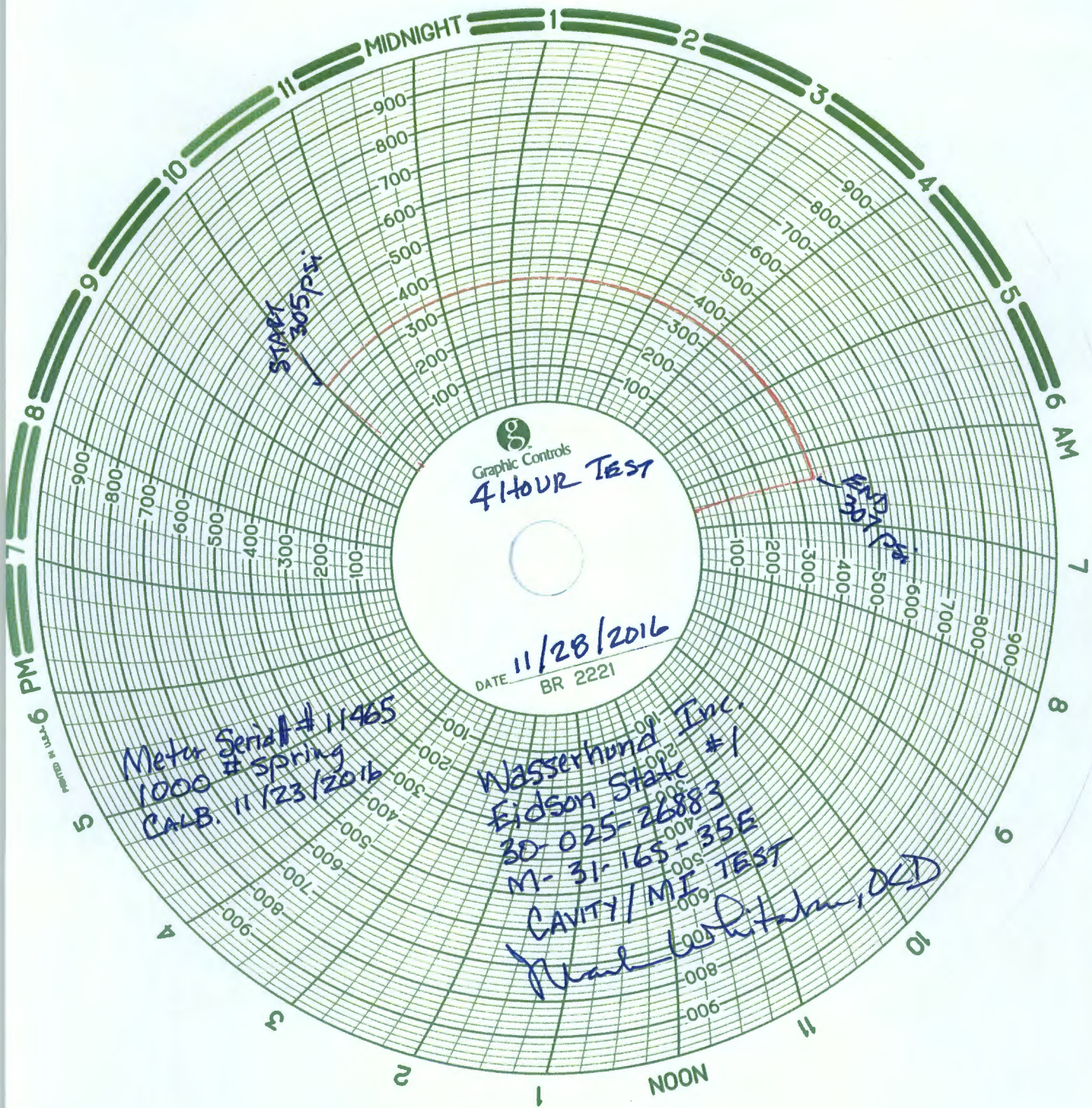
Type or print name Jon Gandy E-mail address: jonrgandy@aol.com PHONE: 575-396-0522

**For State Use Only**

APPROVED BY: Carl J. Cherry TITLE \_\_\_\_\_ DATE 12/6/16

Conditions of Approval (if any):





Graphic Controls  
4 HOUR TEST

DATE 11/28/2016  
BR 2221

Meter Serial # 11465  
1000 # Spring  
CALB. 11/23/2016

Wasservond Inc.  
Edson State #1  
30-025-26883  
M-31-165-35E  
CAVITY/MI TEST

Paul W. Whitman, OED

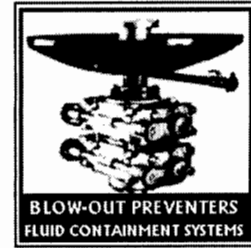
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



**Date:** Wednesday, November 23, 2016

**Invoice #** \_\_\_\_\_

### **Certification of Pressure Recorder Test:**

**Company:** Gandy


**Unit:** Gandy #4

**Model:** 8" PMC

**Pressure Rating:** 1,000#

**Serial #:** 11218

***This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.***



Issac Luna, Technician

# Brine Well Maximum Test Pressure Calculator

Provides an approximate estimate for Maximum Test pressures allowed to prevent possible fracturing of formation.

Inputs are for casing shoe depth, bottom hole depth, and frac gradient.

Answers are given when pressure testing using Fresh water or Brine water.

Major assumptions: Frac Gradient of .65 is used, casing is filled with brine or fresh water

Note: When brine well has been operating in normal flow, then assume that casing is filled with Brine Water.

BW-04 Wasserhund Buckeye

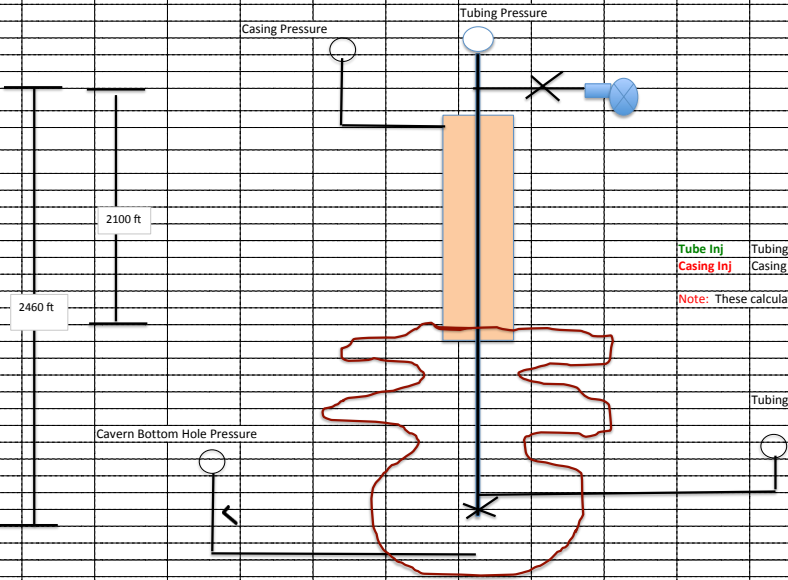
Input Depth to Casing Shoe		2100 ft	Inputs are in Green	
Input Depth to Bottom Hole		2460 ft		
Input Frac/Gradient		0.65 psi/ft		
		Depth ft	Gradient-psi/ft	psig
Casing Shoe	FW	2100	0.433	909
Casing Shoe	BW	2100	0.5	1050
Casing Shoe	Frac	2100	0.65	1365
Bottom Hole	FW	2460	0.433	1065
Bottom Hole	BW	2460	0.5	1230
Bottom Hole	Frac	2460	0.65	1599
FW=Fresh Water				Using BW
BW=Brine Water				Using FW

Tube Inj	Tubing Max Test Pressure	Max Surface Pressure = Depth to Bottom * (Frac Gradient -Water Head Gradient)
Casing Inj	Casing Max Test Pressure	Max Surface Pressure = Depth to Casing Shoe * (Frac Gradient -Water Head Gradient)

Note: These calculations are for static test only and does not take into account dynamic pressure drops in Tubing or Casing.

Answers in Yellow	
369	psig
534	psig
315	psig
456	psig

Do Not Exceed Tubing or Casing Surface Pressures while Pumping or Testing



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

**2018 annual report  
Reviewed May 2019**

Well Status List

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program	Cased/Cemented	Corrective Action
									Checked	across salt section	Required
0	<b><u>30-025-26883</u></b>	<b><u>Wasserhund Eidson #1</u></b>	<b><u>M</u></b>	<b><u>31</u></b>	<b><u>16s</u></b>	<b><u>35e</u></b>	<b><u>567 FSL &amp; 162 FWL</u></b>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved No Action Required
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	no

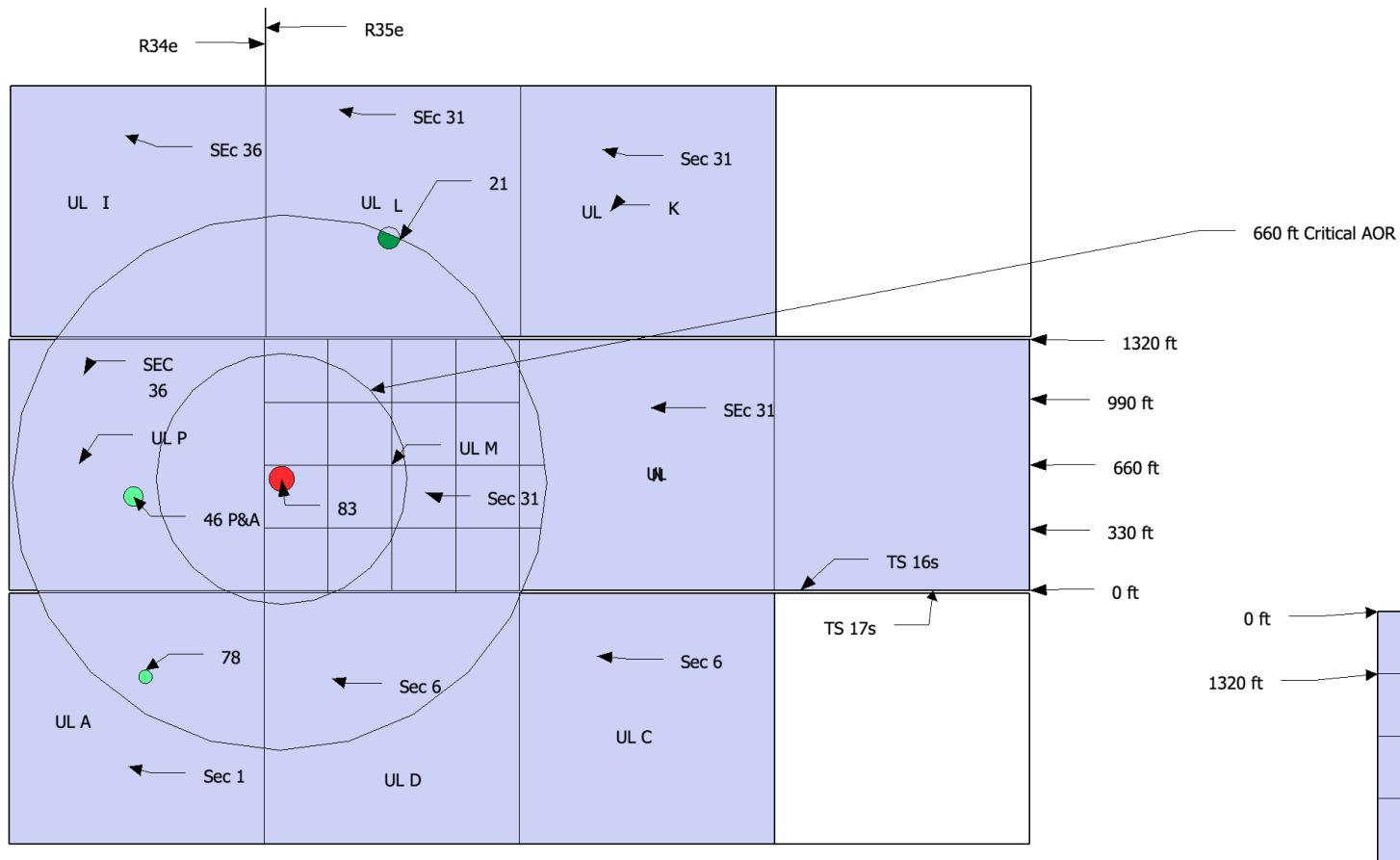
2 2

3 Total # of wells in adjacent quarter-sections  
3 Total # of wells in 1/4 mile AOR  
3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

**Notes:**

\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.





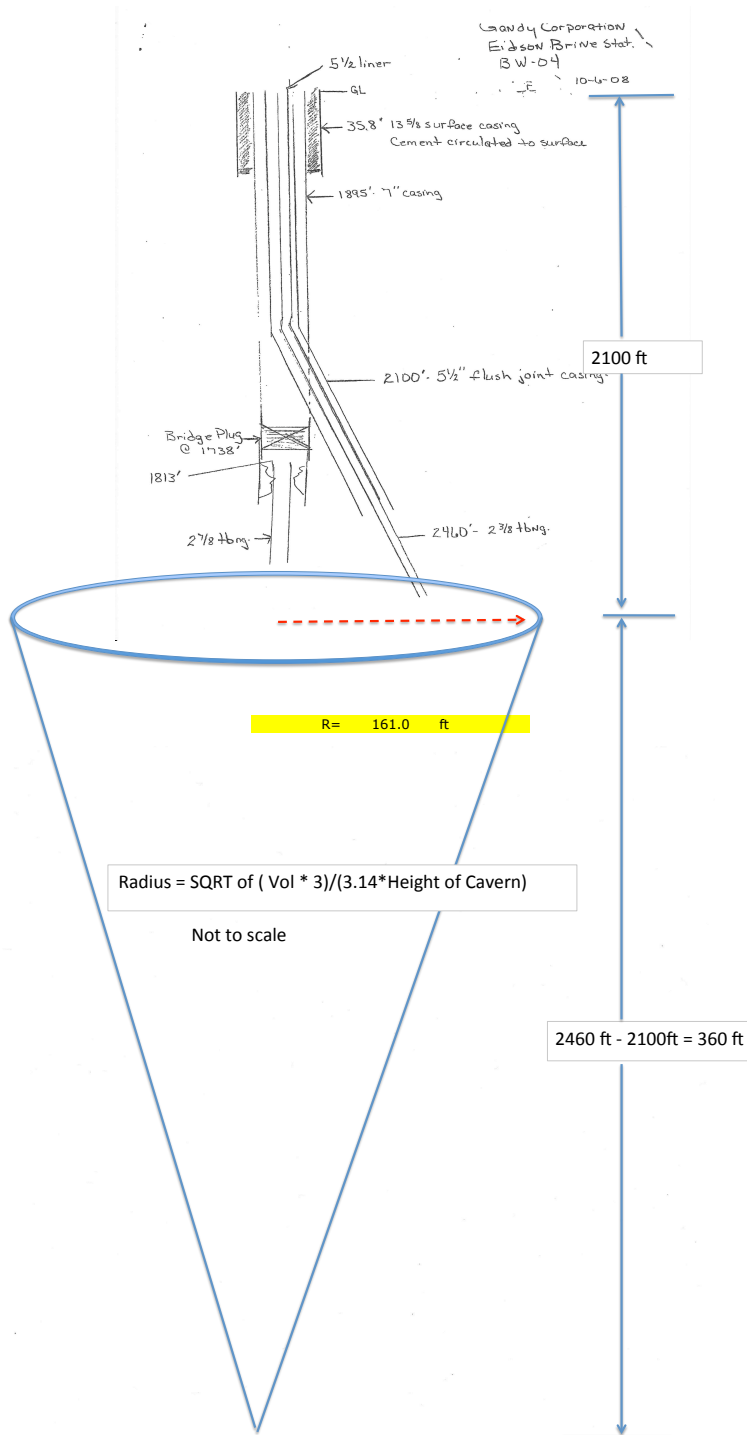
Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2018	Location: UL M-Sec 31-Ts16s-R35e	

## Appendix “F”

- Wellbore Sketch with Log
- Updated Cone Calculations with Radius and D/H values
- Cavern Characterization mass balance updated.







### 2018 Calculations

$$r = \sqrt[3]{V \cdot 3 / \pi \cdot D}$$

V	Volume	=	9,766,847 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft3 salt/bbl	161.0	1 est

$$r = \sqrt[3]{V \cdot 3 / \pi \cdot D}$$

$$D/H = 0.153$$

BW-04 Mass Balance			Independent Inputs	Dependent Variables
Measured Salt Removed vs Calculated Salt Removed			Formulas	
2018 year End total Production Volume	9,766,847	Bbls	Independent variable	
Average Density #/gal produced water measured	9.8	lbs/gal	Independent variable	Seven year Average
Average Salt Density-Est	80	lbs/ft3	Independent variable	Used OCD number for salt density
FT3/bbl	7.35	ft3/bbl	Independent variable	
Lbs of salt per gal	1.466	Lbs/gal	Dependent Variable	
Lbs of Salt per BBL	80.63	Lbs/bbl	Dependent Variable	
Total Lbs of Salt Removed	787,500,874	LBS	Dependent Variable	
Ft3 of salt removed	9,843,761	Ft3	Estimated Cavern Size calculated from Production Numbers	
Geo-Physical Worst Case Cone Calculation V= $\frac{1}{3}\pi R^2 h$				
Radius	161	ft	Dependent Variable	
Height from Log	360	ft	Independent Variable	
Volume of Worst Case Cone	9,767,033	Ft3	Calculated using "Worst Case Cone"	
	1%	Within 10 % Passes	" Plus % = Means Cone Calculation is less than measured salt removed	
			" Neg % = Means Cone Calculation is more than measured salt remove	

## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.

Permit Renewal  
BW-04 Wasserhund Inc. Closure Cost

Pulling Unit Rig	\$8,700
Halliburton Cement Job	\$6,000
Tank Removal, Pad Clean-Up	\$25,000
Total Estimate	\$39,700

\$50,000 Bond is in place

**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2017**

**Wasserhund Inc.**

**Buckeye Brine Station**

**OCD Permit BW-04**

*Expiration Date: November 08, 2018*

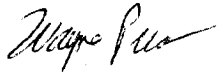
**API No. 30-025-26883 Eidson #1**

**Unit Letter M-Section 31-Ts 16s – R35e**

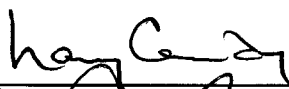
**May 01, 2018**

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

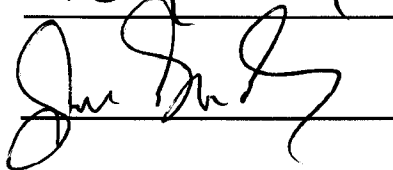
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2017 year there was no major remedial work on the brine well. General housekeeping was routinely performed and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 is included for reference in **Appendix "A"**).*

The brine well was drilled in 1980 and has been in operation for approximately 36 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the past required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

To ensure the safety of the well a Pro-active well "Area of Review" has been conducted annually and will continue including yearly cavern size calculations.

Evaluation of the last sonar test conducted determined cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 “Monthly fluid injection and brine production volume, including the cumulative total carried over each year”

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2017 fresh water injected was 304,453 barrels and brine production volume was 300,182 barrels.

The lifetime fresh water volumes are reported at 9,577,581 barrels and the life time brine production volume is 9,532,364 barrels.

Wassehund Inc. purchased this well from another operator a number of years ago and at that time it appeared the past operator may not have recorded the fresh water injection. Wasserhund Inc. started submitting annual reports in 2011 and carried forward the brine production numbers.

In order to amend the fresh water records, the last seven years were selected where fresh water was reported, and an average fresh water to brine water ratio was calculated. This number was used to back calculate the estimated amount of fresh water that was injected.

This years report reflects a fresh water number that will be carried forward in the future and is reflected in the above numbers.

Enclosed in **Appendix “B”** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- “Injection Pressure Data.”**

(Permit condition 2.J.4 “Injection Pressure Data”

Maximum and Average Injection Pressure:

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 260-280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

Antidotal evidence may suggest older brine wells have a tendency to have a lower frac gradient over time. For this reason Wasserhund will not exceed 315 psig on the casing when operating or testing the formation. The tubing pressure should not exceed 369 psig.

Wasserhund Inc. has set the maximum pump pressure for injection into the tubing at 340 psig. If pumping down the casing the maximum pressure shall not exceed 315 psig.

**Special Note:** This is a change from previous years and a special Brine Well Maximum Test Pressure Calculator is included in **Appendix “D”** for reference. The new frac gradient for this well is set at .65 psi/ft.

#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 “A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.”)

Please find attached in **Appendix “C”** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2017 year and analyzed by Hall Environmental, Albuquerque NM. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed the brine water is predominately sodium chloride with a high density of 1.203 specific gravity. This analysis is very representative of Salado “Salt” formation waters found in the area. Pursuant to the 2017 chemical analysis, the Density of the brine ranged from 1.174 SG to 1.203 SG for an average of 1.191 which equates to 9.93 lbs./gal.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 “Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.”)

A 4-hour Cavern Mechanical Integrity Test (MIT) was successfully ran and passed on November 28, 2016 and subsequently approved by OCD.

Pursuant to the permit conditions this test was not due until 2018. Therefore, the next five-year test will be scheduled for November of 2021, unless otherwise required by OCD for good cause shown or permit condition requirement.

Please find in **Appendix “D”** a copy of the approved C-103, test chart with meter calibration notes.



### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulus and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulus, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 “Results of any leaks and spill reports;”)

There were no reportable leaks and spills in 2017.

The loading areas are concrete with spill containers under the hose connections that are designed to catch de-minimus drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 “An Area of Review (AOR) update summary;”)

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix “E”**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages,

Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 318 feet (R = 159 ft) up-dated for 2017, a 10:1 safety factor is applied that equates to about 1590 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2017 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1590 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1590 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been recompleted in the Abo formation.

Conclusions: OCD has approved the recompletion in 2016.

Corrective Actions and Recommendation: This well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

*(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")*

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been

discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as “catastrophic collapses”, have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “***inverted cone***” ***i.e. base located at the top***. The volume of the cavern is calculated using the lifetime brine production volumes and using a “*rule of thumb*” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.53 million barrels of brine produced as of December 2017. The maximum diameter was calculated to be approximately 318 feet with a corresponding D/H ratio of .151 updated for the 2017 year.

Comparing the current D/H ratio of .151 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately four times.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence-*

*monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

*Wasserhund Inc did submit a plan in last year's reports to meet the requirement of the rule.*

**Special Request: This facility currently does not have subsidence monitors installed and Wasserhund Inc. respectfully request waiver of this requirement until further evaluation can be completed or closure of the site commences.**

This request is based on the fact the well continues to exhibit good Cavern Mechanical Integrity, very low D/H ratio, and the fact the radius of the Cavern does not encroach upon any buildings, wells, or public ROW's. Currently there have been no subsidence issues noted or experienced.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

#### **Solution Cavern Characterization Plan:**

The 2013 annual report included a Solution Cavern Characterization Plan using a combination of calculated results and experimenting with various geophysical methods, including actually performing an "Induced Current Method".

To date, the geophysical method proposed has only been partially successful and due to the high cost of other methods, an accurate cavern size or shape has not been delineated.

We currently are not aware of any one single tool that can accomplish this requirement. The Carlsbad old I&W well is an example where many methods were used and the exact cavern shape is estimated using a consensus of several very expensive methods. When OCD required sonar testing, it also was not totally successful.

To integrate the actual size and shape in bedded salt may be virtually impossible, especially if trying to compare the volume with the calculated volume.

The best method still appears to be the “Worst Case” cone calculation method.

OCD had not provided guidance on this issue in the past and Wasserhund Inc. would like to participate in a study group concerning how to accomplish this feat economically.

**Special Note:** In an E-mail dated April 3, 2018 OCD (Mr. Carl Chavez Environmental Engineer) notify Wayne Price LLC that a study group was not being planned, but OCD is now accepting the Cone Calculation method when an additional well log is supplied supporting the calculation. OCD sent an example and is included in Appendix “F”.

Since the BW-04 well never had any logs run, a well log was obtained from a nearby well and annotated to reflect the geophysical characterization of the area lithology. In addition a well bore schematic is included for reference and a mass balance has been calculated and the results are included in **Appendix ‘F’**.

The mass balance compares the measured salt removed to the calculated salt removed. The comparison was within 1%, which satisfies permit condition 2.

Wasserhund Inc. would like to point out that the OCD example showed a cone with the base at the bottom, while Wasserhund has always used a cone with the base inverted to present the Worst Case analysis of a roof collapse.

Both methods will work, but the D/H critical calculation has to use the inverted base to obtain the proper D/H ratio.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

**Special Note: Wasserhund Inc. requests a minor modification of the permit requirement 3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

*And a **Minor Modification** to permit requirement 2.B.2.b, which has similar language to above, but sets a variance between 90% to 110%. This requirement seems to fit the Wasserhund BW-04 better, but there are still times that the monthly variance can be out side of this range, while there is no immediate issue at hand.*

*Generally the Annual variance does fall into the 90%-110% range.*

**Dear Jim Griswold-NMOCD Environmental Bureau Chief and Carl Chavez  
Environmental Engineer.**

As you know, this topic has been discussed and kicked around for a long time. The current permit requirements do not take into account many factors that can cause the normal variance to be under or over the requirement of 110%-120% and outside of the range of 90% to 110%, notwithstanding some anomaly.

The theoretical 115% ratio came about using the rule of thumb from the "Old Wilson" report that 1 barrel of 10 lb. brine causes a cavity increase of approximately one cubic foot. If you back calculate, this equates to a salt density of about 90 lbs./ft<sup>3</sup>.

Many deeper brine wells such as the Wasserhund BW-04 well probably has a higher salt density, possibly even up to 100-120 lbs./ft<sup>3</sup>. Thus, it requires less fresh water to make 10 lb. brine water, which lowers the Fresh Water/Brine Water ratio.

As long as the brine well can make a quality brine and does not experience any unexpected loss in pressure, the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement puts some operators in a continuous violation and interruption of operations.

Of course notwithstanding, if you have a well that produces for extended periods of time, or starts to pressure up, then you know you may have communicated to a pressure zone, or, if the well loses circulation and/or pressure, then immediate action should be taken and notification to the agency made.

The point to be made here is that the permit required parameters are a trailing indicator not a leading indicator. Of course a continued pattern that deviates from the statically norm (emphasis on norm for a particular well) would be cause for concern. However, this concern may or may not, be an indication of possible collapse, which appears to be OCD's main emphasis for the monitoring.

Currently the permit could reads as follows:

The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the normal ratio of Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

The point here is that each operator should determine the normal range for their specific well and relay that to the agency in the annual report.

**Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;)*

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "G" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

**Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. "2.B.3. Annual Certification: The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.



**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility currently does not have groundwater monitoring at this site.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and a hard copy can be supplied upon request.

## Appendix "A"

- Discharge Plan BW-04-Expires November 11, 2018

**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**

State of New Mexico  
Energy, Minerals and Natural Resources Department

---

**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru.3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

**DISCHARGE PERMIT BW-4**

**1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).



## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

**3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

**3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

**3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.



## Appendix “B”

- Injection and Production Volumes/Comparison Charts

[illegible]

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

April 17, 2017

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 1st qtr 2017

OrderNo.: 1704039

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 4/3/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1704039**

Date Reported: **4/17/2017**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Buckeye Tatum 1st qtr 2017

**Collection Date:** 3/31/2017 12:00:00 PM

**Lab ID:** 1704039-001

**Matrix:** AQUEOUS

**Received Date:** 4/3/2017 1:08:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9985		0		1	4/5/2017 4:15:00 PM	R41912
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	220	50		mg/L	100	4/4/2017 11:15:28 PM	R41868
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	642	20.0	*	mg/L	1	4/9/2017 7:07:00 PM	31133
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.74		H	pH units	1	4/4/2017 5:27:27 PM	R41894

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit		P	Sample pH Not In Range
R	RPD outside accepted recovery limits		RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1704039**

Date Reported: **4/17/2017**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Buckeye Tatum 1st qtr 2017

**Collection Date:** 3/31/2017 12:10:00 PM

**Lab ID:** 1704039-002

**Matrix:** AQUEOUS

**Received Date:** 4/3/2017 1:08:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.184		0		1	4/5/2017 4:15:00 PM	R41912
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	160000	10000	*	mg/L	2E	4/7/2017 1:35:00 AM	A41955
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	298000	2000	*D	mg/L	1	4/9/2017 7:07:00 PM	31133
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.78		H	pH units	1	4/4/2017 5:31:59 PM	R41894
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	88000	5000		mg/L	1E	4/12/2017 12:07:40 PM	31124

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1704039**

Date Reported: **4/17/2017**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Buckeye Tatum 1st qtr 2017

**Collection Date:** 3/31/2017 1:00:00 PM

**Lab ID:** 1704039-003

**Matrix:** AQUEOUS

**Received Date:** 4/3/2017 1:08:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9980		0		1	4/5/2017 4:15:00 PM	R41912
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	82	5.0		mg/L	10	4/4/2017 11:52:41 PM	R41868
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	782	20.0	*	mg/L	1	4/8/2017 1:38:00 PM	31115
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.99		H	pH units	1	4/4/2017 5:36:00 PM	R41894

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1704039**

Date Reported: **4/17/2017**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Buckeye Tatum 1st qtr 2017

**Collection Date:** 3/31/2017 1:10:00 PM

**Lab ID:** 1704039-004

**Matrix:** AQUEOUS

**Received Date:** 4/3/2017 1:08:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.035		0		1	4/5/2017 4:15:00 PM	R41912
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	31000	1000	*	mg/L	2E	4/7/2017 1:47:25 AM	A41955
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	58000	1000	*D	mg/L	1	4/8/2017 1:38:00 PM	31115
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.42		H	pH units	1	4/4/2017 5:40:08 PM	R41894
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	18000	500		mg/L	500	4/7/2017 4:19:36 PM	31104

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1704039

17-Apr-17

Client: Wasserhund Inc

Project: Buckeye Tatum 1st qtr 2017

Sample ID	MB-31104		SampType:	MBLK		TestCode:	EPA Method 200.7: Metals				
Client ID:	PBW		Batch ID:	31104		RunNo:	41953				
Prep Date:	4/5/2017		Analysis Date:	4/7/2017		SeqNo:	1317572		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	ND	1.0									

Sample ID	LCSLL-31104		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 31104		RunNo: 41953					
Prep Date:	4/5/2017		Analysis Date: 4/7/2017		SeqNo: 1317573		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	80.2	50	150			

Sample ID	LCS-31104		SampType:	LCS		TestCode:	EPA Method 200.7: Metals				
Client ID:	LCSW		Batch ID:	31104		RunNo:	41953				
Prep Date:	4/5/2017		Analysis Date:	4/7/2017		SeqNo:	1317574		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	48	1.0	50.00	0	95.4	85	115				

Sample ID	MB-31124		SampType:	MBLK		TestCode:	EPA Method 200.7: Metals				
Client ID:	PBW		Batch ID:	31124		RunNo:	41999				
Prep Date:	4/6/2017		Analysis Date:	4/7/2017		SeqNo:	1319036		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	ND	1.0									

Sample ID	LCSLL-31124		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 31124		RunNo: 41999					
Prep Date:	4/6/2017		Analysis Date: 4/7/2017		SeqNo: 1319037		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	114	50	150			

Sample ID	LCS-31124		SampType:	LCS		TestCode:	EPA Method 200.7: Metals				
Client ID:	LCSW		Batch ID:	31124		RunNo:	41999				
Prep Date:	4/6/2017		Analysis Date:	4/7/2017		SeqNo:	1319038		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	48	1.0	50.00	0	97.0	85	115				

### Qualifiers:

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ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

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E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1704039

17-Apr-17

Client: Wasserhund Inc

Project: Buckeye Tatum 1st qtr 2017

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R41868</b>	RunNo:	<b>41868</b>					
Prep Date:		Analysis Date:	<b>4/4/2017</b>	SeqNo:	<b>1315703</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R41868</b>	RunNo:	<b>41868</b>					
Prep Date:		Analysis Date:	<b>4/4/2017</b>	SeqNo:	<b>1315704</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	95.4	90	110			

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>A41955</b>	RunNo:	<b>41955</b>					
Prep Date:		Analysis Date:	<b>4/6/2017</b>	SeqNo:	<b>1317699</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>A41955</b>	RunNo:	<b>41955</b>					
Prep Date:		Analysis Date:	<b>4/6/2017</b>	SeqNo:	<b>1317700</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	98.9	90	110			

### Qualifiers:

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H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1704039

17-Apr-17

Client: Wasserhund Inc

Project: Buckeye Tatum 1st qtr 2017

Sample ID	MB-31115		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	31115		RunNo:	41978				
Prep Date:	4/6/2017		Analysis Date:	4/8/2017		SeqNo:	1318207		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-31115		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 31115		RunNo: 41978					
Prep Date:	4/6/2017		Analysis Date: 4/8/2017		SeqNo: 1318208		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1030	20.0	1000	0	103	80	120			

Sample ID	MB-31133	SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW	Batch ID:	31133		RunNo:	41980				
Prep Date:	4/7/2017	Analysis Date:	4/9/2017		SeqNo:	1318255	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-31133		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	31133		RunNo:	41980				
Prep Date:	4/7/2017		Analysis Date:	4/9/2017		SeqNo:	1318256		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1020	20.0	1000	0	102	80	120				

Sample ID	1704039-001AMS		SampType:	MS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	Buckeye-Fresh		Batch ID:	31133		RunNo:	41980				
Prep Date:	4/7/2017		Analysis Date:	4/9/2017		SeqNo:	1318258		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1660	20.0	1000	642.0	102	80	120				

Sample ID	1704039-001AMSD		SampType: MSD		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	Buckeye-Fresh		Batch ID: 31133		RunNo: 41980					
Prep Date:	4/7/2017		Analysis Date: 4/9/2017		SeqNo: 1318259		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1650	20.0	1000	642.0	101	80	120	0.846	5	

### Qualifiers:

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ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: **WASSERHUND INC**

Work Order Number: **1704039**

RcptNo: **1**

Received By: **Anne Thorne** 4/3/2017 1:08:00 PM

Completed By: **Lindsay Mangin** 4/3/2017 2:55:09 PM

Reviewed By: *[Signature]* 04/03/17

*[Signature]*  
*[Signature]*

## Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Client

## Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? ~~Yes~~ ☒ No ☒ SRE
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? ~~Yes~~ ☒ No ☒ SRE
9. Was preservative added to bottles? Yes ☒ ~~No~~ ☒ SRE NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved bottles checked for pH:	<u>2</u>
( <u>2</u> or >12 unless noted)	
Adjusted?	<u>yes</u>
Checked by:	<u>SRE</u>

## Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

17. Additional remarks: For metals analysis: Poured out of -002A + -004A liter containers into unpreserved -002B + -004B 500 mL containers and preserved w/ 1 mL HNO<sub>3</sub>
18. Cooler Information for acceptable pH. 04/03/17 @ 1600 SRE

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.8	Good	Not Present			





Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

August 16, 2017

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 2nd QTR 2017

OrderNo.: 1707799

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 7/17/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1707799

Date Reported: 8/16/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Buckeye Tatum 2nd QTR 2017

**Collection Date:** 7/14/2017 12:00:00 PM

**Lab ID:** 1707799-001

**Matrix:** AQUEOUS

**Received Date:** 7/17/2017 11:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9996		0		1	7/20/2017 10:58:00 AM	R44358
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	190	50		mg/L	100	7/25/2017 4:29:46 PM	R44519
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	602	20.0	*	mg/L	1	7/24/2017 3:50:00 PM	32930
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.66		H	pH units	1	7/19/2017 3:00:06 PM	R44365

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	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1707799

Date Reported: 8/16/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Buckeye Tatum 2nd QTR 2017

**Collection Date:** 7/14/2017 12:05:00 PM

**Lab ID:** 1707799-002

**Matrix:** AQUEOUS

**Received Date:** 7/17/2017 11:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.203		0		1	7/20/2017 10:58:00 AM	R44358
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	190000	5000	*	mg/L	1E	7/25/2017 4:54:35 PM	R44519
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	348000	2000	*D	mg/L	1	7/24/2017 3:50:00 PM	32930
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.80		H	pH units	1	7/19/2017 3:04:39 PM	R44365
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>ELS</b>
Sodium	93000	2000		mg/L	2E	7/28/2017 2:36:20 PM	A44595

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 2 of 8
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# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1707799

Date Reported: 8/16/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Buckeye Tatum 2nd QTR 2017

**Collection Date:** 7/14/2017 12:55:00 PM

**Lab ID:** 1707799-003

**Matrix:** AQUEOUS

**Received Date:** 7/17/2017 11:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9946		0		1	7/20/2017 10:58:00 AM	R44358
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	80	5.0		mg/L	10	7/25/2017 5:07:00 PM	R44519
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	667	20.0	*	mg/L	1	7/24/2017 3:50:00 PM	32930
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.03		H	pH units	1	7/19/2017 3:09:12 PM	R44365

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
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# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1707799

Date Reported: 8/16/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Buckeye Tatum 2nd QTR 2017

**Collection Date:** 7/14/2017 1:05:00 PM

**Lab ID:** 1707799-004

**Matrix:** AQUEOUS

**Received Date:** 7/17/2017 11:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9968		0		1	7/20/2017 10:58:00 AM	R44358
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>SRM</b>
Chloride	230	50		mg/L	100	7/28/2017 2:34:01 AM	R44577
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	974	40.0	*D	mg/L	1	7/24/2017 3:50:00 PM	32930
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.05		H	pH units	1	7/19/2017 3:13:45 PM	R44365
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>TES</b>
Sodium	140	10		mg/L	10	7/21/2017 3:05:37 PM	32913

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1707799

16-Aug-17

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2017

Sample ID	MB-32913		SampType:	MBLK		TestCode:	EPA Method 200.7: Metals				
Client ID:	PBW		Batch ID:	32913		RunNo:	44403				
Prep Date:	7/20/2017		Analysis Date:	7/21/2017		SeqNo:	1403570		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	ND	1.0									

Sample ID	LLLCS-32913		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 32913		RunNo: 44403					
Prep Date:	7/20/2017		Analysis Date: 7/21/2017		SeqNo: 1403571		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	138	50	150			

Sample ID	LCS-32913		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: 32913		RunNo: 44403					
Prep Date:	7/20/2017		Analysis Date: 7/21/2017		SeqNo: 1403572		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	50	1.0	50.00	0	99.0	85	115			

Sample ID	MB-A		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: A44595		RunNo: 44595					
Prep Date:			Analysis Date: 7/28/2017		SeqNo: 1409757		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LCSLL-A		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: A44595		RunNo: 44595					
Prep Date:			Analysis Date: 7/28/2017		SeqNo: 1409759		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	100	50	150			

Sample ID	LCS-A		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: A44595		RunNo: 44595					
Prep Date:			Analysis Date: 7/28/2017		SeqNo: 1409761		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	48	1.0	50.00	0	95.0	85	115			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1707799

16-Aug-17

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2017

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R44519	RunNo:	44519					
Prep Date:		Analysis Date:	7/25/2017	SeqNo:	1407705	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R44519	RunNo:	44519					
Prep Date:		Analysis Date:	7/25/2017	SeqNo:	1407706	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	93.9	90	110			

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R44577	RunNo:	44577					
Prep Date:		Analysis Date:	7/27/2017	SeqNo:	1409416	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R44577	RunNo:	44577					
Prep Date:		Analysis Date:	7/27/2017	SeqNo:	1409417	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.3	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1707799

16-Aug-17

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2017

Sample ID	1707799-001ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	Buckeye-Fresh	Batch ID:	R44358	RunNo:	44358					
Prep Date:		Analysis Date:	7/20/2017	SeqNo:	1401629	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9992	0						0.0400	20	

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1707799

16-Aug-17

Client: Wasserhund Inc

Project: Buckeye Tatum 2nd QTR 2017

Sample ID	MB-32930		SampType: MBLK		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	PBW		Batch ID: 32930		RunNo: 44444					
Prep Date:	7/20/2017		Analysis Date: 7/24/2017		SeqNo: 1404905		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-32930		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 32930		RunNo: 44444					
Prep Date:	7/20/2017		Analysis Date: 7/24/2017		SeqNo: 1404906		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1030	20.0	1000	0	103	80	120			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1707799

ReplNo: 1

Received By: Anne Thorne

7/17/2017 11:20:00 AM

Completed By: Ashley Gallegos

7/17/2017 12:10:42 PM

Reviewed By: ENM

7/17/17

## Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Client

## Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $\geq 0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☒
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☒
9. Was preservative added to bottles? Yes ☒ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved bottles checked for pH: 2  
( $<2$  or  $>12$  unless noted)  
Adjusted? YES  
Checked by: Re

## Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
By Whom: \_\_\_\_\_ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person  
Regarding: \_\_\_\_\_  
Client Instructions: \_\_\_\_\_

17. Additional remarks: 250 mL was poured off from -002A and -004A; 0.5 mL HNO<sub>3</sub> was added to both samples and they were held 24 hrs prior to metals analysis. 7/17/17

## 18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.1	Good	Not Present			







Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

October 30, 2017

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 3rd QTR 2017

OrderNo.: 1710852

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 10/16/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1710852

Date Reported: 10/30/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Buckeye Tatum 3rd QTR 2017

**Collection Date:** 10/10/2017 2:00:00 PM

**Lab ID:** 1710852-001

**Matrix:** AQUEOUS

**Received Date:** 10/16/2017 11:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9990		0		1	10/23/2017 2:37:00 PM	R46595
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	190	5.0		mg/L	10	10/16/2017 8:27:07 PM	R46405
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	586	20.0	*	mg/L	1	10/17/2017 3:18:00 PM	34424
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.90		H	pH units	1	10/18/2017 1:21:39 PM	R46502

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 1 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1710852

Date Reported: 10/30/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Buckeye Tatum 3rd QTR 2017

**Collection Date:** 10/10/2017 2:05:00 PM

**Lab ID:** 1710852-002

**Matrix:** AQUEOUS

**Received Date:** 10/16/2017 11:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.203		0		1	10/23/2017 2:37:00 PM	R46595
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	160000	10000	*	mg/L	2E	10/23/2017 11:15:54 PM	R46599
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	321000	2000	*D	mg/L	1	10/17/2017 3:18:00 PM	34424
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.72		H	pH units	1	10/18/2017 1:26:02 PM	R46502
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>TES</b>
Sodium	77000	2000		mg/L	2E	10/20/2017 4:11:09 PM	34473

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 2 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1710852

Date Reported: 10/30/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Buckeye Tatum 3rd QTR 2017

**Collection Date:** 10/10/2017 3:50:00 PM

**Lab ID:** 1710852-003

**Matrix:** AQUEOUS

**Received Date:** 10/16/2017 11:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9982		0		1	10/23/2017 2:37:00 PM	R46595
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	77	5.0		mg/L	10	10/16/2017 9:16:48 PM	R46405
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	663	20.0	*	mg/L	1	10/17/2017 3:18:00 PM	34424
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.00		H	pH units	1	10/18/2017 1:30:23 PM	R46502

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1710852

Date Reported: 10/30/2017

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Buckeye Tatum 3rd QTR 2017

**Collection Date:** 10/10/2017 3:55:00 PM

**Lab ID:** 1710852-004

**Matrix:** AQUEOUS

**Received Date:** 10/16/2017 11:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.041		0		1	10/23/2017 2:37:00 PM	R46595
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	28000	2500	*	mg/L	5E	10/23/2017 11:28:18 PM	R46599
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	57200	2000	*D	mg/L	1	10/17/2017 3:18:00 PM	34424
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.49		H	pH units	1	10/18/2017 1:34:41 PM	R46502
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>TES</b>
Sodium	19000	500		mg/L	500	10/20/2017 4:12:57 PM	34473

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1710852

30-Oct-17

Client: Wasserhund Inc

Project: Buckeye Tatum 3rd QTR 2017

Sample ID	MB-34473		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: 34473		RunNo: 46509					
Prep Date:	10/18/2017		Analysis Date: 10/19/2017		SeqNo: 1481256		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-34473		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 34473		RunNo: 46509					
Prep Date:	10/18/2017		Analysis Date: 10/19/2017		SeqNo: 1481257		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	103	50	150			

Sample ID	LCS-34473		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: 34473		RunNo: 46509					
Prep Date:	10/18/2017		Analysis Date: 10/19/2017		SeqNo: 1481258		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	50	1.0	50.00	0	99.2	85	115			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1710852

30-Oct-17

Client: Wasserhund Inc

Project: Buckeye Tatum 3rd QTR 2017

Sample ID	MB	SampType: mblk			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: R46405			RunNo: 46405						
Prep Date:		Analysis Date: 10/16/2017			SeqNo: 1478479		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								

Sample ID	LCS	SampType: lcs			TestCode: EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID: R46405			RunNo: 46405						
Prep Date:		Analysis Date: 10/16/2017			SeqNo: 1478480		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		4.8	0.50	5.000	0	95.1	90	110			

Sample ID	MB	SampType: mblk			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: R46599			RunNo: 46599						
Prep Date:		Analysis Date: 10/23/2017			SeqNo: 1484119		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID:	R46599	RunNo:	46599						
Prep Date:		Analysis Date:	10/23/2017	SeqNo:	1484120	Units:	mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		4.6	0.50	5.000	0	92.5	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1710852

30-Oct-17

Client: Wasserhund Inc

Project: Buckeye Tatum 3rd QTR 2017

Sample ID	1710852-001ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	Buckeye-Fresh	Batch ID:	R46595	RunNo:	46595					
Prep Date:		Analysis Date:	10/23/2017	SeqNo:	1484020	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9986	0						0.0400	20	

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1710852

30-Oct-17

Client: Wasserhund Inc

Project: Buckeye Tatum 3rd QTR 2017

Sample ID	MB-34424		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	34424		RunNo:	46412				
Prep Date:	10/16/2017		Analysis Date:	10/17/2017		SeqNo:	1478678		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-34424		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	34424		RunNo:	46412				
Prep Date:	10/16/2017		Analysis Date:	10/17/2017		SeqNo:	1478679		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1010	20.0	1000	0	101	80	120				

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: www.hallenvironmental.com

## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1710852

RcptNo: 1

Received By: Sophia Campuzano 10/16/2017 11:25:00 AM

*Sophia Campuzano*

Completed By: Sophia Campuzano 10/16/2017 11:30:47 AM

*Sophia Campuzano*

Reviewed By: *[Signature]* 10/16/17

### Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Client

### Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved bottles checked for pH: 2  
( $\leq 2$  or  $>12$  unless noted)  
Adjusted? yes  
Checked by: DD5

### Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
By Whom: \_\_\_\_\_ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person  
Regarding: \_\_\_\_\_  
Client Instructions: \_\_\_\_\_

17. Additional remarks: Paired off from -002A to -002B and added 0.4 mL  $\text{HNO}_3$   
Paired off from -004A to -004B and added 0.4 mL  $\text{HNO}_3$

### 18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.9	Good	Not Present			

Chain-of-Custody Record			
Client: Wasserhund Inc		Turn-Around Time: <input checked="" type="checkbox"/> Standard <input type="checkbox"/> Rush	
Bill to Wasserhund		Project Name: Buckeye-Tatum 3rd QTR-2017	
Mailing Address: PO Box 2140		Project #: 3-2017	
Phone #: 505-715-2809		Project Manager: Wayne Price-Price LLC	
email or Fax#: wayneprice77@earthlink.net		Sampler: Wayne Price, Sr	
<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Level 4 (Full Validation)		On Ice: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Accreditation: <input type="checkbox"/> NELAP <input type="checkbox"/> Other		Sample Temperature: 2.9	
<input type="checkbox"/> EDD (Type)		HEAL No. 1710852	
Date	Time	Matrix	Sample Request ID
10-10-17	2 AM	Liq	Buckeye-Fresh
"	2:05 PM	"	Buckeye-Brine
"	3:50 PM	"	Tatum-Fresh
"	3:55 PM	"	Tatum-Brine
Date: 10/16/17	Time: 11:25 AM	Relinquished by: WAYNE PRICE-SR	
Date: 10/16/17	Time: 11:25 AM	Relinquished by: Wayne Price	
Date: 10/16/17	Time: 11:25 AM	Relinquished by: Wayne Price	

www.hallenvironmental.com  
4901 Hawkins NE - Albuquerque, NM 87109  
Tel. 505-345-3975 Fax 505-345-4107

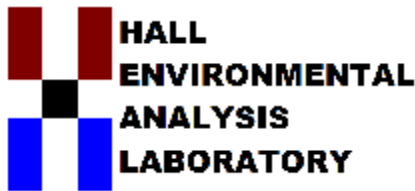
## Analysis Request

[illegible]

Remarks:

Ice in field and Refrig during time until  
del to Lab

if necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

March 13, 2018

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Buckeye Tatum 4th Qtr 2017

OrderNo.: 1802994

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 2/19/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 12:40:00 PM

**Lab ID:** 1802994-001

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9964		0		1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	180	50		mg/L	100	2/27/2018 7:38:46 PM	R49418
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	590	20.0	*	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.79		H	pH units	1	2/22/2018 1:24:54 PM	R49344

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 12:45:00 PM

**Lab ID:** 1802994-002

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.174		0		1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>CJS</b>
Chloride	170000	10000	*	mg/L	2E	3/8/2018 2:08:28 AM	A49635
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	260000	2000	*D	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.92		H	pH units	1	2/22/2018 1:29:21 PM	R49344
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	80000	2000		mg/L	2E	3/5/2018 3:14:06 PM	36678

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 2:35:00 PM

**Lab ID:** 1802994-003

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	0.9961		0		1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	78	5.0		mg/L	10	2/27/2018 8:16:01 PM	R49418
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	653	20.0	*	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	7.95		H	pH units	1	2/22/2018 1:33:36 PM	R49344

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1802994**

Date Reported: **3/13/2018**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Buckeye Tatum 4th Qtr 2017

**Collection Date:** 2/12/2018 2:45:00 PM

**Lab ID:** 1802994-004

**Matrix:** AQUEOUS

**Received Date:** 2/19/2018 10:55:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>JRR</b>
Specific Gravity	1.039		0		1	2/20/2018 12:44:00 PM	R49250
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	30000	1000	*	mg/L	2E	3/4/2018 2:52:53 PM	R49545
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	62800	2000	*D	mg/L	1	2/20/2018 5:42:00 PM	36606
<b>SM4500-H+B / 9040C: PH</b>							Analyst: <b>JRR</b>
pH	6.76		H	pH units	1	2/22/2018 1:37:41 PM	R49344
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>pmf</b>
Sodium	20000	500		mg/L	500	2/27/2018 7:52:12 PM	36678

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

Client: Wasserhund Inc

Project: Buckeye Tatum 4th Qtr 2017

Sample ID	MB-36678		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: 36678		RunNo: 49369					
Prep Date:	2/22/2018		Analysis Date: 2/23/2018		SeqNo: 1593856		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LLLCS-36678		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: 36678		RunNo: 49369					
Prep Date:	2/22/2018		Analysis Date: 2/23/2018		SeqNo: 1593862		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	104	50	150			

Sample ID	LCS-36678		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: 36678		RunNo: 49369					
Prep Date:	2/22/2018		Analysis Date: 2/23/2018		SeqNo: 1593863		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	48	1.0	50.00	0	96.2	85	115			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

Client: Wasserhund Inc

Project: Buckeye Tatum 4th Qtr 2017

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R49418</b>	RunNo:	<b>49418</b>					
Prep Date:		Analysis Date:	<b>2/27/2018</b>	SeqNo:	<b>1596952</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R49418</b>	RunNo:	<b>49418</b>					
Prep Date:		Analysis Date:	<b>2/27/2018</b>	SeqNo:	<b>1596953</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	98.2	90	110			

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R49545</b>	RunNo:	<b>49545</b>					
Prep Date:		Analysis Date:	<b>3/4/2018</b>	SeqNo:	<b>1601219</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R49545</b>	RunNo:	<b>49545</b>					
Prep Date:		Analysis Date:	<b>3/4/2018</b>	SeqNo:	<b>1601220</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.3	90	110			

Sample ID	<b>MB</b>	SampType:	<b>mblk</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>A49635</b>	RunNo:	<b>49635</b>					
Prep Date:		Analysis Date:	<b>3/7/2018</b>	SeqNo:	<b>1604753</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>lcs</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>A49635</b>	RunNo:	<b>49635</b>					
Prep Date:		Analysis Date:	<b>3/7/2018</b>	SeqNo:	<b>1604755</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	96.7	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quantitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1802994

13-Mar-18

Client: Wasserhund Inc

Project: Buckeye Tatum 4th Qtr 2017

Sample ID	MB-36606		SampType: MBLK		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	PBW		Batch ID: 36606		RunNo: 49262					
Prep Date:	2/19/2018		Analysis Date: 2/20/2018		SeqNo: 1589272		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-36606		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 36606		RunNo: 49262					
Prep Date:	2/19/2018		Analysis Date: 2/20/2018		SeqNo: 1589273		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1000	20.0	1000	0	100	80	120			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
PQL Practical Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: www.hallenvironmental.com

## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1802994

RcptNo: 1

Received By: Erin Melendrez 2/19/2018 10:55:00 AM

Completed By: Erin Melendrez 2/19/2018 11:39:52 AM

Reviewed By: *see 02/19/18*

*UAG*

*UAG*

*MW 2/19/18*  
Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐  
2. How was the sample delivered? Client

### Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐  
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☒ No ☐ NA ☐  
5. Sample(s) in proper container(s)? Yes ☒ No ☐  
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐  
7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☒  
8. Was preservative added to bottles? Yes ☒ No ☒ NA ☐  
9. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒  
10. Were any sample containers received broken? Yes ☐ No ☒  
11. Does paperwork match bottle labels? Yes ☒ No ☐  
(Note discrepancies on chain of custody)  
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐  
13. Is it clear what analyses were requested? Yes ☒ No ☐  
14. Were all holding times able to be met? Yes ☒ No ☐  
(If no, notify customer for authorization.)

# of preserved bottles checked for pH: *2*  
(*<2 or >12 unless noted*)  
Adjusted? *yes*  
Checked by: *UAG*

### Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
By Whom: \_\_\_\_\_ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person  
Regarding: \_\_\_\_\_  
Client Instructions: \_\_\_\_\_

16. Additional remarks: *for metals analysis: added  $HNO_3$  to 002B and 004B held for 24 hrs prior to analysis* *@1520 on 2/19/18*

### 17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.1	Good	Not Present			

THE UNIVERSITY OF CHICAGO

Client:	Wasserhund Inc	<input checked="" type="checkbox"/> Standard	<input type="checkbox"/> Rush
Bill to Wasserhund		Project Name	
Mailing Address:	PO Box 2140	Buckeye-Tatum 4 <sup>th</sup> QTR-2017	
Phone #:	505-715-2809	Project #	
email or Fax#:	wayneprice77@earthlink.net	4 -2017	
QA/QC Package		Project Manager:	
<input checked="" type="checkbox"/> Standard	<input type="checkbox"/> Level 4 (Full Validation)	Wayne Price-Price LLC	
Accreditation:		Sampler: Wayne Price: Sr	
<input type="checkbox"/> NELAP	<input type="checkbox"/> Other	On Ice: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> EDD (Type)		Sample Temperature: 3.	

[illegible]

bTEX + MTBE + TMB's (8021)	bTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	ED8 (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO <sub>3</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	IDS, SG, Chlorides, PH	IDS, SG, Chlorides, PH, Na	Air Bubbles (Y or N)
----------------------------	------------------------------	-------------------------------	--------------------	--------------------	-------------------	---------------	--	------------------------------	-------------	-----------------	------------------------	----------------------------	----------------------

Remarks:

Ice in field and Refrig during time until  
del to Lab

\*per wayne

## Appendix “D”

- C-103
- 2016 MIT Chart
- Recorder Calibration
- Brine Well Maximum Test Pressure Calculator

Submit 1 Copy To Appropriate District Office  
District I - (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II - (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III - (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV - (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
Revised July 18, 2013

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

WELL API NO. 30-025-26883
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 25-26883
7. Lease Name or Unit Agreement Name Eidson Brine Station, BW-004
8. Well Number 1
9. OGRID Number 130851
10. Pool name or Wildcat

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other Brine Well	
2. Name of Operator Wasserhund, Inc.	
3. Address of Operator P.O. Box 2140, Lovington, NM 88260	
4. Well Location Unit Letter M : 567.4 feet from the South line and 161.7 feet from the West line Section 31 Township 16S Range 35E NMPM County Lea	
11. Elevation (Show whether DR, RKB, RT, GR, etc.)	

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
DOWNHOLE COMMINGLE <input type="checkbox"/>			
CLOSED-LOOP SYSTEM <input type="checkbox"/>			
OTHER: Integrity Test <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

See Attached Chart

2015 DEC -2 A 3:21  
RECEIVED

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

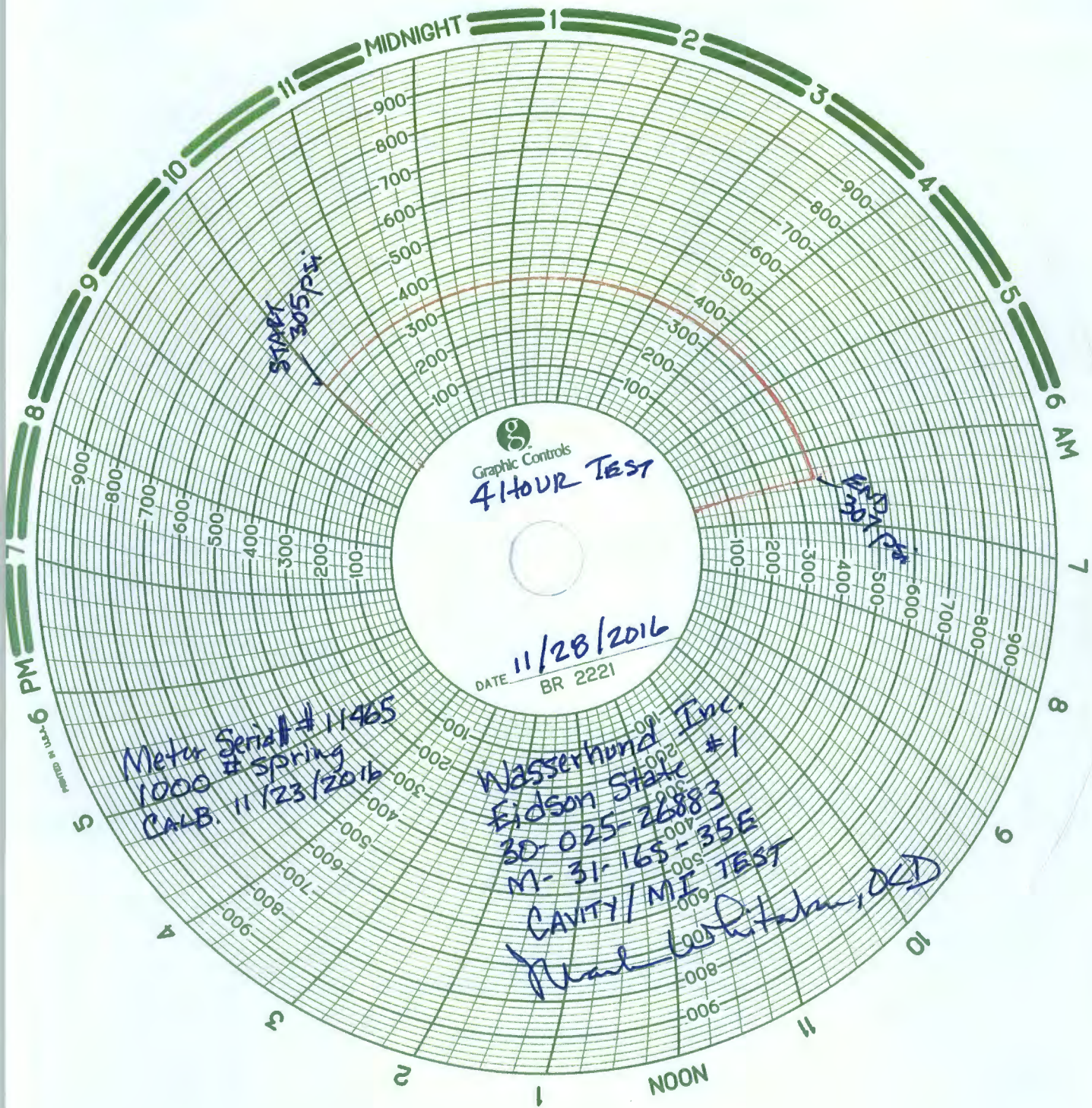
SIGNATURE Jon Gandy TITLE Secretary/Treasurer DATE 11/29/16

Type or print name Jon Gandy E-mail address: jonrgandy@aol.com PHONE: 575-396-0522

**For State Use Only**

APPROVED BY: Carl J. Cherry TITLE \_\_\_\_\_ DATE 12/6/16  
Conditions of Approval (if any): \_\_\_\_\_





Graphic Controls  
4 HOUR TEST

DATE 11/28/2016  
BR 2221

Meter Serial # 11465  
1000 # Spring  
CALB 11/23/2016

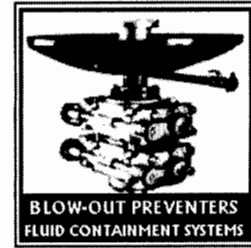
Wasservand Inc.  
Edson State #1  
30-025-26883  
M-31-165-35E  
CAVITY/MI TEST

Paul W. [Signature]



## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260  
P.O. Box 1621  
Office: (575) 396-3715  
Fax: (575) 396-5812



**Date:** Wednesday, November 23, 2016

**Invoice #** \_\_\_\_\_

### **Certification of Pressure Recorder Test:**

**Company:** Gandy  
**Unit:** Gandy #4  
**Model:** 8" PMC  
**Pressure Rating:** 1,000#  
**Serial #:** 11218

***This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.***

  
\_\_\_\_\_  
Issac Luna, Technician

# Brine Well Maximum Test Pressure Calculator

Provides an approximate estimate for Maximum Test pressures allowed to prevent possible fracturing of formation.

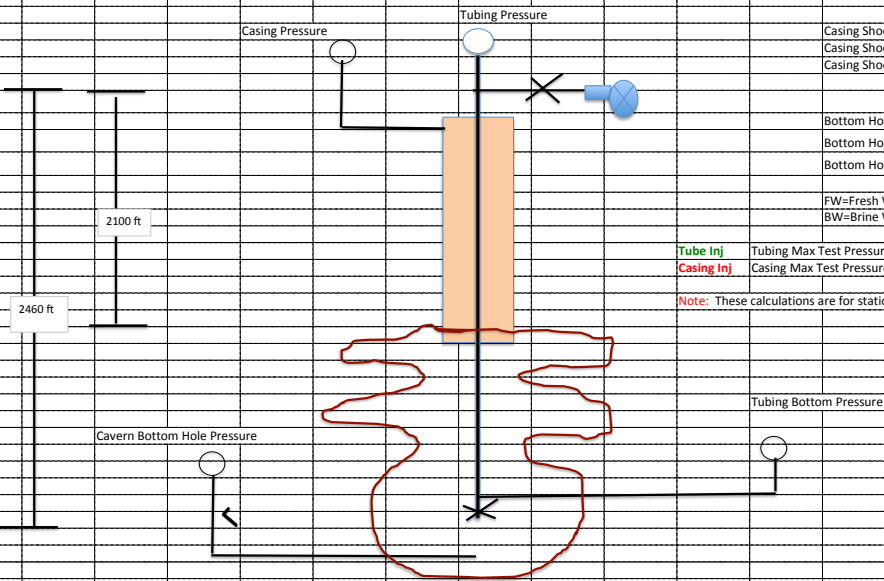
Inputs are for casing shoe depth, bottom hole depth, and frac gradient.

Answers are given when pressure testing using Fresh water or Brine water.

Major assumptions: Frac Gradient of .65 is used, casing is filled with brine or fresh water

**Note: When brine well has been operating in normal flow, then assume that casing is filled with Brine Water.**

BW-04 Wasserhund Buckeye



Input Depth to Casing Shoe 2100 ft  
Input Depth to Bottom Hole 2460 ft  
Input Frac/Gradient 0.65 psi/ft

Inputs are in Green

		Depth ft	Gradient-psi/ft	psig
Casing Shoe	FW	2100	0.433	909
Casing Shoe	BW	2100	0.5	1050
Casing Shoe	Frac	2100	0.65	1365
Bottom Hole	FW	2460	0.433	1065
Bottom Hole	BW	2460	0.5	1230
Bottom Hole	Frac	2460	0.65	1599

FW=Fresh Water  
BW=Brine Water

Answers in Yellow

Tube Inj Tubing Max Test Pressure Max Surface Pressure = Depth to Bottom \* (Frac Gradient -Water Head Gradient)  
Casing Inj Casing Max Test Pressure Max Surface Pressure = Depth to Casing Shoe \* (Frac Gradient -Water Head Gradient)

	Using BW	Using FW
Tube Inj	369 psig	534 psig
Casing Inj	315 psig	456 psig

**Note:** These calculations are for static test only and does not take into account dynamic pressure drops in Tubing or Casing.

**Do Not Exceed Tubing or Casing Surface Pressures while Pumping or Testing**

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

## 2017 BW-04 AOR Review- Well Status List

up-dated April 01., 2018

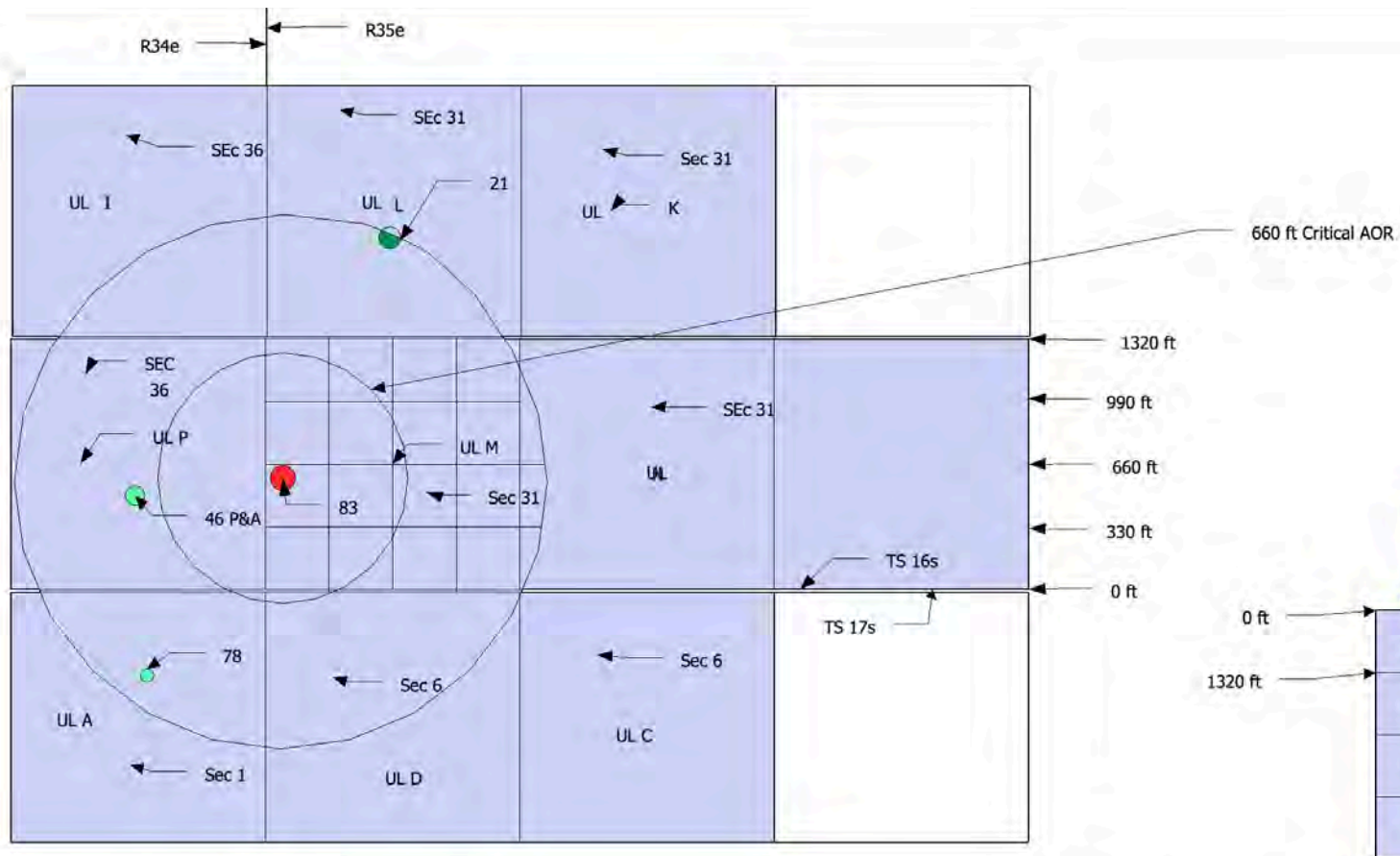
	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program	Cased/Cemented	Corrective Action
									Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved No Action Required
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	

2 2

3 Total # of wells in adjacent quarter-sections  
 3 Total # of wells in 1/4 mile AOR  
 3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

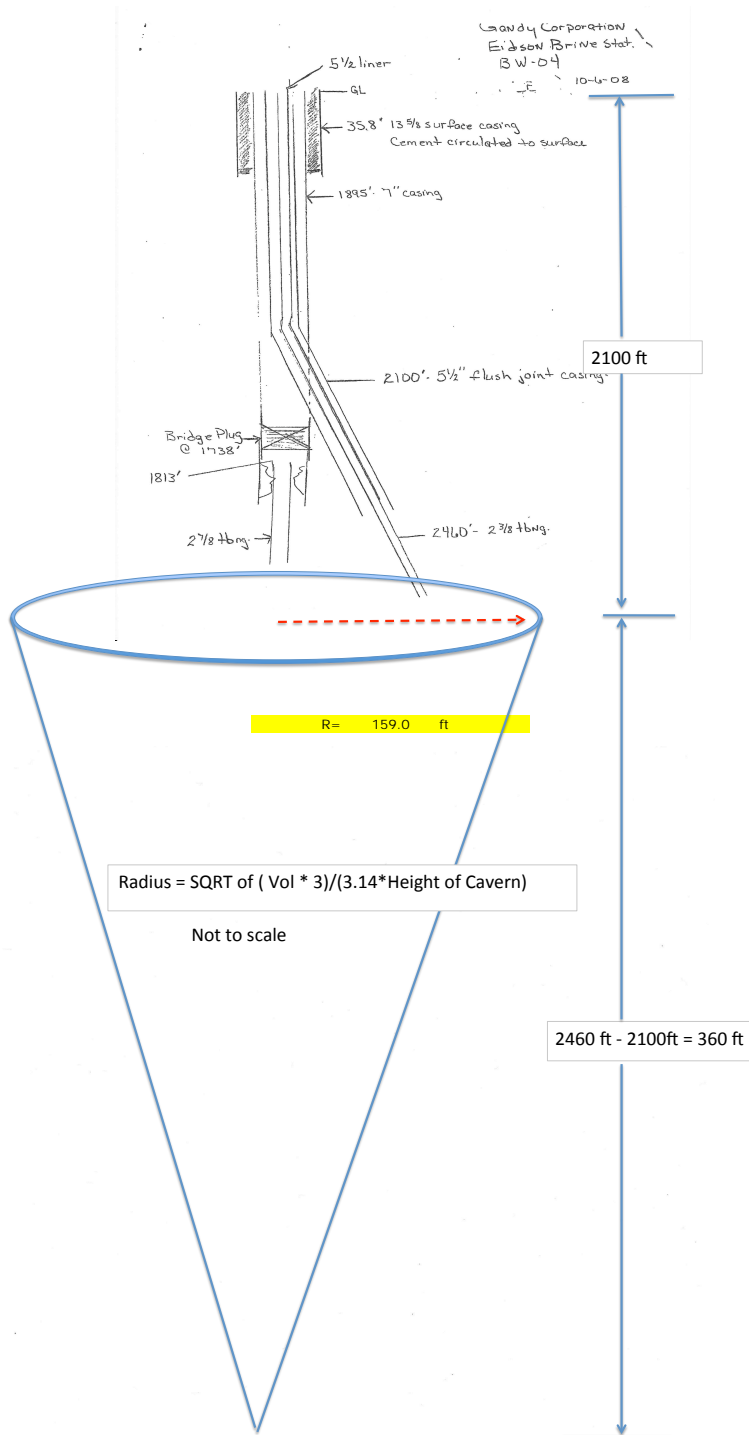
\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.



Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: <b>2017</b>	Location: UL M-Sec 31-Ts16s-R35e	

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2017 Radius and D/H calculations.
- \*\* Cavern Characterization using New OCD Example applied to BW-04**
  - \* OCD Email**
  - \* Example of OCD Well Log + Cavern Layout**
  - \* BW-04 Cavern Superimposed on Nearby well log**
  - \* BW-04 Well Bore Schematic**
  - \* Mass Balance**



### 2017 Calculations

$$r = \sqrt[3]{\frac{V}{\pi \cdot D}}$$

V	Volume	=	9,528,093 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft3 salt/bbl	159.0	1 est

$$r = \sqrt[3]{\frac{159.0}{\pi \cdot 2100}}$$

$$D/H = \frac{360}{2100} = 0.151$$

From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>  
Subject: RE: Key Eunice BW-28 Compliance letter response.  
Date: April 6, 2018 at 10:59:51 AM MDT  
To: Wayne Price <wayneprice@q.com>

Wayne:

**E-mail for documentation by Price  
LLC April 7, 2018- Per C. Chavex-  
OCD can apply to Wasserhund wells  
BW-04 & BW-22 also.**

Good morning. Please see attachment.

Thank you.

-----Original Message-----

From: Wayne Price <wayneprice@q.com>  
Sent: Thursday, April 5, 2018 7:40 PM  
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>  
Cc: Wayne Price <wayneprice@q.com>  
Subject: Re: Key Eunice BW-28 Compliance letter response.

Hi Carl,

What type of well Log?

On Apr 3, 2018, at 1:43 PM, Chavez, Carl J, EMNRD  
<CarlJ.Chavez@state.nm.us> wrote:

Mr. Price, et al.:

Good afternoon. The New Mexico Oil Conservation Division (OCD) is  
in receipt of the Key Energy Services letter (letter) dated March 30,  
2018.

The letter was recently added to the above subject well administrative  
record.

OCD will consider the letter for the upcoming discharge permit  
renewal.

Regarding the workgroup for the cavern characterization, etc., OCD



is accepting the "cone" calculation with additional well log characterization supporting the calculation. Upon request, OCD can send you an example. Therefore, OCD does not believe a "study group" is necessary at this time; however, it will remain an option as OCD reviews the submittals, receives any new proposals, and seeks out any new scientific information on the subject.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)  
New Mexico Oil Conservation Division  
Energy Minerals and Natural Resources Department  
1220 South St Francis Drive  
Santa Fe, New Mexico 87505  
Ph. (505) 476-3490  
E-mail: CarlJ.Chavez@state.nm.us

"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see "Publications")

-----Original Message-----

From: Wayne Price <wayneprice@q.com>  
Sent: Monday, April 2, 2018 12:26 PM  
To: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>  
Cc: Wayne Price <wayneprice@q.com>; Rick Graham <rgraham01@keyenergy.com>  
Subject: Key Eunice BW-28 Compliance letter response.

Dear Mr. Griswold and Mr. Chavez:

Please find attached a response letter to your February 16, 2018 letter requesting record information and a response by May 04, 2018. Price LLC, a consultant for Key Energy has already supplied the Annual Reports for the 2011-2016 years .

Please note this response has some Minor Modification requests.

Please note, you can evaluate them now, or you can wait until we submit the renewal permit application which is due 120 days before expiration of November 08, 2018 of this year.

Please file in the Key OCD BW-28 file. Please let us know if you received this correspondence.

Wayne Price-Price LLC  
312 Encantado Ridge CT NE  
Rio Rancho, NM 87124  
wayneprice@q.com  
505-715-2809

# EXAMPLE SALT CAVERN CHARACTERIZATION

John Doe Well No6

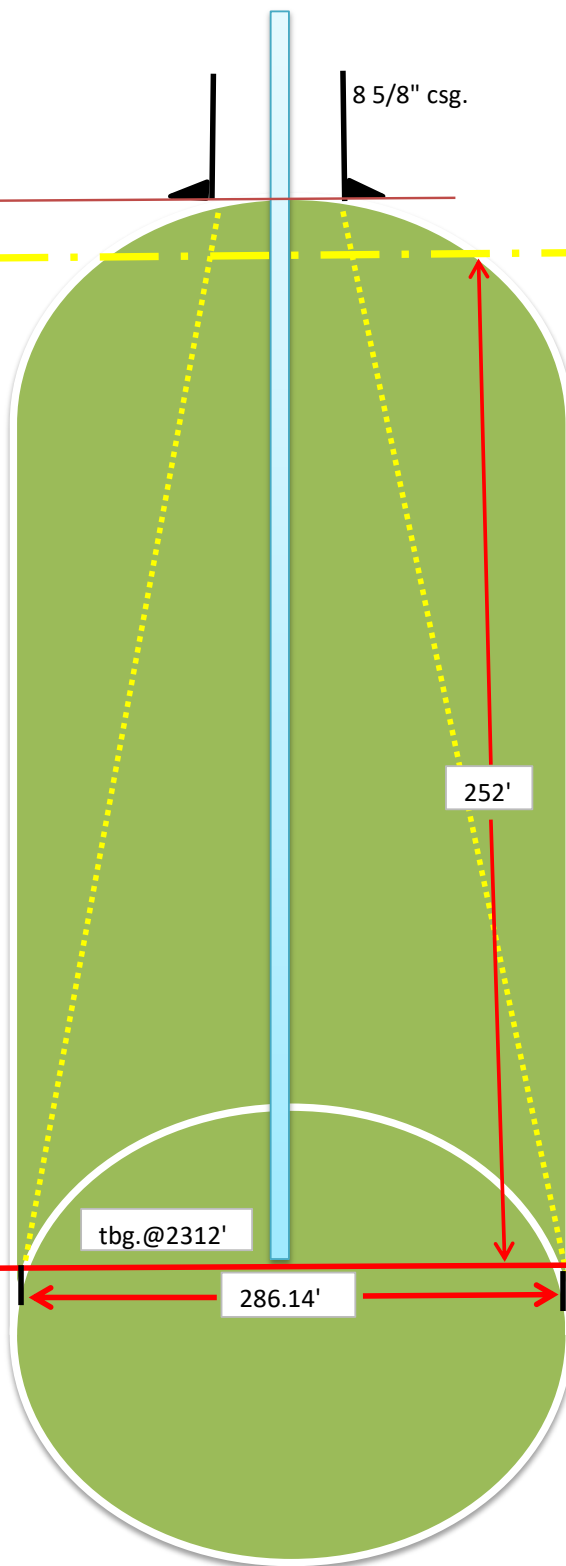
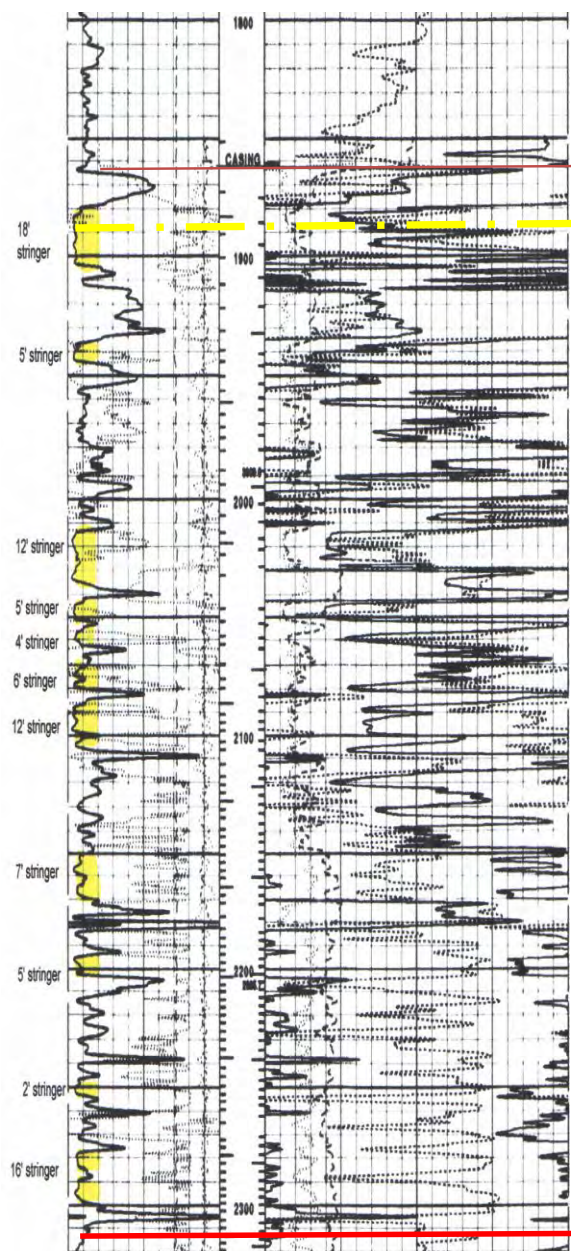
API 30-015-#####

SEC36 T18S R38E

LAT: 32.##### LONG:-103.#####

2 7/8" J-55 6.5# IPC

8 5/8" csg.



PPG 9.97 brine

PPG 8.34 fresh

SG 1.1951

2006 to 2017 Total Brine bbl. 3,538,154

122.136 LBS / BBL = 432,135,977 LBS HALITE

(432,135,977 LBS) / (80BLS per ft<sup>3</sup>) = 5,401,700 ft<sup>3</sup>

$$V = \pi R^2 h / 3$$

$$V = (3.14159 * 143.07^2) * (252') / 3$$

$$V = 5,401,648.6 \text{ ft}^3$$

Est. height is 252'

Est. cavern floor diameter is 286.14'

mberger

# SIDEWALL NEUTRON POROSITY LOG

460FS 880FE

P-38-T16S-R34E

SAGE ENERGY CO

NORTH VACUUM ABO NORTH UNIT #1



30-025-25146

COMPANY K. K. AMINI

WELL EXXON A STATE #1

FIELD BUCKEYE

COUNTY LEA STATE NEW MEXICO

Location API Serial No. 460<sup>1</sup> FSL & 660<sup>1</sup> FEL  
Sec. 36 Twp. 16-S Rge. 34-E

Other Services:

NONE

Permanent Datum: G.L.; Elev.: 4036  
Log Measured From K.B. 12 Ft. Above Perm. Datum  
Drilling Measured From K.B.

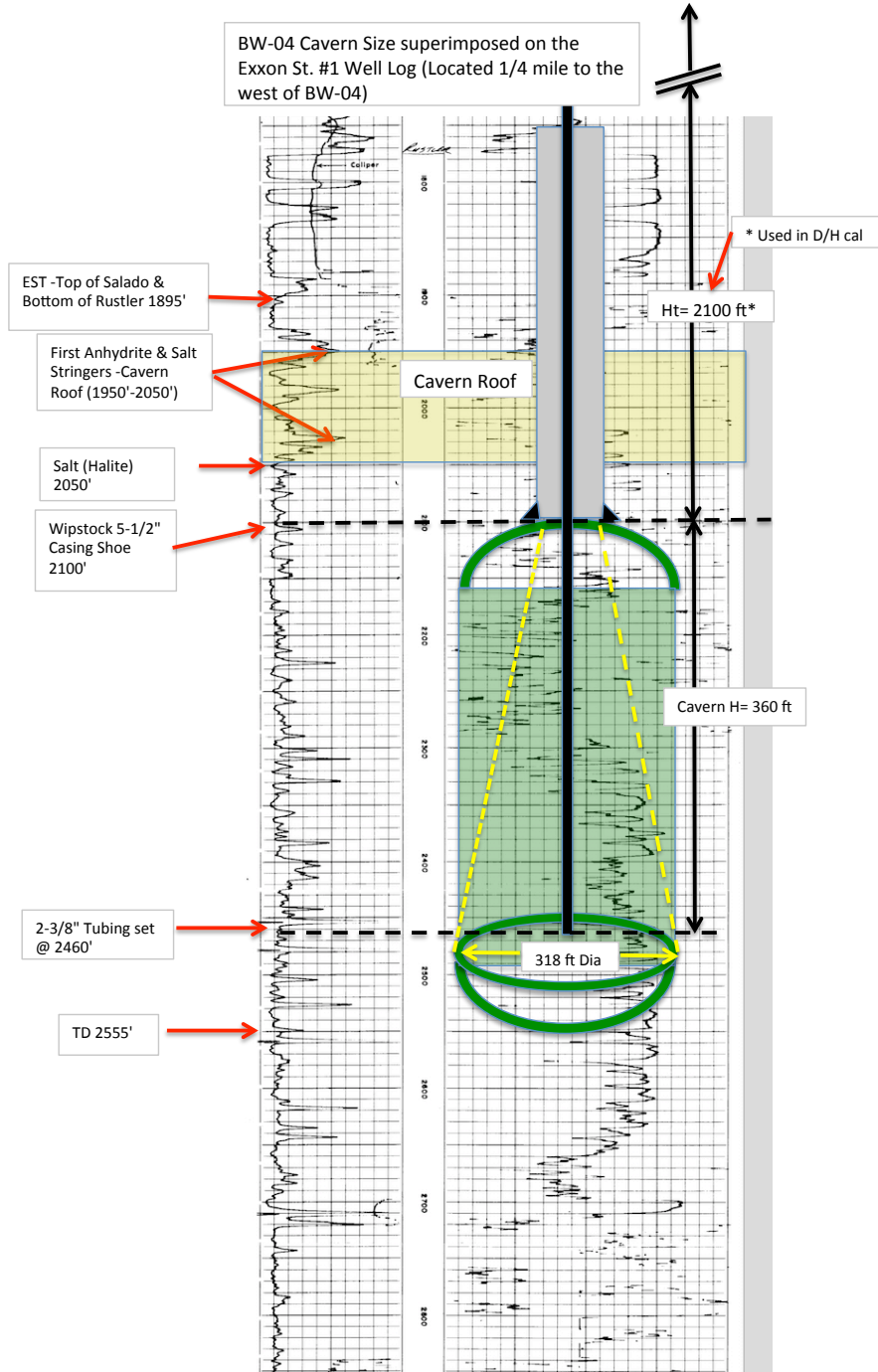
Elev.: K.B. 4048  
D.F. 4036  
G.L. 4036

Date	11-12-75				
Run No.	ONE				
Depth-Driller	8980				
Depth-Logger	8984				
Btm. Log Interval	8983				
Top Log Interval	SURFACE				
Casing-Driller	8 5/8 @ 1680	@	@	@	@
Casing-Logger	1678				
Bit Size	7 7/8				
Type Fluid in Hole	SALT GEL-STARCH				
Dens.	10	40			
pH	6	45.8ml	ml	ml	ml
Source of Sample	CIRCULATED				
R <sub>m</sub> @ Meas. Temp.	.065 @ 62 °F	@ °F	@ °F	@ °F	@ °F
R <sub>mf</sub> @ Meas. Temp.	.049 @ 62 °F	@ °F	@ °F	@ °F	@ °F
R <sub>mc</sub> @ Meas. Temp.	.096 @ 62 °F	@ °F	@ °F	@ °F	@ °F
Source: R <sub>mf</sub> R <sub>mc</sub>	M C				
R <sub>m</sub> @ BHT	.034 @ 128 °F	@ °F	@ °F	@ °F	@ °F
TIME Circulation Stopped	0615				
TIME Logger on Bottom	1100				
Max. Rec. Temp.	128 °F	°F	°F	°F	°F
Equip. Location	7645 HOBBS				
Recorded By	KITTS				
Witnessed By	AMINI				

The well name, location and borehole reference data were furnished by the customer.

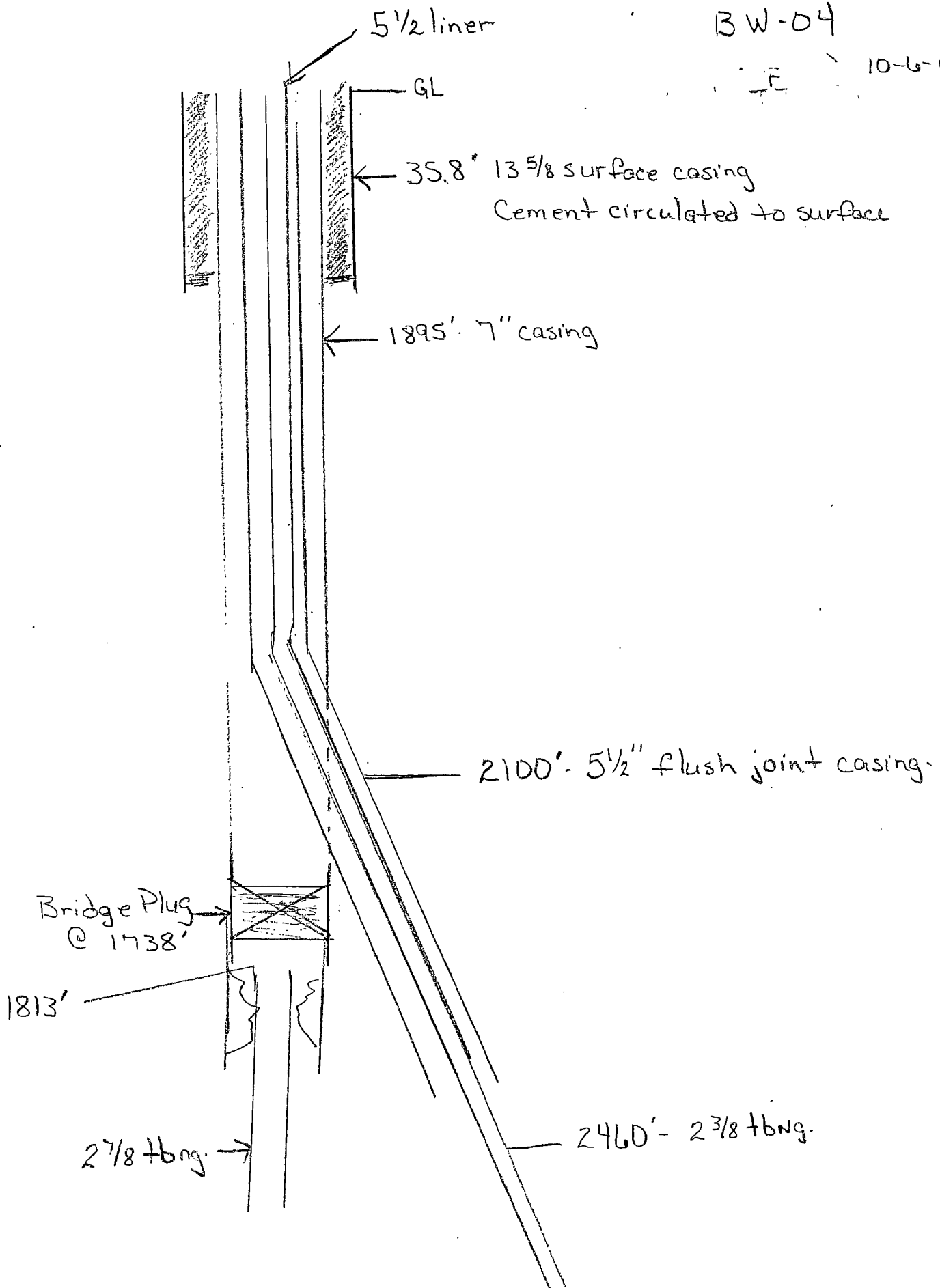
FOLD HERE

BW-04 Cavern Size superimposed on the Exxon St. #1 Well Log (Located 1/4 mile to the west of BW-04)



Gandy Corporation  
Edison Brine Stat.  
BW-04

10-6-08



BW-04 Mass Balance			Independent Inputs	
Measured Salt Removed vs Calculated Salt Removed			Formulas	Dependent Variables
2017 year End total Production Volume	9,528,093	Bbls	Independent variable	
Average Density #/gal produced water measured	9.8	lbs/gal	Independent variable	Seven year Average
Average Salt Density-Est	80	lbs/ft3	Independent variable	Used OCD number for salt density
FT3/bbl	7.35	ft3/bbl	Independent variable	
LBs of salt per gal	1.466	Lbs/gal	Dependent Variable	
LBs of Salt per BBL	80.63	Lbs/bbl	Dependent Variable	
Total LBs of Salt Removed	768,250,139	LBS	Dependent Variable	
Ft3 of salt removed	9,603,127	Ft3	Estimated Cavern Size calculated from Production Numbers	
Geo-Physical Worst Case Cone Calculation V= $\pi R^2 h / 3$				
Radius	159	ft	Dependent Variable	
Height from Log	360	ft	Independent Variable	
Volume of Worst Case Cone	9,525,881	Ft3	Calculated using "Worst Case Cone"	
	1%	Within 10 % Passes		

## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.



2017 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

		CPI	
Pulling Unit Rig	\$25,000	1.03	\$25,750
Halliburton Cement Job	\$8,000.00	1.03	\$8,240
Post Subsidence Monitoring 5 years	\$15,000.00	1.03	\$15,450
Tank Removal, Pad Clean-Up	\$30,000.00	1.03	\$30,900
Consulting fees	\$10,000.00	1.03	\$10,300
Total Estimate	\$88,000	1.03	\$90,640

**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2016**

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04

*Expiration Date: November 08, 2018*

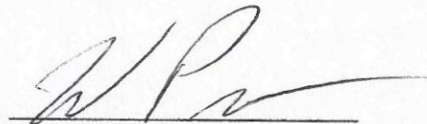
API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

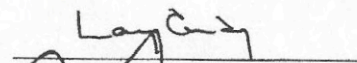
April 30, 2017

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

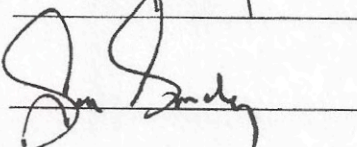
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2016 year there was no major remedial work on the brine well. General housekeeping was routinely performed and inspections were conducted for awareness of the BW-04 permit conditions. (A copy of the most recent OCD approved Discharge Plan permit BW-04 is included for reference in **Appendix "A"**).

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in **Appendix "D"**). The next scheduled 5-year test was scheduled for 2018.

The OCD sent out an E-Mail in July of 2016 indicating a test for this well was being scheduled for 2016. (See Bullet Point 6).

The brine well was drilled in 1980 and has been in operation for approximately 36 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the past required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

To ensure the safety of the well a Pro-active well "Area of Review" has been conducted annually and will continue including yearly cavern size calculations.

Evaluation of the last sonar test conducted determines cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 “Monthly fluid injection and brine production volume, including the cumulative total carried over each year”

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2016 brine production volume was 265,462 bbls and the lifetime production volume is 9,227,911 bbls.

Enclosed in **Appendix “B”** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- “Injection Pressure Data.”**

(Permit condition 2.J.4 “Injection Pressure Data”

Maximum and Average Injection Pressure:

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

The maximum pressure (Injection) is set to 340 psig, which is well below the frac pressure for this well at the casing shoe. The casing shoe depth frac pressure is calculated to be 420 psig using a .70 psi/ft gradient.

Antidotal evidence may suggest older brine wells have a tendency to have a lower frac gradient over time. For this reason Wasserhund will not exceed 315 psig when testing the formation.

**Special Note:** This is a change from previous years and a special Brine Well Maximum Test Pressure Calculator is included in Appendix “D” for reference. The new frac gradient for this well is set at .65 psi/ft.

### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 "A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.")

Please find attached in **Appendix "C"** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2016 year and analyzed by Trace Analysis in Lubbock, Texas and Hall Environmental, Albuquerque NM. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed the brine water is predominately sodium chloride with a high density of 1.208 specific gravity. This analysis is very representative of Salado "Salt" formation waters found in the area. Pursuant to the 2016 chemical analysis, the Density of the brine ranged from 1.171 SG to 1.208 SG for an average of 1.189, which equates to 9.90 lbs./gal.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

The Sodium-Chloride ratios for the year averaged .681, which is very close to the theoretical value of .648 ratio for sodium chloride. This is a fair indication that the well is producing predominantly from the salt section.

### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.")

A 4-hour Cavern Mechanical Integrity Test (MIT) was successfully ran and passed on November 28, 2016 and subsequently approved by OCD.

Pursuant to the permit conditions this test was not due until 2018. Therefore, the next five-year test will be scheduled for November of 2021, unless otherwise required by OCD for good cause shown or permit condition requirement.

Please find in **Appendix "D"** a copy of the approved C-103, test chart with meter calibration notes.

**Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

**Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 “Results of any leaks and spill reports;”)

There were no reportable leaks and spills in 2016.

The loading areas are concrete with spill containers under the hose connections that are designed to catch de-minimus drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

**Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 “An Area of Review (AOR) update summary;”)

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix “E”**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 313 feet (R = 156.5 ft) updated for 2016, a 10:1 safety factor is applied that equates to about 1565 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2016 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1565 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1565 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been approved by OCD for recompletion, which would appear to have the salt zone "Salado" casing cemented. See Copy of proposed recompletion diagram in **Appendix "E"**.

Conclusions: OCD has approved the proposed re-completion.

Corrective Actions and Recommendation: If completed as proposed, this well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

*(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")*

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been



discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as “catastrophic collapses”, have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “**upright cone**”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “*rule of thumb*” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.22 million barrels of brine produced as of December 2016. The maximum diameter was calculated to be approximately 313 feet with a corresponding D/H ratio of .149 updated for the 2016 year.

Comparing the current D/H ratio of .149 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence-monitoring program. The Permittee shall submit the results of all subsidence surveys to*

*OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

*Wasserhund Inc did submit a plan in last year's reports to meet the requirement of the rule.*

**Special Request: This facility currently does not have subsidence monitors installed and Wasserhund Inc. respectfully request waiver of this requirement until further evaluation can be completed or closure of the site commences.**

This request is based on the fact the well continues to exhibit good Cavern Mechanical Integrity, very low D/H ratio, and the fact the radius of the Cavern does not encroach upon any buildings, wells, or public ROW's. Currently there have been no subsidence issues noted or experienced.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an "Induced Current Method" and report these results in the next annual report.

The "Induced Current" Method has not been totally successful, primarily to bad connections; low DC voltage used, capacitance effect, and ground interference. Wasserhund Inc. will investigate other methods and consult with OCD on this issue. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 "A summary of the ratio of the volume of injected fluids to the volume of produced brine;")*

*See Bullet Point #3 and Appendix "B" for comparison chart numbers.*

Special Note: **Wasserhund Inc. requests a minor modification of the permit**

**requirement 3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

**Dear Jim Griswold-NMOCD Environmental Bureau Chief and Carl Chavez Environmental Engineer.**

As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations.

Of course notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency.

The point to be made here is that this parameter is a trailing indicator not a leading indicator. Of course a continued pattern for a few months would be beneficial.

Currently the permit reads as follows:

*The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.*

**Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")*

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "G" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

**Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. "2.B.3. Annual Certification: The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

*(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")*

The BW-04 Wasserhund Inc. Buckeye facility currently does not have groundwater monitoring at this site.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 “The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD’s Environmental Bureau.”)

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Discharge Plan BW-04

**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru.3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office



## DISCHARGE PERMIT BW-4

### 1. GENERAL PROVISIONS:

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

- a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.
- b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a



non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts

2016 Wasserhund Inc OCD BW-04 Annual Production Data												
								Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.				
				Brine-BBLS		Fresh-BBLS		% diff				
Jan				40524		40659		0.33%				
Feb				24732		24845		0.46%				
Mar				15914		16011		0.61%				
Apr				15003		15124		0.81%				
May				19261		19292		0.16%				
Jun				20440		20655		1.05%				
Jul				23497		23612		0.49%				
Aug				22449		22572		0.55%				
Sept				22730		22955		0.99%				
Oct				14084		14179		0.67%				
Nov				21508		21723		1.00%				
Dec				25320		25425		0.41%				
Total				265,462		267,052		0.60%				
Total Brine Water Production Carry Over from Years Past BBLs				8,962,449								
Total Production year ending 2016				9,227,911	bbls							

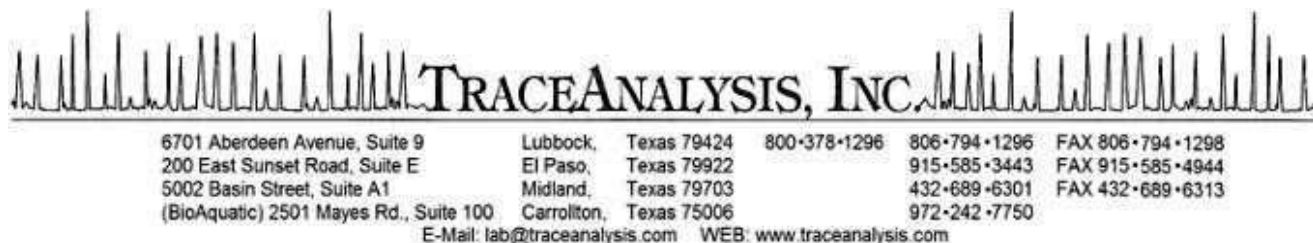
## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water





## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Waynce Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 25, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: February 25, 2016  
Brine Well

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# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	1820	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.980	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 128366      Date Analyzed: 2016-02-22      Analyzed By: LQ  
Prep Batch: 108694      Sample Preparation:      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	7.81	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      Sample Preparation:      Prepared By: LQ

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 128362

Prep Batch: 108686

Analytical Method: S 6010C

Date Analyzed: 2016-02-22

Sample Preparation: 2016-02-22

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>106000</b>	mg/L	1000	1.00

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## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      QC Preparation: 2016-02-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      QC Preparation: 2016-02-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      QC Preparation: 2016-02-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      QC Preparation: 2016-02-23      Prepared By: LQ

Report Date: February 25, 2016  
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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 6	<25.0	mg/L	2.5

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## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1090	1120	mg/L	20	3	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

Report Date: February 25, 2016  
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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	S.U.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.7	103	90 - 110	2016-02-23

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**Standard (CCV-2)**

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.9	104	90 - 110	2016-02-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

---

## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.





## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 25, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

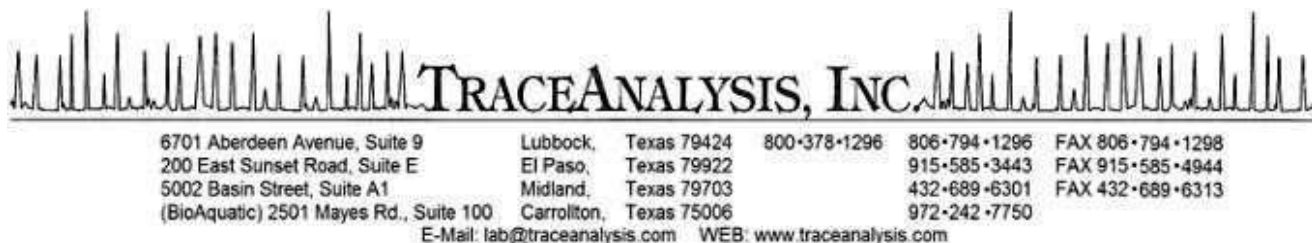
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		<b>1820</b>	mg/L	2.5
Density		<b>0.980</b>	g/ml	
pH		<b>7.81</b>	s.u.	2
Total Dissolved Solids		<b>3240</b>	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Dissolved Sodium		<b>106000</b>	mg/L	1



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

(Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

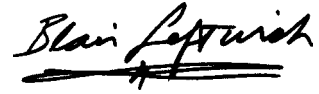
### Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

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# Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Chloride (IC)	E 300.0	109290	2016-03-23 at 14:00	129049	2016-03-23 at 15:09
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Density	ASTM D854-92	109263	2016-03-23 at 11:10	129013	2016-03-23 at 11:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
pH	SM 4500-H+	109282	2016-03-23 at 12:30	129028	2016-03-23 at 12:30
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30
TDS	SM 2540C	109281	2016-03-23 at 16:30	129044	2016-03-23 at 16:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: March 24, 2016  
Brine Well

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# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Chloride (IC) Analytical Method: E 300.0 Prep Method: N/A  
QC Batch: 128419 Date Analyzed: 2016-02-23 Analyzed By: RL  
Prep Batch: 108743 Sample Preparation: Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>1820</b>	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Density Analytical Method: ASTM D854-92 Prep Method: N/A  
QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 Sample Preparation: Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.980</b>	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: pH Analytical Method: SM 4500-H+ Prep Method: N/A  
QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 Sample Preparation: Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.81</b>	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: TDS Analytical Method: SM 2540C Prep Method: N/A  
QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 Sample Preparation: Prepared By: LQ



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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      Sample Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>149000</b>	mg/L	5000	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.16</b>	g/ml	1	0.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      Sample Preparation: 2016-02-22      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>106000</b>	mg/L	1000	1.00

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**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: pH

QC Batch: 129028

Prep Batch: 109282

Analytical Method: SM 4500-H+

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>6.91</b>	s.u.	1	2.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 129044

Prep Batch: 109281

Analytical Method: SM 2540C

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>263000</b>	mg/L	2000	2.50

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## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      QC Preparation: 2016-02-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      QC Preparation: 2016-02-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      QC Preparation: 2016-02-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      QC Preparation: 2016-02-23      Prepared By: LQ

Report Date: March 24, 2016  
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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129013

QC Batch:    129013                      Date Analyzed:    2016-03-23                      Analyzed By:    CF  
Prep Batch:   109263                      QC Preparation:    2016-03-23                      Prepared By:    CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.979	g/ml	

**Method Blank (1)**      QC Batch: 129044

QC Batch:    129044                      Date Analyzed:    2016-03-23                      Analyzed By:    LQ  
Prep Batch:   109281                      QC Preparation:    2016-03-23                      Prepared By:    LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129049

QC Batch:    129049                      Date Analyzed:    2016-03-23                      Analyzed By:    RL  
Prep Batch:   109290                      QC Preparation:    2016-03-23                      Prepared By:    RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1, 2, 3, 4, 5	<0.323	mg/L	2.5

Report Date: March 24, 2016  
Brine Well

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## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1090	1120	mg/L	20	3	10

### Duplicates (1) Duplicated Sample: 414781

QC Batch: 129013 Date Analyzed: 2016-03-23 Analyzed By: CF  
Prep Batch: 109263 QC Preparation: 2016-03-23 Prepared By: CF

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density	<sup>2</sup>	0.978	0.996	g/ml	1	2	20

**Duplicates (1)**    Duplicated Sample: 416191

QC Batch:    129028                      Date Analyzed:    2016-03-23                      Analyzed By:    LQ  
Prep Batch:    109282                      QC Preparation:    2016-03-23                      Prepared By:    LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	<sup>1,2,4,5</sup>	7.18	7.18	s.u.	1	4	20

**Duplicates (1)**    Duplicated Sample: 416188

QC Batch:    129044                      Date Analyzed:    2016-03-23                      Analyzed By:    LQ  
Prep Batch:    109281                      QC Preparation:    2016-03-23                      Prepared By:    LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	<sup>1,2,3,4,5</sup>	4630	4670	mg/L	50	1	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

Report Date: March 24, 2016  
Brine Well

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Buckeye New Mexico

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129044  
Prep Batch: 109281

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	995	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1020	mg/L	10	1000	<25.0	102	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.3	mg/L	1	25.0	<0.323	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	24.2	mg/L	1	25.0	<0.323	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



Report Date: March 24, 2016  
Brine Well

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 416184

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3570	mg/L	100	2500	1100	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3540	mg/L	100	2500	1100	98	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	S.U.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.7	103	90 - 110	2016-02-23

Report Date: March 24, 2016  
Brine Well

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Brine Well

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#### Standard (CCV-2)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.9	104	90 - 110	2016-02-23

#### Standard (CCV-1)

QC Batch: 129028

Date Analyzed: 2016-03-23

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.03	100	98.6 - 101.4	2016-03-23

#### Standard (CCV-1)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

#### Standard (CCV-2)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

---

F	Description
U	The analyte is not detected above the SDL

---

## Result Comments

- 1 Analyzed out of hold time.
- 2 Analyzed out of hold time.

## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 16022210

# TraceAnalysis, Inc.

email: lab@traceanalysis.com

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
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200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

Branch:  
3403 Industrial  
Hobbs, NM 87401  
Tel (575) 392-7500  
Fax (575) 392-4506

Company Name: PRICE LLC Phone #: 832 657 4873

Address: (Street, City, Zip) 310 ENCANTADO RIDGE CT NE 87124 Fax #: 505 892 6643

Contact Person: LESTER WAYNE PRICE JR E-mail: wprice23@hotmail.com

Invoice to: (If different from above) NA

Project #: NA Project Name: BRINE WELL

Project Location (including state): BOCKEYE NM Sampler Signature: LUPAK

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD					SAMPLING	
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE	DATE	TIME
44778	FRESH WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM
779	BRINE WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM

## ANALYSIS REQUEST (Circle or Specify Method No.)

MTBE 8021 / 602 / 8260 / 624	BTEX 8021 / 602 / 8260 / 624	TPH 418.1 / TX1005 / TX1005 Ext(C35)	TPH 8015 GRO / DRO / TVHC	PAH 8270 / 625	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260 / 624	GC/MS Semi. Vol. 8270 / 625	PCBs 8082 / 608	Pesticides 8081 / 608	BOD, TSS, pH	Moisture Content	Cl, F, SO <sub>4</sub> , NO <sub>3</sub> -N, NO <sub>2</sub> -N, PO <sub>4</sub> -P, Alkalinity	Na, Ca, Mg, K, TDS, EC	X Chloride Density Pl, TDS	X Dissolved Sodium	Turn Around Time if different from standard	Hold
------------------------------	------------------------------	--------------------------------------	---------------------------	----------------	---	-------------------------------------	----------------	---------------------	-----------------	-----	-----------------------	-----------------------------	-----------------	-----------------------	--------------	------------------	---	------------------------	----------------------------	--------------------	---	------

Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: KLS	Company: BTK	Date: 2-18-16	Time: 1:03	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7

LAB USE ONLY

REMARKS:

COC # 1

REPORT INV. & COC e-mail

Dry Weight Basis Required  
TRRP Report Required  
Check If Special Reporting Limits Are Needed

# Summary Report

(Corrected Report)

Lester Waynce Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

## Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		<b>1820</b>	mg/L	2.5
Density		<b>0.980</b>	g/ml	
pH		<b>7.81</b>	s.u.	2
Total Dissolved Solids		<b>3240</b>	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Chloride	<sup>H</sup>	<b>149000</b>	mg/L	2.5
Density	<sup>1</sup>	<b>1.16</b>	g/ml	
Dissolved Sodium		<b>106000</b>	mg/L	1
pH		<b>6.91</b>	s.u.	2

*continued ...*

<sup>1</sup>Analyzed out of hold time.

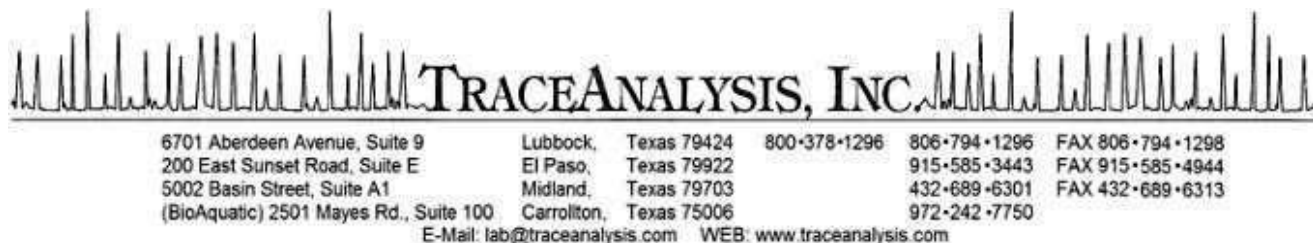


---

*sample 414779 continued ...*

Param	Flag	Result	Units	RL
Total Dissolved Solids		<b>263000</b>	mg/L	2.5

---



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: May 17, 2016

Work Order: 16042902



Project Location: Buckeye NM & Tatum  
Project Name: Gandy Brine/Fresh Well  
Project Number: BW-4 & BW-22

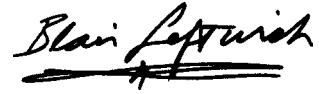
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
418340	BW-4 Fresh Water-B	water	2016-04-28	13:10	2016-04-28
418341	BW-4 Brine Water-B	water	2016-04-28	13:20	2016-04-28
418342	BW-22 Fresh Water-T	water	2016-04-28	12:30	2016-04-28
418343	BW-22 Brine Water-T	water	2016-04-28	12:20	2016-04-28

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

# Report Contents

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## Case Narrative

Samples for project Gandy Brine/Fresh Well were received by TraceAnalysis, Inc. on 2016-04-28 and assigned to work order 16042902. Samples for work order 16042902 were received intact at a temperature of 3.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	110129	2016-05-06 at 10:00	129998	2016-05-06 at 10:30
Na, Dissolved	S 6010C	110161	2016-05-11 at 14:09	130128	2016-05-17 at 11:53
pH	SM 4500-H+	109974	2016-04-29 at 15:30	129815	2016-04-29 at 15:30
TDS	SM 2540C	109973	2016-04-29 at 15:16	129873	2016-04-29 at 16:15

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16042902 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

# Analytical Report

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory: Lubbock  
Analysis: Chloride (IC) Analytical Method: E 300.0 Prep Method: N/A  
QC Batch: 129998 Date Analyzed: 2016-05-06 Analyzed By: RL  
Prep Batch: 110129 Sample Preparation: 2016-05-06 Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>250</b>	mg/L	10	2.50

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory: Lubbock  
Analysis: pH Analytical Method: SM 4500-H+ Prep Method: N/A  
QC Batch: 129815 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109974 Sample Preparation: 2016-04-29 Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.76</b>	s.u.	1	2.00

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory: Lubbock  
Analysis: TDS Analytical Method: SM 2540C Prep Method: N/A  
QC Batch: 129873 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109973 Sample Preparation: 2016-04-29 Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>678</b>	mg/L	20	2.50

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>149000</b>	mg/L	5000	2.50

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	130128	Date Analyzed:	2016-05-17
Prep Batch:	110161	Sample Preparation:	2016-05-11
		Prep Method:	S 3005A
		Analyzed By:	RR
		Prepared By:	RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>91000</b>	mg/L	1100	1.00

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	129815	Date Analyzed:	2016-04-29
Prep Batch:	109974	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>6.92</b>	s.u.	1	2.00

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	129873	Date Analyzed:	2016-04-29
Prep Batch:	109973	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>240000</b>	mg/L	2000	2.50

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BW-4 & BW-22

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Gandy Brine/Fresh Well

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**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>79.4</b>	mg/L	10	2.50

**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	129815	Date Analyzed:	2016-04-29
Prep Batch:	109974	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.85</b>	s.u.	1	2.00

**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	129873	Date Analyzed:	2016-04-29
Prep Batch:	109973	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>670</b>	mg/L	20	2.50

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

*continued ...*



Report Date: May 17, 2016  
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Gandy Brine/Fresh Well

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Buckeye NM & Tatum

*sample 418343 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>11500</b>	mg/L	1000	2.50

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 130128      Date Analyzed: 2016-05-17      Analyzed By: RR  
Prep Batch: 110161      Sample Preparation: 2016-05-11      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>5960</b>	mg/L	1	1.00

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 129815      Date Analyzed: 2016-04-29      Analyzed By: LQ  
Prep Batch: 109974      Sample Preparation: 2016-04-29      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.44</b>	s.u.	1	2.00

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 129873      Date Analyzed: 2016-04-29      Analyzed By: LQ  
Prep Batch: 109973      Sample Preparation: 2016-04-29      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>20700</b>	mg/L	1000	2.50

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BW-4 & BW-22

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## Method Blanks

### Method Blank (1)      QC Batch: 129873

QC Batch:	129873	Date Analyzed:	2016-04-29	Analyzed By:	LQ
Prep Batch:	109973	QC Preparation:	2016-04-29	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 129998

QC Batch:	129998	Date Analyzed:	2016-05-06	Analyzed By:	RL
Prep Batch:	110129	QC Preparation:	2016-05-06	Prepared By:	RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.297	mg/L	2.5

### Method Blank (1)      QC Batch: 130128

QC Batch:	130128	Date Analyzed:	2016-05-17	Analyzed By:	RR
Prep Batch:	110161	QC Preparation:	2016-05-11	Prepared By:	PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

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## Duplicates

### Duplicates (1) Duplicated Sample: 418343

QC Batch: 129815 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109974 QC Preparation: 2016-04-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	7.41	7.44	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 418110

QC Batch: 129873 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109973 QC Preparation: 2016-04-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1660	1670	mg/L	20	1	10

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 129873  
Prep Batch: 109973

Date Analyzed: 2016-04-29  
QC Preparation: 2016-04-29

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	922	mg/L	10	1000	<25.0	92	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	983	mg/L	10	1000	<25.0	98	90 - 110	6	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 129998  
Prep Batch: 110129

Date Analyzed: 2016-05-06  
QC Preparation: 2016-05-06

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	26.8	mg/L	1	25.0	<0.297	107	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	25.3	mg/L	1	25.0	<0.297	101	90 - 110	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 130128  
Prep Batch: 110161

Date Analyzed: 2016-05-17  
QC Preparation: 2016-05-11

Analyzed By: RR  
Prepared By: PM

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	53.4	mg/L	1	52.5	<0.0197	102	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	54.7	mg/L	1	52.5	<0.0197	104	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 418342

QC Batch: 129998  
Prep Batch: 110129

Date Analyzed: 2016-05-06  
QC Preparation: 2016-05-06

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	334	mg/L	10	250	79.4	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	333	mg/L	10	250	79.4	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 418341

QC Batch: 130128  
Prep Batch: 110161

Date Analyzed: 2016-05-17  
QC Preparation: 2016-05-11

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	91500	mg/L	1	525	91000	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	91500	mg/L	1	525	91000	95	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (CCV-1)

QC Batch: 129815

Date Analyzed: 2016-04-29

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	s.u.	7.00	7.02	100	98.6 - 101.4	2016-04-29

### Standard (CCV-1)

QC Batch: 129998

Date Analyzed: 2016-05-06

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.4	102	90 - 110	2016-05-06

### Standard (CCV-2)

QC Batch: 129998

Date Analyzed: 2016-05-06

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.5	102	90 - 110	2016-05-06

### Standard (ICV-1)

QC Batch: 130128

Date Analyzed: 2016-05-17

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	25.1	96	90 - 110	2016-05-17

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**Standard (CCV-1)**

QC Batch: 130128

Date Analyzed: 2016-05-17

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	27.0	104	90 - 110	2016-05-17



# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-16-12	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

Report Date: May 17, 2016  
BW-4 & BW-22

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Gandy Brine/Fresh Well

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Buckeye NM & Tatum

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F	Description
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Qsr	Surrogate recovery outside of laboratory limits.
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U	The analyte is not detected above the SDL
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## Attachments

The scanned attachments will follow this page.

Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

BioAquatic Testing  
2501 Mayes Rd., Ste 100  
Carrollton, Texas 75006  
Tel (972) 242-7750  
Fax (972) 242-7750

email: lab@traceanalysis.com

Company Name: PRICE LLC		Phone #: 505-892-6643												
Address: 312 ENCANTADO RIDGE COURT NE		5002 Basin Street, Suite A1 Midland, Texas 79703 Tel (432) 689-6301 Fax (432) 689-6313												
Contact Person: LESTER WAYNE PRICE JR		E-mail: wprice23@hotmail.com												
Invoice to: JANDY CORPORATION		Project Name: JANDY BRINE/FRESH WELL												
Project #: BWL & BW-22		Sampler Signature: LUPAK												
Project Location (including state): BOSQUE NM & TATUM		Project Signature: LUPAK												
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX				PRESERVATIVE METHOD				SAMPLING DATE	TIME	
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE			NONE
340	FRESH WATER-B	1	1 Lit	X									4/28/16	1:10 PM
341	BRINE WATER-B	1	1 Lit	X									4/28/16	1:20 PM
342	FRESH WATER-T	1	1 Lit	X									4/28/16	1:30 PM
343	BRINE T	1	1 Lit	X									4/28/16	1:40 PM
ANALYSIS REQUEST (Circle or Specify Method No)														
MTBE 8021 / 602 / 8260 / 624														
BTX 8021 / 602 / 8260 / 624														
TPH 418.1 / TX1005 / TX1005 Ext(C35)														
TPH 8015 GRO / DRO / TVHC														
PAH 8270 / 625														
Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7														
TCLP Metals Ag As Ba Cd Cr Pb Se Hg														
TCLP Volatiles														
TCLP Semi Volatiles														
TCLP Pesticides														
RCI														
GC/MS Vol. 8260 / 624														
GC/MS Semi. Vol. 8270 / 625														
PCB's 8082 / 608														
Pesticides 8081 / 608														
BOD, TSS, pH														
Moisture Content														
Cl, F, SO <sub>4</sub> , NO <sub>3</sub> -N, NO <sub>2</sub> -N, PO <sub>4</sub> -P, Alkalinity														
Na, Ca, Mg, K, TDS, EC														
TDS, CL, PH, PH														
Turn Around Time if different from standard														

Relinquished by: LUPAK	Company: PRICE LLC	Date: 4/28/16	Time: 3:50 PM	Received by: [Signature]	Company: B+C	Date: 4/28/16	Time: 3:50 PM	INST: 3	OBS: 3	COR: 3
Relinquished by: [Signature]	Company: PRICE LLC	Date: 4/28/16	Time: 3:50 PM	Received by: [Signature]	Company: B+C	Date: 4/28/16	Time: 3:50 PM	INST: 3	OBS: 3	COR: 3
Relinquished by: [Signature]	Company: PRICE LLC	Date: 4/28/16	Time: 3:50 PM	Received by: [Signature]	Company: B+C	Date: 4/28/16	Time: 3:50 PM	INST: 3	OBS: 3	COR: 3

REMARKS: COC # 1

LAB USE ONLY

Intact ☒ N

Headspace ☒ Y / N / NA

Dry Weight Basis Required ☐

TRRP Report Required ☐

Check if Special Reporting Limits Are Needed ☒

Log-in-Review ☒

Carrier # 25-2343750

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: May 17, 2016

Work Order: 16042902



Project Location: Buckeye NM & Tatum  
Project Name: Gandy Brine/Fresh Well  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
418340	BW-4 Fresh Water-B	water	2016-04-28	13:10	2016-04-28
418341	BW-4 Brine Water-B	water	2016-04-28	13:20	2016-04-28
418342	BW-22 Fresh Water-T	water	2016-04-28	12:30	2016-04-28
418343	BW-22 Brine Water-T	water	2016-04-28	12:20	2016-04-28

### Sample: 418340 - BW-4 Fresh Water-B

Param	Flag	Result	Units	RL
Chloride		<b>250</b>	mg/L	2.5
pH		<b>7.76</b>	s.u.	2
Total Dissolved Solids		<b>678</b>	mg/L	2.5

### Sample: 418341 - BW-4 Brine Water-B

Param	Flag	Result	Units	RL
Chloride		<b>149000</b>	mg/L	2.5
Dissolved Sodium		<b>91000</b>	mg/L	1
pH		<b>6.92</b>	s.u.	2
Total Dissolved Solids		<b>240000</b>	mg/L	2.5

### Sample: 418342 - BW-22 Fresh Water-T

*continued ...*

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*sample 418342 continued ...*

Param	Flag	Result	Units	RL
Param	Flag	Result	Units	RL
Chloride		<b>79.4</b>	mg/L	2.5
pH		<b>7.85</b>	s.u.	2
Total Dissolved Solids		<b>670</b>	mg/L	2.5

**Sample: 418343 - BW-22 Brine Water-T**

Param	Flag	Result	Units	RL
Chloride		<b>11500</b>	mg/L	2.5
Dissolved Sodium		<b>5960</b>	mg/L	1
pH		<b>7.44</b>	s.u.	2
Total Dissolved Solids		<b>20700</b>	mg/L	2.5



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

August 17, 2016

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Brine Wells

OrderNo.: 1608238

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 8/2/2016 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608238

Date Reported: 8/17/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Brine Wells

**Collection Date:** 7/30/2016 2:30:00 PM

**Lab ID:** 1608238-001

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9968		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	240	10		mg/L	20	8/4/2016 9:39:15 PM	A36247
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	676	20.0	*	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.81	1.68	H	pH units	1	8/4/2016 5:40:31 PM	R36251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 1 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608238

Date Reported: 8/17/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Brine Wells

**Collection Date:** 7/30/2016 2:40:00 PM

**Lab ID:** 1608238-002

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.208		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	190000	5000	*	mg/L	1E	8/5/2016 11:38:44 PM	R36295
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	353000	2000	*D	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.83	1.68	H	pH units	1	8/4/2016 5:44:48 PM	R36251
<b>EPA METHOD 200.7: DISSOLVED METALS</b>							Analyst: <b>MED</b>
Sodium	120000	5000		mg/L	5E	8/6/2016 1:34:14 PM	A36279

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1608238**

Date Reported: **8/17/2016**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Brine Wells

**Collection Date:** 7/30/2016 3:30:00 PM

**Lab ID:** 1608238-003

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9979		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	65	10		mg/L	20	8/4/2016 10:28:53 PM	A36247
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	657	20.0	*	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.98	1.68	H	pH units	1	8/4/2016 5:49:03 PM	R36251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1608238**

Date Reported: **8/17/2016**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Brine Wells

**Collection Date:** 7/30/2016 3:40:00 PM

**Lab ID:** 1608238-004

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.025		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	19000	500	*	mg/L	1E	8/8/2016 8:52:15 PM	R36324
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	39200	2000	*D	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.92	1.68	H	pH units	1	8/4/2016 5:53:12 PM	R36251
<b>EPA METHOD 200.7: DISSOLVED METALS</b>							Analyst: <b>MED</b>
Sodium	11000	500		mg/L	500	8/6/2016 1:32:30 PM	A36279

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 4 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB-A		SampType: MBLK		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	PBW		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123618		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LCS-A		SampType: LCS		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	LCSW		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123619		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	49	1.0	50.00	0	98.8	85	115			

Sample ID	LLLCS-A		SampType:	LCSLL		TestCode:	EPA Method 200.7: Dissolved Metals				
Client ID:	BatchQC		Batch ID:	A36279		RunNo:	36279				
Prep Date:			Analysis Date:	8/6/2016		SeqNo:	1123620	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	ND	1.0	0.5000	0	110	50	150				

Sample ID	1608238-002BMS		SampType: MS		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	Buckeye-Brine		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123666		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	360000	5000	250000	116100	98.2	70	130			

Sample ID	1608238-002BMSD		SampType:	MSD		TestCode:	EPA Method 200.7: Dissolved Metals				
Client ID:	Buckeye-Brine		Batch ID:	A36279		RunNo:	36279				
Prep Date:			Analysis Date:	8/6/2016		SeqNo:	1123667	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	370000	5000	250000	116100	100	70	130	1.37	20		

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	A36247	RunNo:	36247					
Prep Date:		Analysis Date:	8/4/2016	SeqNo:	1122810	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	A36247	RunNo:	36247					
Prep Date:		Analysis Date:	8/4/2016	SeqNo:	1122811	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.4	90	110			

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36295	RunNo:	36295					
Prep Date:		Analysis Date:	8/5/2016	SeqNo:	1124287	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36295	RunNo:	36295					
Prep Date:		Analysis Date:	8/5/2016	SeqNo:	1124288	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	97.7	90	110			

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36324	RunNo:	36324					
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1125092	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36324	RunNo:	36324					
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1125093	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	94.9	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	1608238-003ADUP	SampType:	DUP	TestCode:	Specific Gravity						
Client ID:	Tatum-Fresh	Batch ID:	R36304	RunNo:	36304						
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1124614	Units:					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Specific Gravity	0.9963	0						0.160	20		

### Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB-26813		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	26813		RunNo:	36311				
Prep Date:	8/5/2016		Analysis Date:	8/9/2016		SeqNo:	1124795		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-26813		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 26813		RunNo: 36311					
Prep Date:	8/5/2016		Analysis Date: 8/9/2016		SeqNo: 1124796		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	997	20.0	1000	0	99.7	80	120			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# Sample Log-In Check List

 Client Name: **WASSERHUND INC**

 Work Order Number: **1608238**

 RcptNo: **1**

Received by/date:

*AS*
*08/02/16*

Logged By:

**Ashley Gallegos**
**8/2/2016 10:00:00 AM**
*AS*

Completed By:

**Ashley Gallegos**
**8/4/2016 11:33:03 AM**
*AS*

Reviewed By:

*[Signature]*
*08/04/16*

## Chain of Custody

1. Custody seals intact on sample bottles?

 Yes ☐

 No ☐

 Not Present ☒

2. Is Chain of Custody complete?

 Yes ☒

 No ☐

 Not Present ☐

3. How was the sample delivered?

**Courier**

## Log In

4. Was an attempt made to cool the samples?

 Yes ☒

 No ☐

 NA ☐

 5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ?

 Yes ☒

 No ☐

 NA ☐

6. Sample(s) in proper container(s)?

 Yes ☒

 No ☐

7. Sufficient sample volume for indicated test(s)?

 Yes ☒

 No ☐

8. Are samples (except VOA and ONG) properly preserved?

*AS Yes*

 No ☒

9. Was preservative added to bottles?

 Yes ☒

 No ☒

 NA ☐

10. VOA vials have zero headspace?

 Yes ☐

 No ☐

 No VOA Vials ☒

11. Were any sample containers received broken?

 Yes ☐

 No ☒

 # of preserved  
bottles checked  
for pH:

*2*

12. Does paperwork match bottle labels?

(Note discrepancies on chain of custody)

 Yes ☒

 No ☐

13. Are matrices correctly identified on Chain of Custody?

 Yes ☒

 No ☐

14. Is it clear what analyses were requested?

 Yes ☒

 No ☐

15. Were all holding times able to be met?

(If no, notify customer for authorization.)

 Yes ☒

 No ☐

Checked by:

*AS*

 Adjusted? *<2 or >12 unless noted*  
*NO Yes*

## Special Handling (if applicable)

16. Was client notified of all discrepancies with this order?

 Yes ☐

 No ☐

 NA ☒

Person Notified:

Date:

By Whom:

Via:

☐ eMail

☐ Phone

☐ Fax

☐ In Person

Regarding:

Client Instructions:

17. Additional remarks:

*For metals analysis: added 0.4 mL HNO<sub>3</sub> to -002B, -004B  
for acceptable pH.*

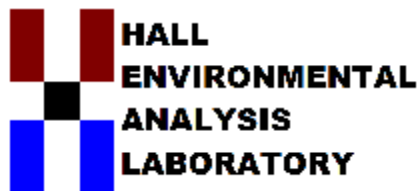
18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.2	Good	Yes			

*8/4@1245*
*AS*







Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

November 29, 2016

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: BW-04 Buckeye BW-22 Tatum

OrderNo.: 1610E77

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 10/28/2016 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 2:50:00 PM

**Lab ID:** 1610E77-001

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9933		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	200	50		mg/L	100	10/31/2016 6:58:15 PM	R38358
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	662	20.0	*	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.11	1.68	H	pH units	1	11/2/2016 5:28:48 PM	R38415

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 3:00:00 PM

**Lab ID:** 1610E77-002

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.171	0			1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	120000	10000	*	mg/L	2E	11/3/2016 3:54:43 AM	A38417
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	276000	2000	*D	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.05	1.68	H	pH units	1	11/2/2016 5:32:50 PM	R38415
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>MED</b>
Sodium	97000	2000		mg/L	2E	11/8/2016 1:43:33 PM	B38512

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 4:00:00 PM

**Lab ID:** 1610E77-003

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9934		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	150	5.0		mg/L	10	10/31/2016 8:00:19 PM	R38358
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	784	20.0	*	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.06	1.68	H	pH units	1	11/2/2016 5:37:16 PM	R38415

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 4:10:00 PM

**Lab ID:** 1610E77-004

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.026		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	17000	1000	*	mg/L	2E	11/3/2016 4:07:08 AM	A38417
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	39300	2000	*D	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.45	1.68	H	pH units	1	11/2/2016 5:41:30 PM	R38415
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>MED</b>
Sodium	12000	200		mg/L	200	11/8/2016 1:45:23 PM	B38512

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	MB-B		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203671		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LCS-B		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203675		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	50	1.0	50.00	0	101	85	115			

Sample ID	LLLCS-B		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203676		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	95.0	50	150			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	<b>MB</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R38358</b>	RunNo:	<b>38358</b>					
Prep Date:		Analysis Date:	<b>10/31/2016</b>	SeqNo:	<b>1197702</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R38358</b>	RunNo:	<b>38358</b>					
Prep Date:		Analysis Date:	<b>10/31/2016</b>	SeqNo:	<b>1197703</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	5.1	0.50	5.000	0	101	90	110			

Sample ID	<b>MB</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>A38417</b>	RunNo:	<b>38417</b>					
Prep Date:		Analysis Date:	<b>11/3/2016</b>	SeqNo:	<b>1199971</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	<b>LCS</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>A38417</b>	RunNo:	<b>38417</b>					
Prep Date:		Analysis Date:	<b>11/3/2016</b>	SeqNo:	<b>1199972</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	91.1	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	1610E77-001ADUP	SampType:	DUP	TestCode:	Specific Gravity						
Client ID:	Buckeye-Fresh	Batch ID:	R38398	RunNo:	38398						
Prep Date:		Analysis Date:	11/2/2016	SeqNo:	1199193	Units:					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Specific Gravity	0.9922	0						0.111	20		

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	MB-28453		SampType: MBLK		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	PBW		Batch ID: 28453		RunNo: 38482					
Prep Date:	11/3/2016		Analysis Date: 11/7/2016		SeqNo: 1201925		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-28453		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	28453		RunNo:	38482				
Prep Date:	11/3/2016		Analysis Date:	11/7/2016		SeqNo:	1201926		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	1020	20.0	1000	0	102	80	120				

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1610E77

RcptNo: 1

Received by/date:

AG

10/28/16

Logged By: Ashley Gallegos

10/28/2016 3:04:00 PM

AG

Completed By: Ashley Gallegos

10/31/2016 11:48:33 AM

AG

Reviewed By:

MJ

10/31/16

### Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Client

### Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved  
bottles checked  
for pH:

2

(2 or >12 unless noted)

Adjusted?

yes

Checked by:

AS

### Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:

Date

By Whom:

Via:

☐ eMail

☐ Phone

☐ Fax

☐ In Person

Regarding:

Client Instructions:

17. Additional remarks: For metals analysis: added 1mL HNO<sub>3</sub> to -002B, -004B
18. Cooler Information For acceptable pH.

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.3	Good	Not Present			

10/31 @ 1330  
AS

## Turn-Around Time:

☒ Standard☒ Standard ☐ Rush

Project Name: 00-04 BR-WF-EF

BW-22 TATUM

Project #: 3 rd QTR

Project Manager: ZAYNE PRICE

PRIZE-442

**Sampler:**

On Ice: ☒ Yes ☐ No

Sample Temperature: 3.3

Container Type and #	Preservative Type	HEAL No. 1610E77
-------------------------	----------------------	---------------------

Date	Time	Matrix	Sample Request ID
------	------	--------	-------------------

Matrix

Sample Request ID

12/7/6	2:56 PM	WATER BUCKEYE - FRESH
"	3 PM	" " - BRINE

WINTER BUCKEYE -	11	-
"	"	"

BUCKEYE - FRESH  
" - BRINE

12/20/16	4 PM	WATER	TATUM - FRESH
"	4:10 PM	"	" - BRINE

WATER TATUM - P	
"	" - B

TATUM - FRESH
" - BRINE

ite: 11/20/2017 Time: 11:00 AM

Relinquished by:

Acquainted by: \_\_\_\_\_

Received by:

Date \_\_\_\_\_ Time \_\_\_\_\_

Date Time 11/11/2011 11:11:11 AM

Time: 4

Relinquished by: \_\_\_\_\_

Relinquished by:

Received by:

~~Date~~ Time

Date \_\_\_\_\_ Time \_\_\_\_\_

If necessary, samples submitted to Hal Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

[www.hallenvironmental.com](http://www.hallenvironmental.com)

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

## Analysis Request

[illegible]

Remarks:

BILL ZASSERHUND

cc of report to

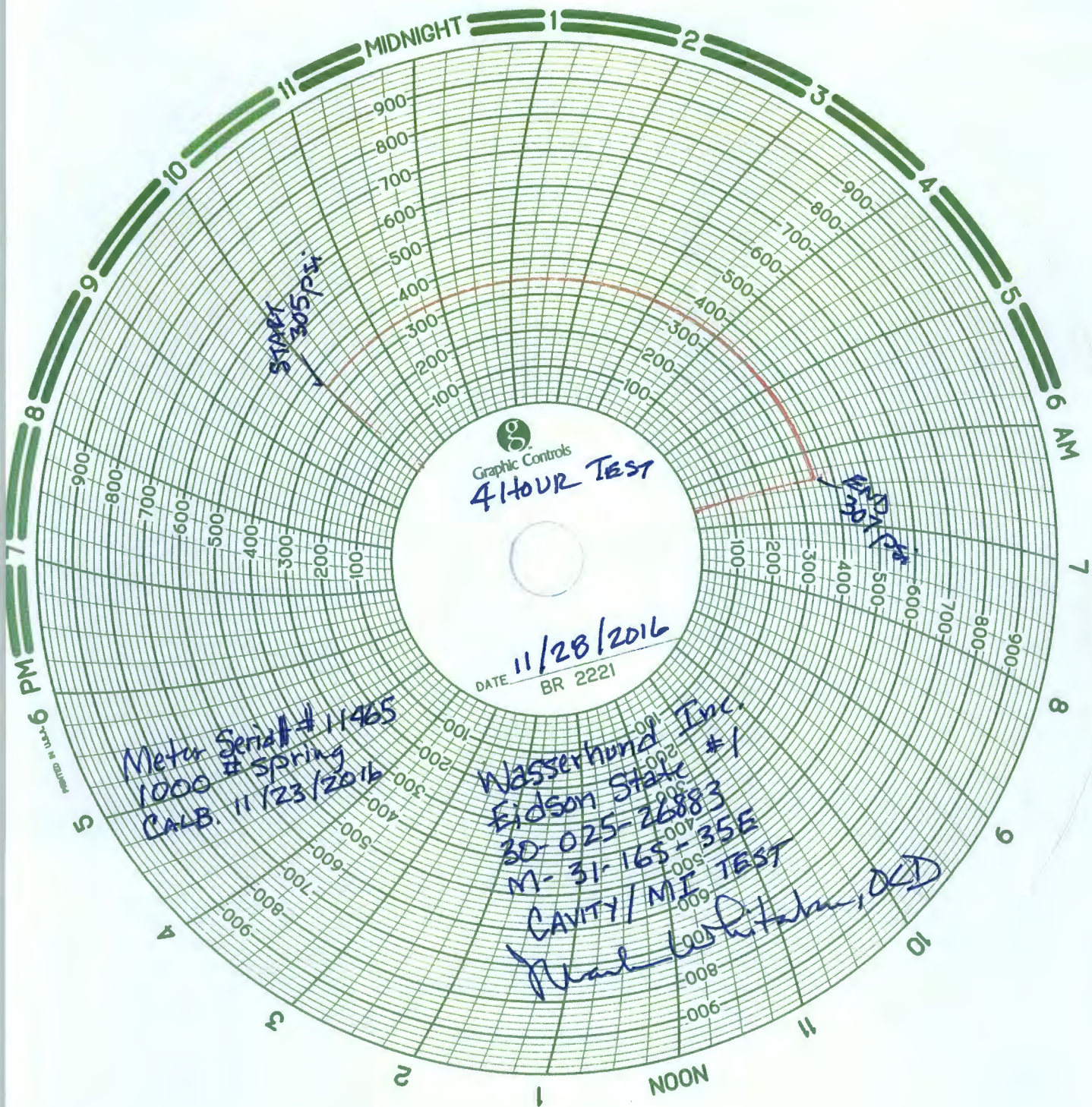
7-14-17 11:30 AM

## Appendix “D”

- C-103
- 2016 MIT Chart
- Recorder Calibration
- Brine Well Maximum Test Pressure Calculator

APPROVED BY: Carl J. Chavez TITLE \_\_\_\_\_ DATE 12/6/16  
Conditions of Approval (if any): \_\_\_\_\_





Graphic Controls  
4 HOUR TEST

DATE 11/28/2016  
BR 2221

Meter Serial # 11465  
1000 # Spring  
CALB. 11/23/2016

Wasserkund Inc.  
Edson State #1  
30-025-26883  
M-31-165-35E  
CAVITY/MT TEST

Paul [unclear]

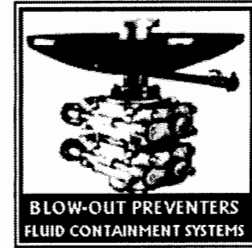
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



**Date:** Wednesday, November 23, 2016

**Invoice #** \_\_\_\_\_

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

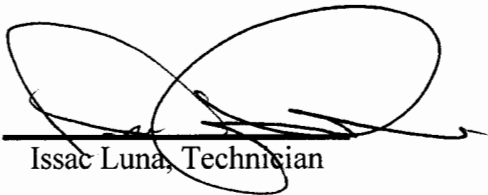
**Unit:** Gandy #4

**Model:** 8" PMC

**Pressure Rating:** 1,000#

**Serial #:** 11218

***This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.***



Issac Luna, Technician

### Brine Well Maximum Test Pressure Calculator

Provides an approximate estimate for Maximum Test pressures allowed to prevent possible fracturing of formation.

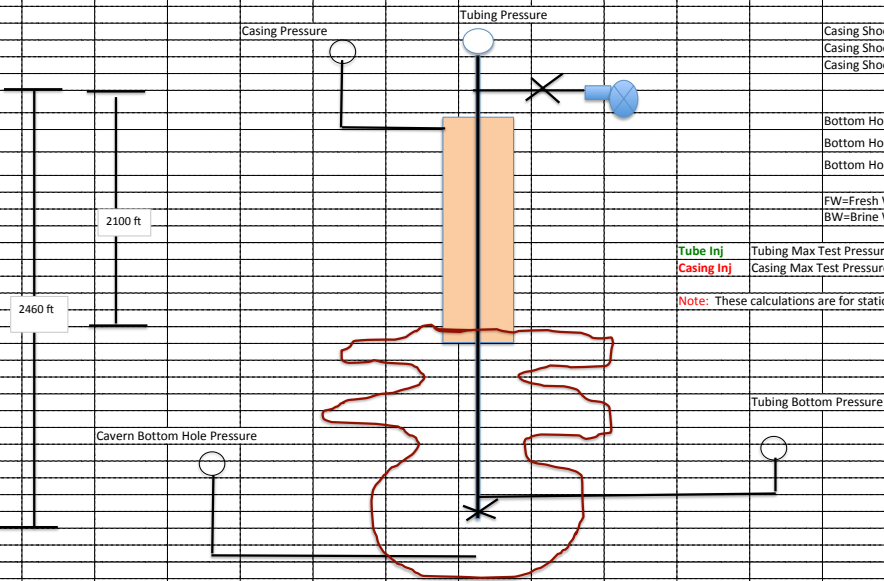
Inputs are for casing shoe depth, bottom hole depth, and frac gradient.

Answers are given when pressure testing using Fresh water or Brine water.

Major assumptions: Frac Gradient of .65 is used, casing is filled with brine or fresh water

**Note: When brine well has been operating in normal flow, then assume that casing is filled with Brine Water.**

BW-04 Wasserhund Buckeye



Input Depth to Casing Shoe 2100 ft  
Input Depth to Bottom Hole 2460 ft  
Input Frac/Gradient 0.65 psi/ft

Inputs are in Green

		Depth ft	Gradient-psi/ft	psig
Casing Shoe	FW	2100	0.433	909
Casing Shoe	BW	2100	0.5	1050
Casing Shoe	Frac	2100	0.65	1365
Bottom Hole	FW	2460	0.433	1065
Bottom Hole	BW	2460	0.5	1230
Bottom Hole	Frac	2460	0.65	1599

FW=Fresh Water  
BW=Brine Water

Answers in Yellow

Tube Inj	Tubing Max Test Pressure	Max Surface Pressure = Depth to Bottom * (Frac Gradient -Water Head Gradient)
Casing Inj	Casing Max Test Pressure	Max Surface Pressure = Depth to Casing Shoe * (Frac Gradient -Water Head Gradient)

	Using BW	Using FW
Tube Inj	369 psig	534 psig
Casing Inj	315 psig	456 psig

**Note:** These calculations are for static test only and does not take into account dynamic pressure drops in Tubing or Casing.

**Do Not Exceed Tubing or Casing Surface Pressures while Pumping or Testing**



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

## 2016 BW-04 AOR Review- Well Status List

up-dated Feb 26, 2017

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program	Cased/Cemented	Corrective Action
									Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved No Action Required
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	

2 2

3 Total # of wells in adjacent quarter-sections  
 3 Total # of wells in 1/4 mile AOR  
 3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

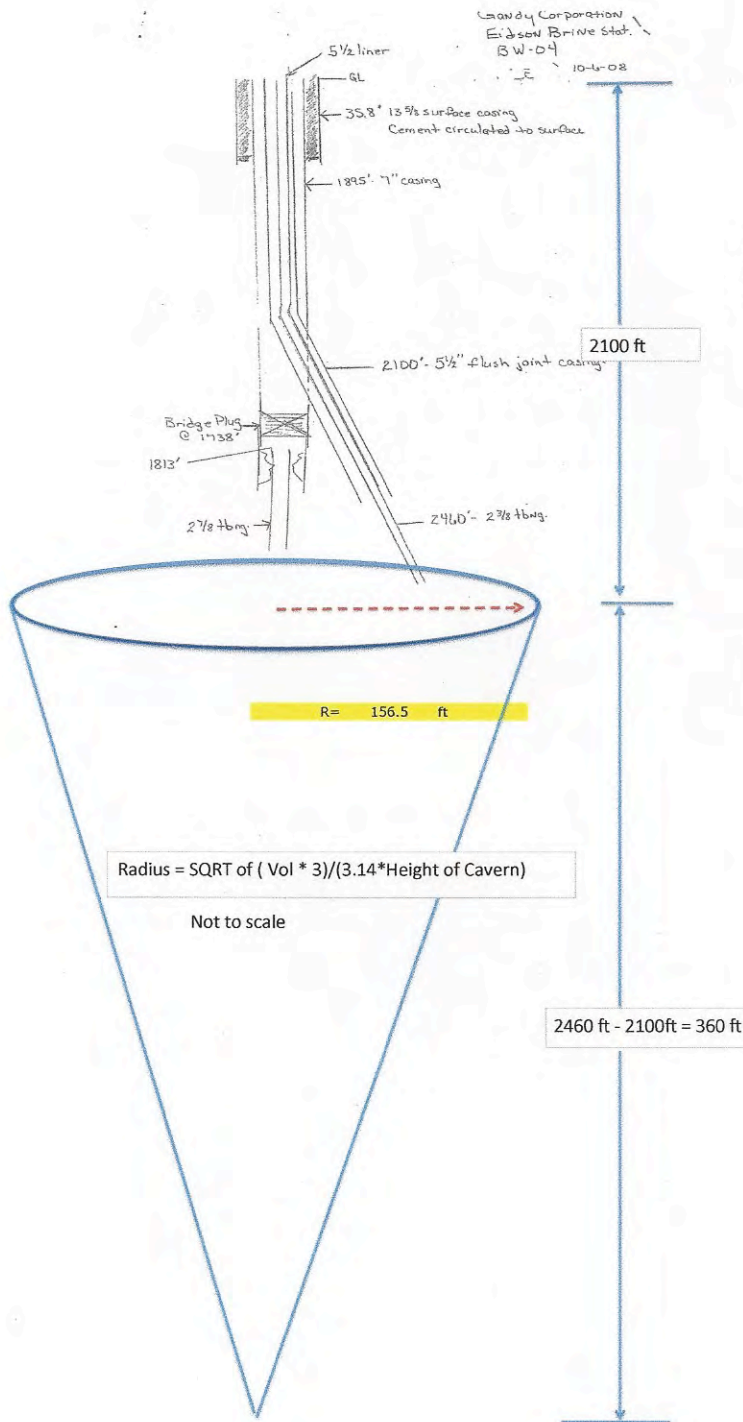
### Notes:

\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2016 Radius and D/H calculations.



# 2016 Calculations

$$r = \sqrt[3]{\frac{V}{\pi \cdot D}}$$

V	Volume	=	9,227,911 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft <sup>3</sup> salt/bbl	156.5	1 est

r	=	156.5 ft
Diameter	=	312.99 ft

$$D/H = 0.149$$

## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.

## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2016 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

		CPI	
Pulling Unit Rig	\$25,000	1.03	\$25,750
Halliburton Cement Job	\$8,000.00	1.03	\$8,240
Post Subsidence Monitoring 5 years	\$15,000.00	1.03	\$15,450
Tank Removal, Pad Clean-Up	\$30,000.00	1.03	\$30,900
Consulting fees	\$10,000.00	1.03	\$10,300
Total Estimate	\$88,000	1.03	\$90,640



**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2015**

**Wasserhund Inc.**

**Buckeye Brine Station**

**OCD Permit BW-04**

***Expiration Date: November 08, 2018***

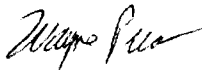
**API No. 30-025-26883 Eidson #1**

**Unit Letter M-Section 31-Ts 16s – R35e**

**April 30, 2016**

**Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.**

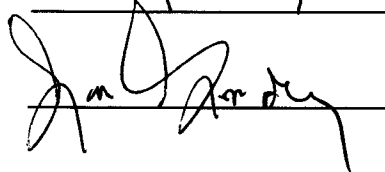
**Wayne Price-LLC**



**Larry Gandy**



**Jon Gandy**



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2015 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04, Aerial photo, and inspection report is included for reference in **Appendix "A"**).*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. **(Appendix "A" shows system filling station photos.)**

Inspections revealed that the loading area concrete sump was not tested in 2014 as planned. The sump was drained in 2015 and routine maintenance was performed, by adding another coat of epoxy. A third party consultant (Price LLC) scheduled and performed a hydrostatic test and the results showed no head loss during the 24 hours.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in Appendix "D"). The next scheduled 5-year test will be due in 2018.

The brine well was drilled in 1980 and has been in operation for approximately 35 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2015 brine production volume was 415,784 bbls and the lifetime production volume is 9,111,275 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 "A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.")

Please find attached in **Appendix "C"** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2015 year and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed the brine water is predominately sodium chloride with a high density of 1.194 specific gravity. This analysis is very representative of Salado "Salt" formation waters found in the area. During the year, it appeared the weight of the brine ranged from 1.124 SG to 1.194 SG, with a weighted averaged of 1.15 SG for the year, equating to 9.57 lbs/gal, which has been normally acceptable to Wasserhund customers.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

The Sodium-Chloride ratio for the year averaged .69, which is above the .648 ratio theoretical value of sodium chloride. It's not unusual for salt caverns to produced super-saturated brine waters.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.")

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix "D"** a copy of the test chart and meter calibration record.

### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 “Results of any leaks and spill reports;”)

There were no reportable leaks and spills in 2015.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 “An Area of Review (AOR) update summary;”)

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix “E”**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 312 feet (R = 156 ft) up-dated for 2015, a 10:1 safety factor is applied that equates to about 1560 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2015 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1560 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1560 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been approved by OCD for recompletion, which would appear to have the salt zone "Salado" casing cemented. See Copy of proposed recompletion diagram in **Appendix "E"**.

Conclusions: OCD has approved the proposed re-completion.

Corrective Actions and Recommendation: If completed as proposed, this well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

*(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")*

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when

the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “upright cone”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “rule of thumb” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.11 million barrels of brine produced as of December 2015. The maximum diameter was calculated to be approximately 312 feet with a corresponding D/H ratio of .148 updated for the 2015 year.

Comparing the current D/H ratio of .148 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 156-foot radius superimposed around the brine well and station. The radius has increased by 2.0 feet from last year.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the*



*subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. "Solution Cavern Monitoring Plan Program". A copy of the proposal is included in **Appendix "G"** for OCD review and approval.

Special Note: Wasserhund Inc. **request a Minor Modifications** that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an "Induced Current Method" and report these results in the next annual report.

The "Induced Current" Method has not been successful, primarily to bad connections and low voltage used. Wasserhund will continue trying this method and others as approved by OCD. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 "A summary of the ratio of the volume of injected fluids to the volume of produced brine;")*

*See Bullet Point #3 and Appendix "B" for comparison chart numbers.*

Special Note: **Key requests a minor modification of the permit requirement 3.K** *"The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours."*

Dear Jim Giswold-NMOCD Environmental Bureau Chief: As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this

as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations. Notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency. Currently the permit reads as follows:

The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

#### **Bullet Point #12- Summary of Activities**

(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "H" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

#### **Bullet Point #13- Annual Certification**

(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. **"2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")

**Operator Response:** Based on all current information and actual on-site

observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the Wasserhund has received OCD approved in install a down-gradient Monitoring Well. The results concerning groundwater will be listed in the 2016 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- 3<sup>rd</sup> Party Field Inspection Report
- Discharge Plan BW-04







Brine Well Inspection Sheet:

Permit # BW-04  
API# 30-025-26883 Eidson #1  
Operator: Wasserhund Inc.  
Location: Unit Letter M-Section 31-Ts 16s - R35e

	Yes	No
1 Any reportable leaks or spills noted at time of inspection?		X
2 Any observed radial cracks or any evidence of subsidence?		X
3 Load/unload pots in place?	X	
4 Any New Wells IN AOR?		X
5 Observed Injection Pressure on Well?	X	220 psig.
6 Is operator experiencing any downhole issues?		X None Noted at this time.
7 Do brine Tanks have secondary containment?	X	
8 Samples Collected?	X	Fresh + Brine
9 Brine well Operated Normal or Reverse Flow?	Normal	
10 Checked Sumps?	X	Holding Water no observed drop in 24 hours
11 Groundwater Monitor Wells on-site?		X
12 Subsidence Monitors on-site?		X
13 Equipment failures?		X
Photos Taken:		2 see attached

Date of Inspection:

2/17/16

Inspector: Wayne Price Jr. Price LLC

Inspector Signature:





A photograph of a water treatment facility. In the center, there are five large, black, cylindrical storage tanks. To the left of the tanks is a small blue building with a white roof. A dirt road curves from the foreground towards the tanks. In the foreground, there is a pile of rocks and gravel. The sky is blue with scattered white clouds. A utility pole with a wire is visible on the right side of the image.

Wasserhund Buckeye BW-04  
Feb 17, 2016-Looking SW  
BY: Price LLC



Wasserhund BW-04 Well Head Pressure Gage  
Feb 17, 2016 Photo by Price LLC



# BW-4

Wasserhund/Buckeye  
Eidson State #1

Permit Renewal  
11/8/13

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## **DISCHARGE PERMIT BW-4**

### **1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or



c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.



a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts



2015 Wasserhund Inc OCD BW-04 Annual Production Data									
							Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.		
				Brine-BBLS	Fresh-BBLS	% diff			
Jan				64,531.00	64,647.00	0.18%			
Feb				43,305.00	43,439.00	0.31%			
Mar				38,845.00	38,974.00	0.33%			
Apr				28,060.00	28,175.00	0.41%			
May				24,125.00	24,275.00	0.62%			
Jun				36,901	37,005	0.28%			
Jul				30,752	30,567	-0.60%			
Aug				23,952	24,331	1.58%			
Sept				26,863	27,020	0.58%			
Oct				33,537	33,669	0.39%			
Nov				32,346	32,461	0.36%			
Dec				31,071	31,221	0.48%			
2014 Total				414,288	415,784	0.36%			
Total Brine Water Production Carry Over from Years Past BBLs				8,696,987					
Total Production year ending 2015				9,111,275	bbls				

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well

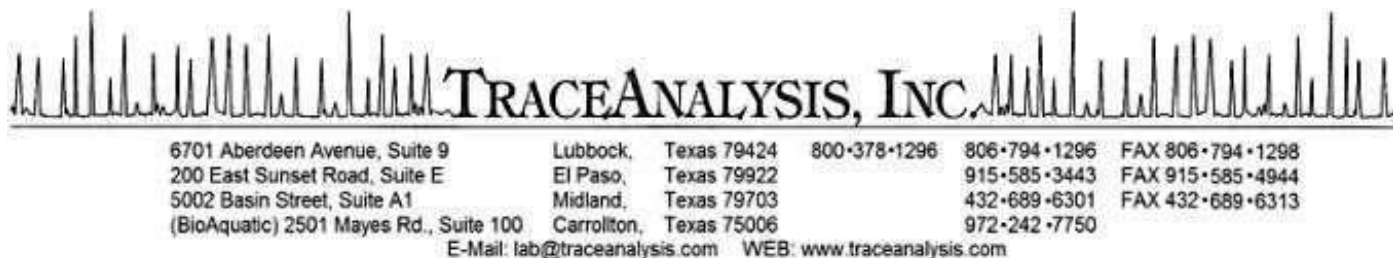
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

### Sample: 385130 - Fresh

Param	Flag	Result	Units	RL
Chloride	H	<b>338</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>221</b>	mg/L	1
pH		<b>8.03</b>	s.u.	2
Specific Gravity		<b>0.9918</b>	g/ml	
Total Dissolved Solids		<b>806</b>	mg/L	2.5

### Sample: 385131 - Brine

Param	Flag	Result	Units	RL
Chloride	H	<b>106000</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>81300</b>	mg/L	1
pH		<b>7.12</b>	s.u.	2
Specific Gravity		<b>1.124</b>	g/ml	
Total Dissolved Solids		<b>186000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well  
Project Number: Brine Well-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

# Report Contents

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012306. Samples for work order 15012306 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	100982	2015-02-16 at 12:00	119410	2015-02-16 at 12:53
Na, Dissolved	S 6010C	100546	2015-01-27 at 17:40	119127	2015-02-06 at 09:23
pH	SM 4500-H+	100544	2015-01-27 at 04:00	118893	2015-01-27 at 16:44
Specific Gravity	ASTM D1429-95	100533	2015-01-27 at 13:00	118885	2015-01-27 at 13:10
TDS	SM 2540C	100553	2015-01-26 at 09:00	118905	2015-01-26 at 17:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15012306 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

Page Number: 4 of 16  
Buckeye, NM

# Analytical Report

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-02-16	Analyzed By:	RL
QC Batch:	119410	Sample Preparation:		Prepared By:	RL
Prep Batch:	100982				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>338</b>	mg/L	10	2.50

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-02-06	Analyzed By:	RR
QC Batch:	119127	Sample Preparation:	2015-01-27	Prepared By:	RR
Prep Batch:	100546				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>221</b>	mg/L	1	1.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-01-27	Analyzed By:	AT
QC Batch:	118893	Sample Preparation:	2015-01-27	Prepared By:	AT
Prep Batch:	100544				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>8.03</b>	s.u.	1	2.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-01-27	Analyzed By:	CF
QC Batch:	118885	Sample Preparation:	2015-01-27	Prepared By:	CF
Prep Batch:	100533				

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9918</b>	g/ml	1	0.000

**Sample: 385130 - Fresh**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>806</b>	mg/L	20	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Chloride (IC)

QC Batch: 119410

Prep Batch: 100982

Analytical Method: E 300.0

Date Analyzed: 2015-02-16

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>106000</b>	mg/L	5000	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 119127

Prep Batch: 100546

Analytical Method: S 6010C

Date Analyzed: 2015-02-06

Sample Preparation: 2015-01-27

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>81300</b>	mg/L	1000	1.00



Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: pH

QC Batch: 118893

Prep Batch: 100544

Analytical Method: SM 4500-H+

Date Analyzed: 2015-01-27

Sample Preparation: 2015-01-27

Prep Method: N/A

Analyzed By: AT

Prepared By: AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.12</b>	s.u.	1	2.00

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Specific Gravity

QC Batch: 118885

Prep Batch: 100533

Analytical Method: ASTM D1429-95

Date Analyzed: 2015-01-27

Sample Preparation: 2015-01-27

Prep Method: N/A

Analyzed By: CF

Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.124</b>	g/ml	1	0.000

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>186000</b>	mg/L	2000	2.50

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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## Method Blanks

### Method Blank (1)      QC Batch: 118885

QC Batch: 118885      Date Analyzed: 2015-01-27      Analyzed By: CF  
Prep Batch: 100533      QC Preparation: 2015-01-27      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9916	g/ml	

### Method Blank (1)      QC Batch: 118905

QC Batch: 118905      Date Analyzed: 2015-01-26      Analyzed By: RL  
Prep Batch: 100553      QC Preparation: 2015-01-26      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 119127

QC Batch: 119127      Date Analyzed: 2015-02-06      Analyzed By: RR  
Prep Batch: 100546      QC Preparation: 2015-01-27      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 119410

QC Batch: 119410      Date Analyzed: 2015-02-16      Analyzed By: RL  
Prep Batch: 100982      QC Preparation: 2015-02-16      Prepared By: RL

Report Date: February 17, 2015  
Brine Well-Buckeye

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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.767	mg/L	2.5

---

## Duplicates

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118885 Date Analyzed: 2015-01-27 Analyzed By: CF  
Prep Batch: 100533 QC Preparation: 2015-01-27 Prepared By: CF

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity	1.074	1.072	g/ml	1	0	200

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118893 Date Analyzed: 2015-01-27 Analyzed By: AT  
Prep Batch: 100544 QC Preparation: 2015-01-27 Prepared By: AT

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	6.79	6.78	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 385130

QC Batch: 118905 Date Analyzed: 2015-01-26 Analyzed By: RL  
Prep Batch: 100553 QC Preparation: 2015-01-26 Prepared By: RL

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	850	806	mg/L	20	5	10

Report Date: February 17, 2015  
Brine Well-Buckeye

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 118905  
Prep Batch: 100553

Date Analyzed: 2015-01-26  
QC Preparation: 2015-01-26

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	988	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	978	mg/L	10	1000	<25.0	98	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.0	mg/L	1	52.5	<0.0184	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	57.2	mg/L	1	52.5	<0.0184	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.0	mg/L	1	25.0	0.767	93	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	23.5	mg/L	1	25.0	0.767	91	90 - 110	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: February 17, 2015  
Brine Well-Buckeye

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## Matrix Spikes

### Matrix Spike (xMS-1) Spiked Sample: 385041

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	1660	mg/L	1	525	1210	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param				MSD			Spike	Matrix		Rec.		RPD
	F	C		Result	Units	Dil.	Amount	Result	Rec.	Limit	RPD	Limit
Dissolved Sodium	Q <sub>s</sub>	Q <sub>s</sub>	2,3,4,5	1580	mg/L	1	525	1210	70	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 386889

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3350	mg/L	100	2500	812	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3290	mg/L	100	2500	812	99	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (CCV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (ICV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2015-02-06

### Standard (CCV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	55.9	110	90 - 110	2015-02-06



Report Date: February 17, 2015  
Brine Well-Buckeye

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Brine Well

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**Standard (CCV-1)**

QC Batch: 119410

Date Analyzed: 2015-02-16

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.8	95	90 - 110	2015-02-16

**Standard (CCV-2)**

QC Batch: 119410

Date Analyzed: 2015-02-16

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.9	96	90 - 110	2015-02-16

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: June 5, 2015

Work Order: 15050505



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station

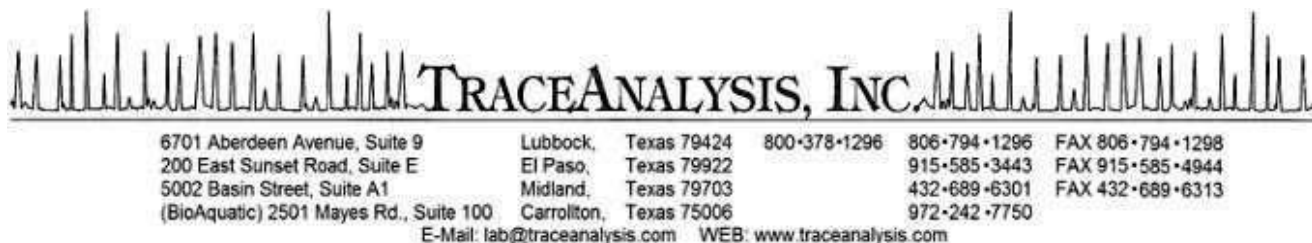
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
392447	Fresh	water	2015-04-27	16:30	2015-05-04
392448	Brine	water	2015-04-27	16:40	2015-05-04

### Sample: 392447 - Fresh

Param	Flag	Result	Units	RL
Chloride		<b>377</b>	mg/L	2.5
pH		<b>7.82</b>	s.u.	2
Specific Gravity		<b>0.9841</b>	g/ml	
Total Dissolved Solids		<b>884</b>	mg/L	2.5

### Sample: 392448 - Brine

Param	Flag	Result	Units	RL
Chloride		<b>185000</b>	mg/L	2.5
Dissolved Sodium		<b>101000</b>	mg/L	1
pH		<b>6.79</b>	s.u.	2
Specific Gravity		<b>1.194</b>	g/ml	
Total Dissolved Solids		<b>269000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: June 5, 2015

Work Order: 15050505



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station  
Project Number: Buckeye Fresh & Brine Station

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
392447	Fresh	water	2015-04-27	16:30	2015-05-04
392448	Brine	water	2015-04-27	16:40	2015-05-04

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Buckeye Fresh & Brine Station were received by TraceAnalysis, Inc. on 2015-05-04 and assigned to work order 15050505. Samples for work order 15050505 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	102846	2015-05-14 at 09:30	121554	2015-05-14 at 10:32
Na, Dissolved	S 6010C	103232	2015-06-04 at 14:09	122047	2015-06-05 at 13:17
pH	SM 4500-H+	102649	2015-05-06 at 16:48	121318	2015-05-06 at 16:51
Specific Gravity	ASTM D1429-95	102660	2015-05-07 at 10:00	121329	2015-05-07 at 10:10
TDS	SM 2540C	102686	2015-05-07 at 17:44	121355	2015-05-07 at 17:46

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15050505 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.



Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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Buckeye, NM

# Analytical Report

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 121554      Date Analyzed: 2015-05-14      Analyzed By: RL  
Prep Batch: 102846      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>377</b>	mg/L	10	2.50

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 121318      Date Analyzed: 2015-05-06      Analyzed By: HJ  
Prep Batch: 102649      Sample Preparation:      Prepared By: HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.82</b>	s.u.	1	2.00

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: Specific Gravity      Analytical Method: ASTM D1429-95      Prep Method: N/A  
QC Batch: 121329      Date Analyzed: 2015-05-07      Analyzed By: CF  
Prep Batch: 102660      Sample Preparation: 2015-05-07      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9841</b>	g/ml	1	0.000

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 121355      Date Analyzed: 2015-05-07      Analyzed By: HJ  
Prep Batch: 102686      Sample Preparation:      Prepared By: HJ

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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Buckeye, NM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>884</b>	mg/L	20	2.50

**Sample: 392448 - Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 121554      Date Analyzed: 2015-05-14      Analyzed By: RL  
Prep Batch: 102846      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>185000</b>	mg/L	5000	2.50

**Sample: 392448 - Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 122047      Date Analyzed: 2015-06-05      Analyzed By: RR  
Prep Batch: 103232      Sample Preparation: 2015-06-04      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>101000</b>	mg/L	1000	1.00

**Sample: 392448 - Brine**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 121318      Date Analyzed: 2015-05-06      Analyzed By: HJ  
Prep Batch: 102649      Sample Preparation:      Prepared By: HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>6.79</b>	s.u.	1	2.00

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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Buckeye, NM

**Sample: 392448 - Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	121329	Date Analyzed:	2015-05-07
Prep Batch:	102660	Sample Preparation:	2015-05-07
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.194</b>	g/ml	1	0.000

**Sample: 392448 - Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	121355	Date Analyzed:	2015-05-07
Prep Batch:	102686	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	HJ
		Prepared By:	HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>269000</b>	mg/L	2000	2.50

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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## Method Blanks

### Method Blank (1)      QC Batch: 121329

QC Batch: 121329      Date Analyzed: 2015-05-07      Analyzed By: CF  
Prep Batch: 102660      QC Preparation: 2015-05-07      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9884	g/ml	

### Method Blank (1)      QC Batch: 121355

QC Batch: 121355      Date Analyzed: 2015-05-07      Analyzed By: HJ  
Prep Batch: 102686      QC Preparation: 2015-05-07      Prepared By: HJ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 121554

QC Batch: 121554      Date Analyzed: 2015-05-14      Analyzed By: RL  
Prep Batch: 102846      QC Preparation: 2015-05-14      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.973	mg/L	2.5

### Method Blank (1)      QC Batch: 122047

QC Batch: 122047      Date Analyzed: 2015-06-05      Analyzed By: RR  
Prep Batch: 103232      QC Preparation: 2015-06-04      Prepared By: PM

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

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Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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## Duplicates

### Duplicates (1) Duplicated Sample: 392489

QC Batch: 121318 Date Analyzed: 2015-05-06 Analyzed By: HJ  
Prep Batch: 102649 QC Preparation: 2015-05-06 Prepared By: HJ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	9.09	9.19	s.u.	1	1	20

### Duplicates (1) Duplicated Sample: 392450

QC Batch: 121329 Date Analyzed: 2015-05-07 Analyzed By: CF  
Prep Batch: 102660 QC Preparation: 2015-05-07 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.008	1.018	g/ml	1	1	200

### Duplicates (1) Duplicated Sample: 392450

QC Batch: 121355 Date Analyzed: 2015-05-07 Analyzed By: HJ  
Prep Batch: 102686 QC Preparation: 2015-05-07 Prepared By: HJ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	32400	34100	mg/L	1000	5	10

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

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Buckeye Fresh & Brine Station

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 121355  
Prep Batch: 102686

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: HJ  
Prepared By: HJ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	963	mg/L	10	1000	<25.0	96	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	970	mg/L	10	1000	<25.0	97	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	0.973	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	0.973	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 122047  
Prep Batch: 103232

Date Analyzed: 2015-06-05  
QC Preparation: 2015-06-04

Analyzed By: RR  
Prepared By: PM

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.8	mg/L	1	52.5	<0.0197	108	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	54.4	mg/L	1	52.5	<0.0197	104	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



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Buckeye Fresh & Brine Station

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 392448

QC Batch: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	320000	mg/L	5000	125000	185000	108	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	316000	mg/L	5000	125000	185000	105	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 394405

QC Batch: 122047  
Prep Batch: 103232

Date Analyzed: 2015-06-05  
QC Preparation: 2015-06-04

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	703	mg/L	1	525	143	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	688	mg/L	1	525	143	104	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.00	100	98.6 - 101.4	2015-05-06

### Standard (CCV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.05	101	98.6 - 101.4	2015-05-06

### Standard (CCV-1)

QC Batch: 121554

Date Analyzed: 2015-05-14

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.8	99	90 - 110	2015-05-14

### Standard (CCV-2)

QC Batch: 121554

Date Analyzed: 2015-05-14

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.9	100	90 - 110	2015-05-14

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

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**Standard (ICV-1)**

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	52.5	103	90 - 110	2015-06-05

**Standard (CCV-1)**

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	50.5	99	90 - 110	2015-06-05

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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F	Description
---	-------------

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U	The analyte is not detected above the SDL
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## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
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5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

Company Name:                      Phone #:             

DRICE LLC  
Phone #: 505-892-6643

Address: (Street, City, Zip) | R10, Rancho N.M. 87124 Fax #: 505-527-6612

Contact Person:	Jing	E-mail:	zhangjing@china.com
Contact Person:		E-mail:	

Invoice to: **WASSER HUND INC.** P.O. 2140 LOUINGTON NM 88260

Project #:	NA
Project Name:	FRAGS 8 BIL NE BOCKEYE STATION

Project Location (including state):	Project EVE NM
Sampler Signature:	LWPATR

Project Location (including state): BOCKEYE NM

[illegible]

## ANALYSIS REQUEST

(Circle or Specify Method No.)

[illegible]

REMARKS:

**LAB USE ONLY**

70

Time: 4:47 p

Date: 6-1-15

Company: B+C

Received by: Billy Bender

Time: 11:00

Date: 5/

Company: *Price*

Relinquished by:

NST \_\_\_\_\_  
OBS \_\_\_\_\_  
COR \_\_\_\_\_

Time:

Date:

**Company:**

Received by:

Time:

Date:

Company:

Relinquished by:

☐ Dry Weight Basis Required

☐ TRRP Report Required

☐ Check If Special Reporting Limits Are Needed

Carrier #

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ADUJ 17N1010U

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: August 19, 2015

Work Order: 15081113



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station

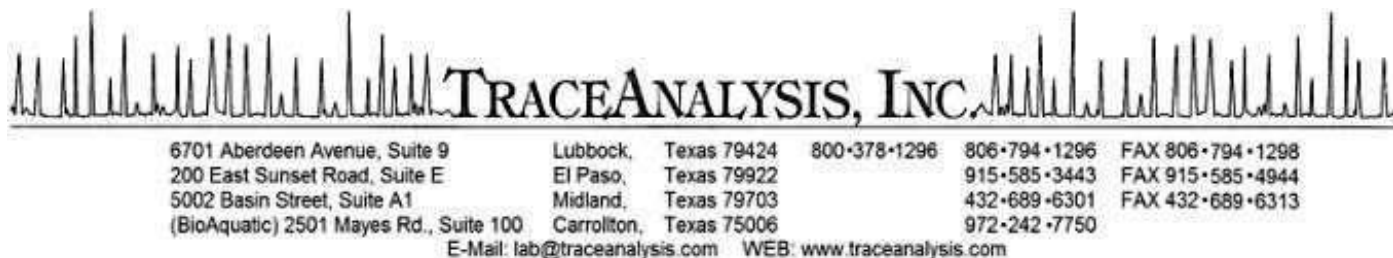
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
401720	Fresh	water	2015-07-08	16:20	2015-08-09
401721	Brine	water	2015-07-08	16:30	2015-08-09

### Sample: 401720 - Fresh

Param	Flag	Result	Units	RL
Chloride	B,H	<b>302</b>	mg/L	2.5
Dissolved Sodium		<b>156</b>	mg/L	1
pH		<b>7.77</b>	s.u.	2
Specific Gravity		<b>0.9842</b>	g/ml	
Total Dissolved Solids		<b>804</b>	mg/L	2.5

### Sample: 401721 - Brine

Param	Flag	Result	Units	RL
Dissolved Sodium		<b>124000</b>	mg/L	1



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: August 19, 2015

Work Order: 15081113



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station  
Project Number: Buckeye Fresh & Brine Station

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

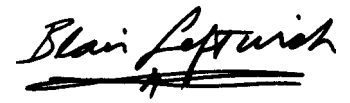
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
401720	Fresh	water	2015-07-08	16:20	2015-08-09
401721	Brine	water	2015-07-08	16:30	2015-08-09

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.



A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Buckeye Fresh & Brine Station were received by TraceAnalysis, Inc. on 2015-08-09 and assigned to work order 15081113. Samples for work order 15081113 were received intact at a temperature of 31.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	104957	2015-08-17 at 11:00	124129	2015-08-17 at 12:10
Na, Dissolved	S 6010C	104805	2015-08-12 at 14:05	124020	2015-08-13 at 16:07
pH	SM 4500-H+	104784	2015-08-11 at 17:18	123931	2015-08-11 at 17:19
Specific Gravity	ASTM D1429-95	104834	2015-08-13 at 10:45	123992	2015-08-13 at 10:50
TDS	SM 2540C	104944	2015-08-17 at 16:36	124118	2015-08-17 at 16:37

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15081113 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

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# Analytical Report

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-08-17	Analyzed By:	RL
QC Batch:	124129	Sample Preparation:		Prepared By:	RL
Prep Batch:	104957				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B,H	1,2,3,4,5	<b>302</b>	mg/L	10	2.50

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-08-13	Analyzed By:	RR
QC Batch:	124020	Sample Preparation:	2015-08-12	Prepared By:	RR
Prep Batch:	104805				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>156</b>	mg/L	10	1.00

## Sample: 401720 - Fresh

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.77</b>	s.u.	1	2.00

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-08-13	Analyzed By:	CF
QC Batch:	123992	Sample Preparation:		Prepared By:	CF
Prep Batch:	104834				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9842</b>	g/ml	1	0.000

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

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Buckeye Fresh & Brine Station

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**Sample: 401720 - Fresh**

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>804</b>	mg/L	20	2.50

**Sample: 401721 - Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved  
QC Batch: 124020  
Prep Batch: 104805

Analytical Method: S 6010C  
Date Analyzed: 2015-08-13  
Sample Preparation: 2015-08-12

Prep Method: S 3005A  
Analyzed By: RR  
Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>124000</b>	mg/L	1000	1.00

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

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## Method Blanks

**Method Blank (1)**      QC Batch: 123992

QC Batch: 123992      Date Analyzed: 2015-08-13      Analyzed By: CF  
Prep Batch: 104834      QC Preparation: 2015-08-13      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9856	g/ml	

**Method Blank (1)**      QC Batch: 124020

QC Batch: 124020      Date Analyzed: 2015-08-13      Analyzed By: RR  
Prep Batch: 104805      QC Preparation: 2015-08-12      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

**Method Blank (1)**      QC Batch: 124118

QC Batch: 124118      Date Analyzed:      Analyzed By:  
Prep Batch:      QC Preparation:      Prepared By:

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 124129

QC Batch: 124129      Date Analyzed: 2015-08-17      Analyzed By: RL  
Prep Batch: 104957      QC Preparation: 2015-08-17      Prepared By: RL

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

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Parameter		Flag	Cert	MDL Result	Units	RL
Chloride	B	B	1,2,3,4,5	0.971	mg/L	2.5

---

Duplicates

Duplicates (1)    Duplicated Sample: 401722

QC Batch:    123931  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	8.05	8.04	s.u.	1	0	20

Duplicates (1)    Duplicated Sample: 401722

QC Batch:    123992  
Prep Batch:    104834

Date Analyzed:    2015-08-13  
QC Preparation:    2015-08-13

Analyzed By:    CF  
Prepared By:    CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		0.9743	1.000	g/ml	1	3	200

Duplicates (1)    Duplicated Sample: 401720

QC Batch:    124118  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	804	804	mg/L	20	0	10



Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 124020  
Prep Batch: 104805

Date Analyzed: 2015-08-13  
QC Preparation: 2015-08-12

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	51.4	mg/L	1	50.0	<0.0197	103	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	51.0	mg/L	1	50.0	<0.0197	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 124118  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	999	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	987	mg/L	10	1000	<25.0	99	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 124129  
Prep Batch: 104957

Date Analyzed: 2015-08-17  
QC Preparation: 2015-08-17

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.9	mg/L	1	25.0	0.971	96	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.1	mg/L	1	25.0	0.971	96	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

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Buckeye, NM

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 401686

QC Batch: 124020  
Prep Batch: 104805

Date Analyzed: 2015-08-13  
QC Preparation: 2015-08-12

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	631	mg/L	1	500	135	99	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	620	mg/L	1	500	135	97	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 402139

QC Batch: 124129  
Prep Batch: 104957

Date Analyzed: 2015-08-17  
QC Preparation: 2015-08-17

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3270	mg/L	100	2500	657	104	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3260	mg/L	100	2500	657	104	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

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Buckeye Fresh & Brine Station

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## Calibration Standards

### Standard (CCV-1)

QC Batch: 123931

Date Analyzed:

Analyzed By:

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.06	101	98.6 - 101.4	2015-08-11

### Standard (ICV-1)

QC Batch: 124020

Date Analyzed: 2015-08-13

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	25.5	26.1	102	90 - 110	2015-08-13

### Standard (CCV-1)

QC Batch: 124020

Date Analyzed: 2015-08-13

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	25.0	23.5	94	90 - 110	2015-08-13

### Standard (CCV-1)

QC Batch: 124129

Date Analyzed: 2015-08-17

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.5	98	90 - 110	2015-08-17

Standard (CCV-2)

QC Batch: 124129				Date Analyzed: 2015-08-17			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.1	100	90 - 110	2015-08-17

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

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[illegible]

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

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## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: November 12, 2015

Work Order: 15102712



Project Location: Buckeye & Tatum NM  
Project Name: Brine Well 3rd QT. Sample  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
407093	BW-22 Tatum Fresh	water	2015-10-23	13:15	2015-10-26
407094	BW-22 Tatum Brine	water	2015-10-23	13:20	2015-10-26
407095	BW-4 Buckeye Fresh	water	2015-10-23	17:55	2015-10-26
407096	BW-4 Buckeye Brine	water	2015-10-23	18:00	2015-10-26

### Sample: 407093 - BW-22 Tatum Fresh

Param	Flag	Result	Units	RL
Chloride		<b>76.6</b>	mg/L	2.5
Density		<b>0.978</b>	g/ml	
pH		<b>7.79</b>	s.u.	2
Total Dissolved Solids		<b>659</b>	mg/L	2.5

### Sample: 407094 - BW-22 Tatum Brine

Param	Flag	Result	Units	RL
Chloride		<b>18000</b>	mg/L	2.5
Density		<b>1.02</b>	g/ml	
Dissolved Sodium		<b>12500</b>	mg/L	1
pH		<b>6.99</b>	s.u.	2
Total Dissolved Solids		<b>37000</b>	mg/L	2.5

### Sample: 407095 - BW-4 Buckeye Fresh

---

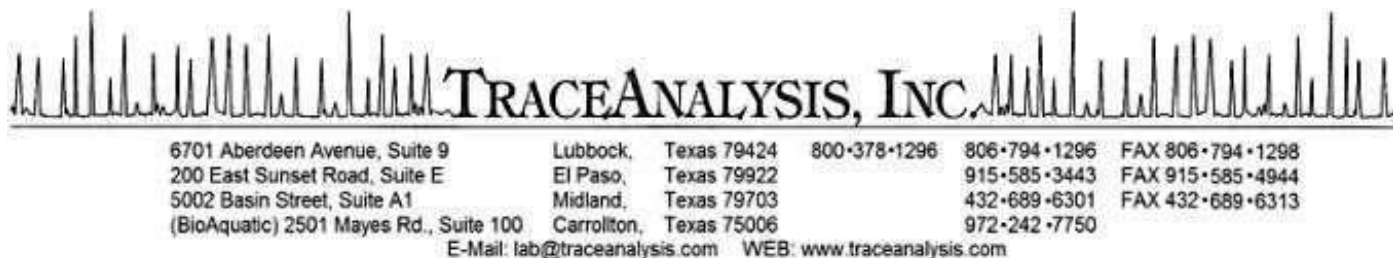
Param	Flag	Result	Units	RL
Chloride		<b>280</b>	mg/L	2.5
Density		<b>0.997</b>	g/ml	
pH		<b>7.61</b>	s.u.	2
Total Dissolved Solids		<b>868</b>	mg/L	2.5

---

**Sample: 407096 - BW-4 Buckeye Brine**

Param	Flag	Result	Units	RL
Chloride		<b>176000</b>	mg/L	2.5
Density		<b>1.18</b>	g/ml	
Dissolved Sodium		<b>108000</b>	mg/L	1
pH		<b>6.76</b>	s.u.	2
Total Dissolved Solids		<b>310000</b>	mg/L	2.5

---



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: November 12, 2015

Work Order: 15102712



Project Location: Buckeye & Tatum NM  
Project Name: Brine Well 3rd QT. Sample  
Project Number: BW-4 & BW-22

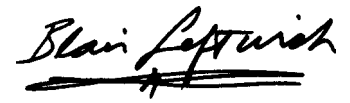
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
407093	BW-22 Tatum Fresh	water	2015-10-23	13:15	2015-10-26
407094	BW-22 Tatum Brine	water	2015-10-23	13:20	2015-10-26
407095	BW-4 Buckeye Fresh	water	2015-10-23	17:55	2015-10-26
407096	BW-4 Buckeye Brine	water	2015-10-23	18:00	2015-10-26

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style and is underlined with a thick, dark line.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well 3rd QT. Sample were received by TraceAnalysis, Inc. on 2015-10-26 and assigned to work order 15102712. Samples for work order 15102712 were received intact at a temperature of 3.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	106703	2015-11-04 at 13:00	126115	2015-11-04 at 13:45
Density	ASTM D854-92	106620	2015-11-02 at 13:10	126018	2015-11-02 at 13:15
Na, Dissolved	S 6010C	106726	2015-11-06 at 12:43	126288	2015-11-12 at 10:10
pH	SM 4500-H+	106519	2015-10-27 at 17:30	125907	2015-10-27 at 17:31
TDS	SM 2540C	106564	2015-10-29 at 12:04	126012	2015-10-29 at 12:00
TDS	SM 2540C	106671	2015-11-03 at 16:30	126079	2015-11-03 at 16:31

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15102712 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

# Analytical Report

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-11-04	Analyzed By:	RL
QC Batch:	126115	Sample Preparation:		Prepared By:	RL
Prep Batch:	106703				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	76.6	mg/L	5	2.50

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D854-92	Prep Method:	N/A
Analysis:	Density	Date Analyzed:	2015-11-02	Analyzed By:	CF
QC Batch:	126018	Sample Preparation:		Prepared By:	CF
Prep Batch:	106620				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.978	g/ml	1	0.00

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-10-27	Analyzed By:	LQ
QC Batch:	125907	Sample Preparation:		Prepared By:	LQ
Prep Batch:	106519				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	7.79	s.u.	1	2.00

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2015-10-29	Analyzed By:	LQ
QC Batch:	126012	Sample Preparation:		Prepared By:	LQ
Prep Batch:	106564				



Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>659</b>	mg/L	10	2.50

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 126115      Date Analyzed: 2015-11-04      Analyzed By: RL  
Prep Batch: 106703      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>18000</b>	mg/L	500	2.50

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 126018      Date Analyzed: 2015-11-02      Analyzed By: CF  
Prep Batch: 106620      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.02</b>	g/ml	1	0.00

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 126288      Date Analyzed: 2015-11-12      Analyzed By: RR  
Prep Batch: 106726      Sample Preparation: 2015-11-06      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>12500</b>	mg/L	100	1.00

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	125907	Date Analyzed:	2015-10-27
Prep Batch:	106519	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>6.99</b>	s.u.	1	2.00

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	126012	Date Analyzed:	2015-10-29
Prep Batch:	106564	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>37000</b>	mg/L	1000	2.50

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	126115	Date Analyzed:	2015-11-04
Prep Batch:	106703	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>280</b>	mg/L	10	2.50

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	126018	Date Analyzed:	2015-11-02
Prep Batch:	106620	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

*continued . . .*

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

*sample 407095 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.997</b>	g/ml	1	0.00

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	125907	Date Analyzed:	2015-10-27	Analyzed By:	LQ
Prep Batch:	106519	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.61</b>	s.u.	1	2.00

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	126012	Date Analyzed:	2015-10-29	Analyzed By:	LQ
Prep Batch:	106564	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>868</b>	mg/L	20	2.50

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	126115	Date Analyzed:	2015-11-04	Analyzed By:	RL
Prep Batch:	106703	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>176000</b>	mg/L	5000	2.50

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Density	Analytical Method:	ASTM D854-92	Prep Method:	N/A
QC Batch:	126018	Date Analyzed:	2015-11-02	Analyzed By:	CF
Prep Batch:	106620	Sample Preparation:		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			1.18	g/ml	1	0.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	126288	Date Analyzed:	2015-11-12	Analyzed By:	RR
Prep Batch:	106726	Sample Preparation:	2015-11-06	Prepared By:	RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	108000	mg/L	1000	1.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	125907	Date Analyzed:	2015-10-27	Analyzed By:	LQ
Prep Batch:	106519	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	6.76	s.u.	1	2.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	126079	Date Analyzed:	2015-11-03	Analyzed By:	LQ
Prep Batch:	106671	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	310000	mg/L	2000	2.50

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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## Method Blanks

### Method Blank (1)      QC Batch: 126012

QC Batch:	126012	Date Analyzed:	2015-10-29	Analyzed By:	LQ
Prep Batch:	106564	QC Preparation:	2015-10-29	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 126018

QC Batch:	126018	Date Analyzed:	2015-11-02	Analyzed By:	CF
Prep Batch:	106620	QC Preparation:	2015-11-02	Prepared By:	CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 126079

QC Batch:	126079	Date Analyzed:	2015-11-03	Analyzed By:	LQ
Prep Batch:	106671	QC Preparation:	2015-11-03	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 126115

QC Batch:	126115	Date Analyzed:	2015-11-04	Analyzed By:	RL
Prep Batch:	106703	QC Preparation:	2015-11-04	Prepared By:	RL

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.323	mg/L	2.5

Method Blank (1)      QC Batch: 126288

QC Batch: 126288	Date Analyzed: 2015-11-12	Analyzed By: RR
Prep Batch: 106726	QC Preparation: 2015-11-06	Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

## Duplicates

### Duplicates (1) Duplicated Sample: 406966

QC Batch: 125907 Date Analyzed: 2015-10-27 Analyzed By: LQ  
Prep Batch: 106519 QC Preparation: 2015-10-27 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	6.95	6.79	s.u.	1	2	20

### Duplicates (1) Duplicated Sample: 407191

QC Batch: 126012 Date Analyzed: 2015-10-29 Analyzed By: LQ  
Prep Batch: 106564 QC Preparation: 2015-10-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	3320	3180	mg/L	50	4	10

### Duplicates (1) Duplicated Sample: 407096

QC Batch: 126018 Date Analyzed: 2015-11-02 Analyzed By: CF  
Prep Batch: 106620 QC Preparation: 2015-11-02 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.19	1.18	g/ml	1	1	20

### Duplicates (1) Duplicated Sample: 407287

QC Batch: 126079 Date Analyzed: 2015-11-03 Analyzed By: LQ  
Prep Batch: 106671 QC Preparation: 2015-11-03 Prepared By: LQ

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1190	1180	mg/L	20	1	10



Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 126012  
Prep Batch: 106564

Date Analyzed: 2015-10-29  
QC Preparation: 2015-10-29

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	1000	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	1000	mg/L	10	1000	<25.0	100	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 126079  
Prep Batch: 106671

Date Analyzed: 2015-11-03  
QC Preparation: 2015-11-03

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	992	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	992	mg/L	10	1000	<25.0	99	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 126115  
Prep Batch: 106703

Date Analyzed: 2015-11-04  
QC Preparation: 2015-11-04

Analyzed By: RL  
Prepared By: RL

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	24.7	mg/L	1	25.0	<0.323	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	24.9	mg/L	1	25.0	<0.323	100	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 126288  
Prep Batch: 106726

Date Analyzed: 2015-11-12  
QC Preparation: 2015-11-06

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	53.0	mg/L	1	52.5	<0.0197	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	53.2	mg/L	1	52.5	<0.0197	101	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: November 12, 2015  
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Work Order: 15102712  
Brine Well 3rd QT. Sample

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 407240

QC Batch: 126115  
Prep Batch: 106703

Date Analyzed: 2015-11-04  
QC Preparation: 2015-11-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	153	mg/L	5	125	26.2	101	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	153	mg/L	5	125	26.2	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 407349

QC Batch: 126288  
Prep Batch: 106726

Date Analyzed: 2015-11-12  
QC Preparation: 2015-11-06

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	874	mg/L	1	525	377	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	852	mg/L	1	525	377	90	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (CCV-1)

QC Batch: 125907

Date Analyzed: 2015-10-27

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	s.u.	7.00	7.01	100	98.6 - 101.4	2015-10-27

### Standard (CCV-1)

QC Batch: 126115

Date Analyzed: 2015-11-04

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.1	100	90 - 110	2015-11-04

### Standard (CCV-2)

QC Batch: 126115

Date Analyzed: 2015-11-04

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	24.6	98	90 - 110	2015-11-04

### Standard (ICV-1)

QC Batch: 126288

Date Analyzed: 2015-11-12

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	27.5	26.8	97	90 - 110	2015-11-12

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	27.5	27.8	101	90 - 110	2015-11-12

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

---

F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.





# Summary Report

## (Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

### Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		1820	mg/L	2.5
Density		0.980	g/ml	
pH		7.81	s.u.	2
Total Dissolved Solids		3240	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Chloride	H	149000	mg/L	2.5
Density	1	1.16	g/ml	
Dissolved Sodium		106000	mg/L	1
pH		6.91	s.u.	2

*continued ...*

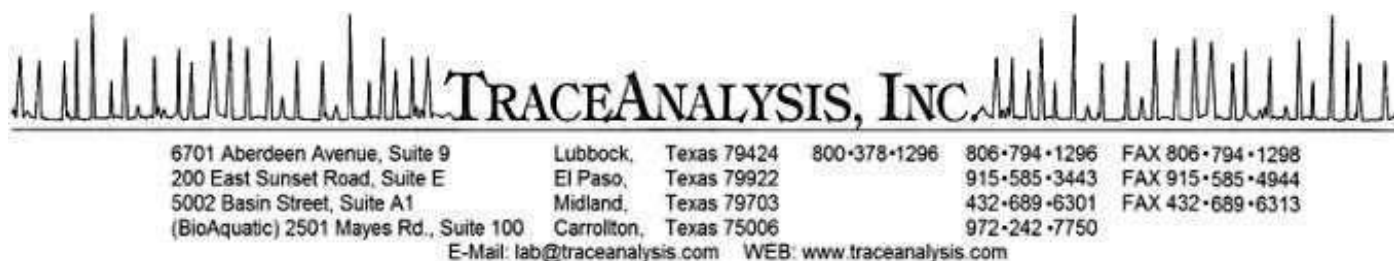
<sup>1</sup>Analyzed out of hold time.

---

*sample 414779 continued ...*

Param	Flag	Result	Units	RL
Total Dissolved Solids		<b>263000</b>	mg/L	2.5

---



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

(Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

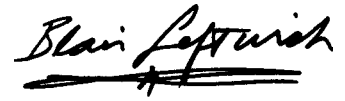
### Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal stroke at the end.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Chloride (IC)	E 300.0	109290	2016-03-23 at 14:00	129049	2016-03-23 at 15:09
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Density	ASTM D854-92	109263	2016-03-23 at 11:10	129013	2016-03-23 at 11:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
pH	SM 4500-H+	109282	2016-03-23 at 12:30	129028	2016-03-23 at 12:30
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30
TDS	SM 2540C	109281	2016-03-23 at 16:30	129044	2016-03-23 at 16:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2016-02-23	Analyzed By:	RL
QC Batch:	128419	Sample Preparation:		Prepared By:	RL
Prep Batch:	108743				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	1820	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	ASTM D854-92	Prep Method:	N/A
Analysis:	Density	Date Analyzed:	2016-02-23	Analyzed By:	CF
QC Batch:	128394	Sample Preparation:		Prepared By:	CF
Prep Batch:	108721				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.980	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2016-02-22	Analyzed By:	LQ
QC Batch:	128366	Sample Preparation:		Prepared By:	LQ
Prep Batch:	108694				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	7.81	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2016-02-23	Analyzed By:	LQ
QC Batch:	128463	Sample Preparation:		Prepared By:	LQ
Prep Batch:	108734				



Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      Sample Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>149000</b>	mg/L	5000	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density		1	<b>1.16</b>	g/ml	1	0.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      Sample Preparation: 2016-02-22      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>106000</b>	mg/L	1000	1.00

Sample: 414779 - Brine Water

Laboratory: Lubbock

Analysis: pH

QC Batch: 129028

Prep Batch: 109282

Analytical Method: SM 4500-H+

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	6.91	s.u.	1	2.00

Sample: 414779 - Brine Water

Laboratory: Lubbock

Analysis: TDS

QC Batch: 129044

Prep Batch: 109281

Analytical Method: SM 2540C

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	263000	mg/L	2000	2.50

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch:	128362	Date Analyzed:	2016-02-22	Analyzed By:	RR
Prep Batch:	108686	QC Preparation:	2016-02-22	Prepared By:	PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch:	128394	Date Analyzed:	2016-02-23	Analyzed By:	CF
Prep Batch:	108721	QC Preparation:	2016-02-23	Prepared By:	CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch:	128419	Date Analyzed:	2016-02-23	Analyzed By:	RL
Prep Batch:	108743	QC Preparation:	2016-02-23	Prepared By:	RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch:	128463	Date Analyzed:	2016-02-23	Analyzed By:	LQ
Prep Batch:	108734	QC Preparation:	2016-02-23	Prepared By:	LQ

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129013

QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      QC Preparation: 2016-03-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.979	g/ml	

**Method Blank (1)**      QC Batch: 129044

QC Batch: 129044      Date Analyzed: 2016-03-23      Analyzed By: LQ  
Prep Batch: 109281      QC Preparation: 2016-03-23      Prepared By: LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129049

QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      QC Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1090	1120	mg/L	20	3	10

### Duplicates (1) Duplicated Sample: 414781

QC Batch: 129013 Date Analyzed: 2016-03-23 Analyzed By: CF  
Prep Batch: 109263 QC Preparation: 2016-03-23 Prepared By: CF

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density	2	0.978	0.996	g/ml	1	2	20

**Duplicates (1)**    Duplicated Sample: 416191

QC Batch: 129028                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109282                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.18	7.18	s.u.	1	4	20

**Duplicates (1)**    Duplicated Sample: 416188

QC Batch: 129044                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109281                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	4630	4670	mg/L	50	1	10

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

Report Date: March 24, 2016  
Brine Well

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Brine Well

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Buckeye New Mexico

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129044  
Prep Batch: 109281

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	995	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1020	mg/L	10	1000	<25.0	102	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.3	mg/L	1	25.0	<0.323	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	24.2	mg/L	1	25.0	<0.323	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



Report Date: March 24, 2016  
Brine Well

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Brine Well

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 416184

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

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Brine Well

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Buckeye New Mexico

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3570	mg/L	100	2500	1100	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3540	mg/L	100	2500	1100	98	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.7	103	90 - 110	2016-02-23

Report Date: March 24, 2016  
Brine Well

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### Standard (CCV-2)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.9	104	90 - 110	2016-02-23

### Standard (CCV-1)

QC Batch: 129028

Date Analyzed: 2016-03-23

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.03	100	98.6 - 101.4	2016-03-23

### Standard (CCV-1)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

### Standard (CCV-2)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

## Appendix

### Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

### Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2015-066	Lubbock

### Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Result Comments**

- 1 Analyzed out of hold time.
- 2 Analyzed out of hold time.

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 16022210

# TraceAnalysis, Inc.

email: lab@traceanalysis.com

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

Branch:  
3403 Industrial  
Hobbs, NM 87401  
Tel (575) 392-7500  
Fax (575) 392-4506

Company Name: PRICE LLC Phone #: 832 657 4873

Address: (Street, City, Zip) 310 ENCANTADO RIDGE CT NE 87124 Fax #: 505 892 6643

Contact Person: LESTER WAYNE PRICE JR E-mail: wprice23@hotmail.com

Invoice to: (If different from above) RANDY CORPORATION

Project #: NA Project Name: BRINE WELL

Project Location (including state): ROCKEYE NM Sampler Signature: LUPAK

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD					SAMPLING	
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE	DATE	TIME
44778	FRESH WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM
779	BRINE WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM

## ANALYSIS REQUEST (Circle or Specify Method No.)

MTBE 8021 / 602 / 8260 / 624	BTEX 8021 / 602 / 8260 / 624	TPH 418.1 / TX1005 / TX1005 Ext(C35)	TPH 8015 GRO / DRO / TVHC	PAH 8270 / 625	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260 / 624	GC/MS Semi. Vol. 8270 / 625	PCBs 8082 / 608	Pesticides 8081 / 608	BOD, TSS, pH	Moisture Content	Cl, F, SO <sub>4</sub> , NO <sub>3</sub> -N, NO <sub>2</sub> -N, PO <sub>4</sub> -P, Alkalinity	Na, Ca, Mg, K, TDS, EC	X Chloride Density Pl, TDS	X Dissolved Sodium		Turn Around Time if different from standard	Hold
------------------------------	------------------------------	--------------------------------------	---------------------------	----------------	---	-------------------------------------	----------------	---------------------	-----------------	-----	-----------------------	-----------------------------	-----------------	-----------------------	--------------	------------------	---	------------------------	----------------------------	--------------------	--	---	------

Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: KLS	Company: BTK	Date: 2-18-16	Time: 1:03	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7

LAB USE ONLY	Inject Y/N	Headspace Y/N	Log-in-Review
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REMARKS:

COC # 1

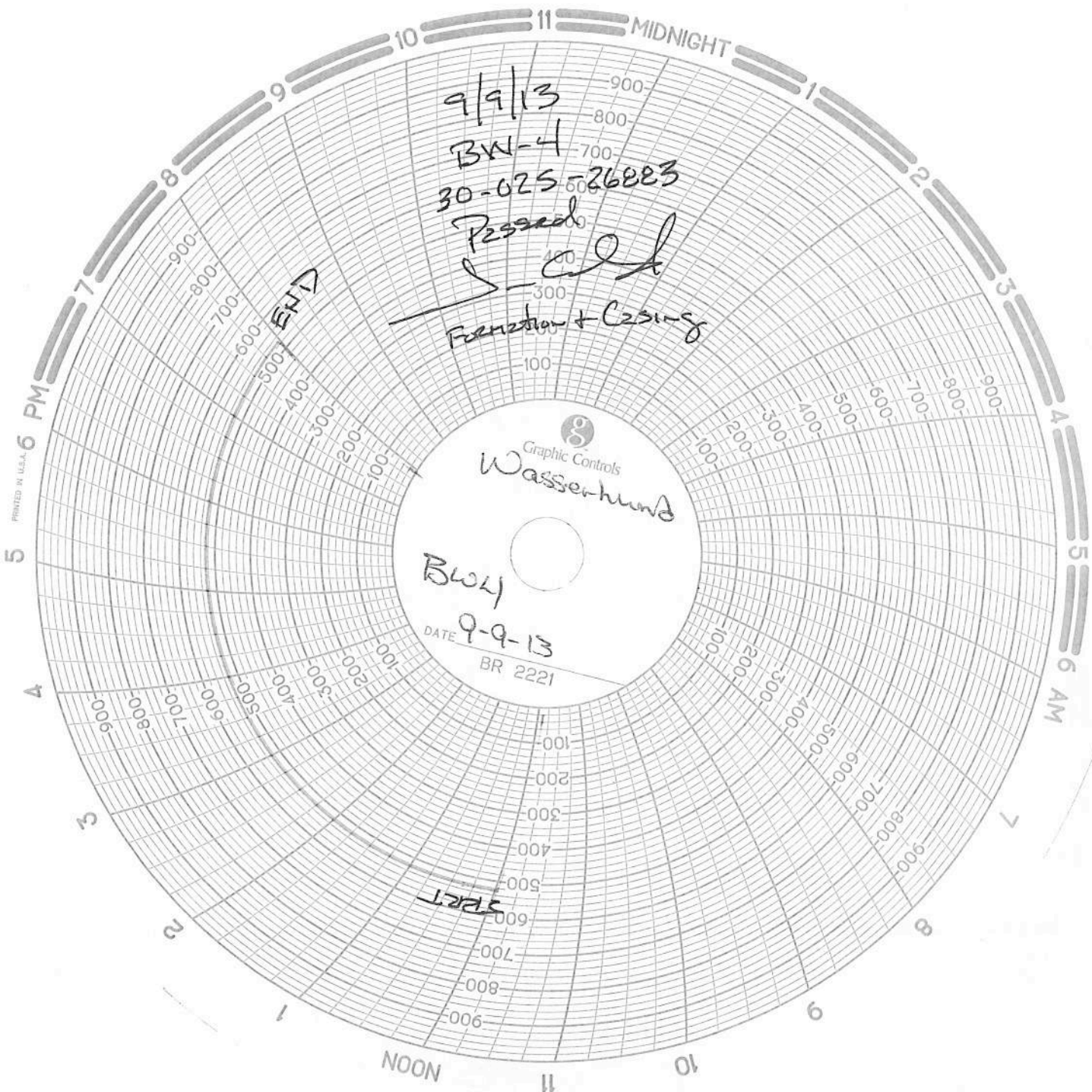
Dry Weight Basis Required  
TRRP Report Required  
Check If Special Reporting Limits Are Needed

REPORT INV. & COC e-mail FAX: 2-25-16 FAX: 2-25-16

## Appendix “D”

- 2013 MIT Chart





9/9/13  
BW-4  
30-025-26883  
Passed

*[Signature]*  
Friction + Casing

END

BLU  
DATE 9-9-13  
BR 2221

START

Graphic Controls  
Wasserhund

PRINTED IN U.S.A.

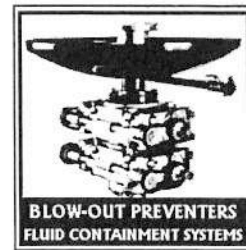
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

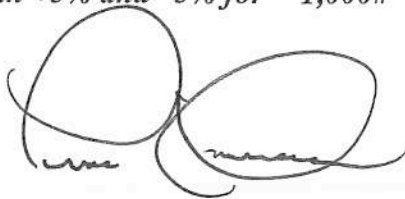
**Unit:** 2

**Model:** 8" Chart recorder

**Pressure Rating:** 1,000#

**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*



\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

2015 BW-04 AOR Review- Well Status List

up-dated Apr 03, 2016

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	No Action Required no

3 Total # of wells in adjacent quarter-sections

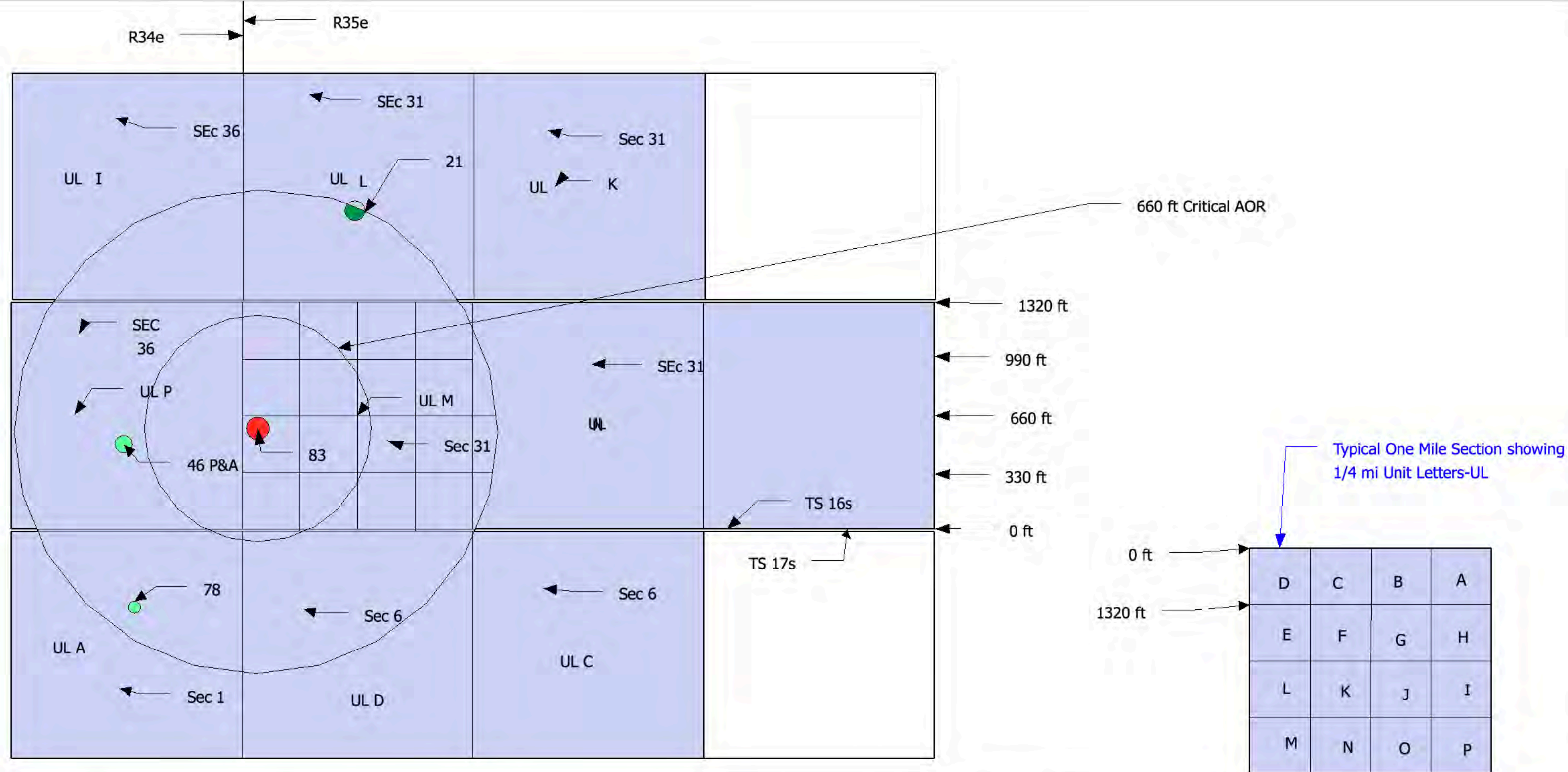
3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

Notes:

\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.





Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2015	Location: UL M-Sec 31-Ts16s-R35e	



Submit 1 Copy To Appropriate District Office  
District I – (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II – (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III – (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV – (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
Revised July 18, 2013

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

WELL API NO. 30-025-35678
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 28798
7. Lease Name or Unit Agreement Name North Vacuum Abo North Unit (form. State VII, 7)
8. Well Number 62
9. OGRID Number
10. Pool name or Wildcat North Vacuum (Abo) (61760)

SUNDRY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well: Oil Well ☐ Gas Well ☒ Other **HOBBS OCD**

2. Name of Operator  
Lime Rock Resources II-A, LP **MAR 18 2016**

3. Address of Operator  
1111 Bagby St., Ste. 4600; Houston, TX 77002 **RECEIVED**

4. Well Location  
Unit Letter A : 660 feet from the N line and 660 feet from the E line  
Section 1 Township 17S Range 34E NMPM County Lea

11. Elevation (Show whether DR, RKB, RT, GR, etc.)  
4051' KB 4033' GL

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐  
CLOSED-LOOP SYSTEM ☐  
OTHER: Recompletion ☒

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☐  
OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Our plan is to recomplete the well, into the North Vacuum (Abo) formation, utilizing the following procedure:

- 1) Dump bail 35' cmt on pkr @ 12406'
- 2) Set CIBP @ +12000'
- 3) Spot 20' cmt on top of CIBP
- 4) Shoot sqz perfs @ 9600' & sqz across Abo formation up to +/-8700'
- 5) Perforate Abo formation from +8820'-8950'
- 6) Return well to production

Spud Date:

4/15/16

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Carla Martin TITLE Carla Martin/Regulatory Tech DATE 3/17/16

Type or print name \_\_\_\_\_ E-mail address: \_\_\_\_\_ PHONE: \_\_\_\_\_

**For State Use Only**

APPROVED BY: [Signature] TITLE Petroleum Engineer DATE 03/22/16

Conditions of Approval (if any):

**MAR 22 2016**



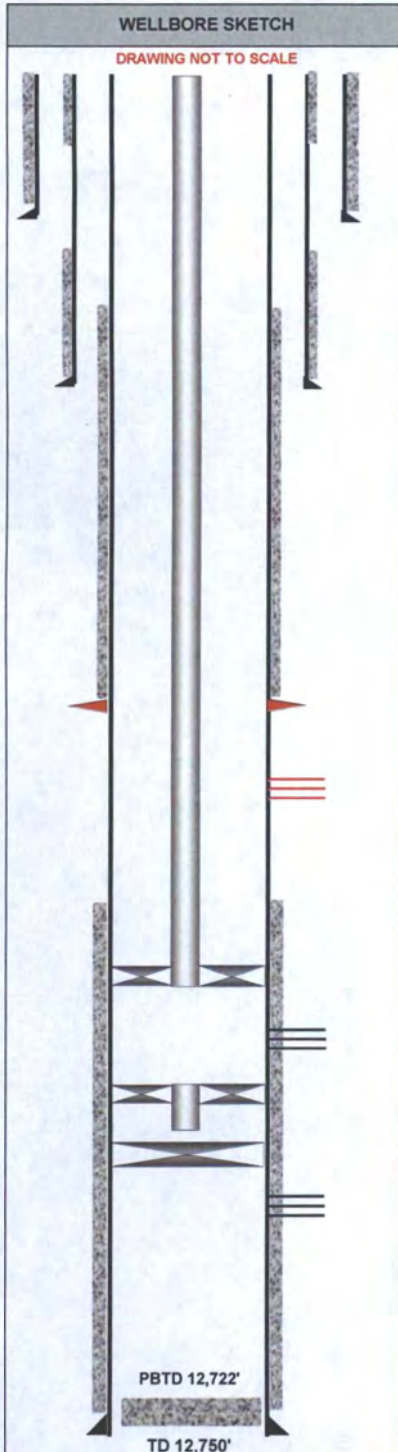
OPERATOR: <b>LRR II-A, LP</b>	LEASE / WELL: <b>State VII, 7 (became NVANU 62)</b>	SURVEY: <b>Sec 1, T17S, R34E</b>	Property No.
COMPLETION RIG:	COUNTY / STATE: <b>Lea County, NM</b>	SURFACE LOCATION: <b>660' FNL &amp; 660' FEL</b>	FIELD: <b>North Vacuum</b>

DIRECTIONAL DATA		
KOP:	STRAIGHT HOLE	
MAX DEV:	deg @	MD
DEV @ PERFS:	deg @	MD
DEV @ PERFS:	deg @	MD
DEV @ PERFS:	deg @	MD

DRILLING / COMPLETION FLUID		
DRILLING FLUID:	ppg -	
DRILLING FLUID:	ppg -	
DRILLING FLUID:	ppg -	
COMPLETION FLUID:	ppg -	
PACKER FLUID:	ppg -	

TUBULAR DATA							
Tubulars	Size	Weight	Grade	Thread	Top	MD	SKS
DRIVE PIPE							
CONDUCTOR	20"				0'	92'	
SURFACE	11-3/4"	42#	H-40	STC	0'	1610'	790
INTERMEDIATE	8-5/8"	32#	K-55	LTC	0'	5020'	1,190
PRODUCTION	4-1/2"	11.6#	P-110	LTC	0'	12,732'	1,380
PROD TIEBACK							
PROD LINER							
PROD LINER							
TUBING	2-3/8"	4.7#	N-80	8rd	0'	12400'	
COILED TUBING							

WELLHEAD DATA	
TYPE	
WP	
T	FLANGE:
R	
E	THREAD:
E	
TUBING HANGER:	
BTM FLANGE:	
BPV PROFILE:	
ELEVATIONS:	GROUND ELEVATION
RKB-DF:	
RKB-ELEV:	<b>4033'</b>



EQUIPMENT DESCRIPTION	ID	OD	DEPTH TVD	DEPTH MD
<b>TA'd Well</b>				
<i>hole in 8-5/8" csg @ 700' - pumped 300 sxs down 4-1/2" x 8-5/8" annulus, circ to surface</i>				
<b>11-3/4" surface csg @ 1610' - cmt'd w/790 sxs to surface</b>				
<b>TOC @ 1740' (TS)</b>				
<b>TOC @ 2000'</b>				
<b>8-5/8" intermediate csg @ 5020' - cmt'd w/1190 sxs</b>				
Tubing Detail (Sept-02):				
386 jts 2-3/8" 4.7# N-80 8rd tubing				
PX plug				
4-1/2" AS1-X retrievable packer @ 12,185' w/1.875" profile nipple w/ PX plug				
6' 2-3/8" sub				
1.875" SN				
4' 2-3/8" sub				
<i>DV tool @ 8498'</i>				
<i>Proposed perfs ~8820'-8950'</i>				
<b>TOC @ 11,475'</b>				
<b>Atoka perfs @ 12,280'-98'</b>				
Permanent packer @ 12,406' w/1 jt 2-3/8" tubing, & 4' sub				
<b>CIBP @ 12,469'</b>				
Morrow perfs @ 12,551'-57', 12,604'-08', 12,612'-18', & 12,621'-27' (6 spf)				
<i>20 bbls 15% HCl, 10 bbls Morrow blend 10% HCl, 70/30 Methanol, 3600 gal</i>				
<i>50Q CO2 Morrow blend</i>				
<b>4-1/2" production csg @ 12,732' - cmt'd w/1380 sxs</b>				
COMMENTS:	Working Interest:	PLUG BACK DEPTH:		
API # 30-025-35678	Net Revenue Interest:	TOTAL WELL DEPTH:		
Property#		PREPARED OR	DATE:	
Spud Date:		REVISED BY:		
Completed in		cml		9/2/2015

**CURRENT**

DIRECTIONS TO LOCATION: Directions to well needed.



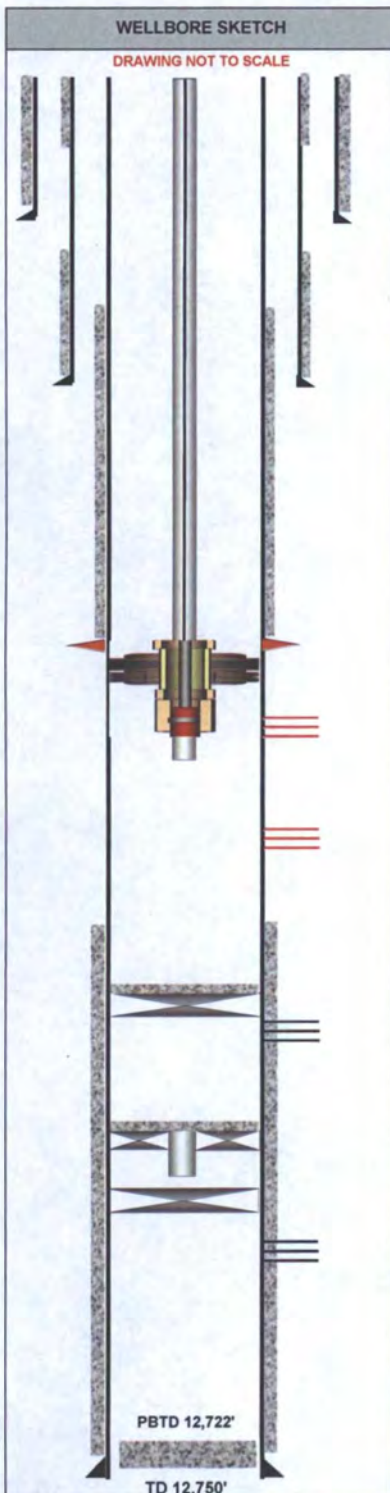
OPERATOR: <b>LRR II-A, LP</b>	LEASE / WELL: <b>NVANU 62 (was State VII, 7)</b>	SURVEY: <b>Sec 1, T17S, R34E</b>	Property No.
COMPLETION RIG:	COUNTY / STATE: <b>Lea County, NM</b>	SURFACE LOCATION: <b>660' FNL &amp; 660' FEL</b>	FIELD: <b>North Vacuum</b>

DIRECTIONAL DATA			
KOP:	STRAIGHT HOLE		
MAX DEV:	deg @	MD	
DEV @ PERFS:	deg @	MD	
DEV @ PERFS:	deg @	MD	
DEV @ PERFS:	deg @	MD	

DRILLING / COMPLETION FLUID			
DRILLING FLUID:	ppg -		
DRILLING FLUID:	ppg -		
DRILLING FLUID:	ppg -		
COMPLETION FLUID:	ppg -		
PACKER FLUID:	ppg -		

TUBULAR DATA							
Tubulars	Size	Weight	Grade	Thread	Top	MD	SKS
DRIVE PIPE							
CONDUCTOR	20"				0'	92'	
SURFACE	11-3/4"	42#	H-40	STC	0'	1610'	790
INTERMEDIATE	8-5/8"	32#	K-55	LTC	0'	5020'	1,190
PRODUCTION	4-1/2"	11.6#	P-110	LTC	0'	12,732'	1,380
PROD TIEBACK							
PROD LINER							
PROD LINER							
TUBING	2-3/8"	4.7#	N-80	8rd	0'	12400'	
COILED TUBING							

WELLHEAD DATA			
TYPE	WP		
T	C A P	FLANGE:	
R		THREAD:	
E			
E			
TUBING HANGER:			
BTM FLANGE:			
BPV PROFILE:			
ELEVATIONS:			
RKB-DF:			
RKB-ELEV:			GROUND ELEVATION 4033'



EQUIPMENT DESCRIPTION	ID	OD	DEPTH TVD	DEPTH MD
<b>PROPOSED WELL</b>				
hole in 8-5/8" csg @ 700' - pumped 300 sxs down 4-1/2" x 8-5/8" annulus, circ to surface				
11-3/4" surface csg @ 1610' - cmt'd w/790 sxs to surface				
TOC @ 1740' (TS)				
TOC @ 2000'				
8-5/8" intermediate csg @ 5020' - cmt'd w/1190 sxs				
Proposed Tubular Installation:				
Rod pump, TA @ ~8450', SN@ ~8975', & EOT @ ~9150'				
DV tool @ 8498'				
Proposed perfs ~8920'-8950'				
sqz perfs @ 9600' - circ cmt to above Abo				
TOC @ 11,475'				
Proposed CIBP @ 12,230' + 20' cmt				
Atoka perfs @ 12,280'-98'				
dump ball 35' cmt on pkr				
Permanent packer @ 12,406' w/1 jt 2-3/8" tubing, & 4' sub				
CIBP @ 12,469'				
Morrow perfs @ 12,551'-57', 12,604'-08', 12,612'-18', & 12,621'-27' (6 spf)				
20 bbls 15% HCl, 10 bbls Morrow blend 10% HCl, 70/30 Methanol, 3600 gal				
50Q CO2 Morrow blend				
4-1/2" production csg @ 12,732' - cmt'd w/1380 sxs				
COMMENTS:	Working Interest:	PLUG BACK DEPTH:		
API # 30-025-35678	Net Revenue Interest:	TOTAL WELL DEPTH:		
Property#		PREPARED OR	DATE:	
Spud Date:		REVISED BY:		
Completed in		cml		3/17/2016

**PROPOSED**

DIRECTIONS TO LOCATION: Directions to well needed.

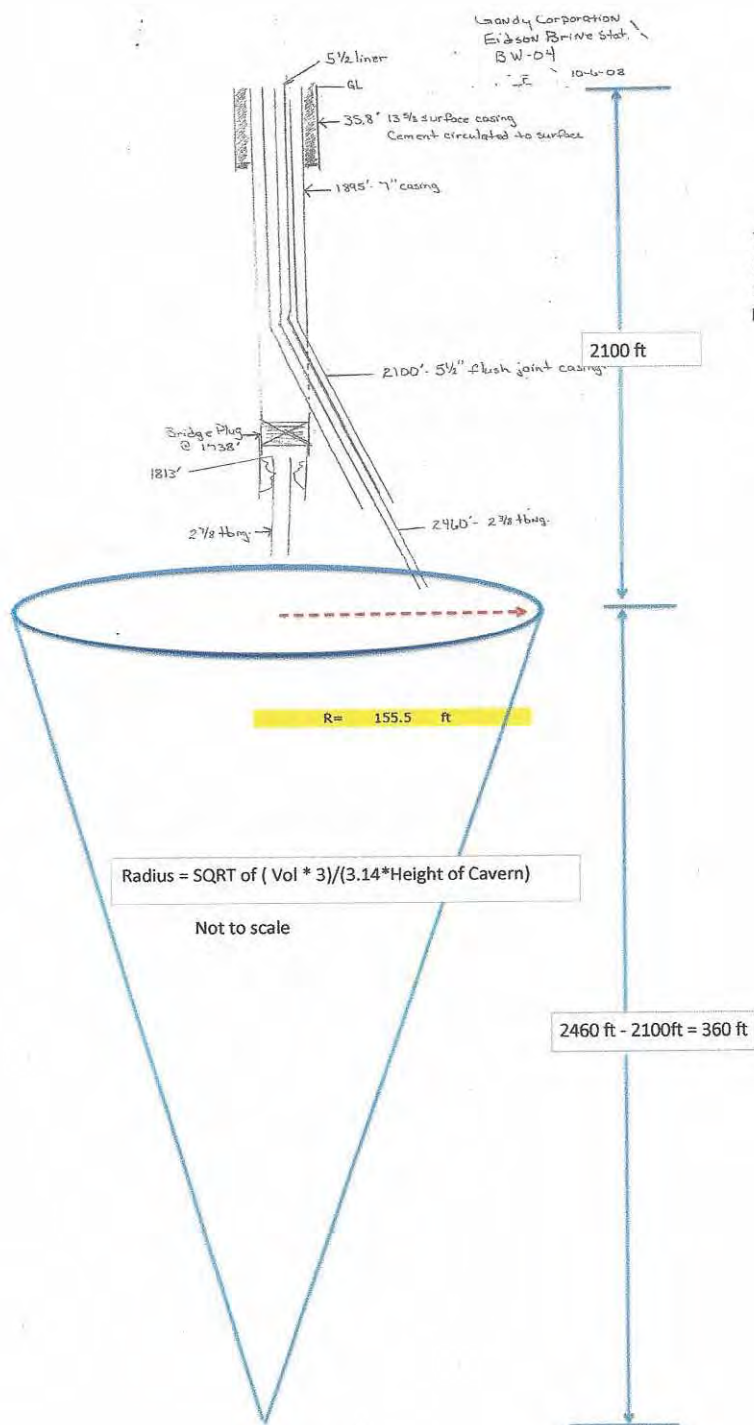


## Appendix “E”

- AOR Well Status List
- AOR Plot Plan
- Lime Rock API # 30-025-35678 Proposed Re-Completion

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2015 Radius and D/H calculations.
- Aerial View showing Cavern Radius



#### 2015 Calculations

$$r = \sqrt[3]{\frac{V}{\pi \cdot D}}$$

V	Volume	=	9,111,275 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft3 salt/bbl	155.5	1 est

$$r = \frac{155.5 \text{ ft}}{\text{Diameter}} = 311.00 \text{ ft}$$

$$D/H = 0.148$$



## Appendix “G”

- Solution Cavern Monitoring Plan Program

# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

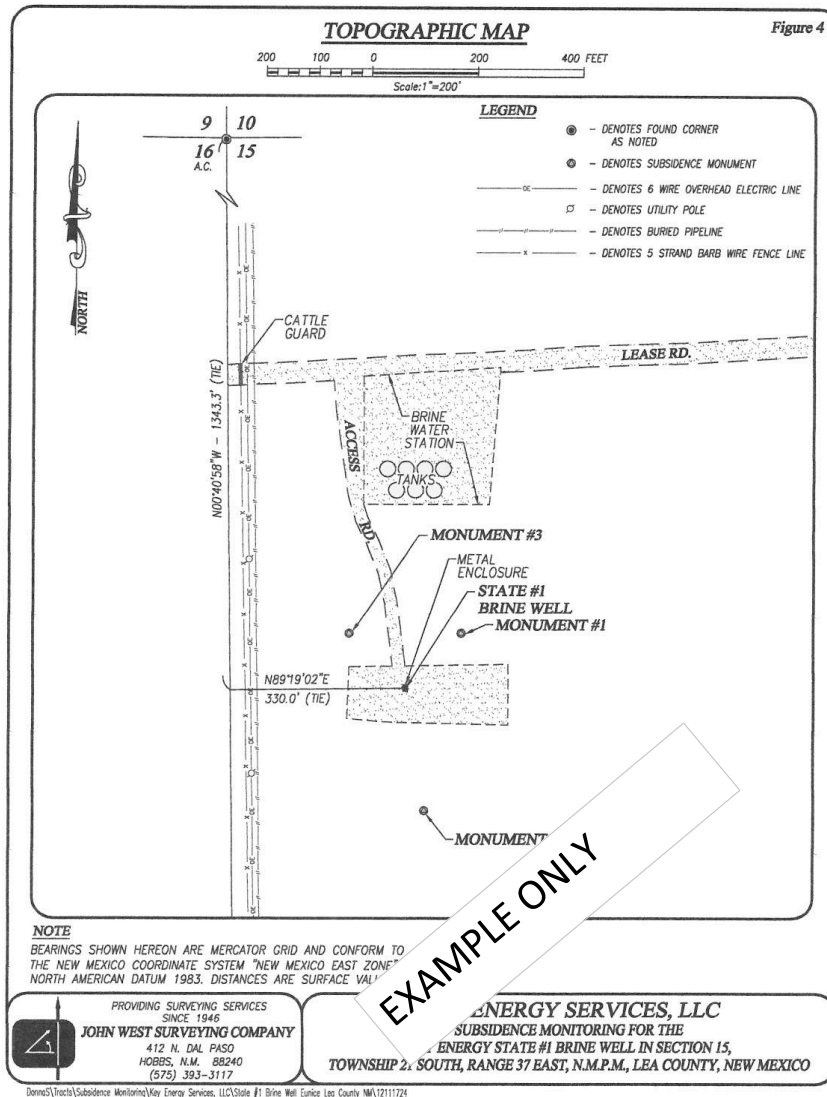
The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

The data will be tabulated and a graph be maintained for each point over the life of the system.

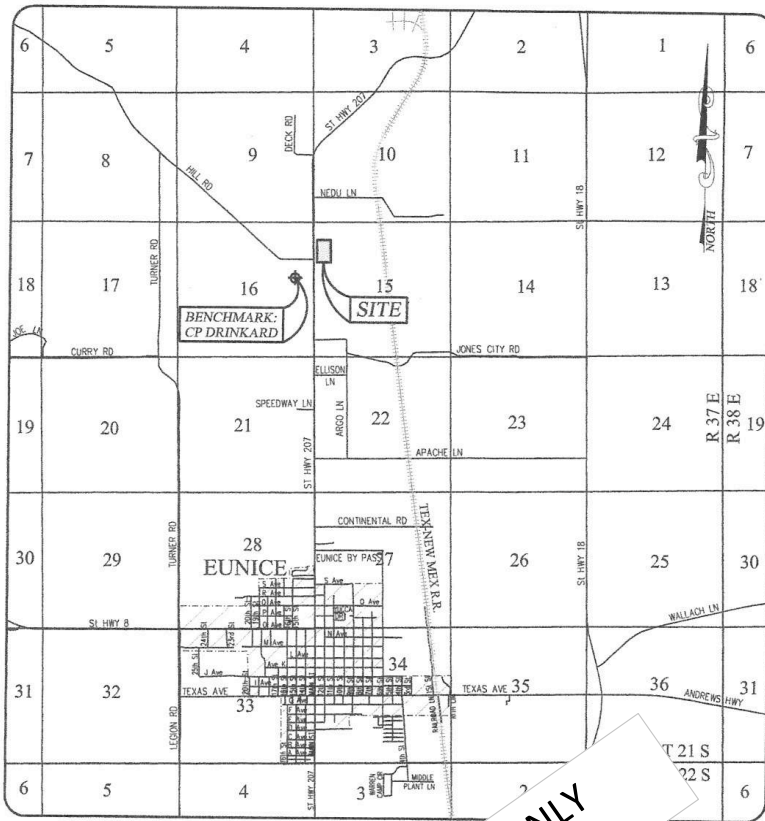
Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only





VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WEST SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC

MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO



Figure 2

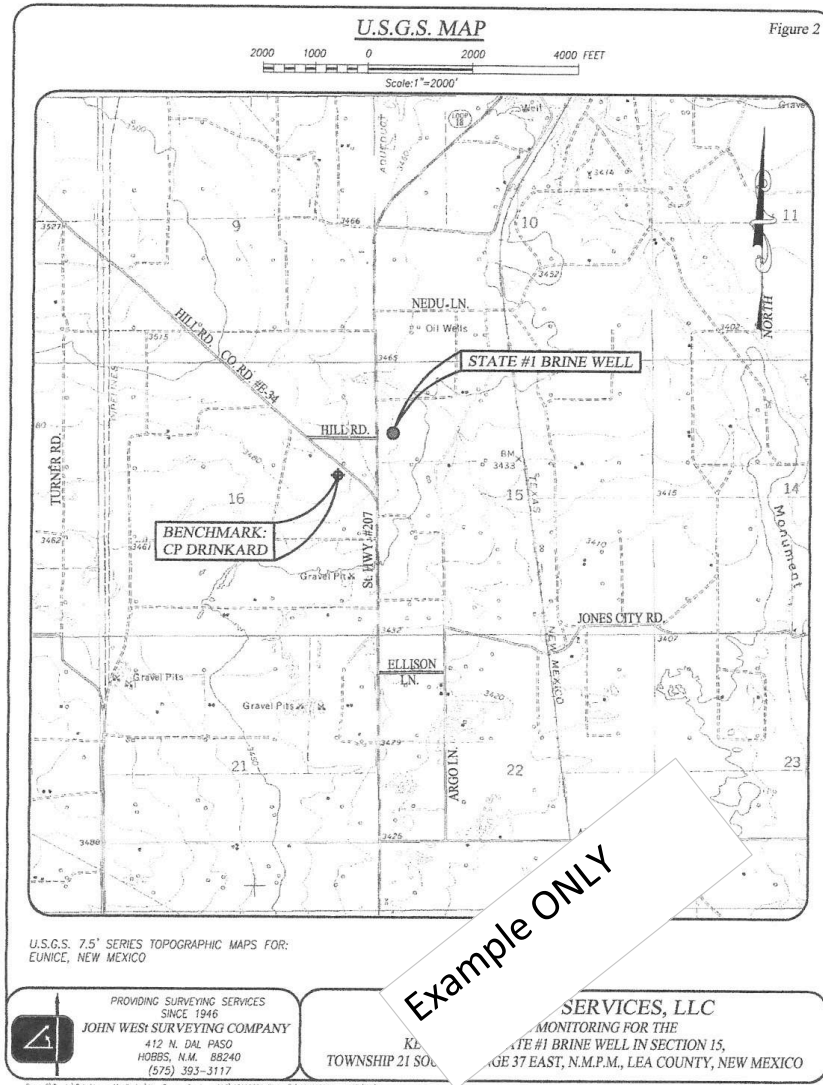
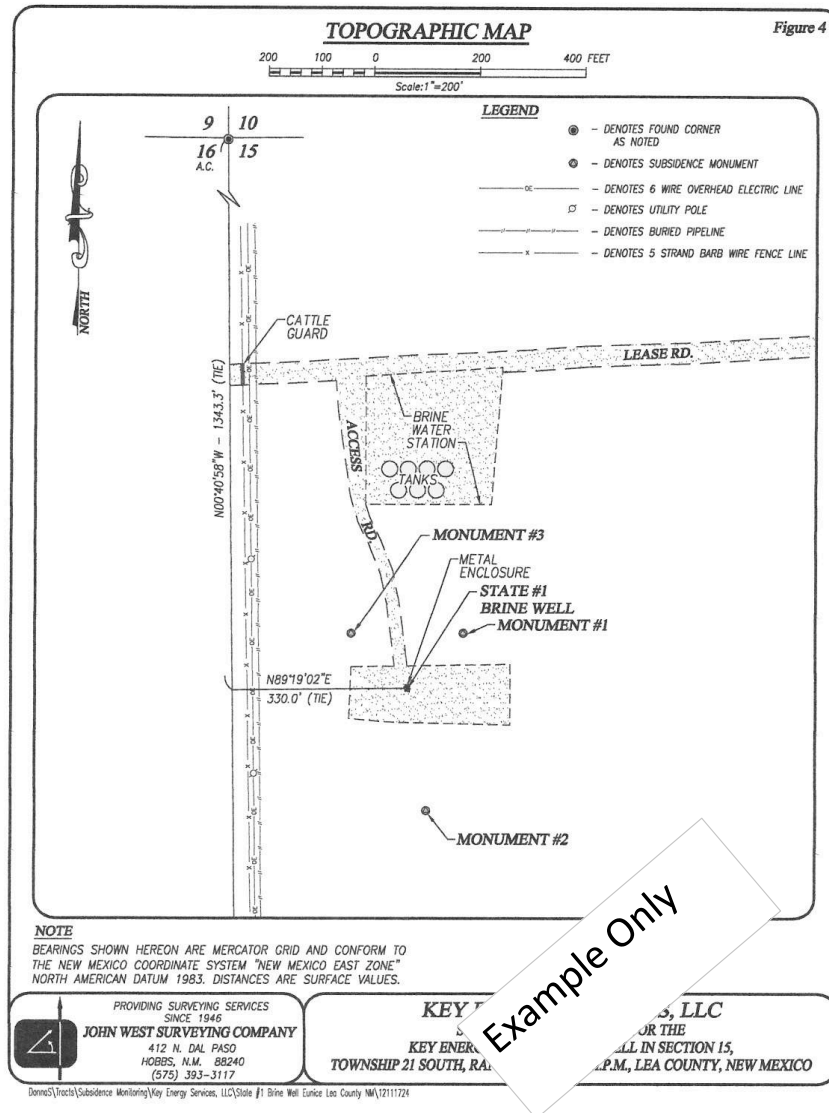
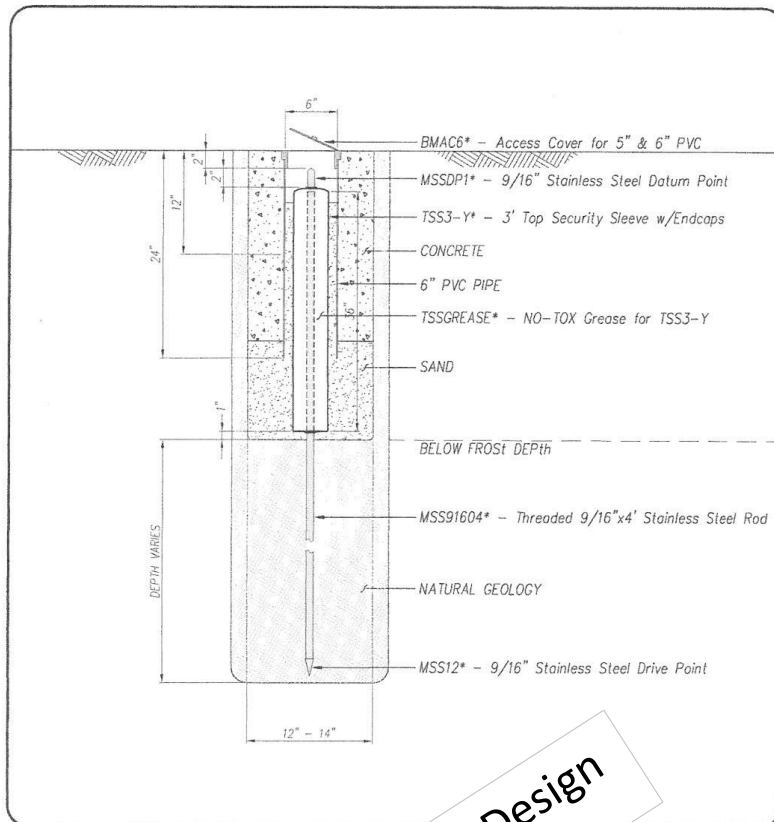


Figure 4



**BERNTSEN MONUMENT INSTALLATION DETAIL**  
NOT TO SCALE

Figure 6



\*REFERENCE:  
www.berntsen.com  
9/16" STAINLESS STEEL TOP SECURITY SLEEVE MONUMENT

Actual Design

PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WESI SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBBS, N.M. 88240  
(505) 393-3117

**ENERGY SERVICES, LLC**  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

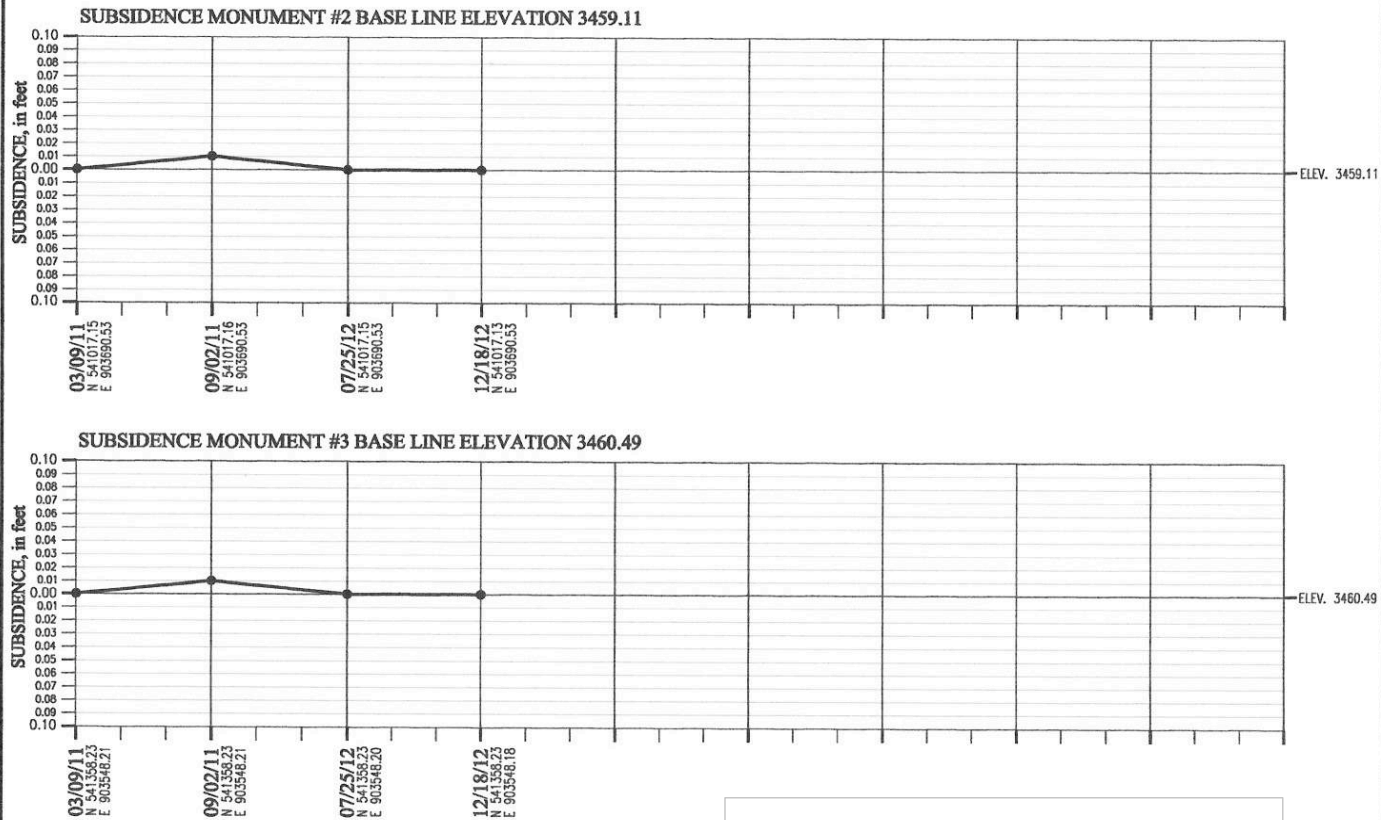
# ADJUSTED ELEVATIONS

Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only

## VERTICAL SUBSIDENCE TABLE



Example Only

Figure 7B

PROVIDING SURVEYING SERVICES  
 SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
 412 N. DAL PASO  
 HOBBS, N.M. 88240  
 (575) 393-3117

**NOTE:**  
 HORIZONTAL ACCURACY OF EQUIPMENT PER  
 MANUFACTURER  $\pm 0.02$  FT.  
 VERTICAL ACCURACY OF EQUIPMENT PER  
 MANUFACTURER  $\pm 0.01$  FT.

SUBSIDENCE MONITORING FOR THE  
**KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
 TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO**

## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2015 Annual Report  
 BW-04 Wasserhund Inc. Closure Cost

		CPI	
Pulling Unit Rig	\$25,000	1.03	\$25,750
Halliburton Cement Job	\$8,000.00	1.03	\$8,240
Post Subsidence Monitoring 5 years	\$15,000.00	1.03	\$15,450
Tank Removal, Pad Clean-Up	\$30,000.00	1.03	\$30,900
Consulting fees	\$10,000.00	1.03	\$10,300
Total Estimate	\$88,000	1.03	\$90,640

**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Livingston, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2014**

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04

*Expiration Date: November 08, 2018*

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

May 30, 2015

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

Wayne Price-LLC

Larry Gandy

Jon Gandy





**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2014 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in **Appendix "A"**).*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. **(Appendix "A" shows system filling station photos.)**

Inspections revealed that the loading area concrete sump was not tested in 2014 as planned. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 01, 2015, next annual report.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in Appendix "D"). The next scheduled 5-year test will be due in 2018.

The brine well was drilled in 1980 and has been in operation for approximately 34 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2014 brine production volume was 602,196 bbls and the lifetime production volume is 8,884,895 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 “A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.”)

Please find attached in **Appendix “C”** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected April 14, 2014 and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with a high density of 1.20 specific gravity. This analysis is very representative of Salado “Salt” formation waters found in the area. During the year, it appeared the weight of the brine ranged from 1.2 SG down to 1.12 SG, and averaged 1.17 SG for the year equating to 9.75 lbs/gal, which is normally acceptable to Wasserhund customers. Wasserhund is in the process of double-checking the reason for the lighter weight product noticed at the end of the year.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 “Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.”)

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix “D”** a copy of the test chart and meter calibration record.

#### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e. reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

#### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 "Results of any leaks and spill reports;")

There were no reportable leaks and spills in 2014.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

#### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 "An Area of Review (AOR) update summary;")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix "E"**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix "E"**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 308 feet (R = 154 ft) up-dated for 2014, a 10:1 safety factor is applied that equates to about 1540 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2014 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1540 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1540 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

Conclusions: This is a Gas producing well, but records indicate it did not produce during the 2014 year and possible OCD evaluation is still on-going.

Corrective Actions and Recommendation: This well appears to be in a temporary status for gas production and no issues have been experienced with the Wasserhund Brine Well BW-04.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered.

Corrective Actions: No Corrective actions required.

### **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “upright cone”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “rule of thumb” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 8.884million barrels of brine produced as of December 2014. The maximum diameter was calculated to be approximately 308 feet with a corresponding D/H ratio of .147 updated for the 2014 year.

Comparing the current D/H ratio of .147 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 154-foot radius superimposed around the brine well and station. The radius has increased by 6.0 feet from last year.

#### **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. “Solution Cavern Monitoring Plan Program”. A copy of the proposal is included in **Appendix “G”** for OCD review and approval.

Special Note: Wasserhund Inc. request a Minor Modifications that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an “Induced Current Method” and report these results in the next annual report.

The ‘Induced Current’ Method has not been successful, primarily to bad connections and low voltage used. Wasserhund will continue trying this method and others as approved by OCD. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

Special Note: **Key requests a minor modification of the permit requirement**

**3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

Dear Jim Giswold-NMOCD Environmental Bureau Chief: As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations. Notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency. Currently the permit reads as follows:



The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to its normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

#### **Bullet Point #12- Summary of Activities**

(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "H" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

#### **Bullet Point #13- Annual Certification**

(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. **"2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the Wasserhund has received OCD approved in install a down-gradient Monitoring Well in the 2015 year. The results concerning groundwater will be listed in the 2016 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- Discharge Plan BW-04







**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## **DISCHARGE PERMIT BW-4**

### **1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.



**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.



### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts

2014 Wasserhund Inc OCD BW-04 Annual Production Data												
								Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.				
				Brine-BBLS		Fresh-BBLS		% diff				
Jan				67469		67634		0.24%				
Feb				58509		58704		0.33%				
Mar				74385		74568		0.25%				
Apr				45348		45463		0.25%				
May				42171		42290		0.28%				
Jun				29669		29784		0.39%				
Jul				36626		36776		0.41%				
Aug				40187		40165		-0.05%				
Sept				42350		42513		0.38%				
Oct				50114		50399		0.57%				
Nov				50837		51032		0.38%				
Dec				64531		64696		0.26%				
2014 Total				602,196		604,024		0.30%				
Total Brine Water Production Carry Over from Years Past BBLs				8,282,699								
Total Production year ending 2014				8,884,895	bbls							

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

### Sample: 359859 - BW-4 Fresh

Param	Flag	Result	Units	RL
Chloride		399	mg/L	2.5
pH		7.77	s.u.	2
Specific Gravity		1.00	g/ml	
Total Dissolved Solids		1000	mg/L	2.5

### Sample: 359860 - BW-4 Brine

Param	Flag	Result	Units	RL
Chloride		219000	mg/L	2.5
Dissolved Sodium		101000	mg/L	1
pH		6.99	s.u.	2
Specific Gravity		1.19	g/ml	
Total Dissolved Solids		132000	mg/L	2.5

### Sample: 359861 - BW-22 Fresh

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Param	Flag	Result	Units	RL
Chloride		<b>406</b>	mg/L	2.5
pH		<b>7.99</b>	s.u.	2
Specific Gravity		<b>0.996</b>	g/ml	
Total Dissolved Solids		<b>1240</b>	mg/L	2.5

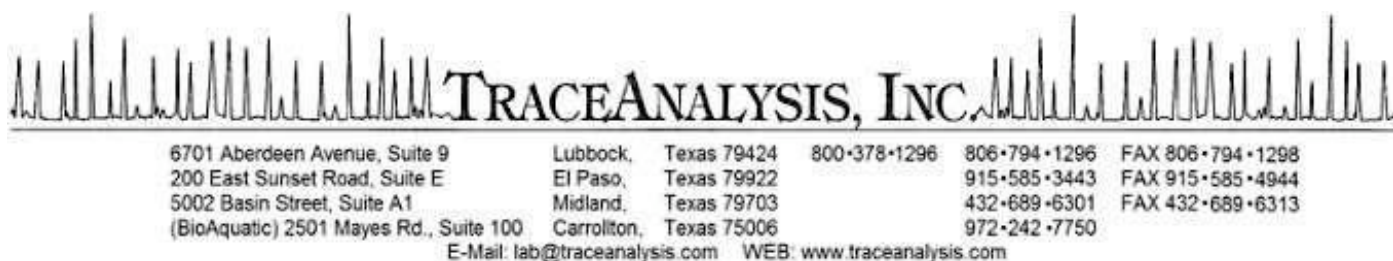
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**Sample: 359862 - BW-22 Brine**

Param	Flag	Result	Units	RL
Chloride		<b>19300</b>	mg/L	2.5
Dissolved Sodium		<b>10400</b>	mg/L	1
pH		<b>6.41</b>	s.u.	2
Specific Gravity		<b>1.03</b>	g/ml	
Total Dissolved Solids		<b>31900</b>	mg/L	2.5

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## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM, 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 18 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich".

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager

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## Case Narrative

Samples for project Annual Report were received by TraceAnalysis, Inc. on 2014-04-08 and assigned to work order 14040811. Samples for work order 14040811 were received intact at a temperature of 2.9 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	94115	2014-04-10 at 16:00	111321	2014-04-10 at 17:33
Chloride (IC)	E 300.0	94116	2014-04-10 at 16:00	111322	2014-04-10 at 17:33
Na, Dissolved	S 6010C	94164	2014-04-22 at 18:51	111398	2014-04-23 at 11:10
pH	SM 4500-H+	93825	2014-04-08 at 13:44	110975	2014-04-08 at 13:45
Specific Gravity	ASTM D1429-95	93887	2014-04-10 at 09:20	111053	2014-04-10 at 09:45
TDS	SM 2540C	94005	2014-04-09 at 16:00	111195	2014-04-09 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14040811 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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BW-4 & BW-22

Work Order: 14040811  
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Buckeye(BW-4) Tatum (BW-22)

# Analytical Report

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-04-10	Analyzed By:	RL
QC Batch:	111321	Sample Preparation:	2014-04-10	Prepared By:	RL
Prep Batch:	94115				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	399	mg/L	10	2.50

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-04-08	Analyzed By:	AT
QC Batch:	110975	Sample Preparation:	2014-04-08	Prepared By:	AT
Prep Batch:	93825				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.77	s.u.	1	2.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-04-10	Analyzed By:	CF
QC Batch:	111053	Sample Preparation:	2014-04-10	Prepared By:	CF
Prep Batch:	93887				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.00	g/ml	1	0.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-04-09	Analyzed By:	RL
QC Batch:	111195	Sample Preparation:	2014-04-09	Prepared By:	RL
Prep Batch:	94005				

Report Date: April 23, 2014  
BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1000</b>	mg/L	20	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      Sample Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>219000</b>	mg/L	5000	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      Sample Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	<b>101000</b>	mg/L	100	1.00

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      Sample Preparation: 2014-04-08      Prepared By: AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>6.99</b>	s.u.	1	2.00

Report Date: April 23, 2014  
BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.19</b>	g/ml	1	0.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>132000</b>	mg/L	1000	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	111321	Date Analyzed:	2014-04-10
Prep Batch:	94115	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B	1	<b>406</b>	mg/L	50	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

*continued ...*

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*sample 359861 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>7.99</b>	s.u.	1	2.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
QC Batch:	111053	Date Analyzed:	2014-04-10	Analyzed By:	CF
Prep Batch:	93887	Sample Preparation:	2014-04-10	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.996</b>	g/ml	1	0.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	111195	Date Analyzed:	2014-04-09	Analyzed By:	RL
Prep Batch:	94005	Sample Preparation:	2014-04-09	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1240</b>	mg/L	20	2.50

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	111322	Date Analyzed:	2014-04-10	Analyzed By:	RL
Prep Batch:	94116	Sample Preparation:	2014-04-10	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>19300</b>	mg/L	1000	2.50

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**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	111398	Date Analyzed:	2014-04-23
Prep Batch:	94164	Sample Preparation:	2014-04-22
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	10400	mg/L	100	1.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	6.41	s.u.	1	2.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.03	g/ml	1	0.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	31900	mg/L	200	2.50



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## Method Blanks

### Method Blank (1)      QC Batch: 111053

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.998	g/ml	

### Method Blank (1)      QC Batch: 111195

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 111321

QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      QC Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.61	mg/L	2.5

### Method Blank (1)      QC Batch: 111322

QC Batch: 111322      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94116      QC Preparation: 2014-04-10      Prepared By: RL

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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.23	mg/L	2.5

**Method Blank (1)**      QC Batch: 111398

QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      QC Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		1	<0.172	mg/L	1

**Duplicates (1)**      Duplicated Sample: 359865

QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      QC Preparation: 2014-04-08      Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	8.45	8.46	s.u.	1	0	20

**Duplicates (1)**      Duplicated Sample: 359862

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.03	1.03	g/ml	1	0	200

**Duplicates (1)**      Duplicated Sample: 360017

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	1690	1720	mg/L	20	2	10

Report Date: April 23, 2014  
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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 111195  
Prep Batch: 94005

Date Analyzed: 2014-04-09  
QC Preparation: 2014-04-09

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	1020	mg/L	10	1000	<25.0	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	10	1000	<25.0	101	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.2	mg/L	1	25.0	1.61	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.1	mg/L	1	25.0	1.61	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	53.0	mg/L	1	50.0	<0.172	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	53.1	mg/L	1	50.0	<0.172	106	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 359861

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1840	mg/L	50	1250	406	115	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1850	mg/L	50	1250	406	116	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)**      Spiked Sample: 360083

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	19000	mg/L	500	12500	4720	114	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	19200	mg/L	500	12500	4720	116	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)**      Spiked Sample: 360135

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	617	mg/L	1	500	82.16	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	582	mg/L	1	500	82.16	100	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.2	105	90 - 110	2014-04-10

### Standard (CCV-2)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

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#### Standard (CCV-1)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (CCV-2)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (ICV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	49.2	96	90 - 110	2014-04-23

#### Standard (CCV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	50.5	99	90 - 110	2014-04-23



# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-14-10	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments

Report Date: April 23, 2014  
BW-4 & BW-22

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

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Company Name: <b>WASSER HUDD INC</b>		Phone #: <b>575-399-5721</b>											
Address: (Street, City, Zip)		Fax #:											
Contact Person: <b>WAYNE PRICE</b>		E-mail:											
Invoice to: (If different from above) <b>WASSER HUDD 1623 S MAIN LEXINGTON NM 88260</b>													
Project #: <b>BW-4 + BW-22</b>		Project Name: <b>ANNUAL REPORT</b>											
Project Location (including state): <b>BUCKEYE (BW-4) TATUM BW-22</b>		Sampler Signature: <i>[Signature]</i>											
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD				SAMPLING		
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE	NONE	DATE
35989	BW-4 FRESH	1	1000 mL	X						X	4/4/14 11:43 AM		
860	BW-4 BRINE	1	"	X						X	4/4/14 11:45 AM		
861	BW-22 FRESH	1	"	X						X	4/4/14 2:45 PM		
862	BW-22 BRINE	1	"	X						X	4/4/14 2:49 PM		
ANALYSIS REQUEST (Circle or Specify Method No.)													
Turn Around Time if different from standard													
Hold													

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: July 31, 2014

Work Order: 14072110



Project Location: Buckeye, NM-Tatum, NM  
Project Name: Quarterly Samples  
Project Number: Buckeye Station-Tatum Station

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
368929	BS FW	water	2014-07-17	13:05	2014-07-17
368930	BS BW	water	2014-07-17	13:08	2014-07-17
368931	TS FW	water	2014-07-17	13:59	2014-07-17
368932	TS BW	water	2014-07-17	14:03	2014-07-17

### Sample: 368929 - BS FW

Param	Flag	Result	Units	RL
Chloride		341	mg/L	2.5
Density		0.995	g/ml	
pH		7.62	s.u.	2
Total Dissolved Solids	Qr	864	mg/L	2.5

### Sample: 368930 - BS BW

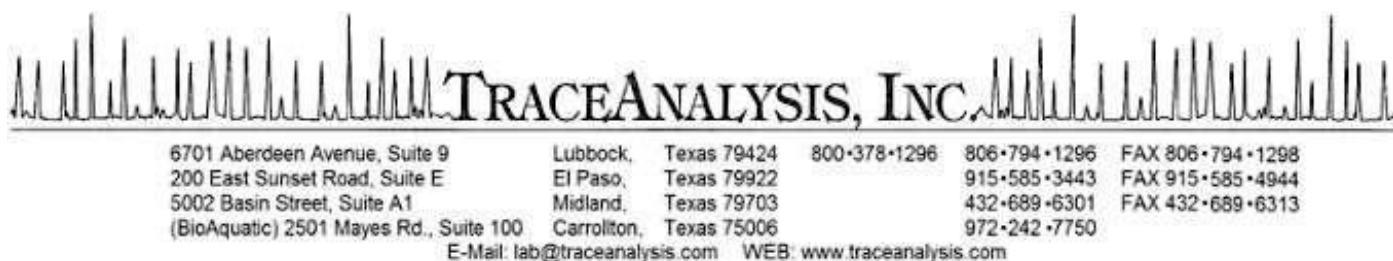
Param	Flag	Result	Units	RL
Chloride		200000	mg/L	2.5
Density		1.20	g/ml	
Dissolved Sodium		149000	mg/L	1
pH		6.90	s.u.	2
Total Dissolved Solids		295000	mg/L	2.5

### Sample: 368931 - TS FW

Param	Flag	Result	Units	RL
Chloride		<b>76.8</b>	mg/L	2.5
Density		<b>0.994</b>	g/ml	
pH		<b>9.30</b>	s.u.	2
Total Dissolved Solids		<b>639</b>	mg/L	2.5

**Sample: 368932 - TS BW**

Param	Flag	Result	Units	RL
Chloride		<b>17900</b>	mg/L	2.5
Density		<b>1.02</b>	g/ml	
Dissolved Sodium		<b>11300</b>	mg/L	1
pH		<b>6.21</b>	s.u.	2
Total Dissolved Solids		<b>34600</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: July 31, 2014

Work Order: 14072110



Project Location: Buckeye, NM-Tatum, NM  
Project Name: Quarterly Samples  
Project Number: Buckeye Station-Tatum Station

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
368929	BS FW	water	2014-07-17	13:05	2014-07-17
368930	BS BW	water	2014-07-17	13:08	2014-07-17
368931	TS FW	water	2014-07-17	13:59	2014-07-17
368932	TS BW	water	2014-07-17	14:03	2014-07-17

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 19 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director

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## Case Narrative

Samples for project Quarterly Samples were received by TraceAnalysis, Inc. on 2014-07-17 and assigned to work order 14072110. Samples for work order 14072110 were received intact at a temperature of 1.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	96480	2014-07-29 at 16:46	114086	2014-07-29 at 16:46
Density	ASTM D854-92	96429	2014-07-28 at 11:00	114019	2014-07-28 at 11:15
Na, Dissolved	S 6010C	96355	2014-07-24 at 13:18	114016	2014-07-25 at 15:56
pH	SM 4500-H+	96321	2014-07-23 at 10:49	113880	2014-07-23 at 10:50
TDS	SM 2540C	96388	2014-07-23 at 11:00	113960	2014-07-23 at 11:00
TDS	SM 2540C	96452	2014-07-25 at 11:40	114047	2014-07-25 at 11:40

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14072110 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.



# Analytical Report

## Sample: 368929 - BS FW

Laboratory:	El Paso	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-07-29	Analyzed By:	JR
QC Batch:	114086	Sample Preparation:	2014-07-29	Prepared By:	JR
Prep Batch:	96480				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	341	mg/L	10	2.50

## Sample: 368929 - BS FW

Laboratory:	Lubbock	Analytical Method:	ASTM D854-92	Prep Method:	N/A
Analysis:	Density	Date Analyzed:	2014-07-28	Analyzed By:	CF
QC Batch:	114019	Sample Preparation:	2014-07-28	Prepared By:	CF
Prep Batch:	96429				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.995	g/ml	1	0.00

## Sample: 368929 - BS FW

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-07-23	Analyzed By:	AT
QC Batch:	113880	Sample Preparation:	2014-07-23	Prepared By:	AT
Prep Batch:	96321				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	7.62	s.u.	1	2.00

## Sample: 368929 - BS FW

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-07-25	Analyzed By:	CF
QC Batch:	114047	Sample Preparation:	2014-07-25	Prepared By:	CF
Prep Batch:	96452				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids	Qr	2,3,5,7,8	<b>864</b>	mg/L	20	2.50

**Sample: 368930 - BS BW**

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	114086	Date Analyzed:	2014-07-29	Analyzed By:	JR
Prep Batch:	96480	Sample Preparation:	2014-07-29	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>200000</b>	mg/L	5000	2.50

**Sample: 368930 - BS BW**

Laboratory:	Lubbock				
Analysis:	Density	Analytical Method:	ASTM D854-92	Prep Method:	N/A
QC Batch:	114019	Date Analyzed:	2014-07-28	Analyzed By:	CF
Prep Batch:	96429	Sample Preparation:	2014-07-28	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.20</b>	g/ml	1	0.00

**Sample: 368930 - BS BW**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	114016	Date Analyzed:	2014-07-25	Analyzed By:	LM
Prep Batch:	96355	Sample Preparation:	2014-07-24	Prepared By:	LM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		3,5,7,8	<b>149000</b>	mg/L	10000	1.00

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**Sample: 368930 - BS BW**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	113880	Date Analyzed:	2014-07-23
Prep Batch:	96321	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>6.90</b>	s.u.	1	2.00

**Sample: 368930 - BS BW**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	113960	Date Analyzed:	2014-07-23
Prep Batch:	96388	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>295000</b>	mg/L	2000	2.50

**Sample: 368931 - TS FW**

Laboratory:	El Paso		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	114086	Date Analyzed:	2014-07-29
Prep Batch:	96480	Sample Preparation:	2014-07-29
		Prep Method:	N/A
		Analyzed By:	JR
		Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>76.8</b>	mg/L	10	2.50

**Sample: 368931 - TS FW**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	114019	Date Analyzed:	2014-07-28
Prep Batch:	96429	Sample Preparation:	2014-07-28
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

*continued ...*

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*sample 368931 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.994</b>	g/ml	1	0.00

**Sample: 368931 - TS FW**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	113880	Date Analyzed:	2014-07-23	Analyzed By:	AT
Prep Batch:	96321	Sample Preparation:	2014-07-23	Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>9.30</b>	s.u.	1	2.00

**Sample: 368931 - TS FW**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	113960	Date Analyzed:	2014-07-23	Analyzed By:	CF
Prep Batch:	96388	Sample Preparation:	2014-07-23	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>639</b>	mg/L	10	2.50

**Sample: 368932 - TS BW**

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	114086	Date Analyzed:	2014-07-29	Analyzed By:	JR
Prep Batch:	96480	Sample Preparation:	2014-07-29	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>17900</b>	mg/L	500	2.50

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**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	114019	Date Analyzed:	2014-07-28
Prep Batch:	96429	Sample Preparation:	2014-07-28
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.02</b>	g/ml	1	0.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	114016	Date Analyzed:	2014-07-25
Prep Batch:	96355	Sample Preparation:	2014-07-24
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	LM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		3,5,7,8	<b>11300</b>	mg/L	100	1.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	113880	Date Analyzed:	2014-07-23
Prep Batch:	96321	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>6.21</b>	s.u.	1	2.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	113960	Date Analyzed:	2014-07-23
Prep Batch:	96388	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>34600</b>	mg/L	1000	2.50

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## Method Blanks

### Method Blank (1)      QC Batch: 113960

QC Batch: 113960      Date Analyzed: 2014-07-23      Analyzed By: CF  
Prep Batch: 96388      QC Preparation: 2014-07-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		2,3,5,7,8	<2.50	mg/L	2.5

### Method Blank (1)      QC Batch: 114016

QC Batch: 114016      Date Analyzed: 2014-07-25      Analyzed By: LM  
Prep Batch: 96355      QC Preparation: 2014-07-24      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		3,5,7,8	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 114019

QC Batch: 114019      Date Analyzed: 2014-07-28      Analyzed By: CF  
Prep Batch: 96429      QC Preparation: 2014-07-28      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.995	g/ml	

### Method Blank (1)      QC Batch: 114047

QC Batch: 114047      Date Analyzed: 2014-07-25      Analyzed By: CF  
Prep Batch: 96452      QC Preparation: 2014-07-25      Prepared By: CF

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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		2,3,5,7,8	<2.50	mg/L	2.5

---

**Method Blank (1)**      QC Batch: 114086

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

---

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,4,6	<0.00680	mg/L	2.5

---

## Duplicates

### Duplicates (1) Duplicated Sample: 368940

QC Batch: 113880 Date Analyzed: 2014-07-23 Analyzed By: AT  
Prep Batch: 96321 QC Preparation: 2014-07-23 Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	2,3,7,8	8.16	8.20	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 369075

QC Batch: 113960 Date Analyzed: 2014-07-23 Analyzed By: CF  
Prep Batch: 96388 QC Preparation: 2014-07-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	2,3,5,7,8	381	380	mg/L	10	0	10

### Duplicates (1) Duplicated Sample: 368932

QC Batch: 114019 Date Analyzed: 2014-07-28 Analyzed By: CF  
Prep Batch: 96429 QC Preparation: 2014-07-28 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.02	1.02	g/ml	1	0	20

### Duplicates (1) Duplicated Sample: 369374

QC Batch: 114047 Date Analyzed: 2014-07-25 Analyzed By: CF  
Prep Batch: 96452 QC Preparation: 2014-07-25 Prepared By: CF



Param				Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	Qr	Qr	2,3,5,7,8	2660	2300	mg/L	50	14	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 113960  
Prep Batch: 96388

Date Analyzed: 2014-07-23  
QC Preparation: 2014-07-23

Analyzed By: CF  
Prepared By: CF

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		2,3,5,7,8	1000	mg/L	1	1000	<2.50	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		2,3,5,7,8	1040	mg/L	1	1000	<2.50	104	90 - 110	4	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 114016  
Prep Batch: 96355

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-24

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		3,5,7,8	49.5	mg/L	1	52.5	<0.0184	94	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		3,5,7,8	50.2	mg/L	1	52.5	<0.0184	96	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 114047  
Prep Batch: 96452

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-25

Analyzed By: CF  
Prepared By: CF

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		2,3,5,7,8	972	mg/L	1	1000	<2.50	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		2,3,5,7,8	1020	mg/L	1	1000	<2.50	102	90 - 110	5	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,4,6	25.2	mg/L	1	25.0	<0.00680	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,4,6	25.1	mg/L	1	25.0	<0.00680	100	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 368864

QC Batch: 114016  
Prep Batch: 96355

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-24

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		3,5,7,8	4530	mg/L	10	525	4100	82	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		3,5,7,8	4540	mg/L	10	525	4100	84	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 368931

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,4,6	1480	mg/L	55.6	1390	76.8	101	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,4,6	1480	mg/L	55.6	1390	76.8	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 113880

Date Analyzed: 2014-07-23

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		2,3,7,8	s.u.	7.00	7.01	100	98 - 102	2014-07-23

### Standard (CCV-1)

QC Batch: 113880

Date Analyzed: 2014-07-23

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		2,3,7,8	s.u.	7.00	7.01	100	98 - 102	2014-07-23

### Standard (ICV-1)

QC Batch: 114016

Date Analyzed: 2014-07-25

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		3,5,7,8	mg/L	51.0	48.8	96	90 - 110	2014-07-25

### Standard (CCV-1)

QC Batch: 114016

Date Analyzed: 2014-07-25

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		3,5,7,8	mg/L	51.0	49.9	98	90 - 110	2014-07-25

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#### Standard (CCV-1)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	24.8	99	90 - 110	2014-07-29

#### Standard (CCV-2)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	25.0	100	90 - 110	2014-07-29

#### Standard (CCV-3)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	25.2	101	90 - 110	2014-07-29

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-103	El Paso
2	PJLA	L14-93	Lubbock
3	Kansas	Kansas E-10317	Lubbock
4	LELAP	LELAP-02002	El Paso
5	LELAP	LELAP-02003	Lubbock
6	NELAP	T104704221-12-3	El Paso
7	NELAP	T104704219-14-10	Lubbock
8		2013-083	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.

F	Description
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

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## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
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## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: October 31, 2014

Work Order: 14102105



Project Location: Buckeye New Mexico  
Project Name: Brine Well

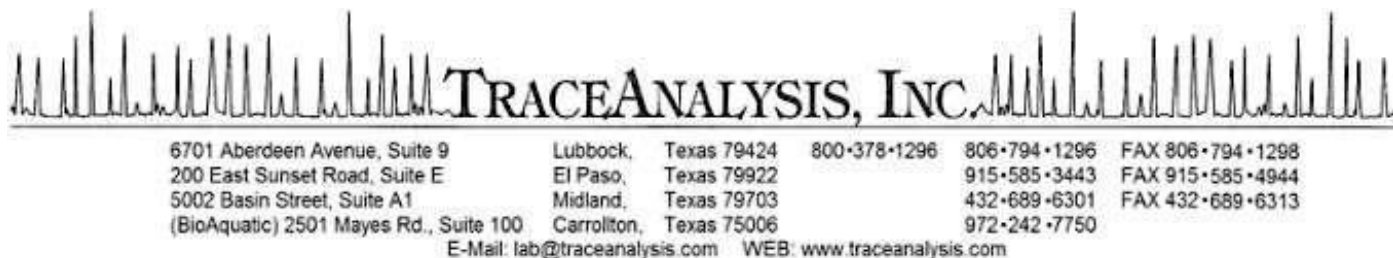
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
377442	Fresh	water	2014-10-16	13:19	2014-10-17
377443	Brine	water	2014-10-16	13:39	2014-10-17

### Sample: 377442 - Fresh

Param	Flag	Result	Units	RL
Chloride		<b>330</b>	mg/L	2.5
pH		<b>7.46</b>	s.u.	2
Specific Gravity		<b>0.9953</b>	g/ml	
Total Dissolved Solids		<b>938</b>	mg/L	2.5

### Sample: 377443 - Brine

Param	Flag	Result	Units	RL
Chloride		<b>132000</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>94600</b>	mg/L	1
pH		<b>7.03</b>	s.u.	2
Specific Gravity		<b>1.154</b>	g/ml	
Total Dissolved Solids		<b>229000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: October 31, 2014

Work Order: 14102105



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
377442	Fresh	water	2014-10-16	13:19	2014-10-17
377443	Brine	water	2014-10-16	13:39	2014-10-17

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2014-10-17 and assigned to work order 14102105. Samples for work order 14102105 were received intact at a temperature of 1.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	98705	2014-10-28 at 15:00	116735	2014-10-28 at 16:01
Chloride (IC)	E 300.0	98782	2014-10-30 at 10:00	116834	2014-10-30 at 11:59
Na, Dissolved	S 6010C	98605	2014-10-23 at 14:50	116734	2014-10-29 at 10:25
pH	SM 4500-H+	98540	2014-10-21 at 16:30	116526	2014-10-21 at 16:30
Specific Gravity	ASTM D1429-95	98592	2014-10-23 at 10:30	116586	2014-10-23 at 10:45
TDS	SM 2540C	98719	2014-10-23 at 10:00	116755	2014-10-23 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14102105 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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# Analytical Report

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-10-28	Analyzed By:	RL
QC Batch:	116735	Sample Preparation:		Prepared By:	RL
Prep Batch:	98705				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>330</b>	mg/L	10	2.50

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-10-21	Analyzed By:	JP
QC Batch:	116526	Sample Preparation:		Prepared By:	JP
Prep Batch:	98540				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.46</b>	s.u.	1	2.00

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-10-23	Analyzed By:	CF
QC Batch:	116586	Sample Preparation:	2014-10-23	Prepared By:	CF
Prep Batch:	98592				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9953</b>	g/ml	1	0.000

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-10-23	Analyzed By:	RL
QC Batch:	116755	Sample Preparation:		Prepared By:	RL
Prep Batch:	98719				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>938</b>	mg/L	20	2.50

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-10-30	Analyzed By:	RL
QC Batch:	116834	Sample Preparation:		Prepared By:	RL
Prep Batch:	98782				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>132000</b>	mg/L	5000	2.50

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2014-10-29	Analyzed By:	LM
QC Batch:	116734	Sample Preparation:	2014-10-23	Prepared By:	LM
Prep Batch:	98605				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>94600</b>	mg/L	1000	1.00

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-10-21	Analyzed By:	JP
QC Batch:	116526	Sample Preparation:		Prepared By:	JP
Prep Batch:	98540				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.03</b>	s.u.	1	2.00



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**Sample: 377443 - Brine**

Laboratory: Lubbock  
Analysis: Specific Gravity  
QC Batch: 116586  
Prep Batch: 98592

Analytical Method: ASTM D1429-95  
Date Analyzed: 2014-10-23  
Sample Preparation: 2014-10-23

Prep Method: N/A  
Analyzed By: CF  
Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.154</b>	g/ml	1	0.000

**Sample: 377443 - Brine**

Laboratory: Lubbock  
Analysis: TDS  
QC Batch: 116755  
Prep Batch: 98719

Analytical Method: SM 2540C  
Date Analyzed: 2014-10-23  
Sample Preparation:

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>229000</b>	mg/L	2000	2.50



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## Method Blanks

**Method Blank (1)**      QC Batch: 116586

QC Batch: 116586      Date Analyzed: 2014-10-23      Analyzed By: CF  
Prep Batch: 98592      QC Preparation: 2014-10-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			1.002	g/ml	

**Method Blank (1)**      QC Batch: 116734

QC Batch: 116734      Date Analyzed: 2014-10-29      Analyzed By: LM  
Prep Batch: 98605      QC Preparation: 2014-10-23      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

**Method Blank (1)**      QC Batch: 116735

QC Batch: 116735      Date Analyzed: 2014-10-28      Analyzed By: RL  
Prep Batch: 98705      QC Preparation: 2014-10-28      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	1.11	mg/L	2.5

**Method Blank (1)**      QC Batch: 116755

QC Batch: 116755      Date Analyzed: 2014-10-23      Analyzed By: RL  
Prep Batch: 98719      QC Preparation: 2014-10-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

Method Blank (1)      QC Batch: 116834

QC Batch:    116834

Date Analyzed:    2014-10-30

Prep Batch:    98782

QC Preparation:    2014-10-30

Analyzed By:    RL

Prepared By:    RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	1.26	mg/L	2.5

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## Duplicates

### Duplicates (1) Duplicated Sample: 377452

QC Batch: 116526 Date Analyzed: 2014-10-21 Analyzed By: JP  
Prep Batch: 98540 QC Preparation: 2014-10-21 Prepared By: JP

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	6.33	6.34	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 377452

QC Batch: 116586 Date Analyzed: 2014-10-23 Analyzed By: CF  
Prep Batch: 98592 QC Preparation: 2014-10-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.009	1.035	g/ml	1	2	200

### Duplicates (1) Duplicated Sample: 377727

QC Batch: 116755 Date Analyzed: 2014-10-23 Analyzed By: RL  
Prep Batch: 98719 QC Preparation: 2014-10-23 Prepared By: RL

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1830	1830	mg/L	20	0	10

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 116734  
Prep Batch: 98605

Date Analyzed: 2014-10-29  
QC Preparation: 2014-10-23

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	54.9	mg/L	1	52.5	<0.0184	104	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	53.4	mg/L	1	52.5	<0.0184	102	85 - 115	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 116735  
Prep Batch: 98705

Date Analyzed: 2014-10-28  
QC Preparation: 2014-10-28

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.4	mg/L	1	25.0	1.11	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	1.11	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 116755  
Prep Batch: 98719

Date Analyzed: 2014-10-23  
QC Preparation: 2014-10-23

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	986	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	969	mg/L	10	1000	<25.0	97	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 116834  
Prep Batch: 98782

Date Analyzed: 2014-10-30  
QC Preparation: 2014-10-30

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.1	mg/L	1	25.0	1.26	95	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.0	mg/L	1	25.0	1.26	95	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 376967

QC Batch: 116734  
Prep Batch: 98605

Date Analyzed: 2014-10-29  
QC Preparation: 2014-10-23

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium	Qs	Qs	2,3,4,5	5740	mg/L	100	525	5457	54 75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium	Qs	Qs	2,3,4,5	5800	mg/L	100	525	5457	65 75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 377451

QC Batch: 116735  
Prep Batch: 98705

Date Analyzed: 2014-10-28  
QC Preparation: 2014-10-28

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			1,2,3,4,5	340	mg/L	10	250	75.5	106 80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			1,2,3,4,5	339	mg/L	10	250	75.5	105 80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 378037

QC Batch: 116834  
Prep Batch: 98782

Date Analyzed: 2014-10-30  
QC Preparation: 2014-10-30

Analyzed By: RL  
Prepared By: RL

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	393	mg/L	10	250	110	113	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	377	mg/L	10	250	110	107	80 - 120	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 116526

Date Analyzed: 2014-10-21

Analyzed By: JP

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98 - 102	2014-10-21

### Standard (CCV-1)

QC Batch: 116526

Date Analyzed: 2014-10-21

Analyzed By: JP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98 - 102	2014-10-21

### Standard (ICV-1)

QC Batch: 116734

Date Analyzed: 2014-10-29

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2014-10-29

### Standard (CCV-1)

QC Batch: 116734

Date Analyzed: 2014-10-29

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	52.5	103	90 - 110	2014-10-29



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#### Standard (CCV-1)

QC Batch: 116735

Date Analyzed: 2014-10-28

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.5	102	90 - 110	2014-10-28

#### Standard (CCV-2)

QC Batch: 116735

Date Analyzed: 2014-10-28

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.4	102	90 - 110	2014-10-28

#### Standard (CCV-1)

QC Batch: 116834

Date Analyzed: 2014-10-30

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.2	101	90 - 110	2014-10-30

#### Standard (CCV-2)

QC Batch: 116834

Date Analyzed: 2014-10-30

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.2	101	90 - 110	2014-10-30

## Appendix

### Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

### Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

### Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 14102105

# TraceAnalysis, Inc.

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**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

Company Name:	PRICE LLC	Phone #:	505-892-6643
Address:	312 Encanto Ridge Court NE, Albuquerque, NM 87124	Fax #:	505-892-6643
Contact Person:	Lester Wayne Price Jr.	E-mail:	wprice23@hotmail.com
Invoice to: (if different from above)	WASSERHUND BANDY		
Project #:	NA	Project Name:	BRINE WELL
Project Location (including state):	BUCKEYE NM	Sampler Signature:	L. W. Price

[illegible]

Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR
LESTER WAYNE PRICE JR	PRICE LLC	10/17/14	4:50PM	BCT	BCT	10-17-14	4:10	INST OBS COR
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

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## ANALYSIS REQUEST

(Circle or Specify Method No.)

[illegible]

LAB USE ONLY	Inlet <u>Y</u> / <u>N</u> Headspace <u>Y</u> / <u>N</u> / <u>NA</u>	<input type="checkbox"/> Dry Weight Basis Required <input type="checkbox"/> TRRP Report Required <input type="checkbox"/> Check if Special Reporting Limits Are Needed	REMARKS:  COC # 1

23 ZR 292510

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well

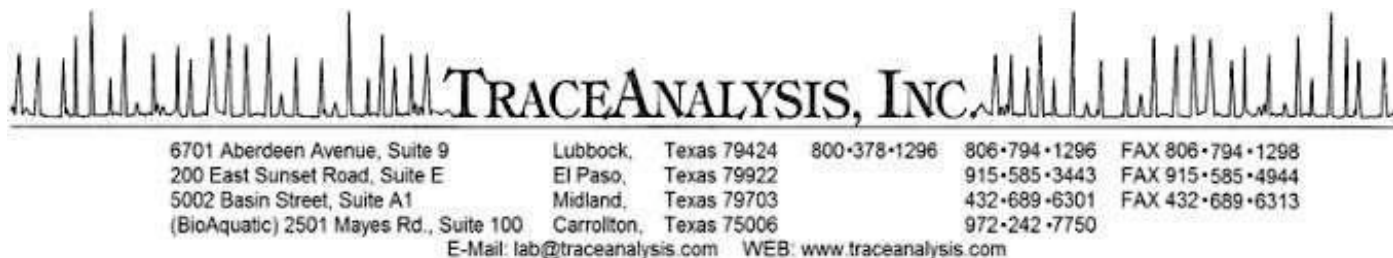
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

### Sample: 385130 - Fresh

Param	Flag	Result	Units	RL
Chloride	H	338	mg/L	2.5
Dissolved Sodium	Qs	221	mg/L	1
pH		8.03	s.u.	2
Specific Gravity		0.9918	g/ml	
Total Dissolved Solids		806	mg/L	2.5

### Sample: 385131 - Brine

Param	Flag	Result	Units	RL
Chloride	H	106000	mg/L	2.5
Dissolved Sodium	Qs	81300	mg/L	1
pH		7.12	s.u.	2
Specific Gravity		1.124	g/ml	
Total Dissolved Solids		186000	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well  
Project Number: Brine Well-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012306. Samples for work order 15012306 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	100982	2015-02-16 at 12:00	119410	2015-02-16 at 12:53
Na, Dissolved	S 6010C	100546	2015-01-27 at 17:40	119127	2015-02-06 at 09:23
pH	SM 4500-H+	100544	2015-01-27 at 04:00	118893	2015-01-27 at 16:44
Specific Gravity	ASTM D1429-95	100533	2015-01-27 at 13:00	118885	2015-01-27 at 13:10
TDS	SM 2540C	100553	2015-01-26 at 09:00	118905	2015-01-26 at 17:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15012306 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.



Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

# Analytical Report

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-02-16	Analyzed By:	RL
QC Batch:	119410	Sample Preparation:		Prepared By:	RL
Prep Batch:	100982				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>338</b>	mg/L	10	2.50

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-02-06	Analyzed By:	RR
QC Batch:	119127	Sample Preparation:	2015-01-27	Prepared By:	RR
Prep Batch:	100546				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>221</b>	mg/L	1	1.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-01-27	Analyzed By:	AT
QC Batch:	118893	Sample Preparation:	2015-01-27	Prepared By:	AT
Prep Batch:	100544				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>8.03</b>	s.u.	1	2.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-01-27	Analyzed By:	CF
QC Batch:	118885	Sample Preparation:	2015-01-27	Prepared By:	CF
Prep Batch:	100533				

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9918</b>	g/ml	1	0.000

**Sample: 385130 - Fresh**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>806</b>	mg/L	20	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Chloride (IC)

QC Batch: 119410

Prep Batch: 100982

Analytical Method: E 300.0

Date Analyzed: 2015-02-16

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>106000</b>	mg/L	5000	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 119127

Prep Batch: 100546

Analytical Method: S 6010C

Date Analyzed: 2015-02-06

Sample Preparation: 2015-01-27

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>81300</b>	mg/L	1000	1.00

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: pH

QC Batch: 118893

Prep Batch: 100544

Analytical Method: SM 4500-H+

Date Analyzed: 2015-01-27

Sample Preparation: 2015-01-27

Prep Method: N/A

Analyzed By: AT

Prepared By: AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.12</b>	s.u.	1	2.00

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Specific Gravity

QC Batch: 118885

Prep Batch: 100533

Analytical Method: ASTM D1429-95

Date Analyzed: 2015-01-27

Sample Preparation: 2015-01-27

Prep Method: N/A

Analyzed By: CF

Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.124</b>	g/ml	1	0.000

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>186000</b>	mg/L	2000	2.50

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

## Method Blanks

### Method Blank (1)      QC Batch: 118885

QC Batch: 118885      Date Analyzed: 2015-01-27      Analyzed By: CF  
Prep Batch: 100533      QC Preparation: 2015-01-27      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9916	g/ml	

### Method Blank (1)      QC Batch: 118905

QC Batch: 118905      Date Analyzed: 2015-01-26      Analyzed By: RL  
Prep Batch: 100553      QC Preparation: 2015-01-26      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 119127

QC Batch: 119127      Date Analyzed: 2015-02-06      Analyzed By: RR  
Prep Batch: 100546      QC Preparation: 2015-01-27      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 119410

QC Batch: 119410      Date Analyzed: 2015-02-16      Analyzed By: RL  
Prep Batch: 100982      QC Preparation: 2015-02-16      Prepared By: RL

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

---

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.767	mg/L	2.5

---

## Duplicates

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118885 Date Analyzed: 2015-01-27 Analyzed By: CF  
Prep Batch: 100533 QC Preparation: 2015-01-27 Prepared By: CF

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity	1.074	1.072	g/ml	1	0	200

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118893 Date Analyzed: 2015-01-27 Analyzed By: AT  
Prep Batch: 100544 QC Preparation: 2015-01-27 Prepared By: AT

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	6.79	6.78	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 385130

QC Batch: 118905 Date Analyzed: 2015-01-26 Analyzed By: RL  
Prep Batch: 100553 QC Preparation: 2015-01-26 Prepared By: RL

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	850	806	mg/L	20	5	10

Report Date: February 17, 2015  
Brine Well-Buckeye

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Brine Well

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 118905  
Prep Batch: 100553

Date Analyzed: 2015-01-26  
QC Preparation: 2015-01-26

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	988	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	978	mg/L	10	1000	<25.0	98	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.0	mg/L	1	52.5	<0.0184	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	57.2	mg/L	1	52.5	<0.0184	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.0	mg/L	1	25.0	0.767	93	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	23.5	mg/L	1	25.0	0.767	91	90 - 110	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

## Matrix Spikes

### Matrix Spike (xMS-1) Spiked Sample: 385041

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	1660	mg/L	1	525	1210	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param			MSD	Units	Dil.	Spike	Matrix	Rec.	Rec.	RPD	RPD	
	F	C	Result			Amount	Result		Limit		Limit	
Dissolved Sodium	Q <sub>s</sub>	Q <sub>s</sub>	2,3,4,5	1580	mg/L	1	525	1210	70	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 386889

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3350	mg/L	100	2500	812	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3290	mg/L	100	2500	812	99	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (CCV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (ICV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2015-02-06

### Standard (CCV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	55.9	110	90 - 110	2015-02-06

Standard (CCV-1)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.8	95	90 - 110	2015-02-16

Standard (CCV-2)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.9	96	90 - 110	2015-02-16

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

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Lubbock, Texas 79424  
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El Paso, Texas 79922  
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1 (888) 588-3443

**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

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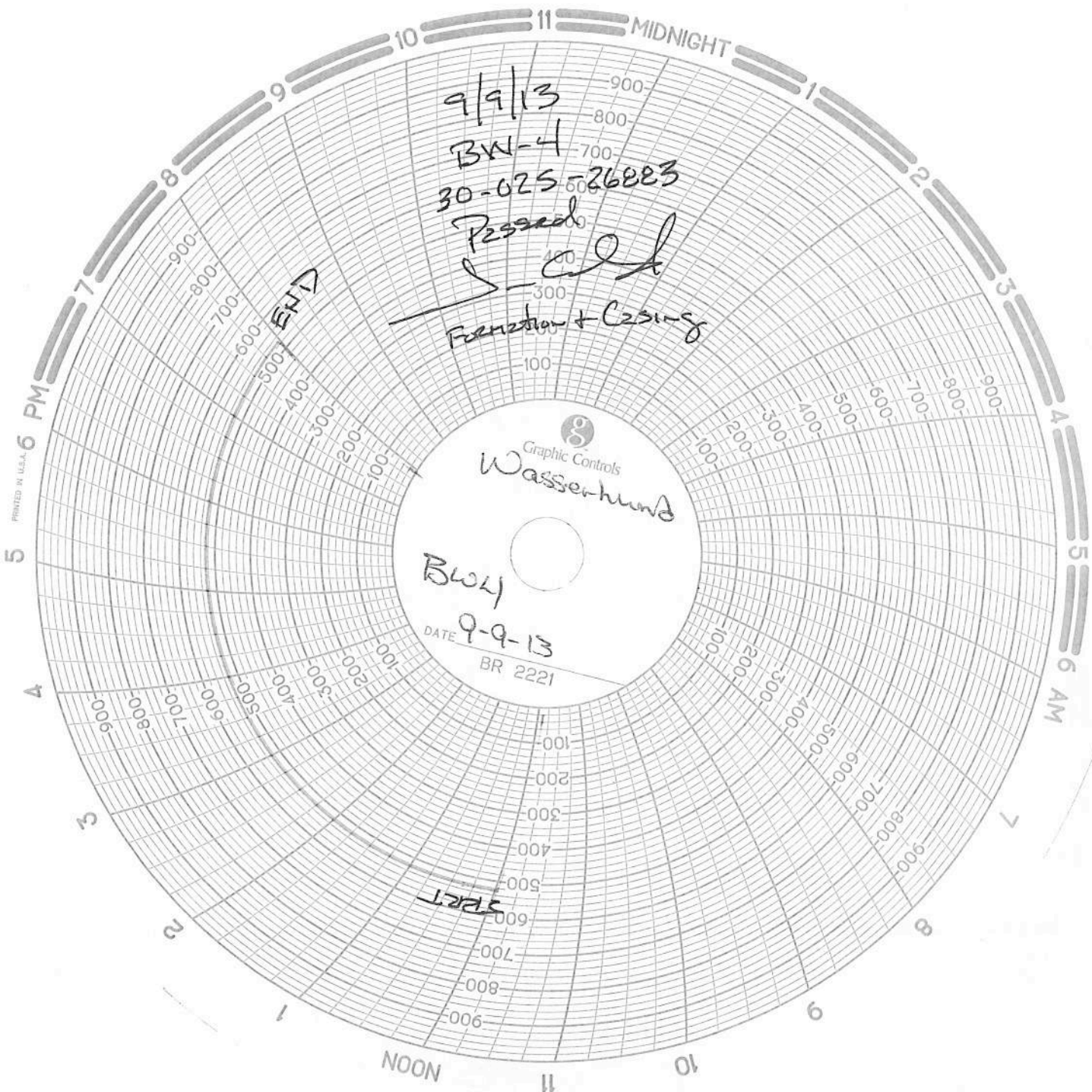
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## Appendix “D”

- 2013 MIT Chart





9/9/13

BW-4

30-025-26883

Passed

*[Signature]*

Friction + Casing

END

BW4

DATE 9-9-13

BR 2221

START



Graphic Controls

Wasserhund



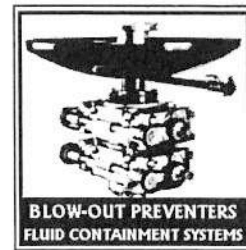
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

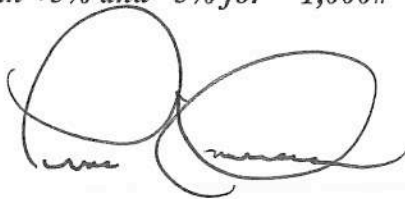
**Unit:** 2

**Model:** 8" Chart recorder

**Pressure Rating:** 1,000#

**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*



\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

## 2014 BW-04 AOR Review- Well Status List

up-dated Apr 28, 2015

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program Checked	Cased/Cemented across salt section	Corrective Action Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	567 FSL & 162 FWL	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation by OCD
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	no

2 2

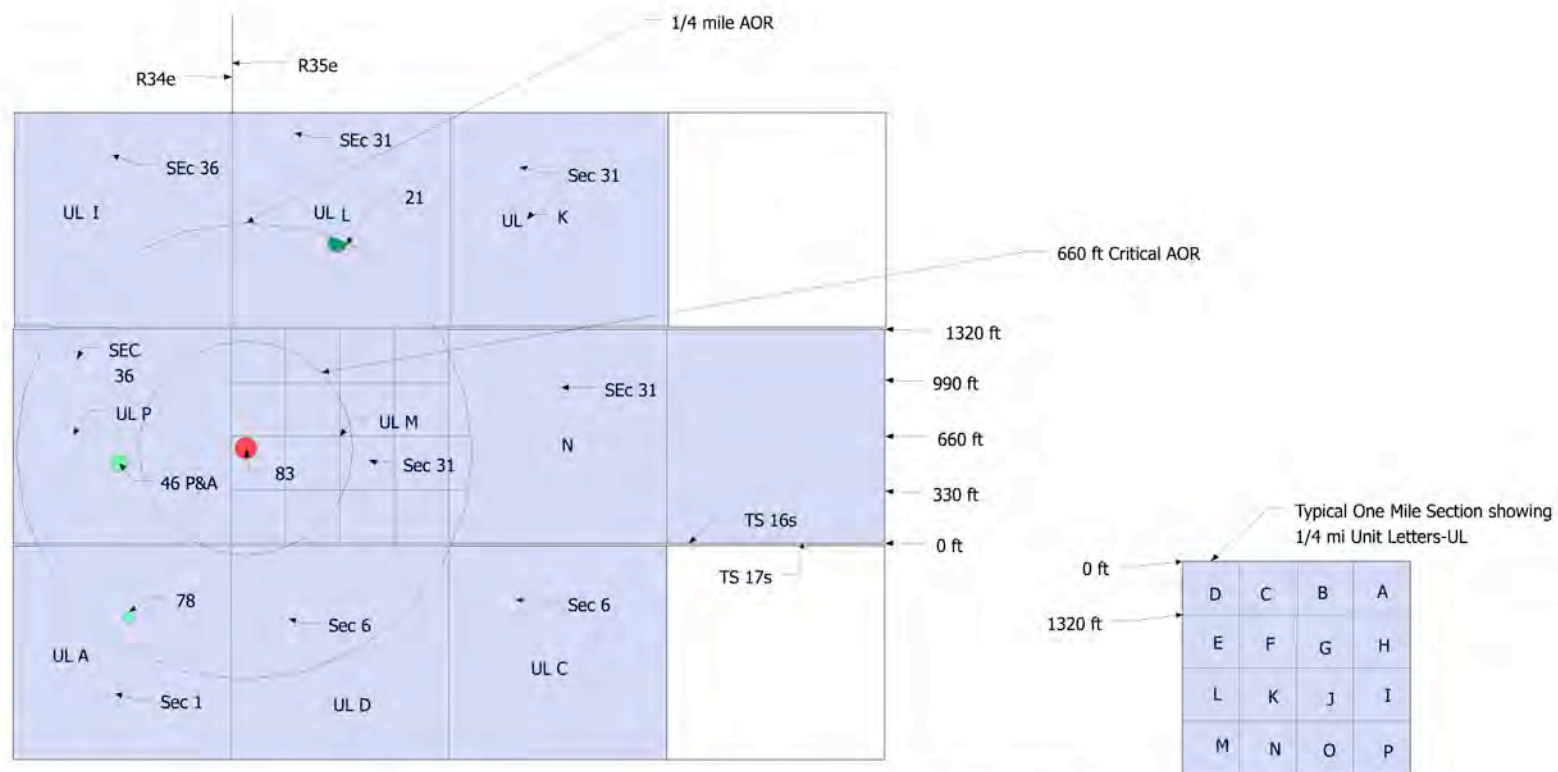
3 Total # of wells in adjacent quarter-sections

3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

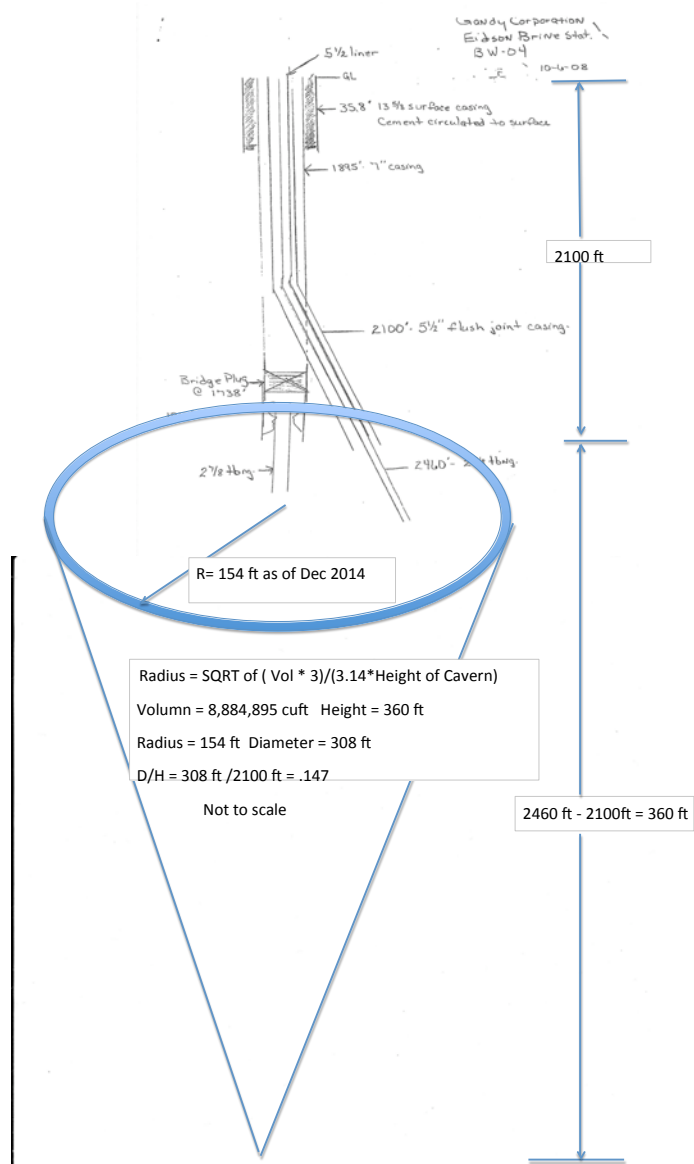
\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.



Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2014	Location: UL M-Sec 31-Ts16s-R35e	

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2014 Radius and D/H calculations.
- Aerial View showing Cavern Radius





Radius of Cavern = 154 ft  
As of Dec 2014.

BW-04

© 2015 Google

©2009 Google

Sat Date: Feb 14, 2014

32°52'23.29" N 103°30'17.92" W elev. 4037 ft

238

Eye alt. 4879 ft

## Appendix “G”

- Solution Cavern Monitoring Plan Program



# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

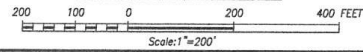
Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

The data will be tabulated and a graph be maintained for each point over the life of the system.

Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only

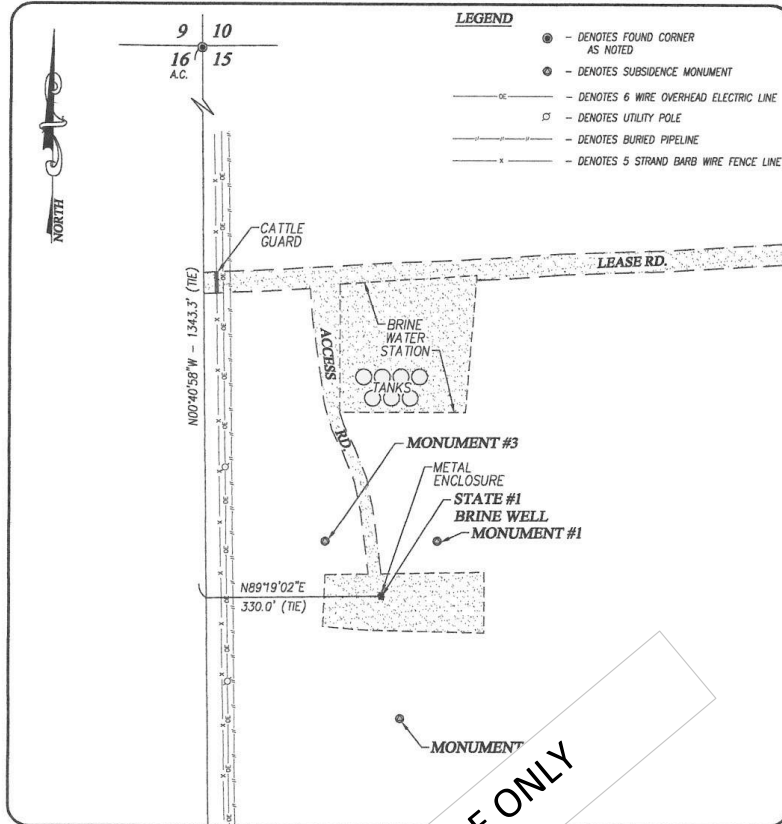
# TOPOGRAPHIC MAP

Figure 4



## LEGEND

- - DENOTES FOUND CORNER AS NOTED
- - DENOTES SUBSIDENCE MONUMENT
- - DENOTES 6 WIRE OVERHEAD ELECTRIC LINE
- - DENOTES UTILITY POLE
- |—|—|— - DENOTES BURIED PIPELINE
- x— - DENOTES 5 STRAND BARB WIRE FENCE LINE



## NOTE

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.



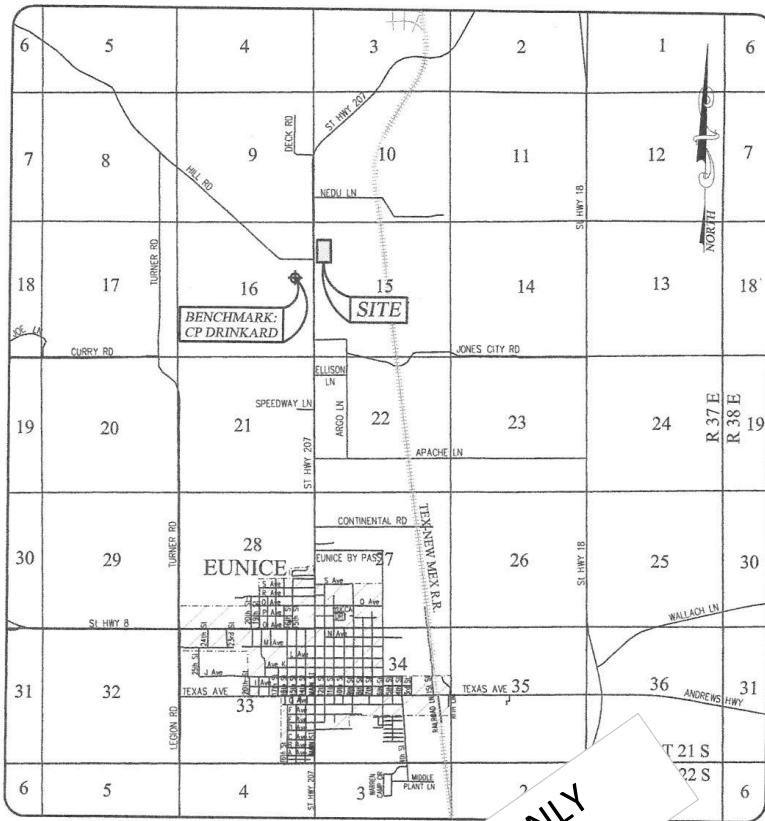
PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mex\Tracts\Subsidence Monitoring\Key Energy Services, LLC\State #1 Brine Well Enclosure Lea County NM\12111721

VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WEST SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC  
MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Figure 2

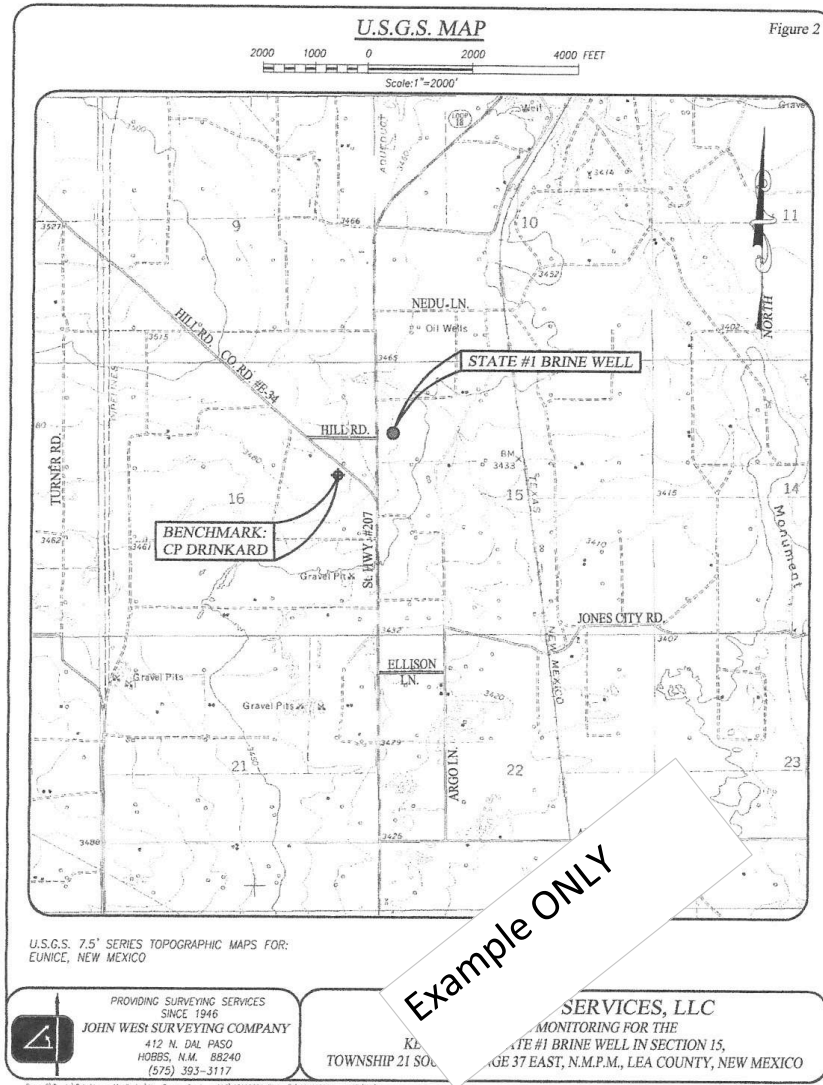
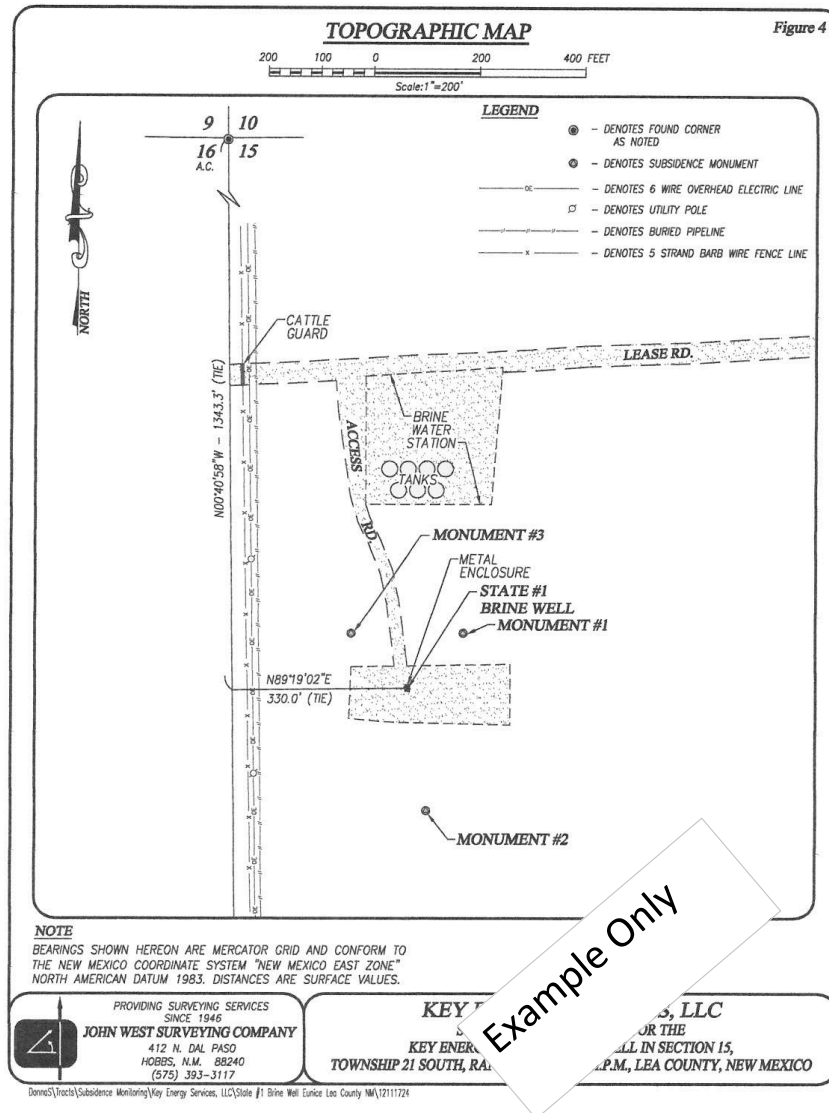
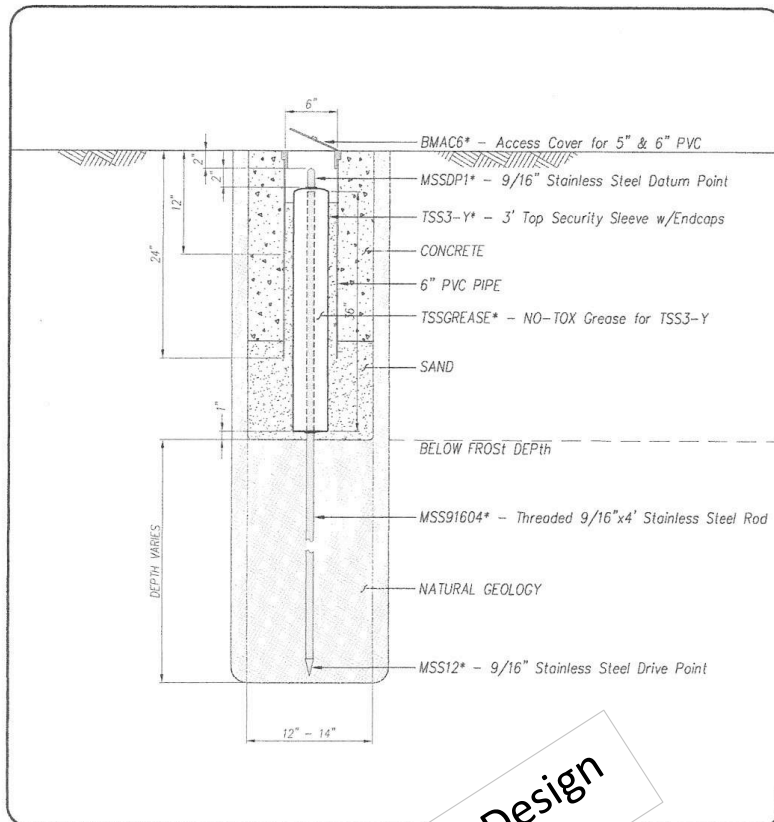


Figure 4



**BERNTSEN MONUMENT INSTALLATION DETAIL**  
NOT TO SCALE

Figure 6



\*REFERENCE:  
www.berntsen.com  
9/16" STAINLESS STEEL TOP SECURITY SLEEVE MONUMENT

Actual Design

PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WESI SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBBS, N.M. 88240  
(505) 393-3117

**ENERGY SERVICES, LLC**  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

# ADJUSTED ELEVATIONS

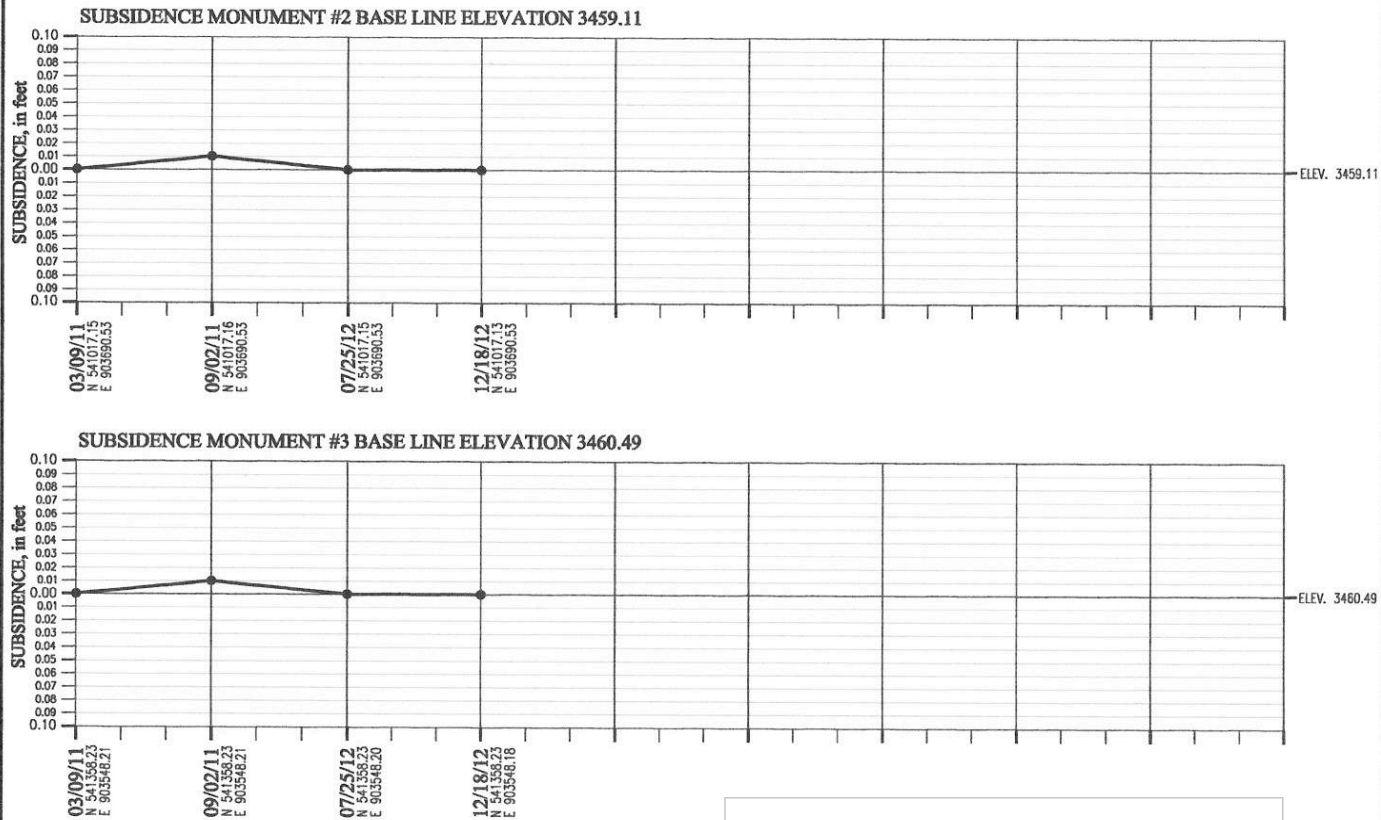
Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only



## VERTICAL SUBSIDENCE TABLE



Example Only

Figure 7B

PROVIDING SURVEYING SERVICES  
SINCE 1946

**JOHN WEST SURVEYING COMPANY**

412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**NOTE:**  
HORIZONTAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.02$  FT.  
VERTICAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.01$  FT.

SUBSIDENCE MONITORING FOR THE  
**KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO**



## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2014 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

Pulling Unit Rig	\$25,000
Halliburton Cement Job	\$8,000.00
Post Subsidence Monitoring 5 years	\$15,000.00
Tank Removal, Pad Clean-Up	\$30,000.00
Consulting fees	\$10,000.00
Total Estimate	\$88,000



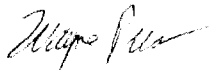
**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2013**

Wasserhund Inc.  
Tatum Brine Station  
OCD Permit BW-22  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e  
May 30, **2014**

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

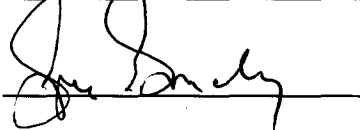
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

*(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.")*

During the 2013 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in Appendix "A").*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. ***(Appendix "A" shows system filling station photos.)***

Inspections revealed that the loading area concrete sump was not tested in 2013 as planned. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 01, 2014, next annual report.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test. The next scheduled 5-year test was due in 2013, and a successful test was performed in September of 2013.

The brine well was drilled in 1980 and has been in operation for approximately 34 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2013 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2013 brine production volume was 763,400 bbls and the lifetime production volume is 8,282,699 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

**Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 “A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.”)

Please find attached in **Appendix “C”** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected April 14, 2014 and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with a high density of 1.19 specific gravity. This analysis is very representative of Salado “Salt” formation waters found in the area.

**Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 “Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.”)

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013 for the past year. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix “D”** a copy of the test chart and meter calibration record.

**Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

#### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 "Results of any leaks and spill reports;")

There were no reportable leaks and spills in 2013.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

#### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 "An Area of Review (AOR) update summary;")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix "E"**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix "E"**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well i.e. 296 feet (R = 148 ft) up-dated for 2013, a 10:1 safety factor is applied that equates to about 1480 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rational of behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.



In the 2013 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1480 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1480 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** The Sheridan NVANU 12-A well #1, according to OCD records is located 460 FSL & 660 FEL of UL P Section 36-Ts16s-R34e. It is shown to be located approximately 700 ft to the WSW of the BW-04 well. This well was drilled in 1975 with surface casing set at 1680 ft and cemented with 760 sacks. A 4-1/2 inch production casing was set at 8980 feet and cemented with 800 sacks.

According to well records in 2011 there appeared to be no cement behind the 4-1/2 casing from 1681 feet to 5500 feet, leaving the salt section exposed to the 4-1/2 casing.

In 2000, a number of casing leaks were noted to be between 4920 feet to 5570 feet. In 2007, a Sheridan well bore schematic noted a water flow up annulus from the off set brine well.

Wasserhund Inc., Price LLC, and OCD reviewed this scenario, and there was no indication that this water was from the brine well. This area is known for being pressured up and the flow was most likely produced water, not brine water. In addition, the brine well as never lost integrity, discounting the Sheridan report.

In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

This well was drilled in 2001 with surface casing set at 1610 feet bgl and cemented with 790 sacks circulated to surface. Intermediate casing was set at 5020 feet and cemented with 1190 sacks with top of cement @ 1740 feet (temp survey). A long string was ran and set at 12,732 feet and cemented with 1380 sacks with top of cement at approximately 2000 feet. From this analysis, it appears that maybe some of casing is exposed to the salt section without adequate cement.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a bradenhead issue, and required corrective actions and a Mechanical Integrity Test. (***see copy included in Appendix "E"***).

**Conclusions:** It is unclear from the reports filed with OCD how the well was actually completed. The description above was taken from C-103's "Notice of Intent", but no final approved C-103 Subsequent report was found. This well was transferred to Chevron USA in 2013 and no issues have been reported to Wasserhund Inc.

**Corrective Actions and Recommendation:** Wasserhund Inc. will notify OCD if any suspected issue arises from this well and any corrective action should be between OCD and Chevron. Wasserhund Inc. does recommend that OCD require Chevron to isolate the salt section, as most wells are completed in the area.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

**Conclusions:** This well is properly cemented from top to bottom, and the salt section is adequately covered.

**Corrective Actions:** No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "upright cone". The volume of the cavern is calculated using the lifetime brine production volumes and using a "rule of thumb" conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix "F"**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 8.28 million barrels of brine produced as of December 2013. The maximum diameter was calculated to be approximately 296 feet with a corresponding D/H ratio of .141 updated for the 2013 year.

Comparing the current D/H ratio of .141 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 148-foot radius superimposed around the brine well and station. The radius has increased by 7.0 feet from last year.

**Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. “Solution Cavern Monitoring Plan Program”. A copy of the proposal is included in **Appendix “G”** for OCD review and approval.

Special Note: Wasserhund Inc. **request a Minor Modifications** that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an “Induced Current Method” and report these results in the next annual report.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

### **Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 “A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;”)*

*See Bullet Point #2 for summary.*

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee’s cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

**Appendix “H”** contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

### **Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 “Annual Certification in accordance with Permit Condition 2.B.3. “**2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.”)*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the final results concerning groundwater will be listed in the 2014 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- Discharge Plan BW-04







# BW-4

Wasserhund/Buckeye  
Eidson State #1

Permit Renewal  
11/8/13

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## DISCHARGE PERMIT BW-4

### 1. GENERAL PROVISIONS:

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.



a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts



2013 Wasserhund Inc OCD BW-04 Annual Production Data										
				Brine-BBLS	Fresh-BBLS		Plus numbers represent more fresh injected than			
							% diff			
Jan				88235	88460		0.26%			
Feb				66445	66760		0.47%			
Mar				70978	71273		0.42%			
Apr				67760	67935		0.26%			
May				58395	58590		0.33%			
Jun				60925	61150		0.37%			
Jul				59405	59550		0.24%			
Aug				65676	65775		0.15%			
Sept				54094	54294		0.37%			
Oct				60555	60677		0.20%			
Nov				48488	48489		0.00%			
Dec				62444	62571		0.20%			
2013 Total				763,400	765,524		0.28%			
Total Brine Water Production Carry Over from Years Past BBLs				7,519,299						
Total Production year ending 2013				8,282,699	bbls					

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

### Sample: 359859 - BW-4 Fresh

Param	Flag	Result	Units	RL
Chloride		399	mg/L	2.5
pH		7.77	s.u.	2
Specific Gravity		1.00	g/ml	
Total Dissolved Solids		1000	mg/L	2.5

### Sample: 359860 - BW-4 Brine

Param	Flag	Result	Units	RL
Chloride		219000	mg/L	2.5
Dissolved Sodium		101000	mg/L	1
pH		6.99	s.u.	2
Specific Gravity		1.19	g/ml	
Total Dissolved Solids		132000	mg/L	2.5

### Sample: 359861 - BW-22 Fresh

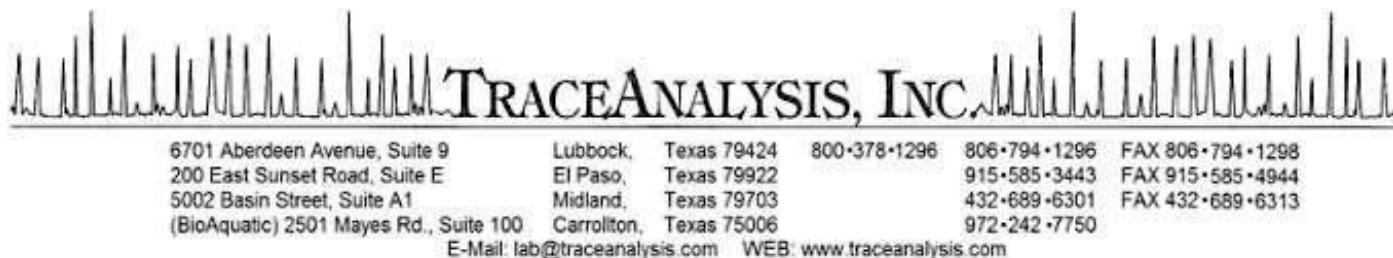
---

Param	Flag	Result	Units	RL
Chloride		<b>406</b>	mg/L	2.5
pH		<b>7.99</b>	s.u.	2
Specific Gravity		<b>0.996</b>	g/ml	
Total Dissolved Solids		<b>1240</b>	mg/L	2.5

---

**Sample: 359862 - BW-22 Brine**

Param	Flag	Result	Units	RL
Chloride		<b>19300</b>	mg/L	2.5
Dissolved Sodium		<b>10400</b>	mg/L	1
pH		<b>6.41</b>	s.u.	2
Specific Gravity		<b>1.03</b>	g/ml	
Total Dissolved Solids		<b>31900</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
 Wasserhund Inc.  
 P.O. Box 2140  
 Lovington, NM, 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
 Project Name: Annual Report  
 Project Number: BW-4 & BW-22

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 18 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
 Dr. Michael Abel, Project Manager

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## Case Narrative

Samples for project Annual Report were received by TraceAnalysis, Inc. on 2014-04-08 and assigned to work order 14040811. Samples for work order 14040811 were received intact at a temperature of 2.9 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	94115	2014-04-10 at 16:00	111321	2014-04-10 at 17:33
Chloride (IC)	E 300.0	94116	2014-04-10 at 16:00	111322	2014-04-10 at 17:33
Na, Dissolved	S 6010C	94164	2014-04-22 at 18:51	111398	2014-04-23 at 11:10
pH	SM 4500-H+	93825	2014-04-08 at 13:44	110975	2014-04-08 at 13:45
Specific Gravity	ASTM D1429-95	93887	2014-04-10 at 09:20	111053	2014-04-10 at 09:45
TDS	SM 2540C	94005	2014-04-09 at 16:00	111195	2014-04-09 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14040811 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

# Analytical Report

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-04-10	Analyzed By:	RL
QC Batch:	111321	Sample Preparation:	2014-04-10	Prepared By:	RL
Prep Batch:	94115				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	399	mg/L	10	2.50

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-04-08	Analyzed By:	AT
QC Batch:	110975	Sample Preparation:	2014-04-08	Prepared By:	AT
Prep Batch:	93825				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.77	s.u.	1	2.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-04-10	Analyzed By:	CF
QC Batch:	111053	Sample Preparation:	2014-04-10	Prepared By:	CF
Prep Batch:	93887				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.00	g/ml	1	0.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-04-09	Analyzed By:	RL
QC Batch:	111195	Sample Preparation:	2014-04-09	Prepared By:	RL
Prep Batch:	94005				



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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1000</b>	mg/L	20	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	111321	Date Analyzed:	2014-04-10	Analyzed By:	RL
Prep Batch:	94115	Sample Preparation:	2014-04-10	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>219000</b>	mg/L	5000	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	111398	Date Analyzed:	2014-04-23	Analyzed By:	LM
Prep Batch:	94164	Sample Preparation:	2014-04-22	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	<b>101000</b>	mg/L	100	1.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110975	Date Analyzed:	2014-04-08	Analyzed By:	AT
Prep Batch:	93825	Sample Preparation:	2014-04-08	Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>6.99</b>	s.u.	1	2.00

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Buckeye(BW-4) Tatum (BW-22)

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-04-10	Analyzed By:	CF
QC Batch:	111053	Sample Preparation:	2014-04-10	Prepared By:	CF
Prep Batch:	93887				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.19</b>	g/ml	1	0.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-04-09	Analyzed By:	RL
QC Batch:	111195	Sample Preparation:	2014-04-09	Prepared By:	RL
Prep Batch:	94005				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>132000</b>	mg/L	1000	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-04-10	Analyzed By:	RL
QC Batch:	111321	Sample Preparation:	2014-04-10	Prepared By:	RL
Prep Batch:	94115				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B	1	<b>406</b>	mg/L	50	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-04-08	Analyzed By:	AT
QC Batch:	110975	Sample Preparation:	2014-04-08	Prepared By:	AT
Prep Batch:	93825				

*continued ...*

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*sample 359861 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>7.99</b>	s.u.	1	2.00

**Sample: 359861 - BW-22 Fresh**

Laboratory: Lubbock  
Analysis: Specific Gravity      Analytical Method: ASTM D1429-95      Prep Method: N/A  
QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      Sample Preparation: 2014-04-10      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.996</b>	g/ml	1	0.00

**Sample: 359861 - BW-22 Fresh**

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      Sample Preparation: 2014-04-09      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1240</b>	mg/L	20	2.50

**Sample: 359862 - BW-22 Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 111322      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94116      Sample Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>19300</b>	mg/L	1000	2.50

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**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	111398	Date Analyzed:	2014-04-23
Prep Batch:	94164	Sample Preparation:	2014-04-22
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	10400	mg/L	100	1.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	6.41	s.u.	1	2.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.03	g/ml	1	0.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	31900	mg/L	200	2.50

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## Method Blanks

### Method Blank (1)      QC Batch: 111053

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.998	g/ml	

### Method Blank (1)      QC Batch: 111195

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 111321

QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      QC Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.61	mg/L	2.5

### Method Blank (1)      QC Batch: 111322

QC Batch: 111322      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94116      QC Preparation: 2014-04-10      Prepared By: RL

Report Date: April 23, 2014  
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Buckeye(BW-4) Tatum (BW-22)

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.23	mg/L	2.5

**Method Blank (1)**      QC Batch: 111398

QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      QC Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		1	<0.172	mg/L	1

**Duplicates (1)**      Duplicated Sample: 359865

QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      QC Preparation: 2014-04-08      Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	8.45	8.46	s.u.	1	0	20

**Duplicates (1)**      Duplicated Sample: 359862

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.03	1.03	g/ml	1	0	200

**Duplicates (1)**      Duplicated Sample: 360017

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Report Date: April 23, 2014  
BW-4 & BW-22

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Annual Report

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Buckeye(BW-4) Tatum (BW-22)

---

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	1690	1720	mg/L	20	2	10

---

Report Date: April 23, 2014  
BW-4 & BW-22

Work Order: 14040811  
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Buckeye(BW-4) Tatum (BW-22)

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 111195  
Prep Batch: 94005

Date Analyzed: 2014-04-09  
QC Preparation: 2014-04-09

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	1020	mg/L	10	1000	<25.0	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	10	1000	<25.0	101	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.2	mg/L	1	25.0	1.61	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.1	mg/L	1	25.0	1.61	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL



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BW-4 & BW-22

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	53.0	mg/L	1	50.0	<0.172	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	53.1	mg/L	1	50.0	<0.172	106	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 359861

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1840	mg/L	50	1250	406	115	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1850	mg/L	50	1250	406	116	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

**Matrix Spike (MS-1)** Spiked Sample: 360083

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	19000	mg/L	500	12500	4720	114	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	19200	mg/L	500	12500	4720	116	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 360135

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	617	mg/L	1	500	82.16	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	582	mg/L	1	500	82.16	100	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.2	105	90 - 110	2014-04-10

### Standard (CCV-2)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

Report Date: April 23, 2014  
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Buckeye(BW-4) Tatum (BW-22)

#### Standard (CCV-1)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (CCV-2)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (ICV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	49.2	96	90 - 110	2014-04-23

#### Standard (CCV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	50.5	99	90 - 110	2014-04-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-14-10	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments

Report Date: April 23, 2014  
BW-4 & BW-22

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Annual Report

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Buckeye(BW-4) Tatum (BW-22)

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

BioAquatic Testing  
2501 Mayes Rd., Ste 100  
Carrollton, Texas 75006  
Tel (972) 242-7750

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

Company Name: <b>WASSER HUDD INC</b>		Phone #: <b>575-399-5721</b>											
Address: (Street, City, Zip)		Fax #:											
Contact Person: <b>WAYNE PRICE</b>		E-mail:											
Invoice to: <b>WASSER HUDD 1623 S MAIN LEXINGTON NM 88260</b>													
Project #: <b>BW-4 + BW-22</b>		Project Name: <b>ANNUAL REPORT</b>											
Project Location (including state): <b>BUCKEYE (BW-4) TATUM BW-22</b>		Sampler Signature: <i>[Signature]</i>											
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX	PRESERVATIVE METHOD					SAMPLING			
					WATER	SOIL	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE
35989	BW-4 FRESH	1	1000 mL	X								4/4/14 11:43 AM	
860	BW-4 BRINE	1	"	X								4/4/14 11:45 AM	
861	BW-22 FRESH	1	"	X								4/4/14 2:45 PM	
862	BW-22 BRINE	1	"	X								4/4/14 2:49 PM	
ANALYSIS REQUEST (Circle or Specify Method No.)													
Turn Around Time if different from standard													
Hold													

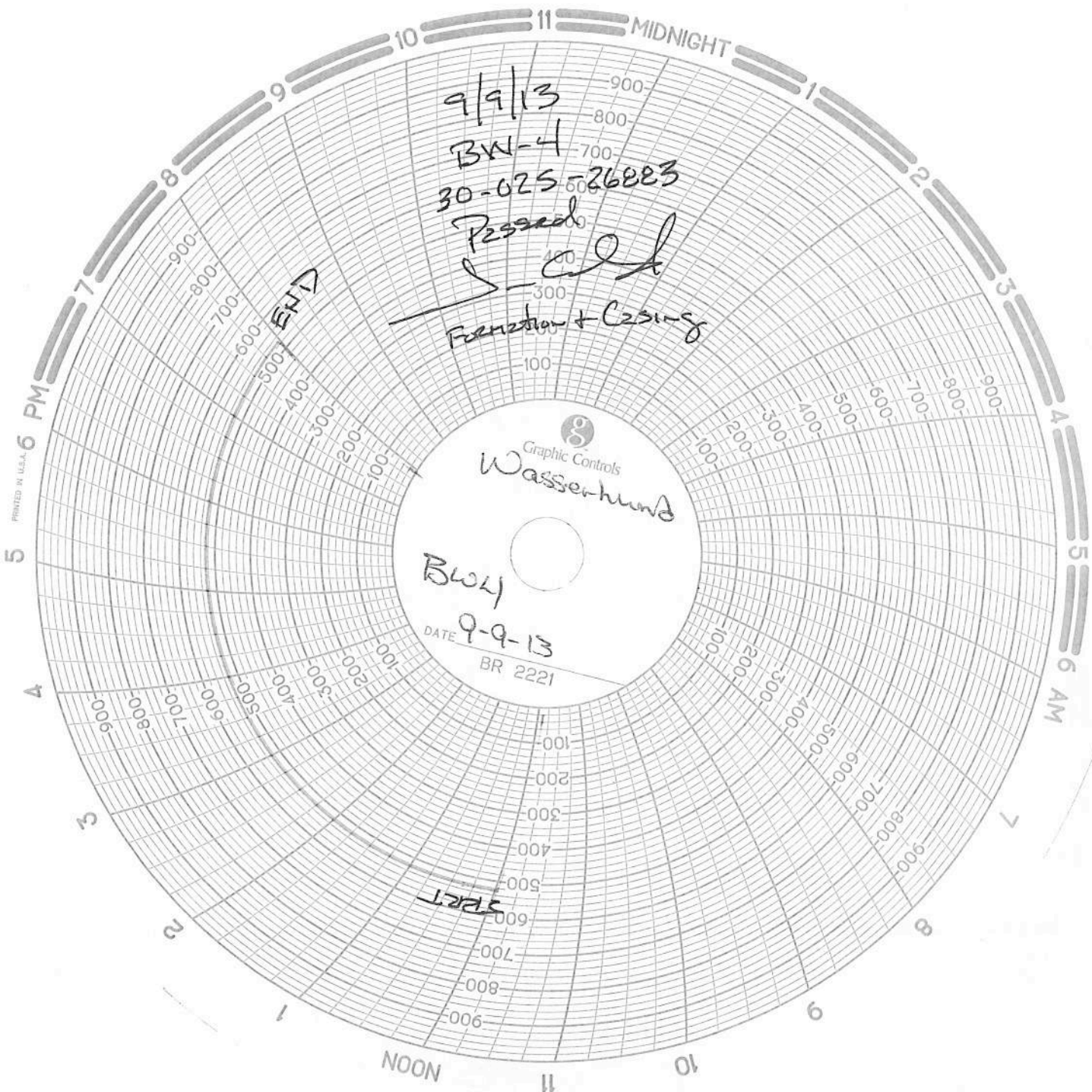
Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## Appendix “D”

- 2013 MIT Chart





9/9/13

BW-4

30-025-26883

Passed

*[Signature]*

Friction + Casing

END

BW4

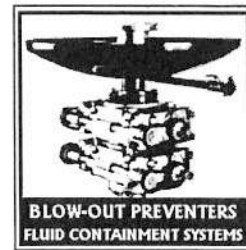
DATE 9-9-13

BR 2221

START

## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260  
P.O. Box 1621  
Office: (575) 396-3715  
Fax: (575) 396-5812



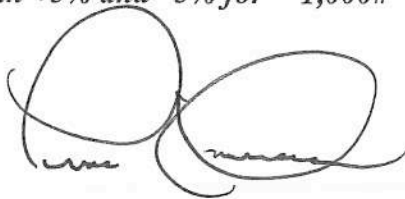
Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy  
**Unit:** 2  
**Model:** 8" Chart recorder  
**Pressure Rating:** 1,000#  
**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*



\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan
- Field Verification by Price LLC check-off list.
- API # 30-025-35678 Chevron USA LOV Letter

## 2013 BW-04 AOR Review- Well Status List

up-dated May 05, 2014

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>167 FSL &amp; 162 FW</u>	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation by OCD
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWI	Yes*	yes	yes	no

2 2

3 Total # of wells in adjacent quarter-sections

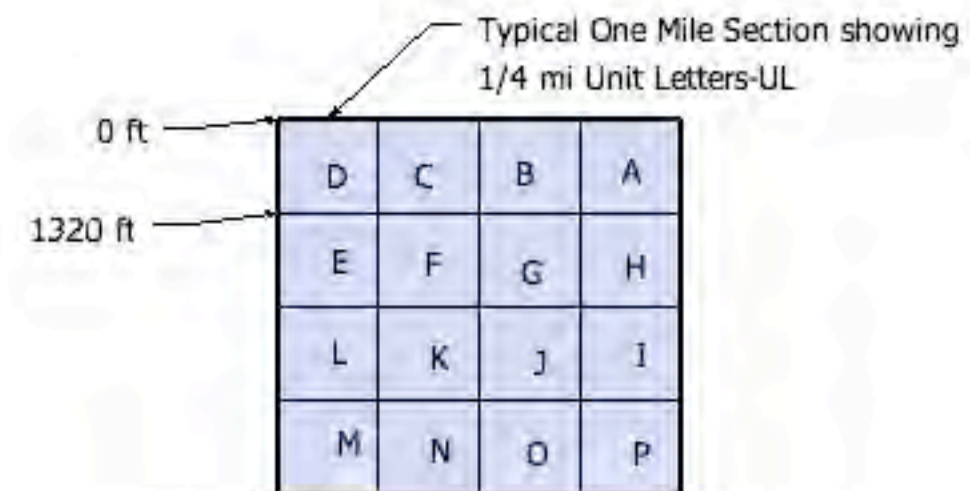
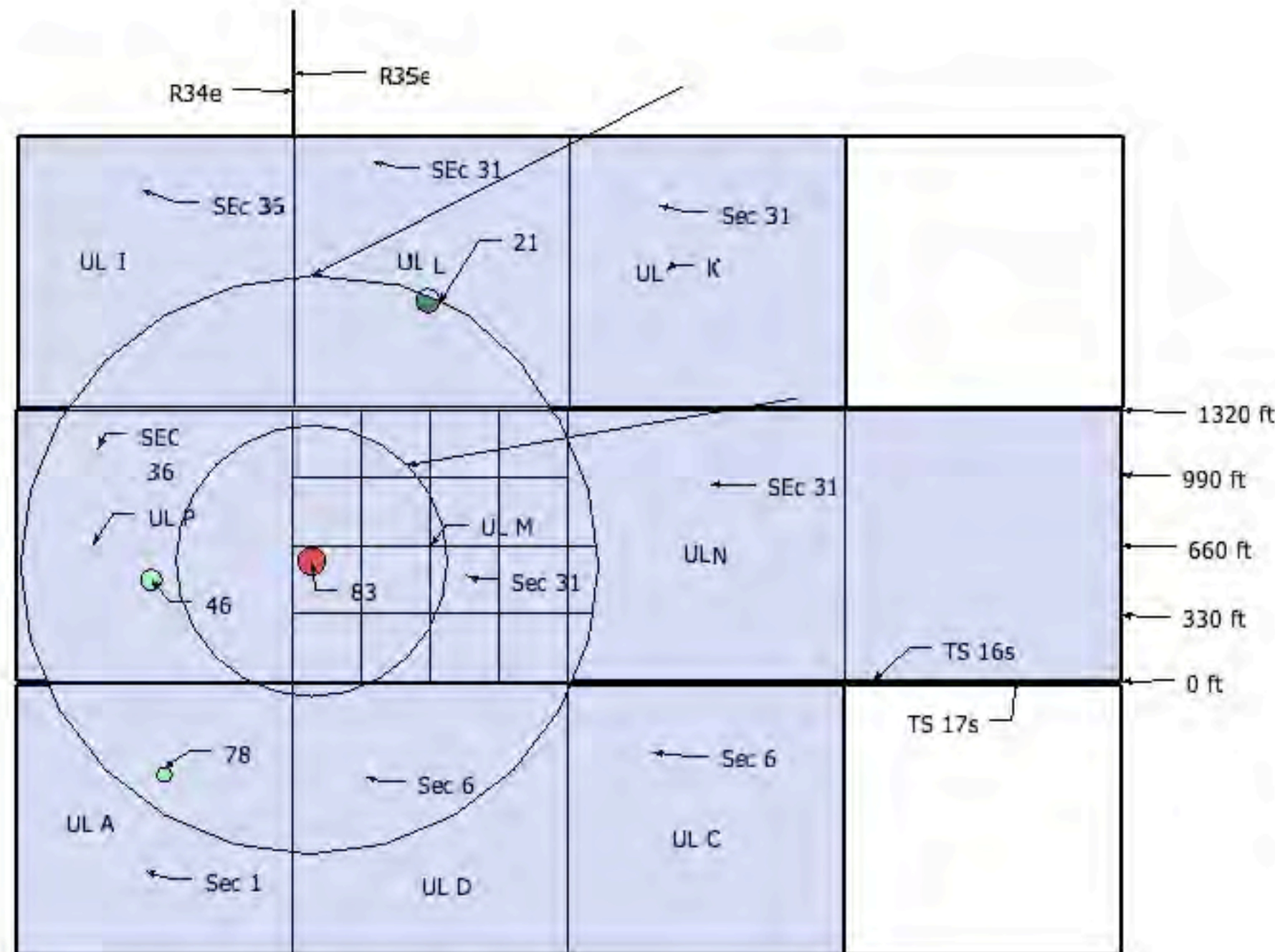
3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

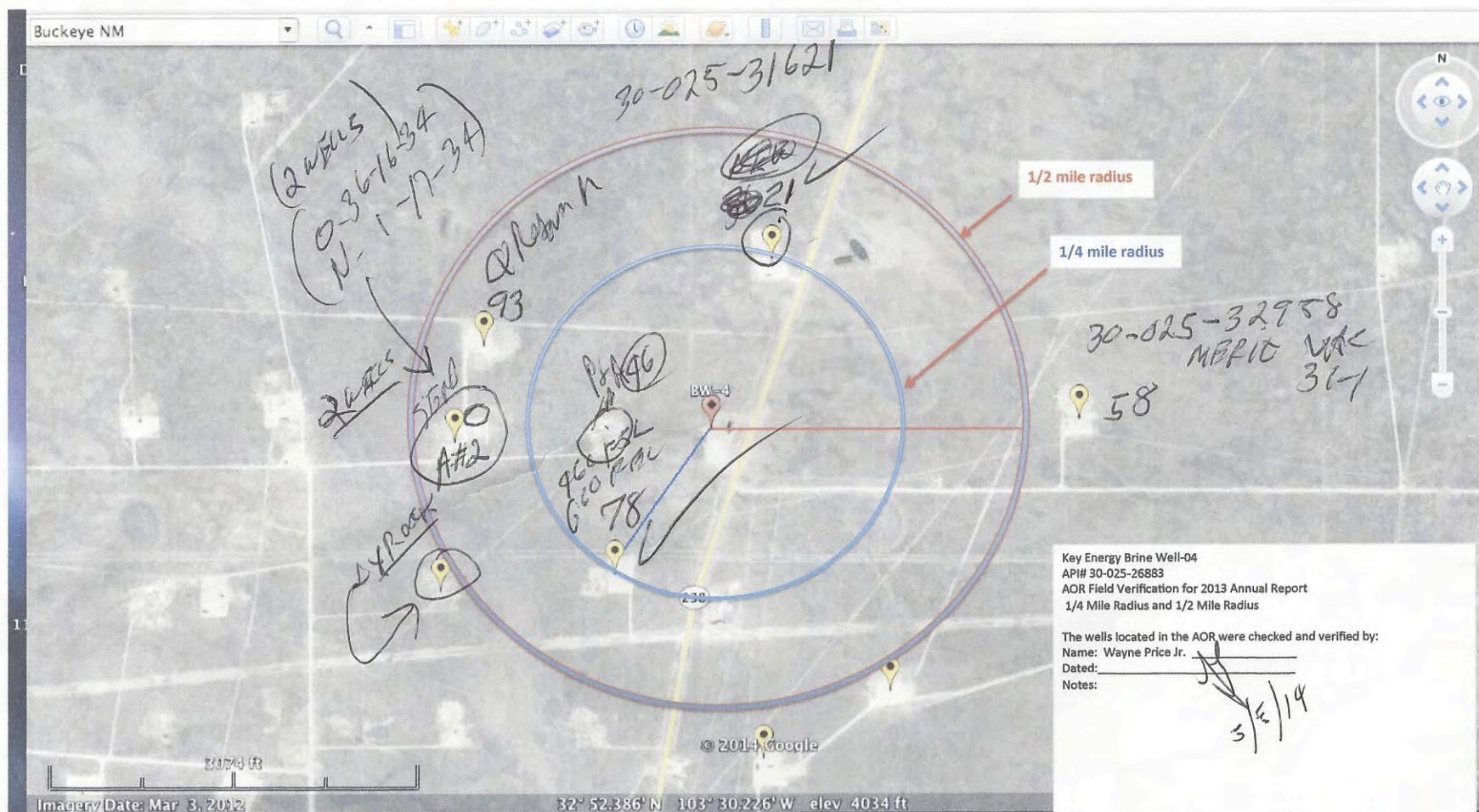
\* Means the well is within 660 ft or Critical AOR (1410 ft) of the outside radius of the brine well and casing program will be checked annually.





Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2013	Location: UL M-Sec 31-Ts16s-R35e	





I.D. ALL WELLS IN 1/2 MI AOR- ADD NEW WELLS, NEW PADS, & POA WELLS.



State of New Mexico  
Energy, Minerals and Natural Resources Department

Susana Martinez  
Governor

HOBBS OCD

John H. Bemis  
Cabinet Secretary

NOV 04 2013

Jami Bailey, Division Director  
Oil Conservation Division

Brett F. Woods, Ph.D.  
Deputy Cabinet Secretary

RECEIVED



**\*Response Required - Deadline**

*Underground Injection Control Program  
"Protecting Our Underground Sources of Drinking"*

01-Nov-13

CHEVRON USA INC.  
ATTN: REGULATORY / NEW MEXICO  
15 SMITH ROAD  
MIDLAND, TX 79705

**LETTER OF VIOLATION and SHUT-IN  
DIRECTIVE Failed Mechanical Integrity Test**

Dear Operator:

The following test(s) were performed on the listed dates on the following well(s) shown below in the test detail section.

The test(s) indicates that the well or wells failed to meet mechanical integrity standards of the New Mexico Oil Conservation Division. To comply with guidelines established by the U.S. Environmental Protection Agency, the well(s) must be shut-in immediately until it is successfully repaired. The test detail section which follows indicates preliminary findings and/or probable causes of the failure. This determination is based on a test of your well or facility by an inspector employed by the Oil Conservation Division. Additional testing during the repair operation may be necessary to properly identify the nature of the well failure.

Please notify the proper district office of the Division at least 48 hours prior to the date and time that the well(s) will be retested so the test may be witnessed by a field representative.

**MECHANICAL INTEGRITY TEST DETAIL SECTION**

QUAIL QUEEN UNIT No.014

30-025-25493-00-00  
G-14-19S-34E

	Active Injection - (All Types)	
Test Date:	10/2/2013	Permitted Injection PSI:
Test Reason:	Annual IMIT	Test Result: F
Test Type:	Bradenhead Test	FAIL TYPE: Operational Violation
Comments on MIT:	PRODUCTION CASING RESPONSE ON BHT FORM IS UNCLEAR; NOI TO P&A WELL ON FILE APRVD 4/8/2013;MIRU TO P&A 7/22/2013; WELL SHOWS PLUG AND ABANDONMENT NOT COMPLETED. **TEST RESULTS NOT CLEAR AND/OR IN CONJUNCTION WITH STATUS OF WELL ON RECORD*** OPERATOR IN VIOLATION OF NMOCD RULE 19.15.26.11***	
		Actual PSI:
		Repair Due: 1/5/2014
		FAIL CAUSE:

NOV 04 2013

November 1, 2013

Page 2

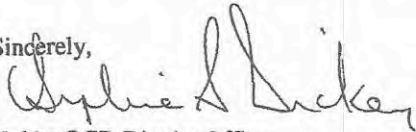
STATE VII No.007

30-025-35678-00-00  
A-1-17S-34E

Test Date:	10/17/2013	Active Gas (Producing)	Permitted Injection PSI:	Actual PSI:	
Test Reason:	Annual IMIT	Test Result:	F	Repair Due:	1/20/2014
Test Type:	Bradenhead Test	FAIL TYPE:	Operational Violation	FAIL CAUSE:	
Comments on MIT:	***FAILED BHT 10/17/2013***OPERATOR IN VIOLATION OF NMOC D RULE 19.15.26.11*** RESULTS OF CASING SHOWS A LIGHT FLOW THAT CONTINUES FOR 5 MINUTES. WELL RECORDS SHOW WELL TO BE A FLOWING GAS WELL WITH PACKER @ 12476; **NOTE OPERATOR NEEDS TO JUSTIFY MECHANICAL INTEGRITY OF CASING RESULTS TO ELIMINATE POSSIBILITY OF PACKER, TUBING AND/OR CASING PROBLEM***				

In the event that a satisfactory response is not received to this letter of direction by the "Repair Due:" date shown above, or if the well(s) are not immediately shut-in, further enforcement will occur. Such enforcement may include this office applying to the Division for an order summoning you to a hearing before a Division Examiner in Santa Fe to show cause why you should not be ordered to permanently plug and abandon this well.

Sincerely,



Hobbs OCD District Office

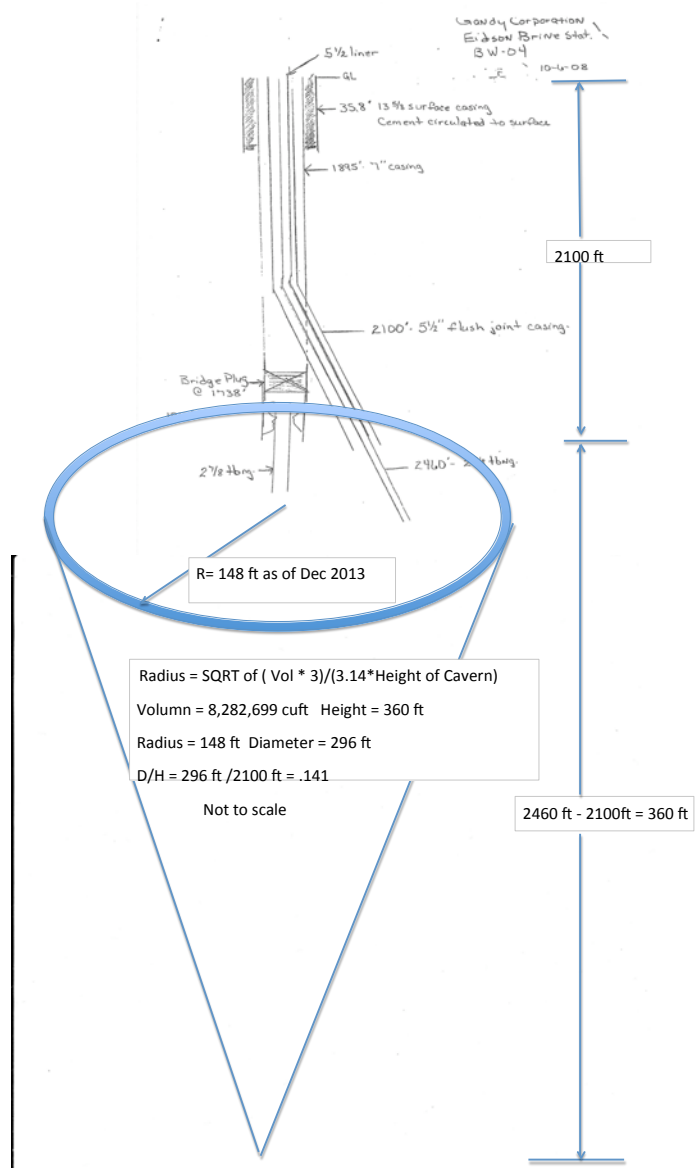
**COMPLIANCE OFFICER**

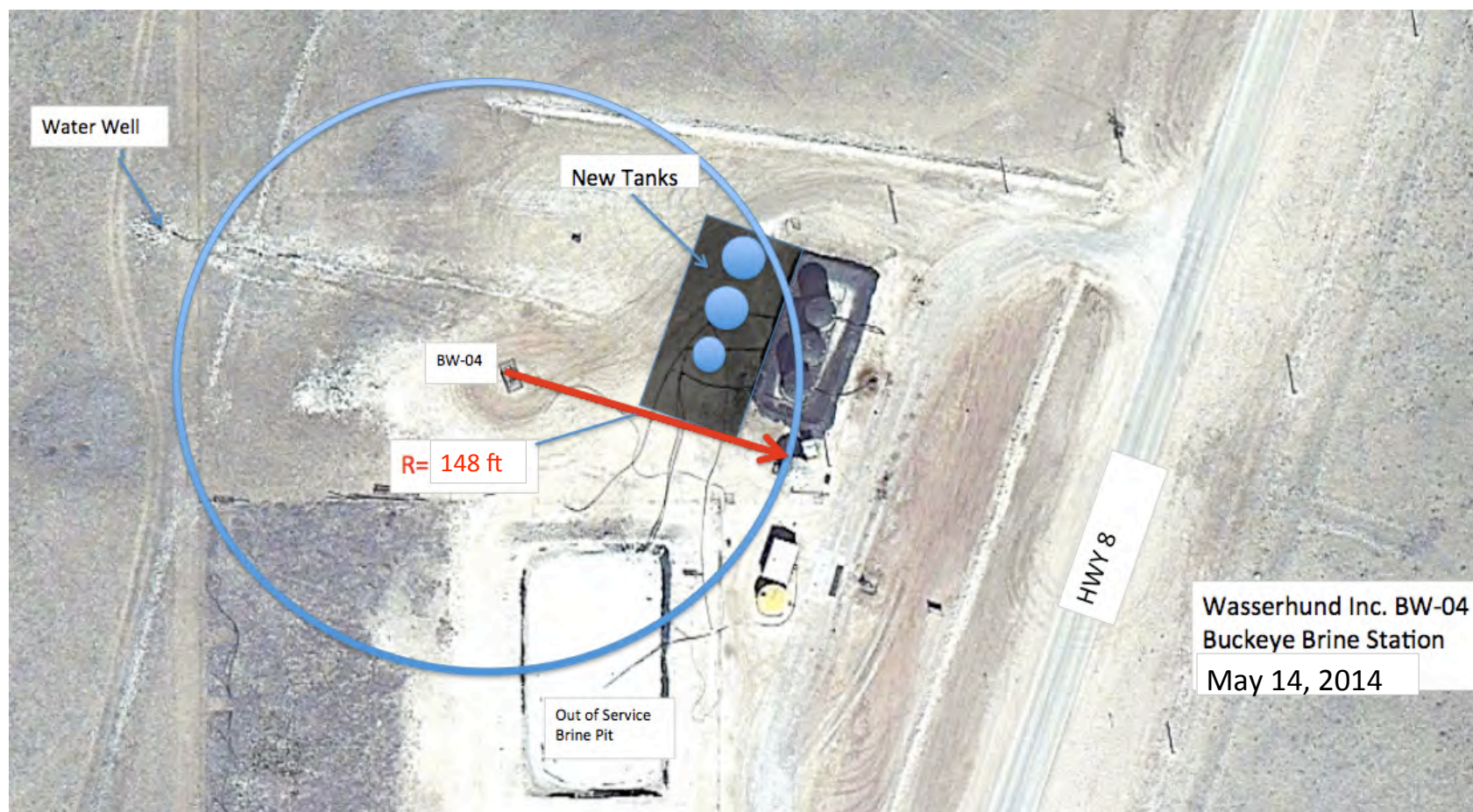
Note: Pressure Tests are performed prior to initial injection, after repairs and otherwise, every 5 years; Bradenhead Tests are performed annually. Information in Detail Section comes directly from field inspector data entries - not all blanks will contain data. "Failure Type" and "Failure Cause" and any Comments are not to be interpreted as a diagnosis of the condition of the wellbore. Additional testing should be conducted by the operator to accurately determine the nature of the actual failure. \* Significant Non-Compliance events are reported directly to the EPA, Region VI, Dallas, Texas.



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2013 Radius and D/H calculations.
- Aerial View showing Cavern Radius





## Appendix “G”

- Solution Cavern Monitoring Plan Program

# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

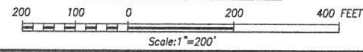
Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

The data will be tabulated and a graph be maintained for each point over the life of the system.

Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only

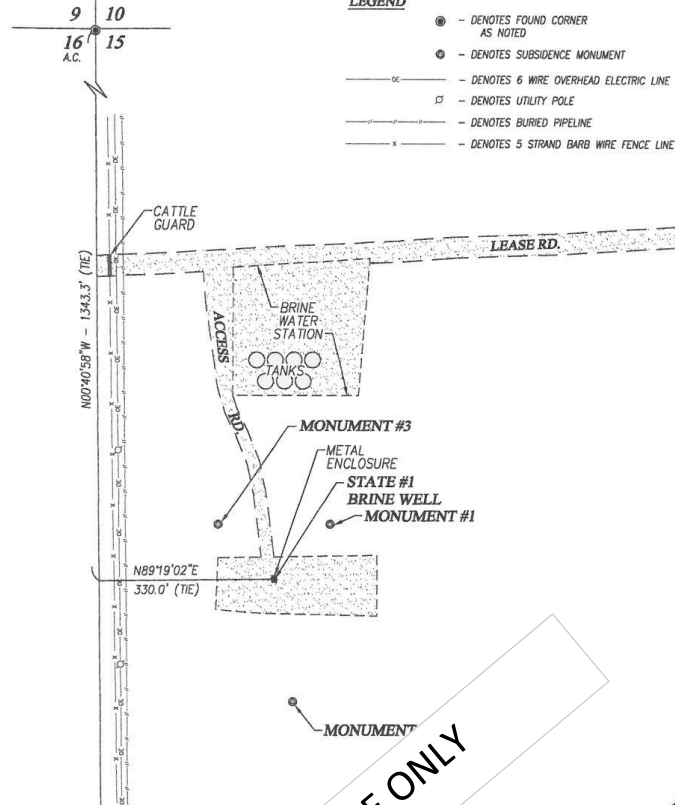
# TOPOGRAPHIC MAP

Figure 4



## LEGEND

- - DENOTES FOUND CORNER AS NOTED
- - DENOTES SUBSIDENCE MONUMENT
- - DENOTES 6 WIRE OVERHEAD ELECTRIC LINE
- - DENOTES UTILITY POLE
- |—|—|— - DENOTES BURIED PIPELINE
- x— - DENOTES 5 STRAND BARB WIRE FENCE LINE



## NOTE

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.



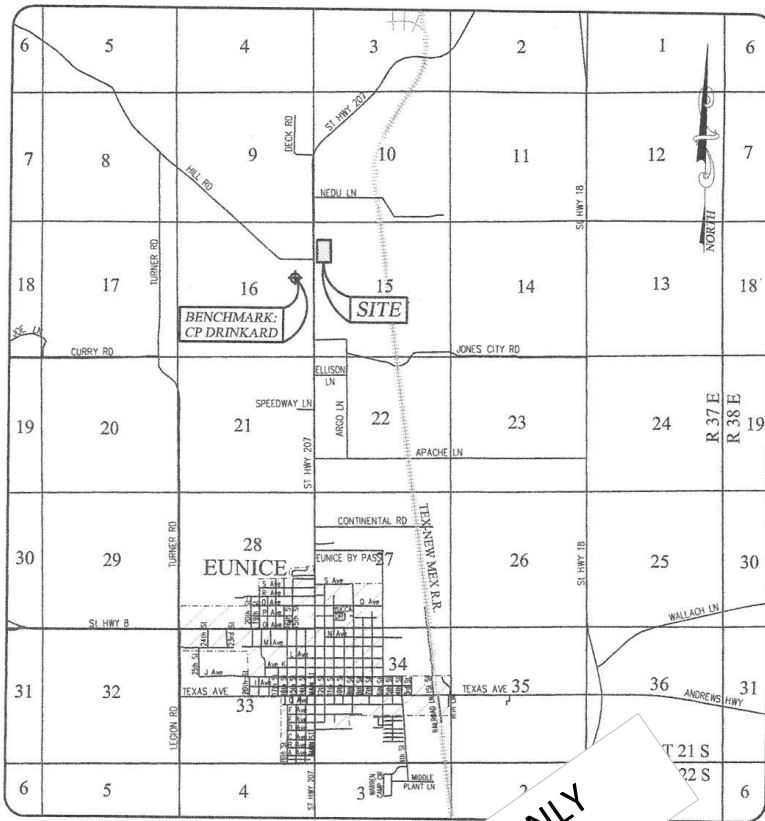
PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mex5\Tracts\Subsidence Monitoring\Key Energy Services, LLC\State #1 Brine Well Eunice Lea County NM\12111721

VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WEST SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC  
MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO



Figure 2

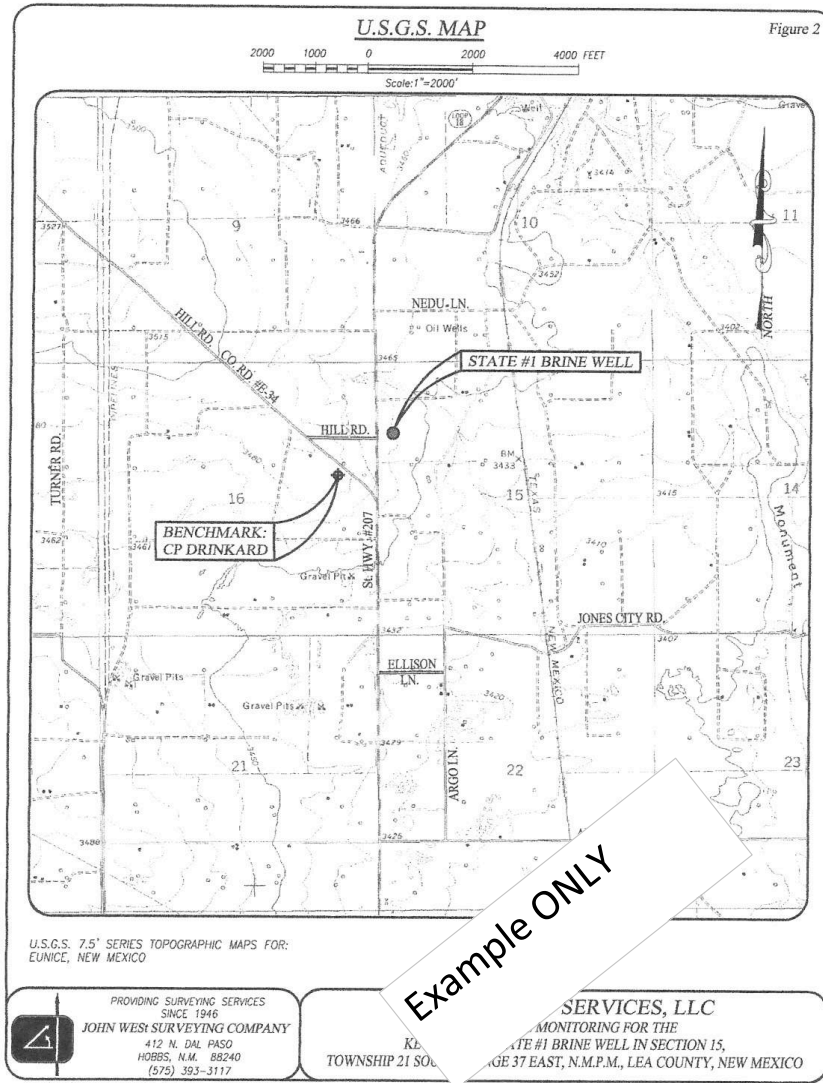
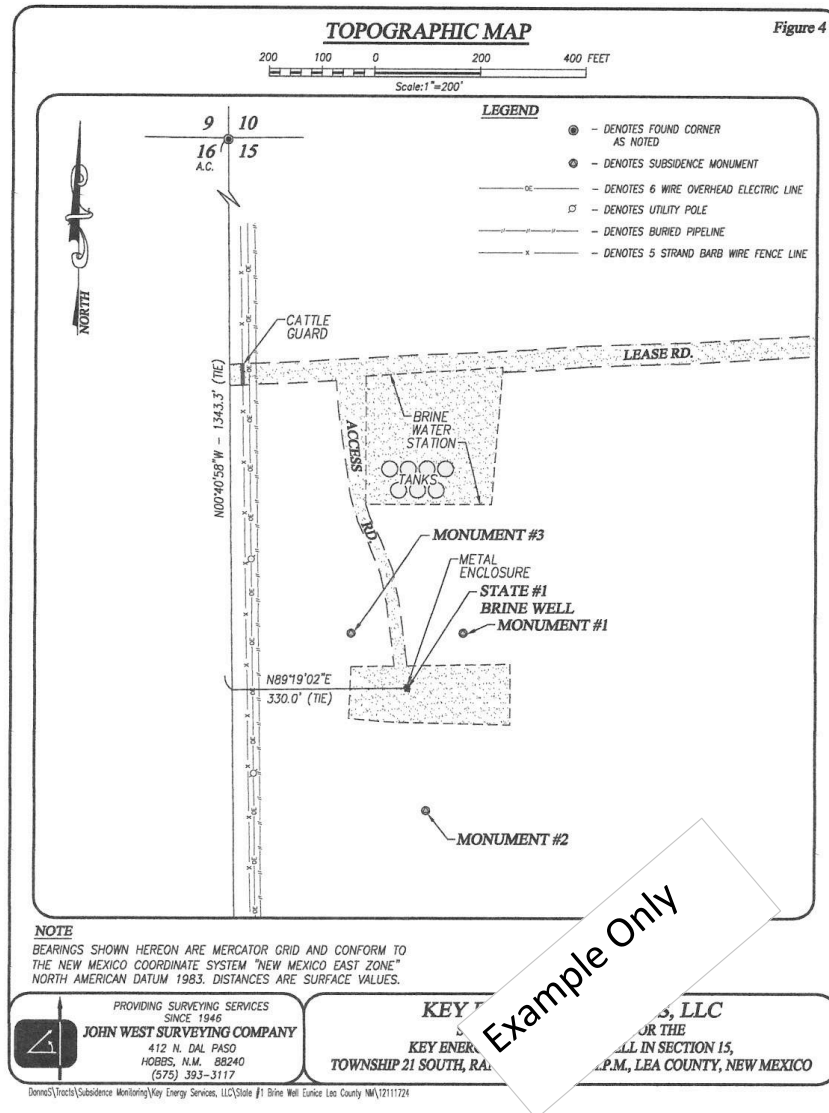





Figure 4



## Figure 6



PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

ENERGY SERVICES, LLC  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

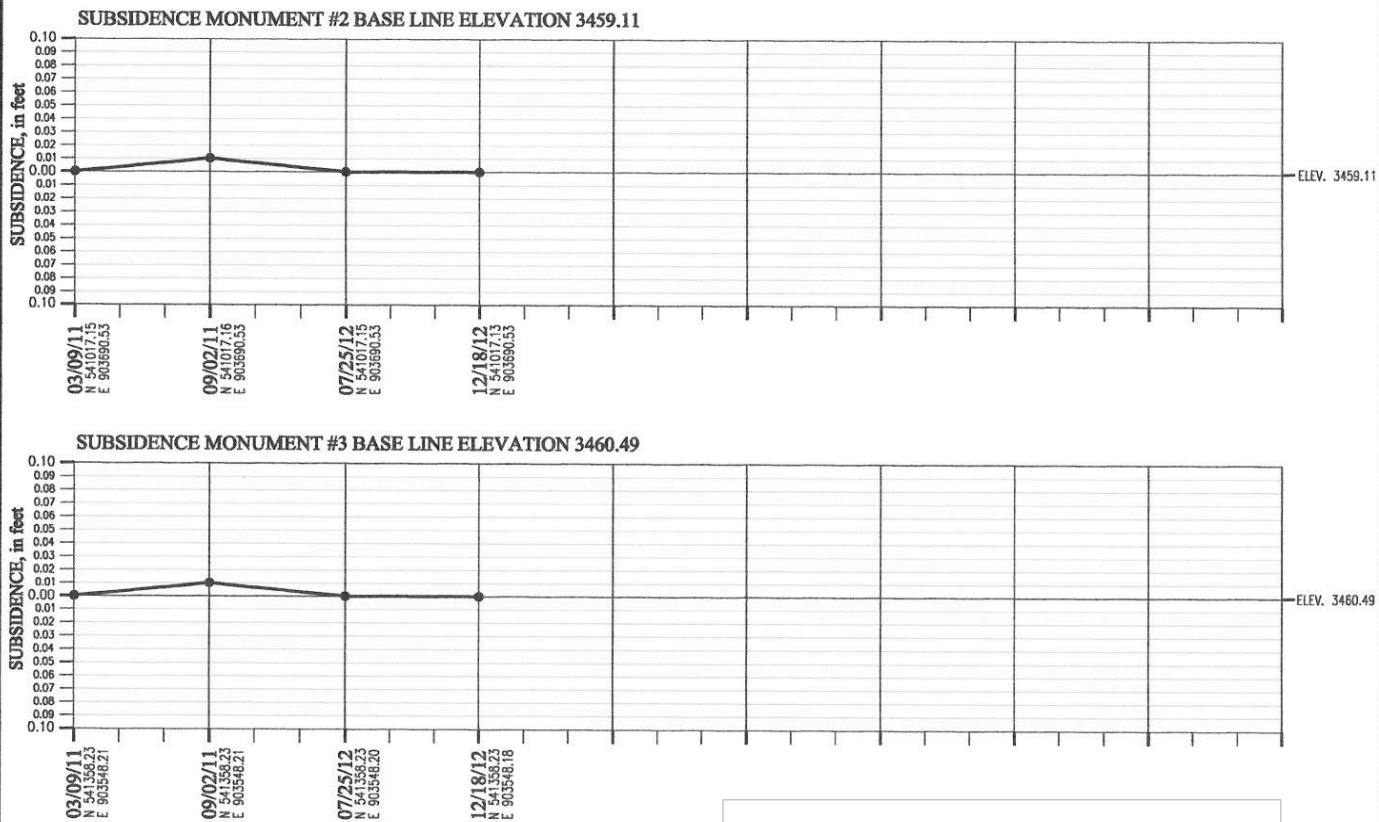
# ADJUSTED ELEVATIONS

Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only

### VERTICAL SUBSIDENCE TABLE



## Example Only

**Figure 7B**



PROVIDING SURVEYING SERVICES  
SINCE 1946

**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**NOTE:**

HORIZONTAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.02$  FT.  
VERTICAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.01$  FT.

KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO

## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2013 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

Pulling Unit Rig	\$25,000
Halliburton Cement Job	\$8,000.00
Post Subsidence Monitoring 5 years	\$15,000.00
Tank Removal, Pad Clean-Up	\$30,000.00
Consulting fees	\$10,000.00
Total Estimate	\$88,000

**Wasserhund Inc.**

P.O. Box 2140

575-396-0522

FAX 575-396-0797

Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2012**

Wasserhund Inc.

Buckeye Brine Station

OCD Permit BW-04

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

March 31, 2013

## Section 1- Summary of Operations:

(Permit Condition 21.L.2. "Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Include copy of C-103 if appropriate.")

During the 2012 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in **Appendix A**).*

Inspections revealed that the loading area concrete sump was not tested in 2012. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 30, 2013.

September 05, 2012 the OCD held a Brine Well Operator's meeting in Hobbs, NM to discuss up-coming permit changes. The most notable change from Wasserhund Inc., standpoint was the removing of the annual "open-to-formation" pressure test requirement. Wasserhund Inc., as most operators, did not run an MIT in 2012.

Wasserhund Inc., has installed approved best management practices at the facility pursuant to the permit conditions. This consisted of three new brine storage tanks installed on a 60 mil liner complete with berms. *(**Appendix "A"** contains a new aerial view that shows site significant features, the new tank locations, and photos.)* The plat shows an annotated up-dated calculated cavern radius. These calculations are discussed in more detail in section 8 below.

The brine well was drilled in 1980 and has been in operation for approximately 33 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Section 8 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.



The last Casing MIT hydrostatic test was successfully performed in October of 2008. Since the OCD generally requires a MIT at least once every five years, this well is due to be tested in 2013. (Copy of last Casing MIT included in **Appendix B.**)

Due to the issues mentioned, Wasserhund Inc., respectfully **request a waiver** on having to pull the tubing for the next MIT/Braden head casing test since re-entry will virtually be impossible. Instead, we would like to purpose using a Nitrogen “Leak Off” Test, which may be considerably more accurate than the OCD standard MIT hydro-test.

On October 13, 2011, the brine well operations were transferred from the Gandy Corporation to Wasserhund Inc. In addition, a brine well renewal application was submitted to OCD with filing fee in June of 2011. **Appendix B** contains the change of operator, renewal application and 2008 MIT test chart.

A Pro-active well “Area of Review” has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Section 8 below.

While this is an older well, it still has not reached its productive end of life and is deemed very safe and an extremely valuable asset for the oil and gas industry.

## **Section 2- Production Volumes:**

*(Permit condition 21.L.3. “Production volumes as required from 21.G. including a running total to be carried over to each year. The maximum and average injection pressure.”)*

(21.G. Requires “The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.”)

Sales tickets and flow meters are used to monitor both water injected and brine produced.

### **Monthly, Yearly and Lifetime Injection and Production Volumes:**

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2012 brine production volume was 730,041 bbls and the lifetime production volume is 7,519,299 bbls.

Enclosed in **Appendix C** is the injection and production and a comparison chart of injected water to produced water with comments.

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the permit maximum pressure of 375 psig.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

**Section 3- Chemical Analysis:**

(Permit condition 21.L.4. "A copy of the chemical analysis as required in 21H. "Analysis of injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.")

Please find attached in **Appendix D** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected November 29, 2012 and analyzed by Trace Analysis, Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and report for general chemistry i.e. major cations and anions, WQCC metals and cyanide.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with minor constituents of calcium, magnesium, and potassium combined with sulfate and bi-carbonate. This analysis is very representative of Salado "Salt" formation waters found in the area.

The specific gravity of the brine water was 1.15 on the day of testing, which equates to 9.60 lb/gal. This is slightly lower than the usual 10 lb/gal normally produced but very acceptable. This lower density is most likely attributed to the current demand for brine in the area, which has decreased the cavity residence time, thus producing lower density brines.

#### **Section 4- Mechanical Integrity:**

(Permit condition 21.L.5. "A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.")

The BW-04 discharge permit condition 21.E set forth the criteria for running MIT's for this well. This condition also includes a schedule for which type of test is required to be run during various years of the permit. As mentioned above, there was no test performed in the year 2012 and according to the permit conditions, a casing MIT or approved alternate will be performed in 2013.

#### **Section 5- Deviations from Normal Production Methods:**

(Permit condition 21.L.6. "Brief explanation describing deviations from normal production methods.")

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc has attempted to change the flow pattern and as of date, 10# brine cannot be made with conventional-flow. Wasserhund inc., will continue to investigate the reason for this problem.

#### **Section 6- Leak and Spill Reports:**

(Permit condition 21.L.7. "A copy of any leaks and spill reports.")

There were no reportable leaks and spills in 2012.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

## Section 7- Groundwater Monitoring:

(Permit condition 21.L.8. "If applicable, results of any groundwater monitoring.")

The BW-04 facility does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

## Section 8- Brine Cavity/Subsidence Information:

(Permit condition 21.L.9. Information required from cavity/subsidence 21.F. "The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment.")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "upright cone". The volume of the cavern is calculated using the lifetime brine production volumes and using a "rule of thumb" conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix F**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 7.52 million barrels of brine produced as of December 2012. The maximum diameter was calculated to be approximately 282 feet with a corresponding D/H ratio of .134 updated for the 2012 year.

Comparing the current D/H ratio of .134 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix F** is an aerial view showing the 141-foot radius superimposed around the brine well and station. The radius has increased by 7 feet from last year.

### **Section 9- Area of Review Update Summary:**

(Permit condition 21.L.10. "An Area of Review (AOR) Summary.")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc., used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix G**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since any future brine well will certainly be limited in size, a critical AOR of 660 feet was initially established and all wells within that radius will be researched in greater detail.

Using the current estimated diameter of the brine well i.e. 282 feet (R = 141 ft) up-dated for 2012, and added a 10:1 safety factor which equates to about 1410 ft. As the brine well grows, the critical AOR will be expanded and new wells will be added or existing wells restudied.

The rationale of this approach is the fact that brine wells are non-static in terms of size and configuration and the fact that Wasserhund Inc has no direct control on wells drilled in close proximity. By just initially focusing on the current wells in the ¼ mile AOR and assuming the status of these wells will remain the same, could be a mistake. Therefore, Wasserhund Inc is taking a more dynamic approach and will re-study wells as the brine well grows, especially wells located in a critical zone.

In the 2012 review, there was one well added to the list, which was the BTA Oil Producers, API # 30-025-31621 located in UL L-Section 31-Ts 16s-R35e. **Appendix G** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

In 2012, there are three wells located within these adjacent units. These wells are within the ¼ miles radius of the brine well and are in the 1410-foot, critical zone. The critical zone was investigated by checking the OCD on-line well records.

The three wells located in the new critical zone i.e. within 1410 feet, were reinvestigated by checking the OCD on-line well records. **Appendix G** contains the last recorded file records for the three wells located in the critical AOR. They are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621.

The Findings are as follows:

**API # 30-025-25146:** The Sheridan NVANU 12-A well #1, according to OCD records (**See Appendix G**), is located 460 FSL & 660 FEL of UL P Section 36-Ts16s-R34e. It is shown to be located approximately 700 ft to the WSW of the BW-04 well. This well was drilled in 1975 with surface casing set at 1680 ft and cemented with 760 sacks. A 4-1/2 inch production casing was set at 8980 feet and cemented with 800 sacks.

According to well records in 2011 there appeared to be no cement behind the 4-1/2 casing from 1681 feet to 5500 feet, leaving the salt section exposed to the 4-1/2 casing.

In 2000, a number of casing leaks were noted to be between 4920 feet to 5570 feet. In 2007, a Sheridan well bore schematic noted a water flow up annulus from off-set brine well.

Wasserhund Inc., Price LLC, and OCD reviewed this scenario, and there was no indication that this water was from the brine well. This area is known for being pressured up and the flow was most likely produced water, not brine water. In addition, the brine well as never lost integrity, discounting the Sheridan report.

In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well has been properly plugged and abandoned in September of 2012, and was approved by OCD. **Appendix G contains the latest OCD P&A reports for this well.**

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records (**attached in Appendix G**), is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

This well was drilled in 2001 with surface casing set at 1610 feet bgl and cemented with 790 sacks circulated to surface. Intermediate casing was set at 5020 feet and cemented

with 1190 sacks with top of cement @ 1740 feet (temp survey). A long string was ran and set at 12,732 feet and cemented with 1380 sacks with top of cement at approximately 2000 feet. From this analysis, it appears that maybe some of casing is exposed to the salt section without adequate cement.

Conclusions: It is unclear from the reports filed with OCD how the well was actually completed. The description above was taken from C-103's "Notice of Intent", but no final approved C-103 Subsequent report was found. This well was transferred to Chevron USA in 2012 and no issues have been reported to Wasserhund Inc.

Corrective actions: Wasserhund Inc. will check with the OCD to determine if the well has been properly completed and approved. Any corrective actions should be between OCD and Chevron.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. A copy of the completion report C-105 is included in Appendix G for reference.

Corrective Actions: No Corrective actions required.

#### **Section 10- Certification (Permit Condition 22.L.11)**

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



---

Larry Gandy  
Principal- Wasserhund Inc.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos
- Discharge Plan BW- **04**



Water Well

New Tanks

BW-04

R=141 ft

Out of Service  
Brine Pit

HWY 8

Wasserhund Inc. BW-04  
Buckeye Brine Station  
March 25, 2013



BW-04 New Brine Water Tanks on 60 Mil Liner with Berms. Looking South between existing tanks on left, and new tanks on right.



Same as above, looking North.







# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**

Governor

**Joanna Prusak**

Cabinet Secretary

**Mark E. Fesmire, P.E.**

Director

Oil Conservation Division

January 24, 2008

Mr. Larry Gandy  
Gandy Corporation  
P.O. Box 827  
Tatum, New Mexico 88267

Re: Discharge Permit Wasserhund Eidson State Well No. 1 Brine Well (BW-004) Renewal

Dear Mr. Gandy:

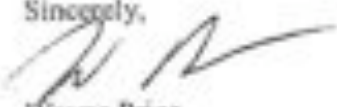
Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the Wasserhund Eidson (*Owner/Operator*) brine well BW 004 (API# 30-025-26883) located in the SW/4, SW/4 of Section 31, Township 16 South, and Range 35 East, NMPM, Lea County, New Mexico, under the conditions specified in the enclosed **Attachment To The Discharge Permit**.

Enclosed are two copies of the conditions of approval. Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail [carlj.chavez@state.nm.us](mailto:carlj.chavez@state.nm.us). On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

  
Wayne Price  
Environmental Bureau Chief

LWP/cc  
Attachments-1  
cc: OCD District Office

RECEIVED  
2008 JAN 12 PM 12 44

**ATTACHMENT TO THE DISCHARGE PERMIT  
Wasserhund Eldson Brine Well (BW-004)  
DISCHARGE PERMIT APPROVAL CONDITIONS**

January 24, 2008

**Please remit a check for \$1700.00 made payable to Water Quality Management Fund:**

**Water Quality Management Fund  
C/o Oil Conservation Division  
1220 S. Saint Francis Drive  
Santa Fe, New Mexico 87505**

- 1. Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of \$100.00, plus a renewal flat fee (see WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required \$100.00 filing fee. However, the owner/operator still owes the required \$1700.00 permit fee for a Class III Brine Well.
- 2. Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on June 11, 2011** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. *Expired permits are a violation of the Water Quality Act [Chapter 74, Article 6, NMSA1978] and civil penalties may be assessed accordingly.*
- 3. Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.
- 4. Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its August 2, 2006 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.
- 5. Modifications:** WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify

the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

**6. Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

**A. OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

**B. Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

**7. Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

**8. Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

**9. Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.



**10. Labeling:** The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

**11. Below-Grade Tanks/Sumps and Pits/Ponds.**

**A.** All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

**B.** All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

**C.** The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

**D.** The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**12. Underground Process/Wastewater Lines:**

**A.** The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for

atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

**B.** The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**13. Class V Wells:** The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

**14. Housekeeping:** The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

**15. Spill Reporting:** The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

**16. OCD Inspections:** The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

**17. Storm Water:** The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

**18. Unauthorized Discharges:** The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in

20.6.2.3[01 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein. An unauthorized discharge is a violation of this permit.

19. **Vadose Zone and Water Pollution:** The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. **Additional Site Specific Conditions:** N/A

21. **Brine Well(s) Identification, Operation, Monitoring, Bonding and Reporting.**

A. Well Identification: API # 30-025-26883

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Fresh water will be injected down the casing and brine shall be recovered up the tubing. Reverse flow will be allowed only once a month for up to 24 hours for clean out. Operators may request long term reverse operation if they can demonstrate that additional casing and monitoring systems are installed and approved by OCD. Operating in the reverse mode for more than 24 hours unless approved otherwise is a violation of this permit.

D. Well Pressure Limits: ~~The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed 375 psig unless otherwise approved by the OCD.~~ The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failures. Systems requiring test pressures less than 300 psig must be approved by OCD prior to testing. At least once every five years and during well work-overs the salt cavern formation will be isolated from the casing/tubing annulus and the casing



pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

**Testing Schedule:**

2007- 30 minute @ 300 psig casing test only (set packer to isolate formation)  
2008- 4 hour @ 300 psig casing open to formation test  
2009- 4 hour @ 300 psig casing open to formation test  
2010- 4 hour @ 300 psig casing open to formation test  
2011- 4 hour @ 300 psig casing open to formation test

- F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

**Any subsidence must be reported within 24 hours of discovery.**

- G. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.
- H. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.
- I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from the brine well.
- J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.
- K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond in the amount of \$50,000.00 to restore the site, plug and abandon

the well by January 1, 2008, pursuant to OCD rules and regulations. If warranted, OCD may require additional financial assurance.

**L. Annual Report:** All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Brine Well Report, name of operator, BW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

**22. Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

**23. Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

**24. Certification:** Gandy Corporation (Owner/Operator), by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. Owner/Operator further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Mr. Larry Gandy  
Eldon State Well No. 1 (BW-004)  
January 24, 2008  
Page 9 of 9

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

Gandy Corporation  
Company Name-print name above

Larry Gandy  
Company Representative- print name

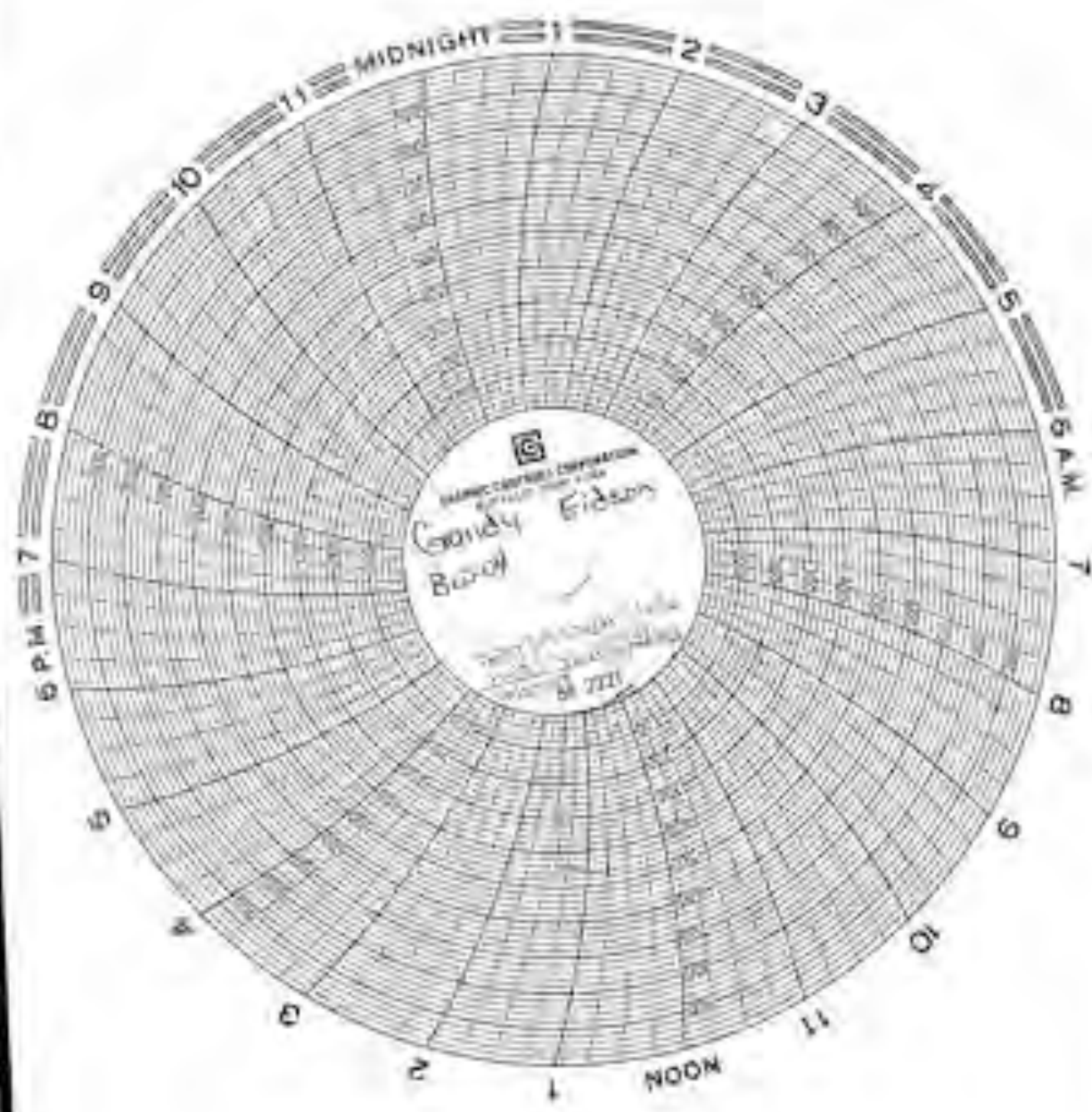
Larry Gandy  
Company Representative- signature

Title Sec/Treas

Date: 2-18-08

## Appendix “B”

- 2008 MIT Chart
- Change of Operator
- Permit Renewal Application







District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Avenue, Artesia, NM 88210  
District III  
1000 Rio Bravo Road, Artesia, NM 88210  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources Department  
Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Revised June 10, 2011  
Submit Original  
Plus 1 Copy  
to Santa Fe  
1 Copy to Appropriate  
District Office

## DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITIES

(Refer to the OCD Guidelines for assistance in completing the application)

☐ New ☒ XX Renewal

- I. Facility Name: Eidson Brine Station-BW-04  
II. Operator: Gandy Corporation  
Address: P.O. Box 827 Tatum, NM 88267  
Contact Person: Larry Gandy Phone: 505-398-4940

### Request, Commitments and Attachments:

Pursuant to WQCC 20.6.2.5003.A NMAC "Existing Facilities" and per WQCC 20.6.2.5003.B, Gandy Corporation is requesting that the previously submitted information be referenced for this permit renewal application and Gandy Corporation hereby commits to continue and operate pursuant to the existing permit on-file with OCD until renewed by OCD. Required \$100.00 filing fee is attached hereto.

- III. Location: SW/4 SW/4 Section 31 Township 16S Range 35E  
Submit large scale topographic map showing exact location.- **ON File with OCD**  
IV. Attach the name and address of the landowner of the facility site.-**ON File with OCD**  
V. Attach a description of the types and quantities of fluids at the facility.-**ON File with OCD**  
VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.-**ON File with OCD**  
VII. Attach a description of underground facilities (i.e. brine extraction well).-**ON File with OCD**  
VIII. Attach a contingency plan for reporting and clean-up of spills or releases.-**ON File with OCD**  
IX. Attach geological/hydrological evidence demonstrating that brine extraction operations will not adversely impact fresh water.-**ON File with OCD**  
X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.-**ON File with OCD**  
XI. CERTIFICATION:

*I hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.*

Name: Wayne Price-Price LLC

Title: Agent for Gandy Corporation

Signature: 

Date: June 09, 2011

E-mail Address: wayneprice77@earthlink.net

## Appendix “C”

- Injection and Production Volumes/Comparison Charts
- Monthly/Quarterly Data Sheets



# 2012 Wasserhund Inc OCD BW-04 Annual Production Data

								Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.		
				Brine-BBLS		Fresh-BBLS		% diff		
Jan				56363		56568		0.36%		
Feb				59406		59561		0.26%		
Mar				55617		55812		0.35%		
Apr				44577		44689		0.25%		
May				60794		60889		0.16%		
Jun				57671		57788		0.20%		
Jul				63510		63735		0.35%		
Aug				63455		63684		0.36%		
Sep				50325		50500		0.35%		
Oct				62264		62379		0.18%		
Nov				74404		74527		0.17%		
Dec				81655		81780		0.15%		
2012 Total				730,041		731,912		0.26%		
Total Brine Water Production Carry Over from Years Past BBLs				6,789,258						
Total Production year ending 2012				7,519,299						

## Appendix “D”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: December 21, 2012

Work Order: 12120307



Project Location: Buckeye, NM  
Project Name: Wasserhund

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
315453	Brine	water	2012-11-29	09:45	2012-12-01
315454	Fresh	water	2012-11-29	09:45	2012-12-01

### Sample: 315453 - Brine

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.005
Total Aluminum		<0.0500	mg/L	0.05
Hydroxide Alkalinity		<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		<b>102</b>	mg/L as CaCo3	20
Total Alkalinity		<b>102</b>	mg/L as CaCo3	20
Total Arsenic		<0.0100	mg/L	0.01
Total Boron		<b>3.23</b>	mg/L	0.01
Total Barium		<b>0.0580</b>	mg/L	0.01
Total Beryllium		<0.00500	mg/L	0.005
Dissolved Calcium		<b>1190</b>	mg/L	1
Dissolved Potassium		<b>1640</b>	mg/L	1
Dissolved Magnesium		<b>1200</b>	mg/L	1
Dissolved Sodium		<b>84200</b>	mg/L	1
Total Cadmium		<0.0100	mg/L	0.01
Total Cobalt		<0.0100	mg/L	0.01
Specific Conductance		<b>346000</b>	uMHOS/cm	
Total Chromium		<0.0100	mg/L	0.01
Total Copper		<0.00500	mg/L	0.005
Density		<b>1.15</b>	g/ml	
Total Iron		<b>0.0470</b>	mg/L	0.01

*continued ...*

*sample 315453 continued ...*

Param	Flag	Result	Units	RL
Total Mercury		<0.000200	mg/L	0.0002
Fluoride		<50.0	mg/L	0.5
Chloride		<b>244000</b>	mg/L	2.5
Sulfate		<b>4150</b>	mg/L	2.5
Total Manganese		<b>0.0450</b>	mg/L	0.005
Total Molybdenum		<0.0500	mg/L	0.05
Total Nickel		<0.0100	mg/L	0.01
Nitrate-N		<4.00	mg/L	0.04
Total Lead		<0.0100	mg/L	0.01
pH		<b>7.02</b>	s.u.	2
Total Antimony		<0.0500	mg/L	0.05
Total Selenium		<0.0200	mg/L	0.02
Total Dissolved Solids		<b>255200</b>	mg/L	10
Total Thallium		<0.0500	mg/L	0.05
Total Cyanide		<0.0150	mg/L	0.015
Total Uranium		<0.0300	mg/L	0.03
Total Zinc		<b>0.0390</b>	mg/L	0.01

**Sample: 315454 - Fresh**

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.005
Total Aluminum		<0.0500	mg/L	0.05
Hydroxide Alkalinity		<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		<b>142</b>	mg/L as CaCo3	20
Total Alkalinity		<b>142</b>	mg/L as CaCo3	20
Total Arsenic		<0.0100	mg/L	0.01
Total Boron		<0.0100	mg/L	0.01
Total Barium		<b>0.0820</b>	mg/L	0.01
Total Beryllium		<0.00500	mg/L	0.005
Dissolved Calcium		<b>94.2</b>	mg/L	1
Dissolved Potassium		<b>12.1</b>	mg/L	1
Dissolved Magnesium		<b>13.5</b>	mg/L	1
Dissolved Sodium		<b>192</b>	mg/L	1
Total Cadmium		<0.0100	mg/L	0.01
Total Cobalt		<0.0100	mg/L	0.01
Specific Conductance		<b>1470</b>	uMHOS/cm	
Total Chromium		<0.0100	mg/L	0.01
Total Copper		<0.00500	mg/L	0.005
Density		<b>0.990</b>	g/ml	
Total Iron		<b>0.467</b>	mg/L	0.01
Total Mercury		<0.000200	mg/L	0.0002
Fluoride		<b>0.586</b>	mg/L	0.5
Chloride		<b>316</b>	mg/L	2.5
Sulfate		<b>53.0</b>	mg/L	2.5

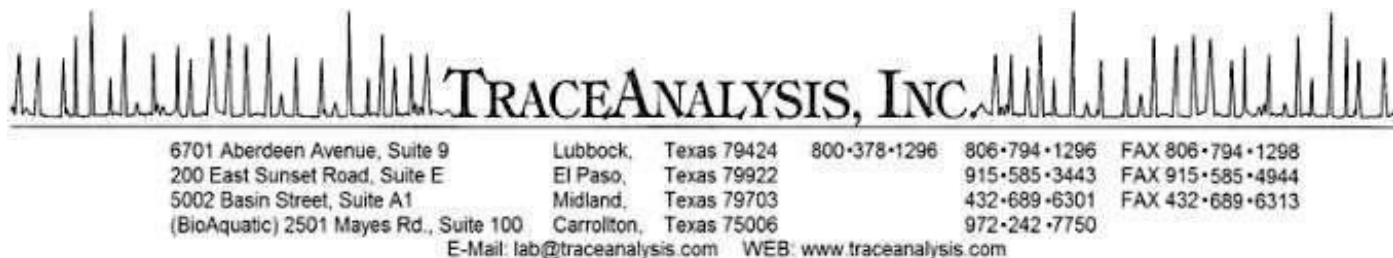
*continued ...*

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*sample 315454 continued ...*

Param	Flag	Result	Units	RL
Total Manganese		<0.00500	mg/L	0.005
Total Molybdenum		<0.0500	mg/L	0.05
Total Nickel		<0.0100	mg/L	0.01
Nitrate-N		<b>1.52</b>	mg/L	0.04
Total Lead		<0.0100	mg/L	0.01
pH		<b>7.98</b>	s.u.	2
Total Antimony		<0.0500	mg/L	0.05
Total Selenium		<0.0200	mg/L	0.02
Total Dissolved Solids		<b>768.0</b>	mg/L	10
Total Thallium		<0.0500	mg/L	0.05
Total Cyanide		<0.0150	mg/L	0.015
Total Uranium		<0.0300	mg/L	0.03
Total Zinc		<0.0100	mg/L	0.01

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## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: December 21, 2012

Work Order: 12120307



Project Location: Buckeye, NM  
Project Name: Wasserhund  
Project Number: Wasserhund-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
315453	Brine	water	2012-11-29	09:45	2012-12-01
315454	Fresh	water	2012-11-29	09:45	2012-12-01

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 69 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager

# Report Contents

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# Case Narrative

Samples for project Wasserhund were received by TraceAnalysis, Inc. on 2012-12-01 and assigned to work order 12120307. Samples for work order 12120307 were received intact at a temperature of 3.8 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Ag, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Alkalinity	SM 2320B	82400	2012-12-08 at 11:19	97314	2012-12-11 at 13:57
Al, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
As, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Ba, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Be, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
B, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Ca, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Cd, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Chloride (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Conductivity	SM 2510B	82309	2012-12-04 at 11:00	97106	2012-12-04 at 14:00
Co, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Cr, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Cu, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Density	ASTM D854-92	82732	2012-12-21 at 11:50	97653	2012-12-21 at 12:10
Fe, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Fluoride (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Hg, Total	S 7470A	82287	2012-12-04 at 11:30	97089	2012-12-04 at 13:01
K, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Mg, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Mn, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Mo, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Na, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Ni, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
NO3 (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Pb, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
pH	SM 4500-H+	82481	2012-12-07 at 10:00	97327	2012-12-11 at 16:35
Sb, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Se, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
SO4 (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
TDS	SM 2540C	82308	2012-12-04 at 12:00	97104	2012-12-04 at 15:00
Tl, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Total Cyanide	SM 4500-CN C,E	82281	2012-12-04 at 09:15	97087	2012-12-04 at 11:34
U, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Zn, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 12120307 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

# Analytical Report

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Ag, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Silver	U	1	<0.00500	mg/L	1	0.00500

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Al, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Aluminum	U	1	<0.0500	mg/L	1	0.0500

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Alkalinity  
QC Batch: 97314  
Prep Batch: 82400

Analytical Method: SM 2320B  
Date Analyzed: 2012-12-11  
Sample Preparation: 2012-12-08

Prep Method: N/A  
Analyzed By: DM  
Prepared By: DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		1	<b>102</b>	mg/L as CaCo3	1	20.0
Total Alkalinity		1	<b>102</b>	mg/L as CaCo3	1	20.0

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	As, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Arsenic	u	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	B, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Boron		1	<b>3.23</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Ba, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Barium		1	<b>0.0580</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Be, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Beryllium	u	1	<0.00500	mg/L	1	0.00500

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**Sample: 315453 - Brine**

Laboratory: Lubbock

Analysis: Cations

QC Batch: 97265

Prep Batch: 82293

Analytical Method: S 6010C

Date Analyzed: 2012-12-10

Sample Preparation: 2012-12-04

Prep Method: S 3005A

Analyzed By: RR

Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		1	<b>1190</b>	mg/L	10	1.00
Dissolved Potassium		1	<b>1640</b>	mg/L	10	1.00
Dissolved Magnesium		1	<b>1200</b>	mg/L	10	1.00
Dissolved Sodium		1	<b>84200</b>	mg/L	100	1.00

**Sample: 315453 - Brine**

Laboratory: Lubbock

Analysis: Cd, Total

QC Batch: 97267

Prep Batch: 82312

Analytical Method: S 6010C

Date Analyzed: 2012-12-10

Sample Preparation: 2012-12-05

Prep Method: S 3010A

Analyzed By: RR

Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cadmium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory: Lubbock

Analysis: Co, Total

QC Batch: 97267

Prep Batch: 82312

Analytical Method: S 6010C

Date Analyzed: 2012-12-10

Sample Preparation: 2012-12-05

Prep Method: S 3010A

Analyzed By: RR

Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cobalt	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory: Lubbock

Analysis: Conductivity

QC Batch: 97106

Prep Batch: 82309

Analytical Method: SM 2510B

Date Analyzed: 2012-12-04

Sample Preparation: 2012-12-04

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Conductance		1	<b>346000</b>	uMHOS/cm	4	0.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Cr, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Chromium	u	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Cu, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Copper	u	1	<0.00500	mg/L	1	0.00500

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Density	Analytical Method:	ASTM D854-92	Prep Method:	N/A
QC Batch:	97653	Date Analyzed:	2012-12-21	Analyzed By:	AK
Prep Batch:	82732	Sample Preparation:	2012-12-21	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.15</b>	g/ml	1	0.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Fe, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV



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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Iron		1	<b>0.0470</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Hg, Total  
QC Batch: 97089  
Prep Batch: 82287

Analytical Method: S 7470A  
Date Analyzed: 2012-12-04  
Sample Preparation: 2012-12-04

Prep Method: N/A  
Analyzed By: TP  
Prepared By: TP

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Mercury	U	1	<0.000200	mg/L	1	0.000200

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Ion Chromatography  
QC Batch: 97164  
Prep Batch: 82305

Analytical Method: E 300.0  
Date Analyzed: 2012-12-04  
Sample Preparation: 2012-12-04

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Fluoride	U	1	<50.0	mg/L	100	0.500
Chloride		1	<b>244000</b>	mg/L	10000	2.50
Sulfate		1	<b>4150</b>	mg/L	100	2.50

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Mn, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Manganese		1	<b>0.0450</b>	mg/L	1	0.00500

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Mo, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Molybdenum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Ni, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Nickel	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	NO3 (IC)	Analytical Method:	E 300.0
QC Batch:	97164	Date Analyzed:	2012-12-04
Prep Batch:	82305	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Nitrate-N	U	1	<4.00	mg/L	100	0.0400

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Pb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Lead	U	1	<0.0100	mg/L	1	0.0100

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	97327	Date Analyzed:	2012-12-11
Prep Batch:	82481	Sample Preparation:	2012-12-07
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.02	s.u.	1	2.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Sb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Antimony	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Se, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Selenium	U	1	<0.0200	mg/L	1	0.0200

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	97104	Date Analyzed:	2012-12-04
Prep Batch:	82308	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	255200	mg/L	1	10.00

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Tl, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Thallium	u	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Total Cyanide	Analytical Method:	SM 4500-CN C,E
QC Batch:	97087	Date Analyzed:	2012-12-04
Prep Batch:	82281	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cyanide	u	1	<0.0150	mg/L	1	0.0150

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	U, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Uranium	u		<0.0300	mg/L	1	0.0300

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Zn, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Zinc		1	<b>0.0390</b>	mg/L	1	0.0100

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Ag, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Silver	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Al, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Aluminum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Alkalinity	Analytical Method:	SM 2320B
QC Batch:	97314	Date Analyzed:	2012-12-11
Prep Batch:	82400	Sample Preparation:	2012-12-08
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		1	<b>142</b>	mg/L as CaCo3	1	20.0
Total Alkalinity		1	<b>142</b>	mg/L as CaCo3	1	20.0

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	As, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Arsenic	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: B, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Boron	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Ba, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Barium		1	<b>0.0820</b>	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Be, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Beryllium	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Cations  
QC Batch: 97265  
Prep Batch: 82293

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-04

Prep Method: S 3005A  
Analyzed By: RR  
Prepared By: KV

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		1	<b>94.2</b>	mg/L	1	1.00
Dissolved Potassium		1	<b>12.1</b>	mg/L	1	1.00
Dissolved Magnesium		1	<b>13.5</b>	mg/L	1	1.00
Dissolved Sodium		1	<b>192</b>	mg/L	1	1.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Cd, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cadmium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Co, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cobalt	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	SM 2510B	Prep Method:	N/A
Analysis:	Conductivity	Date Analyzed:	2012-12-04	Analyzed By:	RL
QC Batch:	97106	Sample Preparation:	2012-12-04	Prepared By:	RL
Prep Batch:	82309				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Conductance		1	<b>1470</b>	uMHOS/cm	1	0.00

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Cr, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Chromium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Cu, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Copper	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	97653	Date Analyzed:	2012-12-21
Prep Batch:	82732	Sample Preparation:	2012-12-21
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.990</b>	g/ml	1	0.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Fe, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Iron		1	<b>0.467</b>	mg/L	1	0.0100



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**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 7470A	Prep Method:	N/A
Analysis:	Hg, Total	Date Analyzed:	2012-12-04	Analyzed By:	TP
QC Batch:	97089	Sample Preparation:	2012-12-04	Prepared By:	TP
Prep Batch:	82287				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Mercury	U	1	<0.000200	mg/L	1	0.000200

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Ion Chromatography	Date Analyzed:	2012-12-04	Analyzed By:	RL
QC Batch:	97164	Sample Preparation:	2012-12-04	Prepared By:	RL
Prep Batch:	82305				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Fluoride		1	<b>0.586</b>	mg/L	1	0.500
Chloride		1	<b>316</b>	mg/L	10	2.50
Sulfate		1	<b>53.0</b>	mg/L	10	2.50

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Mn, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Manganese	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Mo, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

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*sample 315454 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Molybdenum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	Ni, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Nickel	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	NO3 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	97164	Date Analyzed:	2012-12-04	Analyzed By:	RL
Prep Batch:	82305	Sample Preparation:	2012-12-04	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Nitrate-N		1	<b>1.52</b>	mg/L	1	0.0400

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	Pb, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Lead	U	1	<0.0100	mg/L	1	0.0100

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	97327	Date Analyzed:	2012-12-11
Prep Batch:	82481	Sample Preparation:	2012-12-07
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.98	s.u.	1	2.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Sb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Antimony	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Se, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Selenium	U	1	<0.0200	mg/L	1	0.0200

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	97104	Date Analyzed:	2012-12-04
Prep Batch:	82308	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	768.0	mg/L	1	10.00

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Tl, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Thallium	u	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Total Cyanide	Analytical Method:	SM 4500-CN C,E
QC Batch:	97087	Date Analyzed:	2012-12-04
Prep Batch:	82281	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cyanide	u	1	<0.0150	mg/L	1	0.0150

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	U, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Uranium	u		<0.0300	mg/L	1	0.0300

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Zn, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Zinc	u	1	<0.0100	mg/L	1	0.0100

## Method Blanks

### Method Blank (1)      QC Batch: 97087

QC Batch: 97087      Date Analyzed: 2012-12-04      Analyzed By: AK  
Prep Batch: 82281      QC Preparation: 2012-12-04      Prepared By: AK

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cyanide		1	<0.0115	mg/L	0.015

### Method Blank (1)      QC Batch: 97089

QC Batch: 97089      Date Analyzed: 2012-12-04      Analyzed By: TP  
Prep Batch: 82287      QC Preparation: 2012-12-04      Prepared By: TP

Parameter	Flag	Cert	MDL Result	Units	RL
Total Mercury		1	<0.0000675	mg/L	0.0002

### Method Blank (1)      QC Batch: 97104

QC Batch: 97104      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82308      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<5.000	mg/L	10

### Method Blank (1)      QC Batch: 97106

QC Batch: 97106      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82309      QC Preparation: 2012-12-04      Prepared By: RL

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Parameter	Flag	Cert	MDL Result	Units	RL
Specific Conductance		1	2.06	uMHOS/cm	

**Method Blank (1)**      QC Batch: 97164

QC Batch: 97164      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82305      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Nitrate-N		1	<0.0119	mg/L	0.04

**Method Blank (1)**      QC Batch: 97164

QC Batch: 97164      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82305      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Fluoride		1	<0.0388	mg/L	0.5
Chloride		1	<0.209	mg/L	2.5
Sulfate		1	<0.145	mg/L	2.5

**Method Blank (1)**      QC Batch: 97265

QC Batch: 97265      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82293      QC Preparation: 2012-12-04      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Calcium		1	<0.146	mg/L	1
Dissolved Potassium		1	<0.0879	mg/L	1
Dissolved Magnesium		1	<0.0537	mg/L	1
Dissolved Sodium		1	<0.172	mg/L	1

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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Silver		1	<0.00130	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Aluminum		1	<0.00340	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Arsenic		1	<0.00290	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Boron		1	<0.00440	mg/L	0.01

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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Barium		1	<0.00180	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Beryllium		1	<0.00240	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cadmium		1	<0.00470	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cobalt		1	<0.00430	mg/L	0.01



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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Chromium		1	<0.00160	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Copper		1	<0.00180	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Iron		1	<0.00190	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Manganese		1	<0.00290	mg/L	0.005

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**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Molybdenum		1	<0.00550	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Nickel		1	<0.00160	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Lead		1	<0.00820	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Antimony		1	<0.00860	mg/L	0.05

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**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Selenium		1	<0.00540	mg/L	0.02

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Thallium		1	<0.00260	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Uranium			<0.0116	mg/L	0.03

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Zinc		1	<0.00530	mg/L	0.01

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**Method Blank (1)**      QC Batch: 97314

QC Batch: 97314      Date Analyzed: 2012-12-11      Analyzed By: DM  
Prep Batch: 82400      QC Preparation: 2012-12-08      Prepared By: DM

Parameter	Flag	Cert	MDL Result	Units	RL
Hydroxide Alkalinity		1	<1.00	mg/L as CaCo3	20
Carbonate Alkalinity		1	<1.00	mg/L as CaCo3	20
Bicarbonate Alkalinity		1	<1.00	mg/L as CaCo3	20
Total Alkalinity		1	<20.0	mg/L as CaCo3	20

**Method Blank (1)**      QC Batch: 97653

QC Batch: 97653      Date Analyzed: 2012-12-21      Analyzed By: AK  
Prep Batch: 82732      QC Preparation: 2012-12-21      Prepared By: AK

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.987	g/ml	

**Duplicates (1)**      Duplicated Sample: 315546

QC Batch: 97104      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82308      QC Preparation: 2012-12-04      Prepared By: RL

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	670.0	700.0	mg/L	1	4	10

**Duplicates (1)**      Duplicated Sample: 315454

QC Batch: 97106      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82309      QC Preparation: 2012-12-04      Prepared By: RL

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Conductance	1	1460	1470	uMHOS/cm	1	1	20

**Duplicates (1)** Duplicated Sample: 315708

QC Batch: 97314 Date Analyzed: 2012-12-11 Analyzed By: DM  
Prep Batch: 82400 QC Preparation: 2012-12-08 Prepared By: DM

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	1	<1.00	<1.00	mg/L as CaCo3	1	0	20
Carbonate Alkalinity	1	<1.00	<1.00	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity	1	395	390	mg/L as CaCo3	1	1	20
Total Alkalinity	1	395	390	mg/L as CaCo3	1	1	20

**Duplicates (1)** Duplicated Sample: 315667

QC Batch: 97327 Date Analyzed: 2012-12-11 Analyzed By: DM  
Prep Batch: 82481 QC Preparation: 2012-12-07 Prepared By: DM

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	7.95	7.91	s.u.	1	0	20

**Duplicates (1)** Duplicated Sample: 316264

QC Batch: 97653 Date Analyzed: 2012-12-21 Analyzed By: AK  
Prep Batch: 82732 QC Preparation: 2012-12-21 Prepared By: AK

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.19	1.19	g/ml	1	0	20

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 97089 Date Analyzed: 2012-12-04 Analyzed By: TP  
Prep Batch: 82287 QC Preparation: 2012-12-04 Prepared By: TP

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury		1	0.00395	mg/L	1	0.00400	<0.0000675	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury		1	0.00398	mg/L	1	0.00400	<0.0000675	100	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97104 Date Analyzed: 2012-12-04 Analyzed By: RL  
Prep Batch: 82308 QC Preparation: 2012-12-04 Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	969	mg/L	1	1000	<5.00	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	1	1000	<5.00	101	90 - 110	4	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97164 Date Analyzed: 2012-12-04 Analyzed By: RL  
Prep Batch: 82305 QC Preparation: 2012-12-04 Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Nitrate-N		1	5.16	mg/L	1	5.00	<0.0119	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Nitrate-N		1	5.23	mg/L	1	5.00	<0.0119	105	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Fluoride		1	5.14	mg/L	1	5.00	<0.0388	103	90 - 110
Chloride		1	24.2	mg/L	1	25.0	<0.209	97	90 - 110
Sulfate		1	25.9	mg/L	1	25.0	<0.145	104	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Fluoride		1	5.19	mg/L	1	5.00	<0.0388	104	90 - 110	1	20
Chloride		1	25.1	mg/L	1	25.0	<0.209	100	90 - 110	4	20
Sulfate		1	26.9	mg/L	1	25.0	<0.145	108	90 - 110	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97265  
Prep Batch: 82293

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-04

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		1	52.5	mg/L	1	52.5	<0.146	100	85 - 115
Dissolved Potassium		1	49.7	mg/L	1	52.5	<0.0879	95	85 - 115
Dissolved Magnesium		1	50.7	mg/L	1	52.5	<0.0537	96	85 - 115
Dissolved Sodium		1	51.2	mg/L	1	52.5	<0.172	98	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		1	53.2	mg/L	1	52.5	<0.146	101	85 - 115	1	20
Dissolved Potassium		1	50.5	mg/L	1	52.5	<0.0879	96	85 - 115	2	20
Dissolved Magnesium		1	53.5	mg/L	1	52.5	<0.0537	102	85 - 115	5	20
Dissolved Sodium		1	51.6	mg/L	1	52.5	<0.172	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver		1	0.122	mg/L	1	0.125	<0.00130	98	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver		1	0.127	mg/L	1	0.125	<0.00130	102	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum		1	1.11	mg/L	1	1.00	<0.00340	111	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum		1	1.10	mg/L	1	1.00	<0.00340	110	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



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#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic		1	0.504	mg/L	1	0.500	<0.00290	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic		1	0.502	mg/L	1	0.500	<0.00290	100	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Boron		1	0.0470	mg/L	1	0.0500	<0.00440	94	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Boron		1	0.0460	mg/L	1	0.0500	<0.00440	92	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium		1	1.13	mg/L	1	1.00	<0.00180	113	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium		1	1.12	mg/L	1	1.00	<0.00180	112	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Beryllium		1	0.0230	mg/L	1	0.0250	<0.00240	92	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Beryllium		1	0.0246	mg/L	1	0.0250	<0.00240	98	85 - 115	7	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium		1	0.252	mg/L	1	0.250	<0.00470	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium		1	0.250	mg/L	1	0.250	<0.00470	100	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cobalt		1	0.248	mg/L	1	0.250	<0.00430	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cobalt		1	0.246	mg/L	1	0.250	<0.00430	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium		1	0.0990	mg/L	1	0.100	<0.00160	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium		1	0.0980	mg/L	1	0.100	<0.00160	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Copper		1	0.128	mg/L	1	0.125	<0.00180	102	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Copper		1	0.127	mg/L	1	0.125	<0.00180	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron		1	0.560	mg/L	1	0.500	<0.00190	112	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron		1	0.538	mg/L	1	0.500	<0.00190	108	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Manganese		1	0.248	mg/L	1	0.250	<0.00290	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Manganese		1	0.267	mg/L	1	0.250	<0.00290	107	85 - 115	7	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Molybdenum		1	0.530	mg/L	1	0.500	<0.00550	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Molybdenum		1	0.526	mg/L	1	0.500	<0.00550	105	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Nickel		1	0.271	mg/L	1	0.250	<0.00160	108	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Nickel		1	0.249	mg/L	1	0.250	<0.00160	100	85 - 115	8	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead		1	0.537	mg/L	1	0.500	<0.00820	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead		1	0.530	mg/L	1	0.500	<0.00820	106	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Antimony		1	0.242	mg/L	1	0.250	<0.00860	97	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Antimony		1	0.243	mg/L	1	0.250	<0.00860	97	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium		1	0.478	mg/L	1	0.500	<0.00540	96	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium		1	0.475	mg/L	1	0.500	<0.00540	95	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Thallium		1	0.537	mg/L	1	0.500	<0.00260	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Thallium		1	0.547	mg/L	1	0.500	<0.00260	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Uranium			0.526	mg/L	1	0.500	<0.0116	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Uranium			0.538	mg/L	1	0.500	<0.0116	108	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Zinc		1	0.252	mg/L	1	0.250	<0.00530	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Zinc		1	0.255	mg/L	1	0.250	<0.00530	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 315454

QC Batch: 97087  
Prep Batch: 82281

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: AK  
Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cyanide		1	0.105	mg/L	1	0.120	<0.0115	88	10 - 170

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cyanide		1	0.104	mg/L	1	0.120	<0.0115	87	10 - 170	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315388

QC Batch: 97089  
Prep Batch: 82287

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: TP  
Prepared By: TP

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury		1	0.00358	mg/L	1	0.00400	<0.0000675	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury		1	0.00350	mg/L	1	0.00400	<0.0000675	88	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315615

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Nitrate-N		1	49.4	mg/L	10	50.0	<0.119	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Nitrate-N		1	50.3	mg/L	10	50.0	<0.119	101	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315615

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL



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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Fluoride		1	48.8	mg/L	10	50.0	<0.388	98	80 - 120
Chloride		1	288	mg/L	10	250	53.8	94	80 - 120
Sulfate		1	436	mg/L	10	250	164	109	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Fluoride		1	50.7	mg/L	10	50.0	<0.388	101	80 - 120	4	20
Chloride		1	297	mg/L	10	250	53.8	97	80 - 120	3	20
Sulfate		1	437	mg/L	10	250	164	109	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (xMS-1)** Spiked Sample:

QC Batch: 97265  
Prep Batch: 82293

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-04

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		1	665	mg/L	1	525	132	102	75 - 125
Dissolved Potassium		1	513	mg/L	1	525	3.35	97	75 - 125
Dissolved Magnesium		1	555	mg/L	1	525	47.7	97	75 - 125
Dissolved Sodium		1	637	mg/L	1	525	138	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		1	659	mg/L	1	525	132	100	75 - 125	1	20
Dissolved Potassium		1	509	mg/L	1	525	3.35	96	75 - 125	1	20
Dissolved Magnesium		1	562	mg/L	1	525	47.7	98	75 - 125	1	20
Dissolved Sodium		1	645	mg/L	1	525	138	96	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver		1	0.113	mg/L	1	0.125	<0.00130	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver		1	0.117	mg/L	1	0.125	<0.00130	94	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum		1	0.978	mg/L	1	1.00	0.028	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum		1	0.952	mg/L	1	1.00	0.028	92	75 - 125	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic		1	0.477	mg/L	1	0.500	<0.00290	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic		1	0.472	mg/L	1	0.500	<0.00290	94	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Boron		1	3.32	mg/L	1	0.0500	3.27	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Boron		1	3.32	mg/L	1	0.0500	3.27	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium		1	0.917	mg/L	1	1.00	0.026	89	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium		1	0.927	mg/L	1	1.00	0.026	90	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Beryllium		1	0.0242	mg/L	1	0.0250	<0.00240	97	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Beryllium		1	0.0242	mg/L	1	0.0250	<0.00240	97	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium		1	0.237	mg/L	1	0.250	<0.00470	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium		1	0.241	mg/L	1	0.250	<0.00470	96	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cobalt		1	0.241	mg/L	1	0.250	<0.00430	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cobalt		1	0.242	mg/L	1	0.250	<0.00430	97	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium		1	0.0870	mg/L	1	0.100	<0.00160	87	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium		1	0.0960	mg/L	1	0.100	<0.00160	96	75 - 125	10	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Copper		1	0.122	mg/L	1	0.125	0.019	82	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Copper		1	0.130	mg/L	1	0.125	0.019	89	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron		1	3.79	mg/L	1	0.500	3.23	112	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron		1	3.78	mg/L	1	0.500	3.23	110	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Manganese		1	0.387	mg/L	1	0.250	0.136	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Manganese		1	0.385	mg/L	1	0.250	0.136	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Molybdenum		1	0.478	mg/L	1	0.500	<0.00550	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Molybdenum		1	0.483	mg/L	1	0.500	<0.00550	97	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Nickel		1	0.238	mg/L	1	0.250	<0.00160	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Nickel		1	0.246	mg/L	1	0.250	<0.00160	98	75 - 125	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR  
Prep Batch: 82312 QC Preparation: 2012-12-05 Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead		1	0.459	mg/L	1	0.500	<0.00820	92	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead		1	0.482	mg/L	1	0.500	<0.00820	96	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR  
Prep Batch: 82312 QC Preparation: 2012-12-05 Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Antimony		1	0.238	mg/L	1	0.250	<0.00860	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Antimony		1	0.248	mg/L	1	0.250	<0.00860	99	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR  
Prep Batch: 82312 QC Preparation: 2012-12-05 Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium		1	0.447	mg/L	1	0.500	<0.00540	89	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium		1	0.449	mg/L	1	0.500	<0.00540	90	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Thallium		1	0.436	mg/L	1	0.500	<0.00260	87	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Thallium		1	0.462	mg/L	1	0.500	<0.00260	92	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Uranium			0.474	mg/L	1	0.500	<0.0116	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Uranium			0.483	mg/L	1	0.500	<0.0116	97	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



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**Matrix Spike (MS-1)**      Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Zinc		1	0.258	mg/L	1	0.250	0.01	99	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Zinc		1	0.261	mg/L	1	0.250	0.01	100	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 97087 Date Analyzed: 2012-12-04 Analyzed By: AK

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cyanide		1	mg/L	0.120	0.128	107	85 - 115	2012-12-04

### Standard (CCV-1)

QC Batch: 97087 Date Analyzed: 2012-12-04 Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cyanide		1	mg/L	0.120	0.126	105	85 - 115	2012-12-04

### Standard (CCV-1)

QC Batch: 97089 Date Analyzed: 2012-12-04 Analyzed By: TP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Mercury		1	mg/L	0.00500	0.00503	101	90 - 110	2012-12-04

### Standard (CCV-2)

QC Batch: 97089 Date Analyzed: 2012-12-04 Analyzed By: TP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Mercury		1	mg/L	0.00500	0.00493	99	90 - 110	2012-12-04

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### Standard (ICV-1)

QC Batch: 97106 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Specific Conductance		1	uMHOS/cm	1410	1440	102	90 - 110	2012-12-04

### Standard (CCV-1)

QC Batch: 97106 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Specific Conductance		1	uMHOS/cm	1410	1430	101	90 - 110	2012-12-04

### Standard (CCV-1)

QC Batch: 97164 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Nitrate-N		1	mg/L	5.00	5.11	102	90 - 110	2012-12-04

### Standard (CCV-1)

QC Batch: 97164 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Fluoride		1	mg/L	5.00	5.03	101	90 - 110	2012-12-04
Chloride		1	mg/L	25.0	24.0	96	90 - 110	2012-12-04
Sulfate		1	mg/L	25.0	26.3	105	90 - 110	2012-12-04

**Standard (CCV-2)**

QC Batch: 97164 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Nitrate-N		1	mg/L	5.00	5.04	101	90 - 110	2012-12-04

**Standard (CCV-2)**

QC Batch: 97164 Date Analyzed: 2012-12-04 Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Fluoride		1	mg/L	5.00	5.14	103	90 - 110	2012-12-04
Chloride		1	mg/L	25.0	24.3	97	90 - 110	2012-12-04
Sulfate		1	mg/L	25.0	25.7	103	90 - 110	2012-12-04

**Standard (ICV-1)**

QC Batch: 97265 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		1	mg/L	51.0	52.3	102	90 - 110	2012-12-10
Dissolved Potassium		1	mg/L	55.0	55.2	100	90 - 110	2012-12-10
Dissolved Magnesium		1	mg/L	51.0	52.6	103	90 - 110	2012-12-10
Dissolved Sodium		1	mg/L	51.0	51.7	101	90 - 110	2012-12-10

**Standard (CCV-1)**

QC Batch: 97265 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		1	mg/L	51.0	50.9	100	90 - 110	2012-12-10
Dissolved Potassium		1	mg/L	55.0	54.4	99	90 - 110	2012-12-10

*continued ...*

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*standard continued ...*

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Magnesium		1	mg/L	51.0	51.3	100	90 - 110	2012-12-10
Dissolved Sodium		1	mg/L	51.0	51.7	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Silver		1	mg/L	0.125	0.127	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Aluminum		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Boron		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Barium		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Beryllium		1	mg/L	1.00	0.997	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cadmium		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cobalt		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Copper		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Iron		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Manganese		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Molybdenum		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Nickel		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Lead		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR



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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Antimony		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Selenium		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Thallium		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Uranium			mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Zinc		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Silver		1	mg/L	0.125	0.118	94	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Aluminum		1	mg/L	1.00	0.978	98	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		1	mg/L	1.00	0.920	92	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Report Date: December 21, 2012  
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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Boron		1	mg/L	1.00	0.910	91	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Barium		1	mg/L	1.00	0.956	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Beryllium		1	mg/L	1.00	0.936	94	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cadmium		1	mg/L	1.00	0.962	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cobalt		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		1	mg/L	1.00	0.962	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Copper		1	mg/L	1.00	0.970	97	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Iron		1	mg/L	1.00	0.997	100	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Report Date: December 21, 2012  
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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Manganese		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Molybdenum		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Nickel		1	mg/L	1.00	0.960	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Lead		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Report Date: December 21, 2012  
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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Antimony		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Selenium		1	mg/L	1.00	0.920	92	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Thallium		1	mg/L	1.00	0.959	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Uranium			mg/L	1.00	0.983	98	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Zinc		1	mg/L	1.00	0.973	97	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97314

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Carbonate Alkalinity		1	mg/L as CaCo3	0.00	255		-	2012-12-11
Bicarbonate Alkalinity		1	mg/L as CaCo3	0.00	35.0		-	2012-12-11
Total Alkalinity		1	mg/L as CaCo3	250	255	102	90 - 110	2012-12-11

#### Standard (CCV-1)

QC Batch: 97314

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Carbonate Alkalinity		1	mg/L as CaCo3	0.00	230		-	2012-12-11
Bicarbonate Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Total Alkalinity		1	mg/L as CaCo3	250	249	100	90 - 110	2012-12-11

#### Standard (ICV-1)

QC Batch: 97327

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2012-12-11

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2012-12-11



# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-12-8	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments

Report Date: December 21, 2012  
Wasserhund-Buckeye

Work Order: 12120307  
Wasserhund

Page Number: 69 of 69  
Buckeye, NM

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



— (1)	Arsenic (As)	0.1 mg/l
— (2)	Barium (Ba)	1.0 mg/l
— (3)	Cadmium (Cd)	0.01 mg/l
— (4)	Chromium (Cr)	0.05 mg/l
(5)	Cyanide (CN)	0.2 mg/l
(6)	Fluoride (F)	1.6 mg/l
— (7)	Lead (Pb)	0.05 mg/l
— (8)	Total Mercury (Hg)	0.002 mg/l
(9)	Nitrate (NO <sub>3</sub> as N)	10.0 mg/l
— (10)	Selenium (Se)	0.05 mg/l
— (11)	Silver (Ag)	0.05 mg/l
— (12)	Uranium (U)	0.03 mg/l
(13)	Radioactivity: Combined Radium-226 & Radium-228	30 pCi/l
(14)	Benzene	0.01 mg/l
(15)	Polychlorinated biphenyls (PCB's)	0.001 mg/l
(16)	Toluene	0.75 mg/l
(17)	Carbon Tetrachloride	0.01 mg/l
(18)	1,2-dichloroethane (EDC)	0.01 mg/l
(19)	1,1-dichloroethylene (1,1-DCE)	0.005 mg/l
(20)	1,1,2,2-tetrachloroethylene (PCE)	0.02 mg/l
(21)	1,1,2-trichloroethylene (TCE)	0.1 mg/l
(22)	ethylbenzene	0.75 mg/l
(23)	total xylenes	0.62 mg/l
(24)	methylene chloride	0.1 mg/l
(25)	chloroform	0.1 mg/l
(26)	1,1-dichloroethane	0.025 mg/l
(27)	ethylene dibromide (EDB)	0.0001 mg/l
(28)	1,1,1-trichloroethane	0.06 mg/l
(29)	1,1,2-trichloroethane	0.01 mg/l
(30)	1,1,2,2-tetrachloroethane	0.01 mg/l
(31)	vinyl chloride	0.001 mg/l

- (32) PAHs: total naphthalene plus monomethylnaphthalenes.....0.03 mg/l
- (33) benzo-a-pyrene.....0.0007 mg/l

**B. Other Standards for Domestic Water Supply**

- (1) Chloride (Cl) .....250.0 mg/l
- (2) Copper (Cu) .....1.0 mg/l
- (3) Iron (Fe) .....1.0 mg/l
- (4) Manganese (Mn) .....0.2 mg/l
- (6) Phenols.....0.005 mg/l
- (7) Sulfate (SO<sub>4</sub>) .....600.0 mg/l
- (8) Total Dissolved Solids (TDS) .....1000.0 mg/l
- (9) Zinc (Zn) .....10.0 mg/l
- (10) pH.....between 6 and 9

**C. Standards for Irrigation Use - Ground water shall meet the standards of Subsection A, B, C of this section unless otherwise provided.**

- (1) Aluminum (Al) .....5.0 mg/l
- (2) Boron (B) .....0.75 mg/l
- (3) Cobalt (Co) .....0.05 mg/l
- (4) Molybdenum (Mo) .....1.0 mg/l
- (5) Nickel (Ni) .....0.2 mg/l

1-77, 1-29-82, 11-17-83, 3-3-86, 12-1-95; 20.6.2.3103 NMAC - Rn, 20 NMAC 6.2.III.3103, 1-15-01; A, 9-26-



Trace Analytical Services, Inc.  
600 Rowley Road, Suite 224  
Greenville, SC 29615  
(724) 631-1889

December 18, 2012

Liz Greens  
TraceAnalytical, Inc.  
8701 Aberdeen Avenue, Suite 9  
Lubbock, TX 79424

RE: Project 315453, 315454  
Pace Project No. 3063063

Dear Liz Greens:

Enclosed are the analytical results for sample(s) received by the laboratory on December 04, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

[jqcollins@traceatsc.com](mailto:jqcollins@traceatsc.com)  
Project Manager

Enclosure



#### REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, copied or in any way  
violate the written consent of Trace Analytical Services, Inc.

## CERTIFICATIONS

Phone: (770) 962-1399

Fax: (770) 962-1399

### Pennsylvania Certification IDs

11251 Pottsville Rd Suite 2, 35A Commerce, PA 17021  
ACI/ACI (DO-ELAP Accreditation # A26, 1544)  
Alabama Certification # 41590  
Arizona Certification # AC1704  
Arkansas Certification  
California/TN Certification # 0422202A  
Colorado Certification  
Connecticut Certification # PH-0863  
Delaware Certification  
Florida/TN Certification # 031883  
Guam/PADEP Certification  
Hawaii/PADEP Certification  
Idaho Certification  
Illinois/PADEP Certification  
Indiana/PADEP Certification  
Iowa Certification # 501  
Kansas/TN Certification # E-10366  
Kentucky Certification # 90153  
Louisiana/TN Certification # LA000002  
Louisiana/TN Certification # 4086  
Maine Certification # PH0001  
Maryland Certification # 328  
Massachusetts Certification # MPA0457

### Michigan/PADEP Certification

Michigan Certification # 235  
Minnesota Certification # Cert 0000  
Nevada Certification  
New Hampshire/TN Certification # 2872  
New Jersey/TN Certification # NJ 051  
New Mexico Certification  
New York/TN Certification # 10083  
North Carolina Certification # 47700  
Oregon/TN Certification # PA200002  
Pennsylvania/TN Certification # 65-00002  
Puerto Rico Certification # PA01457  
South Dakota Certification  
Tennessee Certification # TN0002  
Texas/TN Certification # T 004704188  
Utah/TN Certification # A/STE  
Virgin Island/PADEP Certification  
Virginia Certification # 00112  
Virginia/VELAP Certification # 990168  
Washington Certification # C88A  
West Virginia Certification # 143  
Wisconsin/PADEP Certification  
Wyoming Certification # 07N012

## REPORT OF LABORATORY ANALYSIS

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### SAMPLE SUMMARY

Project: 215453, 215454

Pace Project No: 3033063

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3033063001	215453	Water	11/29/12 09:45	12/04/12 09:45
3033063002	215454	Water	11/29/12 09:45	12/04/12 09:45

### REPORT OF LABORATORY ANALYSIS

"This report shall not be intentionally altered in any way without the written consent of Pace Analytical Services, Inc."

Page 5 of 11



# SAMPLE ANALYTE COUNT

Project: 315453, 315454  
Pace Project No: 0063083

Lab ID	Sample ID	Method	Analyte	Analytes Reported
303000001	315453	STP 003.1	SLA	1
		STP 004.0	SAW	1
303000002	315454	STP 003.1	SLA	1
		STP 004.0	SAW	1

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: 315453, 315454  
Pace Project No.: 3065063

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Method: EPA 903.1  
Description: 903.1 Radon 226  
Client: Pace Analytical, Inc.  
Date: December 18, 2012

### General Information:

2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold time with any exceptions noted below.

### Method Blank:

All analyzed were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike components were within QC limits with any exceptions noted below.

### Matrix Spike:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: 315453, 315454

Pace Project No.: 3063063

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Method: EPA 904.0

Description: 904.0 Rotum 229

Client: TraceAnalysis, Inc.

Date: December 18, 2012

### General Information:

7 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method specified hold times with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spikes:

All laboratory control spike compounds were within 12% limit with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

This data package has been reviewed for quality and completeness and it is approved for release.

## REPORT OF LABORATORY ANALYSIS

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# ANALYTICAL RESULTS

Project: 315432 315434

Phase Project (s): 3000003

Sample: 315433	Lab ID: 3083063001	Collected: 11/29/12 09:45	Received: 12/04/12 09:45	Matrix: Water		
INOC:	Site ID:	Sample Type:				
Parameters	Method	Act & UCL (MDC)	Units	Analyzed	CAS No.	Qual
Fluoride-225	STA 9031	7.71 ± 2.54 (1.85)	µg/L	12/13/12 14:04	13982-83-3	
Sulfate-226	STA 9040	63.9 ± 4.33 (6.82)	mg/L	12/13/12 14:26	10025-00-0	

Sample: 315434	Lab ID: 3083063002	Collected: 11/29/12 09:45	Received: 12/04/12 09:45	Matrix: Water		
INOC:	Site ID:	Sample Type:				
Parameters	Method	Act & UCL (MDC)	Units	Analyzed	CAS No.	Qual
Fluoride-225	STA 9031	0.458 ± 0.457 (0.902)	µg/L	12/13/12 14:04	13982-83-3	
Sulfate-226	STA 9040	0.219 ± 0.295 (0.523)	µg/L	12/13/12 14:26	10025-00-0	

# QUALITY CONTROL DATA

Project: 115483, 115454

Phase/Project No.: 3060063

QC Batch: RAD214059

Analysis Method: EPA 900.1

QC Batch Method: EPA 900.1

Analysis Description: 90.1 Radium-226

Associated Lab Samples: 3063063001, 3063063002

METHOD BLANK: 50999

Matrix: Water

Associated Lab Samples: 3063063001, 3063063002

Parameter	Net ± 1σ (MC)	Unit	Sampled	Location
Radium-226	-0.058 ± 0.300 (3.594)	pCi/L	1/21/12 (2:42)	

# QUALITY CONTROL DATA

Project: 315453, 315454

Pace Project no: 3063063

QC Batch: RAD014058

Analysis Method: 1019.004.0

QC Batch Method: F19.004.0

Analysis Description: 104.0-Fluorim 228

Associated Lab Samples: 3063063001, 3063063002

METHOD BLANK: 532926

Matrix: Water

Associated Lab Samples: 3063063001, 3063063002

Parameter	Rel. Unc. (MCR)	Unit	Analysis	Qualification
Radiation-228	5.762 ± 0.467 (0.755)	pCi/L	12/18/12 (11.8)	

## QUALIFIERS

Project: 015453, 015454

Phase Project No.: 0063063

### DEFINITIONS

DF - Dilution Factor. If reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit

L - Estimated concentration above the validated method detection limit and below the adjusted reporting limit

MDL - Adjusted Method Detection Limit

PRC - Pace Reporting Limit

RL - Reporting Limit

S - Sample

1,3-Diphenylisoxane (DZD listed analyte) decomposes in Acetonitrile

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and PRC values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable

SO - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for but not detected.

1,4-bis(2-phenylphenyl)benzene decomposes and cannot be separated from 1,4-bis(2-phenylphenyl)benzene using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

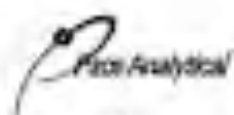
(MDC) - Maximum Detectable Concentration

Pace Analytical is TM accepted. Contact your Project PM for the current list of accepted analytes

TR - This NELAP facility







## Sample Condition Upon Receipt

Client Name: TraceProject # 3063063Carrier: ☒ FedEx ☐ UPS ☐ USPS ☐ Other ☐ Other ☐ OtherTracking #: 794207946396Custody Seal on Cooler/Box Present: ☒ Yes ☐ No Seal intact: ☒ Yes ☐ NoPacking Material: ☐ Bubble Wrap ☐ Bubble Sheet ☒ None ☐ OtherThermometer Used: 5 8 7Type of Ice: White Blue None☐ Samples on ice, cooling process has begunCooler Temperature: 4.2Biological Tissue is Frozen: Yes No(Date and initials of person performing contents: SMB 12/4/12)

Temp should be above freezing in RTC

Comments:

Chain of Custody Present:	<u>Yes</u> <u>No</u> <u>Other</u>	1
Chain of Custody Filled Out:	<u>Yes</u> <u>No</u> <u>Other</u>	2
Chain of Custody Requisitioned:	<u>Yes</u> <u>No</u> <u>Other</u>	3
Sample Name & Signature on COC:	<u>Yes</u> <u>No</u> <u>Other</u>	4
Sample Arrived within Hold Time:	<u>Yes</u> <u>No</u> <u>Other</u>	5
Short Hold Time Analysis (472hr):	<u>Yes</u> <u>No</u> <u>Other</u>	6
Roach Test Around Time Requested:	<u>Yes</u> <u>No</u> <u>Other</u>	7
Sufficient Volume:	<u>Yes</u> <u>No</u> <u>Other</u>	8
Correct Containers Used:	<u>Yes</u> <u>No</u> <u>Other</u>	9
Other Containers Used:	<u>Yes</u> <u>No</u> <u>Other</u>	
Containers Intact:	<u>Yes</u> <u>No</u> <u>Other</u>	10
Filtered volume removed for Diagnostics tests:	<u>Yes</u> <u>No</u> <u>Other</u>	11
Sample Labels match COC:	<u>Yes</u> <u>No</u> <u>Other</u>	12
Includes date/time/temperature: <u>Multiple</u>		
All containers meeting preservation have been checked:	<u>Yes</u> <u>No</u> <u>Other</u>	13
All containers meeting preservation are found to be in compliance with EPA recommendations:	<u>Yes</u> <u>No</u> <u>Other</u>	
Includes: VOA, column, TSC, DGL, HPLC (yes/no)	<u>Yes</u> <u>No</u>	Initial when completed: <u>SMB</u> Date of action preservation: <u>12/4/12</u>
Samples checked for decomposition:	<u>Yes</u> <u>No</u> <u>Other</u>	14
Preservation in VOA Vials (10min):	<u>Yes</u> <u>No</u> <u>Other</u>	15
Trip Blank Present:	<u>Yes</u> <u>No</u> <u>Other</u>	16
Trip Blank Custody Seal Present:	<u>Yes</u> <u>No</u> <u>Other</u>	
Pres Trip Blank Lot # (if purchased):		

Client Notification/Resolution:

Field Data Received?

Y / N

Person Contacted:

Date/Time:

Continental Resolution:

Project Manager Review:

SMB

Date:

12/4/12

(Note: Whenever there is a discrepancy affecting North Carolina compliance records, a copy of this form will be sent to the North Carolina Office of Certification and Compliance, 1111 West 10th Street, Raleigh, NC 27603, (919) 733-2000, (919) 733-2001, (919) 733-2002, (919) 733-2003, (919) 733-2004, (919) 733-2005, (919) 733-2006, (919) 733-2007, (919) 733-2008, (919) 733-2009, (919) 733-2010, (919) 733-2011, (919) 733-2012, (919) 733-2013, (919) 733-2014, (919) 733-2015, (919) 733-2016, (919) 733-2017, (919) 733-2018, (919) 733-2019, (919) 733-2020, (919) 733-2021, (919) 733-2022, (919) 733-2023, (919) 733-2024, (919) 733-2025, (919) 733-2026, (919) 733-2027, (919) 733-2028, (919) 733-2029, (919) 733-2030, (919) 733-2031, (919) 733-2032, (919) 733-2033, (919) 733-2034, (919) 733-2035, (919) 733-2036, (919) 733-2037, (919) 733-2038, (919) 733-2039, (919) 733-2040, (919) 733-2041, (919) 733-2042, (919) 733-2043, (919) 733-2044, (919) 733-2045, (919) 733-2046, (919) 733-2047, (919) 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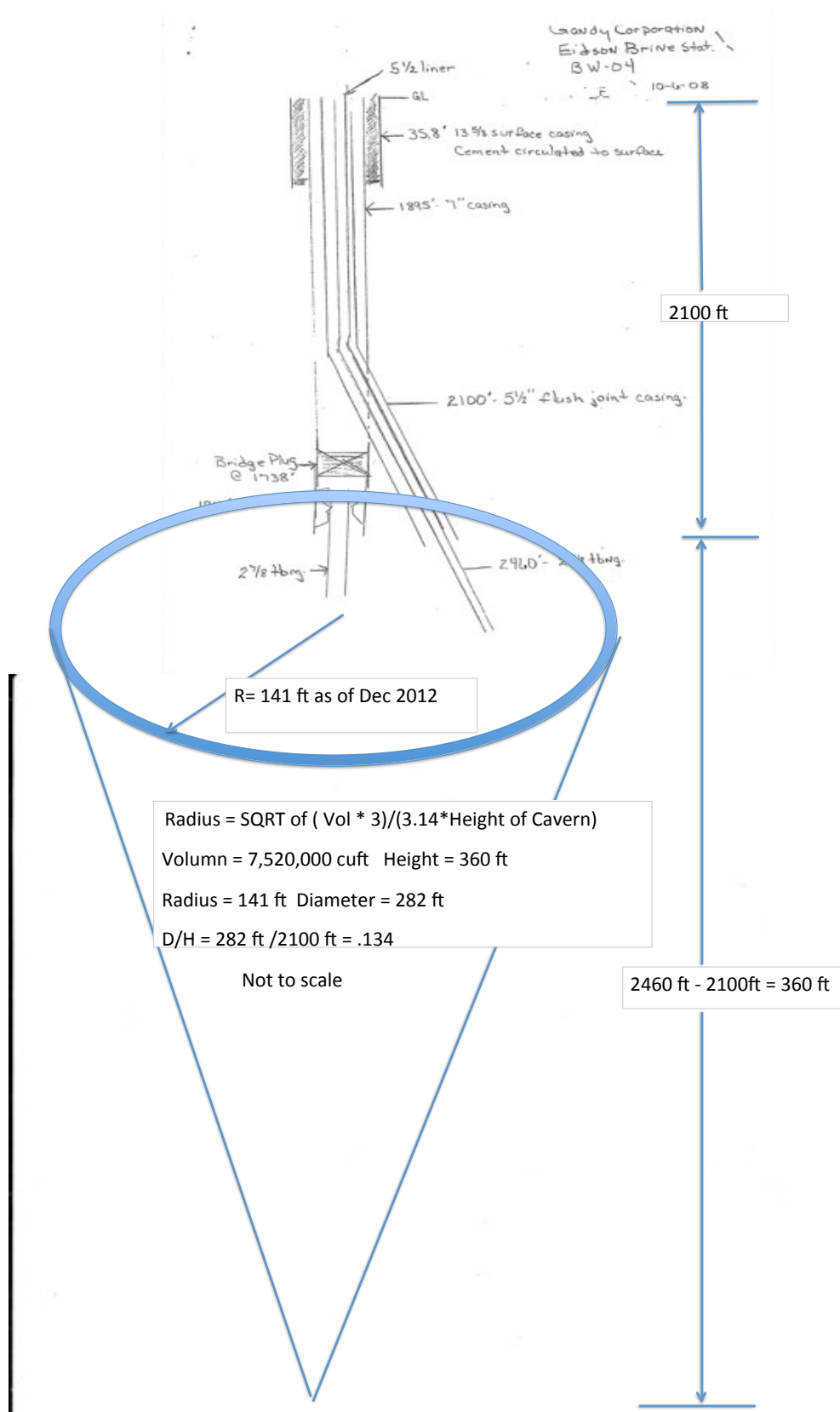


## Appendix “E”

Blank- No Inserts

## Appendix “F”

- Brine Cavity Calculations with Wellbore Sketch
- D/H Calculations
- Aerial View showing Cavern Radius





Water Well

New Tanks

BW-04

R=141 ft

Out of Service  
Brine Pit

HWY 8

Wasserhund Inc. BW-04  
Buckeye Brine Station  
March 25, 2013



## Appendix “G”

- AOR Well Status List
- AOR Plot Plan
- OCD Well Records for Wells In Critical AOR

## 2012 BW-04 AOR Review- Well Status List

up-dated Mar 26, 2013

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	567 FSL & 162 FW	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWI	Yes*	yes	yes	no

2 2

3 Total # of wells in adjacent quarter-sections

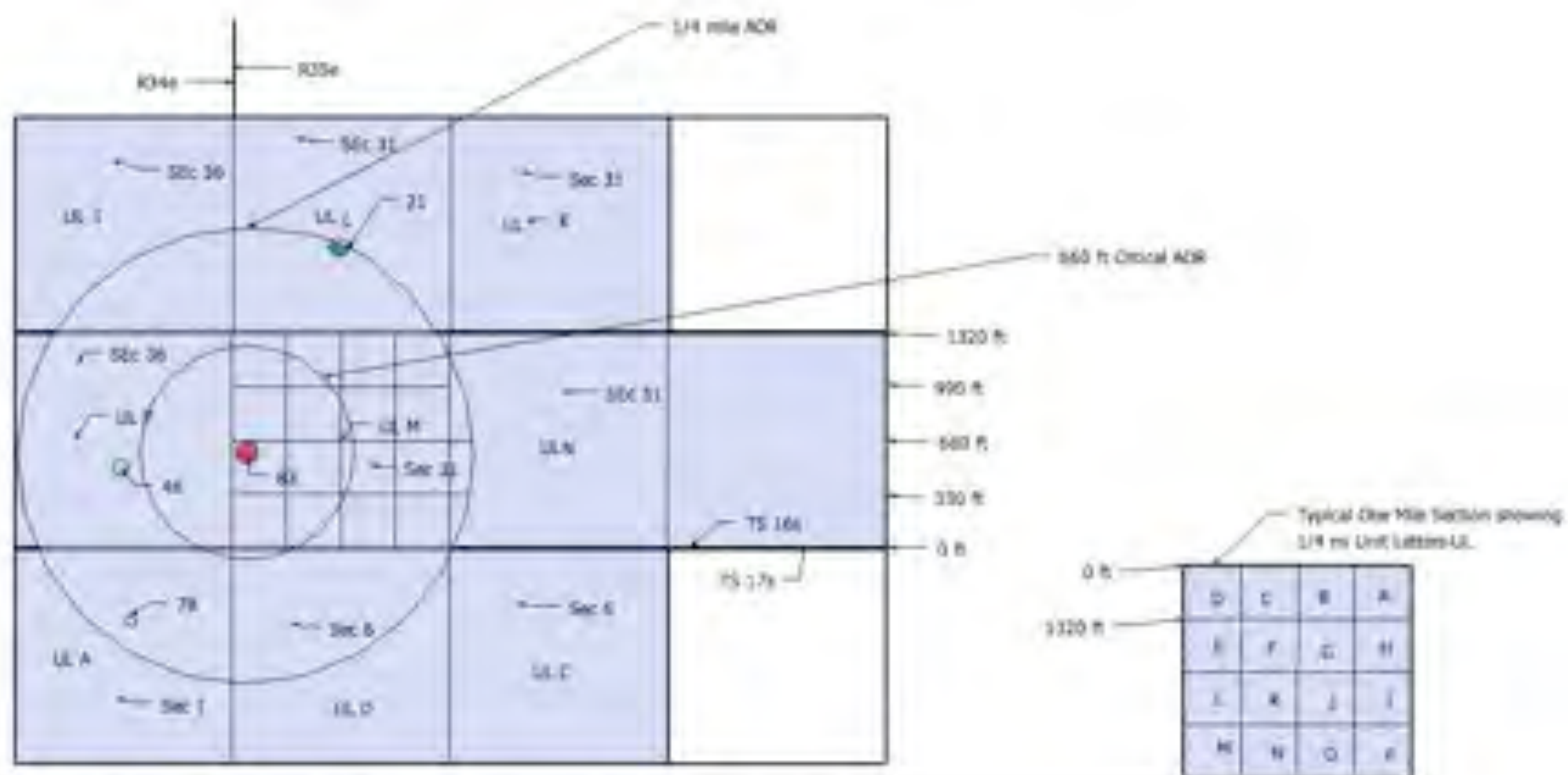
3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

\* Means the well is within 660 ft or Critical AOR (1410 ft) of the outside radius of the brine well and casing program will be checked annually.





Drill Well Area of Review (AOR) UL Plot Plan	Well API# 30-025-2883	Note: Wells are identified by the last 2 digits of the well's API#, API #'s are listed in the well status list.
Operator Name: Wassmund DE	Permit # Btl-04	
AOR Year: 2012	Location: UL M-Sec 31-Tal6a-R35e	

Sheridan NVAN 12-A Well #1

API 30-025-25146



## OIL CONSERVATION DIVISION

1220 South St. Francis Dr.  
Santa Fe, NM 87505

SUNDY <del>CANON</del> AND REPORTS ON WELLS <small>(PRINT FOR THIS FORM THE INFORMATION IN BOLD OR IT RETURNS OR FILL BACK TO A          REVENUE OFFICE. THE "APPLICABLE FORMS" (FORM) INCLUDE SUCH          PROVISIONS.)</small>						7. Lease Name or Unit Agreement Name: <b>NORWICH OIL &amp; GAS COMPANY</b> <b>130 N</b>	
1. Type of Well: Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input type="checkbox"/>						8. Well Number: <b>9</b>	
2. Name of Operator: <b>Shenandoah Production Company, LLC</b>						9. DRIED Number: <b>254496</b>	
3. Address of Operator: <b>9 Haverhill Plaza, Suite 300, Haverhill, MA 01830</b>						10. Field name or Wildcat: <b>Haverhill, Ohio North</b>	
4. Well Location: (See List) <b>Q</b> <b>Aldo</b> <b>Section 10</b> <b>Township 16 N Range 34 E</b> <b>Section 10</b> Section: <b>D16</b> Township: <b>16 N</b> Range: <b>34 E</b> NMPN County: <b>P.O.</b>							
(1) Elevation (Show whether DR, PR, AT, GR, etc.)							





# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

Suzanne Martinez  
Governor

John H. Berry  
Cabinet Secretary

Bob A. Woods, Ph.D.  
Deputy Cabinet Secretary

Jami Bulley  
Deputy Director  
Oil Conservation Division

Inspection Required - Oilfield Facilities

12 May 12

SIBERIAN PRODUCTION COMPANY, LLC  
FOURTEENWAY PLAZA SUITE 1700  
HOUSTON TX 77056

HOBBS OGD

MAY 15 2012

RECEIVED

LETTER OF VIOLATION - Inspection

Dear Operator:

The following inspection(s) indicate that the well, equipment, location or operational status of the well(s) failed to meet standards of the New Mexico Oil Conservation Division as designated in the attached notification letter. To comply with standards imposed by Rules and Regulations of the Division, corrective action must be taken immediately and the violation brought into compliance. The attached report indicates preliminary findings and/or probable nature of the violation. This determination is based on an inspection of your well or facility by an inspector employed by the Oil Conservation Division on the date(s) indicated.

Please notify the proper District Office of the Division, in writing, of the date corrective actions are scheduled to be made or that a temporary plan has been proposed for the well and/or facility.

## INSPECTION DETAIL SECTION

NORTH VACUUM AND NORTH UNIT No.111

P.O. Box 165, Hobbs

AL-025-25146-01-000

Inspection Date	Type Inspection	Inspector	Violated?	Significant Non-Compliance?	Corrective Action Due By	Inspection No.
05/10/2012	Plugged Well Surface	Hobbs Mary Brown	Yes	No	6/17/2012	MOB1213553387
Comments on Inspection:		DETAILED RELEASE: WELL HAS 25 IN. NORTH TO MAKE ADDITIONS. IT HAS HAD BEEN NEED FIRST LETTER OR FORFEITURE. NEED TO SUBMIT C-103 SUBSEQUENT FOR PLUGGING. ALSO THIS WELL IS IN THE 1 YEAR TIME FRAME FOR CLEANUP AND RELEASE OF LEAKAGE. REMOVE SIGN, MISC HUNK AND FLOWLINE AS INDICATED IN PHOTO. THIS IS 1ST LETTER OF NON-COMPLIANCE. MLH				

NO  
C-103  
FILED  
AFTER  
P+R

NORTH VACUUM AND NORTH UNIT No.123

P.O. Box 165, Hobbs

AL-025-37018-01-000

Inspection Date	Type Inspection	Inspector	Violated?	Significant Non-Compliance?	Corrective Action Due By	Inspection No.
05/10/2012	Running Perforator	Hobbs Mary Brown	Yes	No	6/17/2012	MOB1213558245
Comments on Inspection:		RELEASED THE HEAD OF PERFORATOR. THIS IS 1ST LETTER OF NON-COMPLIANCE. MLH				

MAY 15 2012



to the fact that consistently keeping your finger in the land of objection by the "Constructive Action Plan" (CAP) will only annoy, further correspondence with you. Such correspondence may include the officer applying to the Division for an event necessary for a change of rank, if Brown's name is Sold 15, or other cases why you should not be contacted by your military flag and shoulder patch. Such a change may occur without an inspection or CIVIL DISSENT for your submission. Tell your

### References

Maey Brown

COMPLIANCE OFFICER

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P/A'D. OK TO RELEASE

DATE: 9/12/2012

COMPANY: LIME ROCK RESOURCES

LEASE NAME and # NORTH VACUUM ABO NORTH UNIT # 1

API# 30-025-25146

UL P SECTION 36 TOWNSHIP 16S RANGE 34E

SIGNED: Mary Brown

Chevron USA- Chesapeake VII #7  
API 30-025-35678



# RICKS EXPLORATION INC.

State VII #1

Sec. 1-178-34E

Lea Co., NM

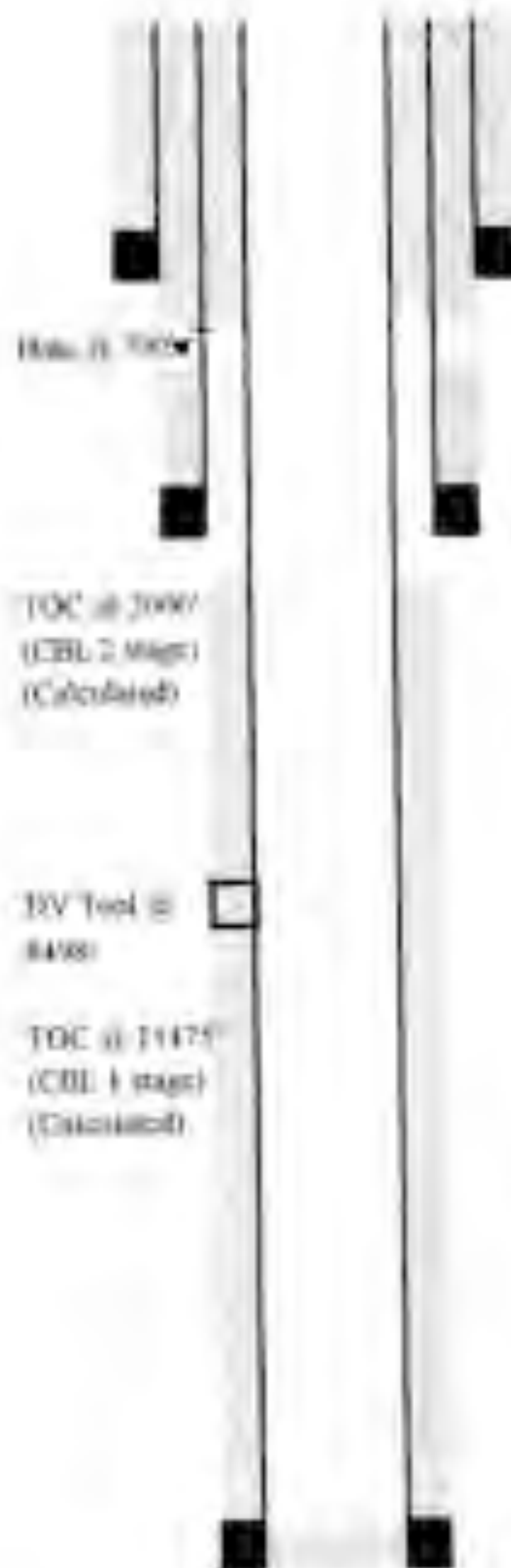
Spud Date: 9/02/01

Proposed 8 5/8" casing repair

GL: 4033'

DF: 4052'

NB: 4053'



## SURFACE CASING:

11-3/4" 42# H40 wt @ 1010'

CMT w/ 700 ccs to diff

## INTERMEDIATE CASING:

8-5/8" 32# K-55 wt @ 5070'

CMT w/ 1100 ccs - Diff not cmt to diff

TOC @ 1740' (Temp Survey)

Hole indicated in 8 5/8" @ 700'

Pump Cl C seat cmt dn 4 1/2" X 8 5/8" annulus until cmt returns to sh

Est 300 ccs

## ATOKA PERFORATIONS

11528' - 11555' 4/SPF (1/93)

Loc an Pkr @ 11682' w/ w/oil tool & plug set in R. Apple @ 11750'  
(4" TCP jam in hole)

11902' - 11934' 4/SPF (10/3)

## PRODUCTION CASING:

4-1/2" E138 P110 LT&C @ 12732

Cement w/ 1100 ccs

PBTD: 12722'

TD: 12750'

BOH 11/12/01



District I  
 1422 N. French Dr., Roswell, NM 87203  
 District II  
 1111 South First, Amarillo, NM 89113  
 District III  
 1100 Elm Street Road, Alameda, NM 87401  
 District IV  
 2540 South Pacheco, Santa Fe, NM 87505

State of New Mexico  
 Energy Minerals and Natural Resources

Form C-101  
 Revised March 17, 1990

Oil Conservation Division  
 2040 South Pacheco  
 Santa Fe, NM 87505

Submit to appropriate District Office  
 State Lease - 6 Copies  
 Fee Lease - 5 Copies

☐ ATTENDED REPORT

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

Operator Name and Address BLICKS EXPLORATION, INC. 210 PARK AVE OKLAHOMA CITY, OKLAHOMA 73102		Lease Number 188489
Lessee Name LYNN SUCHY 405-516-1130		APT Number M-025-35678
Property Code 28998	STATE UTI	Well No. ?

Surface Location

LL or SL No.	Section	Township	Range	Location	Footwall No.	North/South Line	Footwall No.	East/West Line	County
A/1	1	17S	34E		660'	NORTH	660'	EAST	LEA

Proposed Bottom Hole Location If Different From Surface

LL or SL No.	Section	Township	Range	Location	Footwall No.	North/South Line	Footwall No.	East/West Line	County
Proposed Foot 1 VACUUM-ATOKA, MORROW NORTH (068005)					Proposed Foot 2				

Well Type Code	Well Type Code	Casing/Screen	Lease Type Code	Cement/Liner Extension
B	G	ROTARY	15	4033'
NO	11,000'	Alaska - Morrow	PATTERSON	WHEN APPROVED

Proposed Casing and Cement Program

Casing Size	Casing Foot	Casing Weight/Foot	String Depth	Amount of Cement	Removal FOC
21"	20'	Conductor	40'	Redi-mix	surface
14 3/4"	11 3/4"	42	1600'	1800 Sx.	surface
12 1/2"	8 5/8"	24	5000'	1190 Sx.	1100' FS
7 7/8"	5 1/2"	17	13,000'	670'	7500' FS

\* Describe the proposed program. If not applicable, it is OK to check PLUGBACK, give the date of the permit expiration date and proposed new production date.

Describe the planned prevention program, if any. Use additional sheets if necessary.

1. Drill 21" hole to 40'. Set 40' of 20" conductor and cement to surface with Redi-mix.
2. Drill 14 3/4" hole to 1600', run and set 1600' of 11 3/4" J-55 42# STAG casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1% Fluoride/Sx. Circulate cement to surface.
3. Drill 12 1/2" hole to 5000'. Run and set 5000' of 8 5/8" 24032# J-55 STAG casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1% Fluoride/Sx. Circulate top of cement 1100'.
4. Drill 7 7/8" hole to 13,000'. Run and set 13,000' of 3 1/2" 17# K-80 17# casing. Cement with 670 Sx. of Class "B" Premium Plus cement + additives. Top of cement at least 100' above upper most Perforation.

Permit Expires 1 Year From Approval  
 Date Mining Drilling Underway

\* I hereby certify that the information given above is true and correct to the best of my knowledge and belief.

Signature: *Joe T. Janice*  
 Printed Name: Joe T. Janice

Title: Agent

Date: 06/18/91

Phone: 405-341-8501

OIL CONSERVATION DIVISION

Approved By: *[Signature]*

Printed Name: *[Signature]*

Approved Date: \_\_\_\_\_

Signature of Applicant: \_\_\_\_\_

2004

2004



DISTRICT I  
P.O. Box 1840, Santa Fe, NM 87501

DISTRICT II  
P.O. Box 1840, Santa Fe, NM 87501

DISTRICT III  
1000 New Mexico Ave., Santa Fe, NM 87501

# OIL CONSERVATION DIVISION

2040 Pacheco St.  
Santa Fe, NM 87305

WELL API NO.

10-6025-15678

1. License Type of Lease

STATE ☒ FEDERAL ☐

2. State Oil & Gas Lease No.

28798

3. Lease Name or Other Agreement Name

STATE VII

4. Well No.

7

5. Pool Name or Wellhead

Vacuum - Atoka, Morrow North

SUNDY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM G-101) FOR SUCH PROPOSALS.)

1. Type of Well

Oil Well ☐

Gas Well ☒

Other

2. Name of Operator

Rice Exploration, Inc.

3. Address of Operator

210 Park Ave., Suite 3000

4. Well Location

East Line 5 - 400' Feet From The North Line 140' Feet From The East Line

Section 1 Township 17S Range 14E NMPM 140' East County

15. Township (State number 10, 11, 12, etc.)

17S

11. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐

PLUG AND ABANDON ☐

TEMPORARILY ABANDON ☐

CHANGE PLANS ☐

PULL OR ALTER CASING ☐

OTHER: Add perforations ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐

ALTERING CASING ☐

COMMENCE DRILLING OPS. ☐

PLUG AND ABANDONMENT ☐

CASING TEST AND CEMENT JOB ☐

OTHER ☐

12. Describe Proposed or Completed Operations (Clearly state all proposed details and give primary data, including estimated date of starting any proposed work) SEE RULE 100.

Run in hole w/Oil and tag TCF to verify W/L. Fish is still @12070' in the 2-1/8" tbg string. Set collar stop and W/L plug @12000'. Set W/L and perforate 4 holes in 2-1/8" tbg., 1 ft above W/L plug @12000'. Set FL to 4000'. Release Retrievable Packer & TCH w/1-1/8" production string. Run W/L, tag Profile Nipple in 2-3/8" casings below permanent packer @12445', set W/L plug just above Nipple. TCH w/Model 8 Retrievable Packer on 2-1/8" tbg to 12298', & circ. Set Packer and pressure test plug in permanent Packer. Release Packer, spot acid from 12298'-12305'. TCH w/tbg & Packer. Run W/L and perforate interval from 12280'-12298', w/1-1/8" casings, 4 SPV, 40 deg phasing. TCH w/3-Nipples (1X plug in place, 10' 3in. ASIX Retrievable Packer, set @12200' +/-). Acidize, seal, & test. Evaluate production and treat if necessary. Return well to production. Procedure to be completed in September, 2002, or as soon as possible.

I hereby certify that the information given is true and correct to the best of my knowledge and belief.

SIGNATURE

*Lyne Rudy*

TITLE

STILLING ENGINEER

DATE

8/21/02

171

106/516-111

TELEPHONE NO.

TYPE OR PRINT NAME

Lyne Rudy

(The name for the well)

G. V. H. HENRY

OG VIT HENRY

TITLE

AUG 21 2002

APPROVED BY

(Signature of Operator or Agent)



Submit 3 Copies To Appropriate District  
Office  
District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1501 W. Grand Ave., Amarillo, NM 89101  
District III  
1000 Rio Bruma Rd., Aztec, NM 87418  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM  
87505

State of New Mexico  
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-104  
Revised March 15, 1999

<b>SUNDRY NOTICES AND REPORTS ON WELLS</b> (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 10-075-15678
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input checked="" type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Rocka Exploration, Inc.		6. State Oil & Gas Lease No.
3. Address of Operator 210 Park Ave, STE 1000, Oklahoma City, OK 73102		7. Lease Name or Unit Agreement Name: State VII
4. Well Location Unit Layer: A 150 feet from the North line and 150 feet from the East line Section 1 Township 17S Range 34E NMPM Lea County		8. Well No. <del>34</del> 7
10. Elevation (Show whether DR, PCK, RT, GR, etc.) 4633' GR.		9. Foot name of Wellcat Vaguan-Aldex, Morris North

11. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data	
<b>NOTICE OF INTENTION TO:</b>	<b>SUBSEQUENT REPORT OF:</b>
PERFORM REMEDIAL WORK <input checked="" type="checkbox"/> PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/> ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/> CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPERATIONS <input type="checkbox"/> PLUG AND ABANDONMENT <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/> MULTIPLE COMPLETION <input type="checkbox"/>	CASING TEST AND CEMENT JOB <input type="checkbox"/>
OTHER: <input type="checkbox"/>	OTHER: <input type="checkbox"/>

12. Describe proposed or completed operations. (Clearly state all pertinent details and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1405. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

( ) RI RI Services. RI to accept return via 11 1/2" X 8 5/8" annulus. Establish circulation via 4 1/4" X 8 5/8" annulus. Pump CI C cement (14.8 ppb) Yield (1.34 (b) (a)) until cement is circulated to surface (Estimate: 30 (a)). RI RI

I hereby certify that the information shown is true and complete to the best of my knowledge and belief.

SIGNATURE Bryon Rether TITLE Engineer DATE 11/14/91

Type or print name Bryon Rether Telephone No. 405/518/1100

(This space for State use)

APPROVED BY \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_  
(Indicate if approval, if any)



## RECEIVED

District I  
 1625 N. French Dr., Hobbs, NM 88240  
 Phone (505) 393-4141 Fax (505) 393-0726  
 District II  
 811 S. First St., Artesia, NM 88211  
 Phone (505) 748-1242 Fax (505) 748-9726  
 District III  
 1000 E. Broadway Rd., Alamogordo, NM 88410  
 Phone (505) 334-4178 Fax (505) 334-4179  
 District IV  
 1220 S. St. Francis Dr., Santa Fe, NM 87503  
 Phone (505) 435-3479 Fax (505) 435-3481

State of New Mexico  
 Energy, Minerals and Natural  
 Resources

Oil Conservation Division  
 1220 S. St Francis Dr.  
 Santa Fe, NM 87505

Form C-145  
 August 1, 2011  
 Permit 155721

## Change of Operator

## Previous Operator Information

OGRID: 147179  
 Name: CHOCOLA LAKE OPERATING, INC  
 Address: P.O. Box 18496  
 City, State, Zip: Oklahoma City, OK 73154

## New Operator Information

Effective Date: Effective on the date of approval by the OCD  
 OGRID: 4323  
 Name: CHEVRON U S A INC  
 Address: Attn: Sandy Seidman-Daniel  
 P.O. Box 2100  
 City, State, Zip: Houston, TX 77232

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, CHEVRON U S A INC certifies that it has read and understands the following synopsis of applicable rules.

PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17.13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17.11(f) NMAC.

CHEVRON U S A INC understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.





information, and I am responsible for updating that information when it changes. See 15.15.B.B.C. NIAC. I understand that I can update that information on the DCD's website under "Electronic Petition."

10. If I transfer well operations to another operator, the OCD must approve the change before the new operator can begin operations. See 19.15.9.9.B NMAC. I remain responsible for the well and related facilities and all related regulatory filings until the OCD approves the operator change. I understand that the transfer will not relieve me of responsibility or liability for any act or omission which occurred while I operated this well and related facilities.

Previous Operator

Signature \_\_\_\_\_

Printed Name:

[English - Content](#)

44

Exhibits: New! Freeport  
 Apartments & Churches

Date \_\_\_\_\_

50093513 Phone: 406-833-5000

### New Operator

## Summary

Dedicated

## History

TEAM

Down

**NMOCD Approval**

Electronic Signature: Randy Dade, District 2

Date: October 09, 2012

BTA Oil Producers

API 30-025-31621



Submit to Appropriate  
District Office  
State Lease - 5 copies  
Fee Lease - 3 copies  
DISTRICT 1  
P.O. Box 1982, Hobbs, NM 88240

DISTRICT 2  
P.O. District 2D, Amarillo, NM 89110

DISTRICT 3  
1000 Rio Grande S.E., Alamogordo, NM 87410

State of New Mexico  
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION  
P.O. Box 2088  
Santa Fe, New Mexico 87504-2088

Form C-100  
Revised 1-1-89

WELL APHS

30-025-31621

5. Lease Type of Lease

STATE ☒

FEE ☐

6. State Oil & Gas Lease No.

Y-3836

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

1A. Type of Well: OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER ☐

5. Type of Completion

NEW ☒ MOD ☐ REPAIR ☐ PLUG BACK ☐ STOP ☐ OTHER ☐

2. Name of Operator

ATA Oil Products

3. Address of Operator

104 S. Pecos, Midland, TX 79701

4. Well Location

Unit Lease: 1-1-1980, Deck From The South, Case and 600 Feet From The West Line

Section 31 Township 16S Range 35E NE/4 Sec 31

10. Date Spudded: 1-8-92 11. Date TD Reached: 8-13-92 12. Date Compl. (Ready to Prod): 8/24/92 13. Dimensions (D/A R/B, RT, GR, etc.): 4025' CG 4042' R/B 14. Elev. Casings: 12,415-12,425 (Atoka)

15. Total Depth: 12,900 16. Plug Back TD: 12,823 17. If Multiple Completions, How Many Zones? 18. (Inventory Control by) 12,900 19. Cable Tools

20. Producing Interval(s) of this completion - Top, Bottom, Name: 12,415-12,425 (Atoka) 21. Was Orientation Survey Made: No

22. Type Electric and Other Log(s) Run: COT-EDT 23. Was Wire Core: No

24. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB/FT	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT FILLED
13-1/8	58	423	17-1/2	580 cu - Circ	
8-5/8	32	4795	11	2300 cu - Circ	
5-1/2	17.470	10800	7-1/8	2100 cu - Circ	

25. LINER RECORD

SIZE	TOP	BOTTOM	BACKS CEMENT	SCREEN
7-7/8	12,328	12,153		

26. PERFORATION RECORD (Interval, size, and number)

DEPT. INTERVAL	AMOUNT AND KIND MATERIAL USED
12,415-12,425	A/W 470 gr/s

27. PRODUCTION

08/20/92		Flowing				Shut-In	
Date of Test	Hours Tested	Choke Size	Pressure Test Period	Oil - Bbl	Gas - MCF	Water - Bbl	Gas - Oil Ratio
8-25-92	24	48/64		11	756	0	11.00/1
Flow Testing From	Casing Pressure	Estimated 14-Flow Rate	Oil - Bbl	Gas - MCF	Water - Bbl	Oil Gravity - API - (Calc)	
170	28.5		12	756	0	49.0	

28. Disposition of Gas (Vent, used for fuel, re-inject, etc.): 29. Test Witnessed By: Tom Williams

30. Log Attachments: C 100, Log, inclination

31. I hereby certify that the information shown on each page of this form is true and complete to the best of my knowledge and belief

Signature: Dorothy Houghton Printed Name: Dorothy Houghton Title: Supv. Admin. Date: 9-10-92



# INSTRUCTIONS

This form is to be filed with the appropriate District Office of the Division not later than 20 days after the completion of any newly-drilled or deepened well. It shall be accompanied by one copy of all electrical and radio-activity logs run on the well and a summary of all special tests conducted, including drill stem tests. All depths reported shall be measured depths. In the case of directionally drilled wells, true vertical depths shall also be reported. For multiple completions, items 25 through 29 shall be reported for each zone. The form is to be filed in quadruplicate except on state land, where no copies are required. See Rule 1105.

## INDICATE FORMATION TOPS IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE

### Southeastern New Mexico

T. Adley	T. Canyon
T. Salt	T. Strawn 11761
B. Salt	T. Anoka
T. Yates	T. Miss 12504
T. T. Rivers	T. Devonian
T. Queen	T. Silurian
T. Grayburg	T. Monrovia
T. San Andres	T. Simpson
T. Giarata 6225	T. McKee
T. Paddock	T. Ellenburger
T. Blinney	T. Gr. Wash
T. Tubb 7518	T. Delaware Sand
T. Drinkard	T. Blue Springs
T. Abo 8185	T.
T. Wolfcamp	T.
T. Perm	T.
T. Coo (Bough C)	T.

### Northwestern New Mexico

T. Ojo Alamo	T. Perm. "B"
T. Kinland-Fossiland	T. Perm. "C"
T. Pictured Cliffs	T. Perm. "D"
T. Cliff House	T. Leakeville
T. Menard	T. Madison
T. Point Lookout	T. Elbert
T. Mancos	T. McCracken
T. Gallup	T. Ignacio Oaks
Blue Greenhorn	T. Granite
T. Dakota	T.
T. Morrison	T.
T. Todillo	T.
T. Escada	T.
T. Wingate	T.
T. Chinle	T.
T. Permian	T.
T. Perm "A"	T.

### OIL OR GAS SANDS OR ZONES

No. 1, from 12513 to 12523  
No. 2, from to  
No. 3, from to  
No. 4, from to

### IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from to feet  
No. 2, from to feet  
No. 3, from to feet

### LITHOLOGY RECORD (Attach additional sheet if necessary)

From	To	Thickness in Feet	Lithology	From	To	Thickness in Feet	Lithology
Surface	423	423	Surface rock & sand				
423	1800	1377	Anhydrite				
1800	3013	1865	Salt & Anhydrite				
3013	4105	1090	Shale & anhydrite				
4105	5890	1785	Anhydrite, Dolomite, Shale & Sand				
5890	6815	925	Dolomite & Shale				
6815	8875	2060	Dolomite				
8875	9755	880	Dolomite, Anhydrite, & Lime				
9755	10134	379	Lime & Shale				
10134	12045	1911	Lime & Shale				
12045	12900	855	Lime, Sand, & Shale				

RECEIVED

SEP 17 1952

DEPT. OF MINES OFFICE



**Wasserhund Inc.**

P.O. Box 2140

575-396-0522

FAX 575-396-0797

Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2011**

Wasserhund Inc.

Buckeye Brine Station

OCD Permit BW-04

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

April 28, 2012

## Section 1- Summary of Operations:

(Permit Condition 21.L.2. "Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Include copy of C-103 if appropriate.")

The brine well was drilled in 1980 and has been in operation for approximately 32 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-04 and aerial photo is included for reference in **Appendix A**.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Section 8 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive.

This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

Wasserhund Inc respectfully request a waiver on having to pull the tubing for the next MIT/Braden head test since re-entry will virtually be impossible. We would like to purpose using a Nitrogen "Leak Off" Test instead. These test are considerably more accurate than the OCD standard MIT hydro-test that includes a 10% variance.

On October 13, 2011, the brine well operations were transferred from the Gandy Corporation to Wasserhund Inc. In addition, a brine well renewal application was submitted to OCD with filing fee in June of 2011. **Appendix B** contains the change of operator and renewal application.

During the 2011 year there was no major remedial work on the brine well, other than the annual open to formation mechanical integrity test (MIT). Since the well-head and tubing was not unseated or pulled, a C-103 is normally not required, however a C-103 form was submitted and is included in the MIT Section 3 found in **Appendix E**.



General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the permit conditions. The loading area has a concrete sump that will be tested in the 2012 year and reported in the annual report. Wasserhund Inc has installed best management practices at the facility pursuant to the permit conditions.

A Pro-active well "Area of Review" has being conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Section 8 below.

While this is an older well, it still has not reached its productive end of life and is deemed very safe and an extremely valuable asset for the oil and gas industry.

## **Section 2- Production Volumes:**

(Permit condition 21.L.3. "Production volumes as required from 21.G. including a running total to be carried over to each year. The maximum and average injection pressure.")

(21.G. Requires "The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.")

Sales tickets and flow meters are used to monitor both water injected and brine produced.

### Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2011 brine production volume was 610,256 bbls and the lifetime production volume is 6,789,258 bbls.

Enclosed in **Appendix C** is the injection and production and a comparison chart of injected water to produced water with comments.

### Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the permit maximum pressure of 375 psig.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.



### Section 3- Chemical Analysis:

(Permit condition 21.L.4. "A copy of the chemical analysis as required in 21H. "Analysis of injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.")

Please find attached in **Appendix D** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected October 18, 2011 and analyzed by Cardinal Laboratory in Hobbs, NM. The sampling process and laboratory used common approved EPA methods to collect, analyze and report for general chemistry i.e. major cations and anions, WQCC metals and cyanide.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with minor constituents of calcium, magnesium, and potassium combined with sulfate and bi-carbonate. This analysis is very representative of Salado "Salt" formation waters found in the area.

The specific gravity of the brine water was 1.186, which equates to 9.88 lb/gal. This is slightly lower than the usual 10 lb/gal normally produced but very acceptable. This lower amount may be attributed to the fact that during the test in October, most of the brine water was sold leaving only fresh water for the MIT "Open to Formation Test."

### Section 4- Mechanical Integrity:

(Permit condition 21.L.5. "A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.")

The BW-04 discharge permit condition 21.E set forth the criteria for running MIT's for this well. This condition also includes a schedule for which type of test is required to be run during various years of the permit. In 2011, an "open to formation" test was successfully run and witness by Mr. Maxey Brown of the OCD Hobbs office. The MIT test chart is attached in **Appendix E** for review.

## **Section 5- Deviations from Normal Production Methods:**

(Permit condition 21.L.6. "Brief explanation describing deviations from normal production methods.")

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc has attempted to change the flow pattern and as of date, 10# brine cannot be made with conventional-flow. Wasserhund will continue to investigate the reason for this problem.

## **Section 6- Leak and Spill Reports:**

(Permit condition 21.L.7. "A copy of any leaks and spill reports.")

There were no reportable leaks and spills in 2011.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

## **Section 7- Groundwater Monitoring:**

(Permit condition 21.L.8. "If applicable, results of any groundwater monitoring.")

The BW-04 facility does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.



## Section 8- Brine Cavity/Subsidence Information:

(Permit condition 21.L.9. Information required from cavity/subsidence 21.F. "The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment.")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "upright cone". The volume of the cavern is calculated using the lifetime brine production volumes and using a "rule of thumb" conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix F**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 6.79 million barrels of brine produced as of December 2011. The maximum diameter was calculated to be approximately 268 feet with a corresponding D/H ratio of .126 updated for the 2011 year.



Comparing the current D/H ratio of .126 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by over five times.

Included in **Appendix F** is an aerial view showing the 134-foot radius superimposed around the brine well and station.

## **Section 9- Area of Review Update Summary:**

### *(Permit condition 21.L.10. "An Area of Review (AOR) Summary.")*

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix G**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since any future brine well will certainly be limited in size, a critical AOR of 660 feet was initially established and all wells within that radius will be researched in greater detail.

We used the current estimated diameter of the brine well i.e. 268 feet (R = 134 ft) updated for 2011, and added a 10:1 safety factor which equates to about 1340 ft. As the brine well grows, the critical AOR will be expanded and new wells will be added or existing wells restudied.

The rational of this approach is the fact that brine wells are non-static in terms of size and configuration and the fact that Wasserhund Inc has no direct control on wells drilled in close proximity. By just initially focusing on the current wells in the ¼ mile AOR and assuming the status of these wells will remain the same, could be a mistake. Therefore, Wasserhund Inc is taking a more dynamic approach and will re-study wells as the brine well grows, especially wells located in a critical zone.

In the 2011 review, there were no new wells added to the list. **Appendix G** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

As in 2010, there are only two wells located within these adjacent units. These two wells are within the ¼ miles radius of the brine well and are now in the 1340 foot critical zone. The critical zone was investigated by checking the OCD on-line well records.

The two wells located in the new critical zone i.e. within 1340 feet, were reinvestigated by checking the OCD on-line well records. There was no well activity for any of these



wells reported since the last 2010 review. Appendix G contains the last recorded file record for the two wells located in the critical AOR. They are identified as API# 30-025-25146 and 30-025-35678.

The Findings are as follows:

API # 30-025-25146: The Sheridan NVANU 12-A well #1, according to OCD records (attached at the end of **Appendix G**), is located 460 FSL & 660 FEL of UL P Section 36-Ts16s-R34e. It is shown to be located approximately 700 ft to the WSW of the BW-04 well. This well was drilled in 1975 with surface casing set at 1680 ft and cemented with 760 sacks. A 4-1/2 inch production casing was set at 8980 feet and cemented with 800 sacks.

According to recent well records there appears to be no cement behind the 4-1/2 casing from 1681 feet to 5500 feet, leaving the salt section exposed to the 4-1/2 casing.

In 2000, a number of casing leaks were noted to be between 4920 feet to 5570 feet. In 2007, a Sheridan well bore schematic noted a water flow up annulus from off-set brine well.

In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet.

Conclusions: The OCD records do not show that a subsequent P&A report was filed. So at this time it is undetermined if the well has been P&A.

Corrective Actions: Wasserhund Inc will follow up with the OCD to determine if this well has been properly P&A and approved by OCD.

API # 30-025-35678: The Chesapeake St. VII #7, according to OCD records (attached at the end of Appendix G), is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

This well was drilled in 2001 with surface casing set at 1610 feet bgl and cemented with 790 sacks circulated to surface. Intermediate casing was set at 5020 feet and cemented with 1190 sacks with top of cement @ 1740 feet (temp survey). A long string was ran and set at 12,732 feet and cemented with 1380 sacks with top of cement at approximately 2000 feet. From this analysis, it appears that maybe some of casing is exposed to the salt section without adequate cement.

Conclusions: It is unclear from the reports filed with OCD how the well was actually completed. The description above was taken from C-103's "Notice of Intent", but no final approved C-103 Subsequent report was found.

Corrective actions: Wasserhund will check with the OCD to determine if the well has been properly completed and approved.

#### **Section 10- Certification (Permit Condition 22.L.11)**

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

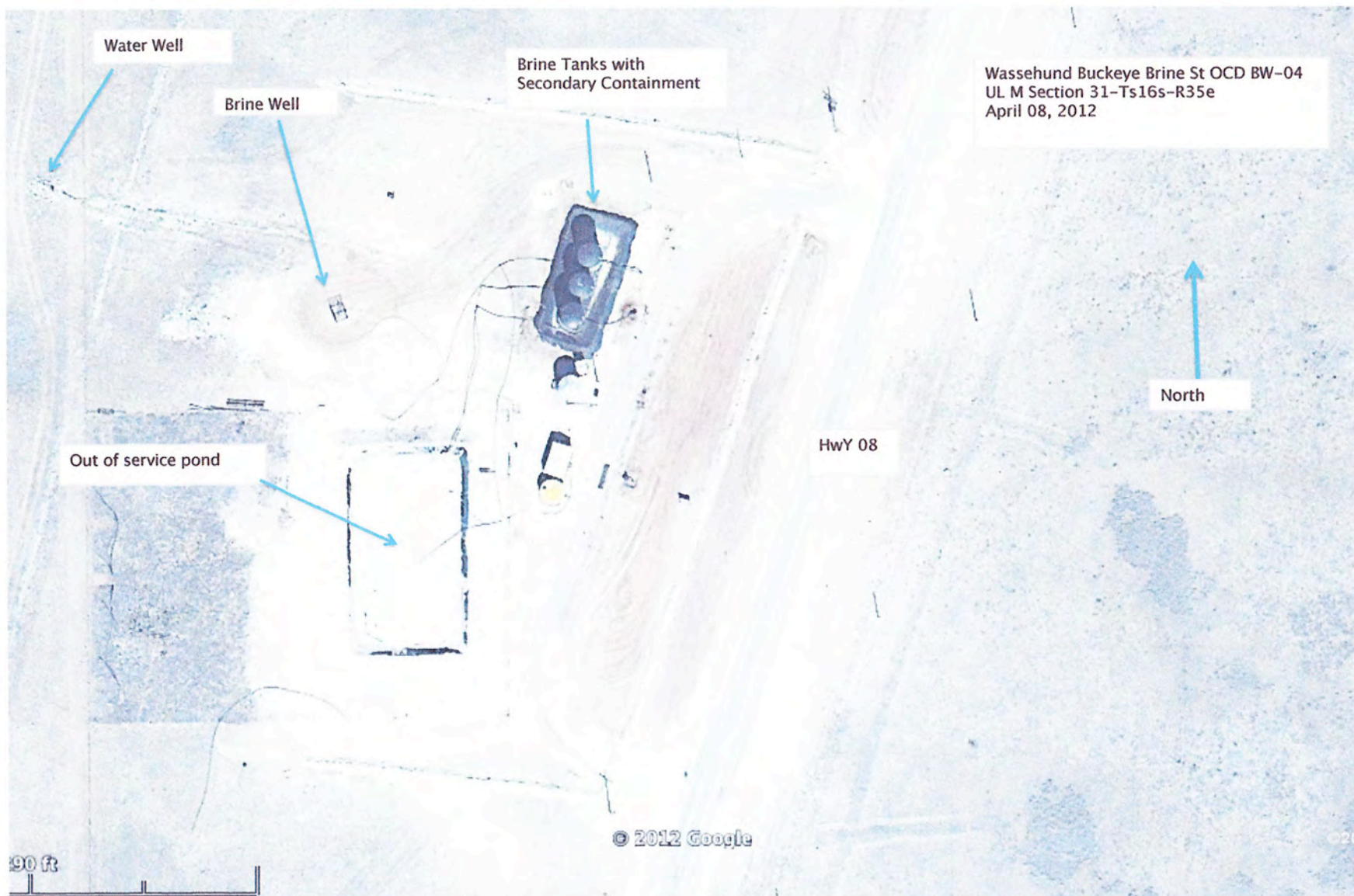
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Larry Gandy  
Principal- Wasserhund Inc.

## Appendix “A”

- Aerial Photo
- Discharge Plan BW-1 **04**







# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**

Governor

**Joanna Prukop**

Cabinet Secretary

**Mark E. Fesmire, P.E.**

Director

**Oil Conservation Division**

January 24, 2008

Mr. Larry Gandy  
Gandy Corporation  
P.O. Box 827  
Tatum, New Mexico 88267

**Re: Discharge Permit Wasserhund Eidson State Well No. 1 Brine Well (BW-004) Renewal**

Dear Mr. Gandy:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the Wasserhund Eidson (**Owner/Operator**) brine well BW 004 (API# 30-025-26883) located in the SW/4, SW/4 of Section 31, Township 16 South, and Range 35 East, NMPM, Lea County, New Mexico, under the conditions specified in the enclosed **Attachment To The Discharge Permit**.

Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail [carlj.chavez@state.nm.us](mailto:carlj.chavez@state.nm.us). On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Wayne Price  
Environmental Bureau Chief

LWP/cc  
Attachments-1  
xc: OCD District Office

RECEIVED  
2008 MAR 12 PM 12:44



**ATTACHMENT TO THE DISCHARGE PERMIT  
Wasserhund Eidson Brine Well (BW-004)  
DISCHARGE PERMIT APPROVAL CONDITIONS**

**January 24, 2008**

**Please remit a check for \$1700.00 made payable to Water Quality Management Fund:**

**Water Quality Management Fund  
C/o: Oil Conservation Division  
1220 S. Saint Francis Drive  
Santa Fe, New Mexico 87505**

- 1. Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of \$100.00, plus a renewal flat fee (see WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required \$100.00 filing fee. However, the owner/operator still owes the required \$1700.00 permit fee for a Class III Brine Well.
- 2. Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on June 11, 2011** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. *Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.*
- 3. Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.
- 4. Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its August 2, 2006 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.
- 5. Modifications:** WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify



the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

**6. Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

**A. OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

**B. Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

**7. Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

**8. Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

**9. Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.



**10. Labeling:** The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

**11. Below-Grade Tanks/Sumps and Pits/Ponds.**

**A.** All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

**B.** All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

**C.** The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

**D.** The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**12. Underground Process/Wastewater Lines:**

**A.** The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for



atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

**B.** The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**13. Class V Wells:** The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

**14. Housekeeping:** The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

**15. Spill Reporting:** The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

**16. OCD Inspections:** The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

**17. Storm Water:** The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

**18. Unauthorized Discharges:** The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in



20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein. **An unauthorized discharge is a violation of this permit.**

**19. Vadose Zone and Water Pollution:** The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

**20. Additional Site Specific Conditions:** N/A

**21. Brine Well(s) Identification, Operation, Monitoring, Bonding and Reporting.**

**A. Well Identification:** API # 30-025-26883

**B. Well Work Over Operations:** OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

**C. Production Method:** Fresh water will be injected down the casing and brine shall be recovered up the tubing. Reverse flow will be allowed only once a month for up to 24 hours for clean out. Operators may request long term reverse operation if they can demonstrate that additional casing and monitoring systems are installed and approved by OCD. Operating in the reverse mode for more than 24 hours unless approved otherwise is a violation of this permit.

**D. Well Pressure Limits:** The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed 375 psig unless otherwise approved by the OCD. The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

**E. Mechanical Integrity Testing:** Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failures. Systems requiring test pressures less than 300 psig must be approved by OCD prior to testing. At least once every five years and during well work-overs the salt cavern formation will be isolated from the casing/tubing annulars and the casing



pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

**Testing Schedule:**

2007- 30 minute @ 300 psig casing test only (set packer to isolate formation)  
2008- 4 hour @ 300 psig casing open to formation test  
2009- 4 hour @ 300 psig casing open to formation test  
2010- 4 hour @ 300 psig casing open to formation test  
2011- 4 hour @ 300 psig casing open to formation test

- F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

**Any subsidence must be reported within 24 hours of discovery.**

- G. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.
- H. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.
- I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from the brine well.
- J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.
- K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond in the amount of \$50,000.00 to restore the site, plug and abandon



the well by January 1, 2008, pursuant to OCD rules and regulations. If warranted, OCD may require additional financial assurance.

**L. Annual Report:** All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Brine Well Report, name of operator, BW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

**22. Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

**23. Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

**24. Certification: Gandy Corporation (Owner/Operator),** by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Mr. Larry Gandy  
Eidson State Well No. 1 (BW-004)  
January 24, 2008  
Page 9 of 9

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

Gandy Corporation  
Company Name- print name above

Larry Gandy  
Company Representative- print name

Larry Gandy  
Company Representative- signature

Title sec/treas

Date: 2-18-08

## Appendix “B”

- Change of Operator
- Permit Renewal Application

**District I**  
1625 N. Lincoln St., Hobbs, NM 88201  
Phone: (505) 393-6161 Fax: (505) 393-0224

**District II**  
311 N. First St., Amarillo, NM 89109  
Phone: (505) 718-1281 Fax: (505) 728-9720

**District III**  
1000 Red House Rd., Arco, NM 87410  
Phone: (505) 334-6178 Fax: (505) 334-6170

**District IV**  
1220 S. St. Francis Dr., Santa Fe, NM 87508  
Phone: (505) 426-3370 Fax: (505) 426-1462

**State of New Mexico**  
**Energy, Minerals and Natural**  
**Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

Form C-145  
August 1, 2011  
Permit 138088

**HOBBS OCD**

**OCT 12 2011**

**RECEIVED**

## Change of Operator

### Previous Operator Information

OGRID: 8426  
Name: GANDY CORP  
Address: P.O. Box 2140  
City, State, Zip: Lovington, NM 88260

### New Operator Information

Effective Date: [Effective on the date of approval by the OCD]  
OGRID: 130851  
Name: WASSERHUND INC  
Address: P.O. Box 2140  
City, State, Zip: Lovington, NM 88260

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, WASSERHUND INC certifies that it has read and understands the following synopsis of applicable rules:

PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17 13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17 11(i) NMAC.

WASSERHUND INC understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.



District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Avenue, Artesia, NM 88210  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources Department  
Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Revised June 10, 2003

Submit Original  
Plus 1 Copy  
to Santa Fe  
1 Copy to Appropriate  
District Office

## DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITIES

(Refer to the OCD Guidelines for assistance in completing the application)

☐ New    ☒ XX Renewal

I. Facility Name: Eidson Brine Station-BW-04  
II. Operator: Gandy Corporation  
Address: P.O. Box 827 Tatum, NM 88267  
Contact Person: Larry Gandy                      Phone: 505-398-4940

### ***Request, Commitments and Attachments:***


Pursuant to WQCC 20.6.2.5003.A NMAC "Existing Facilities" and per WQCC 20.6.2.5003.B; Gandy Corporation is requesting that the previously submitted information be referenced for this permit renewal application and Gandy Corporation hereby commits to continue and operate pursuant to the existing permit on-file with OCD until renewed by OCD. **Required \$100.00 filing fee is attached hereto.**

- III. Location: SW/4 SW/4 Section 31 Township 16S Range 35E  
Submit large scale topographic map showing exact location.- **ON File with OCD**
- IV. Attach the name and address of the landowner of the facility site.-**ON File with OCD**
- V. Attach a description of the types and quantities of fluids at the facility.-**ON File with OCD**
- VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.-**ON File with OCD**
- VII. Attach a description of underground facilities (i.e. brine extraction well).-**ON File with OCD**
- VIII. Attach a contingency plan for reporting and clean-up of spills or releases.-**ON File with OCD**
- IX. Attach geological/hydrological evidence demonstrating that brine extraction operations will not adversely impact fresh water.-**ON File with OCD**
- X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.-**ON File with OCD**
- XI. CERTIFICATION:

*I hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.*

Name: Wayne Price-Price LLC

Title: Agent for Gandy Corporation

Signature: 

Date: June 09, 2011

E-mailAddress:wayneprice77@earthlink.net



## Appendix “C”

- Injection and Production Volumes/Comparison Charts
- Monthly/Quarterly Data Sheets

## 20111 Wasserhund Inc OCD BW-04 Annual Production Data

	Brine-BBLS	Fresh-BBLS	% diff	Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.
Jan	51764	51888	0.24%	
Feb	32383	32514	0.40%	
Mar	39860	39975	0.29%	
Apr	43421	43537	0.27%	
May	60807	60921	0.19%	
Jun	45645	45766	0.27%	
Jul	53719	53534	-0.34%	
Aug	60035	60125	0.15%	
Sep	50941	51116	0.34%	
Oct	60060	60160	0.17%	
Nov	58349	58464	0.20%	
Dec	53272	53357	0.16%	
2011 Total	610,256	611357	0.18%	
Total Brine Water Production Carry Over from Years Past BBLS	6,179,002			
Total Production year ending 2011	6,789,258			

**WASSERHUND, INC.**  
**P.O. Box 2140**  
**Lovington, NM 88260-2140**

July 15, 2011

NM Oil Conservation Division  
1220 S. Saint Francis  
Santa Fe, NM 87505


Fresh Water injected at the Wasserhund Brine Station (BW-004) .

April 2011	43537
May 2011	60921
July 2011	45766

Brine Water sold at the Wasserhund Brine Station (BW-004)

April 2011	43421
May 2011	60807
July 2011	45645

Sincerely Yours:

  
Donny Collins

**GANDY CORPORATION  
OILFIELD SERVICES**

P.O. Box 2140  
Lovington, New Mexico 88260  
575-396-0522  
FAX 575-396-0797

April 15, 2011

NM Oil Conservation Division  
1220 S. Saint Francis  
Santa Fe, NM 87505

Fresh Water injected at the Wasserhund Brine Station (BW-004)

January 2011	51888
February 2011	32514
March 2011	39975

Brine Water sold at the Wasserhund Brine Station (BW-004)

January 2011	51764
February 2011	32383
March 2011	39860

Sincerely Yours:



Donny Collins

---

**WASSERHUND, INC.**  
**P.O. Box 2140**  
**Lovington, NM 88260-2140**

October 15, 2011

NM Oil Conservation Division  
1220 S. Saint Francis  
Santa Fe, NM 87505


Fresh Water injected at the Wasserhund Brine Station (BW-004)

July 2011	53534
August 2011	60125
September 2011	51116

Brine Water sold at the Wasserhund Brine Station (BW-004)

July 2011	53719
August 2011	60035
September 2011	50941

Sincerely Yours:

  
Donny Collins

**WASSERHUND, INC.**  
**P.O. Box 2140**  
**Lovington, NM 88260-2140**

January 16, 2012

NM Oil Conservation Division  
1220 S. Saint Francis  
Santa Fe, NM 87505

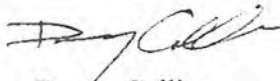
Fresh Water injected at the Wasserhund Brine Station (BW-004)

October 2011	60160
November 2011	58464
December 2011	53357

Brine Water sold at the Wasserhund Brine Station (BW-004)

October 2011	60060
November 2011	58349
December 2011	53272

Sincerely Yours:

  
Donny Collins

## Appendix “D”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water



April 10, 2012

LESTER WAYNE PRICE, JR  
PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO, NM 87124

RE: BUCKEYE BRINE WELL

*BW-04 AMENDED qd*

Enclosed are the results of analyses for samples received by the laboratory on 10/18/11 16:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (\*). For a complete list on accredited analytes and matrices visit the TCEQ website at [www.tceq.texas.gov/field/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

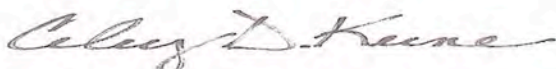
Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Celey D. Keene

Lab Director/Quality Manager



**Analytical Results For:**

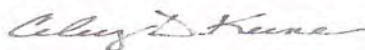
PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: BUCKEYE BRINE WELL Project Number: NONE GIVEN Project Manager: LESTER WAYNE PRICE, JR Fax To: UNK-NOWN	Reported: 10-Apr-12 10:55
--	--	------------------------------

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FRESHWATER	H102247-01	Water	18-Oct-11 12:30	18-Oct-11 16:30
BRINE WATER	H102247-02	Water	18-Oct-11 12:40	18-Oct-11 16:30

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### FRESHWATER H102247-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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#### Cardinal Laboratories

#### Total Metals by ICPMS

Arsenic	0.0060	0.0005	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Barium	0.100	0.000500	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Cadmium	ND	0.00010	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Chromium	ND	0.001	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Cobalt	0.00020	0.00010	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Copper	0.0036	0.0001	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Lead	0.0010	0.0005	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Manganese	ND	0.0050	mg/L	10	1111412	JM	11-Nov-11	200.8	GAL
Molybdenum	0.0035	0.0005	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Nickel	0.0055	0.0005	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Selenium	0.006	0.001	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Silver	ND	0.00010	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Uranium	0.00150	0.000100	mg/L	1	1111412	JM	02-Nov-11	200.8	GAL
Zinc	ND	0.010	mg/L	10	1111412	JM	11-Nov-11	200.8	GAL

#### Mercury (Total) by CVAA

Mercury	ND	0.0002	mg/L	1	1111411	JM	27-Oct-11	245.1	GAL
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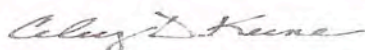
#### Inorganic Compounds

Alkalinity, Bicarbonate	195	5.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	
Alkalinity, Carbonate	ND	0.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	
Chloride	364	4.00	mg/L	1	1101905	HM	21-Oct-11	4500-Cl-B	
Conductivity	1410	1.00	uS/cm	1	1102705	HM	20-Oct-11	120.1	
Cyanide (total)	ND	0.005	mg/L	1	1111413	CK	26-Oct-11	335.4	GAL
Fluoride	0.753	0.200	mg/L	1	1111414	CK	01-Nov-11	4500F C	GAL
pH	7.73	0.100	pH Units	1	1102705	HM	20-Oct-11	150.1	
Specific Gravity @ 60° F	0.9969	0.000	[blank]	1	1110307	HM	28-Oct-11	SM 2710F	
Sulfate	67.5	10.0	mg/L	1	1103102	HM	28-Oct-11	375.4	
TDS	788	5.00	mg/L	1	1102605	HM	26-Oct-11	160.1	
Alkalinity, Total	160	4.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager





PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

**FRESHWATER  
H102247-01 (Water)**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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**Cardinal Laboratories**

**Inorganic Compounds**

TSS	11.0	2.00	mg/L	1	1102505	HM	20-Oct-11	160.2	
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**TOTAL METALS BY ICP**

Aluminum	0.316	0.0500	mg/L	1	1111410	JM	26-Oct-11	200.7	GAL
Boron	ND	0.300	mg/L	1	1111410	JM	26-Oct-11	200.7	GAL
Calcium	91.9	1.00	mg/L	1	1111410	CK	26-Oct-11	200.7	GAL
Iron	2.55	0.060	mg/L	1	1111410	JM	26-Oct-11	200.7	GAL
Magnesium	20.1	1.00	mg/L	1	1111410	CK	26-Oct-11	200.7	GAL
Potassium	4.25	1.00	mg/L	1	1111410	CK	26-Oct-11	200.7	GAL
Sodium	151	1.00	mg/L	1	1111410	CK	26-Oct-11	200.7	GAL

Cardinal Laboratories

\*=Accredited Analyte

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*Celey D. Keene*

Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### BRINE WATER H102247-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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#### Cardinal Laboratories

#### Total Metals by ICPMS

Arsenic	ND	0.0500	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Barium	0.366	0.0500	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Cadmium	ND	0.0100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Chromium	ND	0.100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Cobalt	ND	0.0100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Copper	0.501	0.0100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Lead	ND	0.0500	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Manganese	1.41	0.0050	mg/L	10	1111412	JM	11-Nov-11	200.8	GAL
Molybdenum	ND	0.0500	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Nickel	ND	0.0500	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Selenium	ND	0.100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Silver	ND	0.0100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Uranium	ND	0.0100	mg/L	100	1111412	JM	02-Nov-11	200.8	GAL
Zinc	0.416	0.010	mg/L	10	1111412	JM	11-Nov-11	200.8	GAL

#### Mercury (Total) by CVAA

Mercury	ND	0.0002	mg/L	1	1111411	JM	27-Oct-11	245.1	GAL
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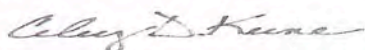
#### Inorganic Compounds

Alkalinity, Bicarbonate	161	5.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	
Alkalinity, Carbonate	ND	0.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	
Chloride	196000	4.00	mg/L	1	1101905	HM	21-Oct-11	4500-Cl-B	
Conductivity	532000	1.00	uS/cm	1	1102705	HM	20-Oct-11	120.1	
Cyanide (total)	ND	0.005	mg/L	1	1111413	CK	26-Oct-11	335.4	GAL
Fluoride	ND	0.200	mg/L	1	1111414	CK	01-Nov-11	4500F C	GAL
pH	6.79	0.100	pH Units	1	1102705	HM	20-Oct-11	150.1	
Specific Gravity @ 60° F	1.186	0.000	[blank]	1	1110307	HM	28-Oct-11	SM 2710F	
Sulfate	8160	10.0	mg/L	1	1103102	HM	28-Oct-11	375.4	
TDS	291000	5.00	mg/L	1	1102605	HM	26-Oct-11	160.1	
Alkalinity, Total	132	4.00	mg/L	1	1083007	HM	20-Oct-11	310.1M	

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



**Analytical Results For:**

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

**BRINE WATER**  
**H102247-02 (Water)**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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**Cardinal Laboratories**

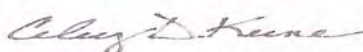
**Inorganic Compounds**

TSS	260	2.00	mg/L	1	1102505	HM	20-Oct-11	160.2	
<b><u>TOTAL METALS BY ICP</u></b>									
Aluminum	2.57	0.500	mg/L	10	1111410	JM	26-Oct-11	200.7	GAL
Boron	14.0	3.00	mg/L	10	1111410	JM	26-Oct-11	200.7	GAL
Calcium	759	10.0	mg/L	10	1111410	CK	26-Oct-11	200.7	GAL
Iron	6.14	0.600	mg/L	10	1111410	JM	26-Oct-11	200.7	GAL
Magnesium	2250	10.0	mg/L	10	1111410	CK	26-Oct-11	200.7	GAL
Potassium	2290	10.0	mg/L	10	1111410	CK	26-Oct-11	200.7	GAL
Sodium	124000	1.00	mg/L	1	1111410	CK	26-Oct-11	Calculation	
Sodium	Saturated >25000	10.0	mg/L	10	1111410	CK	26-Oct-11	200.7	GAL

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 PRICE LLC  
 312 ENCANTADO RIDGE COURT, NE  
 RIO RANCHO NM, 87124

 Project: BUCKEYE BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 10:55

**Total Metals by ICPMS - Quality Control**
**Cardinal Laboratories**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch 1111412 - EPA 3005**
**Blank (1111412-BLK1)**

Prepared: 01-Nov-11 Analyzed: 02-Nov-11

Molybdenum	ND	0.0005	mg/L							
Manganese	0.0035	0.0005	mg/L							B1
Cobalt	ND	0.00010	mg/L							
Cadmium	ND	0.00010	mg/L							
Selenium	ND	0.001	mg/L							
Nickel	ND	0.0005	mg/L							
Copper	ND	0.0001	mg/L							
Silver	ND	0.00010	mg/L							
Lead	ND	0.0005	mg/L							
Chromium	ND	0.001	mg/L							
Uranium	ND	0.000100	mg/L							
Barium	ND	0.000500	mg/L							
Zinc	0.018	0.001	mg/L							B1
Arsenic	ND	0.0005	mg/L							

**LCS (1111412-BS1)**

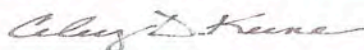
Prepared: 01-Nov-11 Analyzed: 02-Nov-11

Cobalt	0.0515		mg/L	0.0500		103	85-115			
Lead	0.0503		mg/L	0.0500		101	85-115			
Chromium	0.049		mg/L	0.0500		98.6	85-115			
Arsenic	0.0529		mg/L	0.0500		106	85-115			
Cadmium	0.0507		mg/L	0.0500		101	85-115			
Barium	0.0503		mg/L	0.0500		101	85-115			
Copper	0.0502		mg/L	0.0500		100	85-115			
Nickel	0.0504		mg/L	0.0500		101	85-115			
Manganese	0.0429		mg/L	0.0500		85.8	85-115			
Molybdenum	0.0542		mg/L	0.0500		108	85-115			
Selenium	0.273		mg/L	0.250		109	85-115			
Zinc	0.059		mg/L	0.0500		118	85-115			BS1
Silver	0.0521		mg/L	0.0500		104	85-115			
Uranium	0.0490		mg/L	0.0500		98.0	85-115			

**Cardinal Laboratories**

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### Total Metals by ICPMS - Quality Control

#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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#### Batch 1111412 - EPA 3005

#### LCS Dup (1111412-BS1)

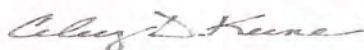
Prepared: 01-Nov-11 Analyzed: 02-Nov-11

Nickel	0.0493		mg/L	0.0500		98.6	85-115	2.21	20	
Uranium	0.0485		mg/L	0.0500		97.0	85-115	1.03	20	
Zinc	0.065		mg/L	0.0500		130	85-115	9.52	20	BS1
Barium	0.0492		mg/L	0.0500		98.4	85-115	2.21	20	
Manganese	0.0443		mg/L	0.0500		88.6	85-115	3.21	20	
Cobalt	0.0503		mg/L	0.0500		101	85-115	2.36	20	
Lead	0.0498		mg/L	0.0500		99.6	85-115	0.999	20	
Arsenic	0.0505		mg/L	0.0500		101	85-115	4.64	20	
Silver	0.0483		mg/L	0.0500		96.6	85-115	7.57	20	
Cadmium	0.0501		mg/L	0.0500		100	85-115	1.19	20	
Selenium	0.256		mg/L	0.250		102	85-115	6.43	20	
Chromium	0.049		mg/L	0.0500		98.2	85-115	0.407	20	
Copper	0.0487		mg/L	0.0500		97.4	85-115	3.03	20	
Molybdenum	0.0523		mg/L	0.0500		105	85-115	3.57	20	

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Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### Mercury (Total) by CVAA - Quality Control

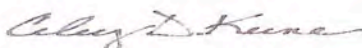
#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1111411 - EPA 245.1</b>										
<b>Blank (1111411-BLK1)</b>										
Mercury	ND	0.0002	mg/L							Prepared & Analyzed: 27-Oct-11
<b>LCS (1111411-BS1)</b>										
Mercury	0.0022		mg/L	0.00200		110	85-115			Prepared & Analyzed: 27-Oct-11
<b>LCS Dup (1111411-BSD1)</b>										
Mercury	0.0021		mg/L	0.00200		105	85-115	4.65	20	Prepared & Analyzed: 27-Oct-11

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Celey D. Keene, Lab Director/Quality Manager



### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### Inorganic Compounds - Quality Control

#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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#### Batch 1083007 - General Prep - Wet Chem

##### Blank (1083007-BLK1)

Prepared: 25-Aug-11 Analyzed: 14-Sep-11

Alkalinity, Carbonate	ND	0.00	mg/L							
Alkalinity, Bicarbonate	ND	5.00	mg/L							
Alkalinity, Total	ND	4.00	mg/L							

##### LCS (1083007-BS1)

Prepared: 25-Aug-11 Analyzed: 14-Sep-11

Alkalinity, Carbonate	ND	0.00	mg/L				80-120			
Alkalinity, Bicarbonate	ND	5.00	mg/L				80-120			
Alkalinity, Total	112	4.00	mg/L	100		112	80-120			

##### LCS Dup (1083007-BSD1)

Prepared: 25-Aug-11 Analyzed: 14-Sep-11

Alkalinity, Carbonate	ND	0.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	ND	5.00	mg/L				80-120		20	
Alkalinity, Total	116	4.00	mg/L	100		116	80-120	3.51	20	

##### Duplicate (1083007-DUP1)

Source: H101772-01

Prepared & Analyzed: 25-Aug-11

Alkalinity, Carbonate	ND	0.00	mg/L		0.00				20	
Alkalinity, Bicarbonate	259	5.00	mg/L		244			5.96	20	
Alkalinity, Total	212	4.00	mg/L		200			5.83	20	

#### Batch 1101905 - SPLP 1312

##### Blank (1101905-BLK1)

Prepared: 17-Oct-11 Analyzed: 20-Oct-11

Chloride	ND	4.00	mg/L							
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##### LCS (1101905-BS1)

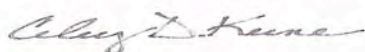
Prepared: 17-Oct-11 Analyzed: 20-Oct-11

Chloride	112	4.00	mg/L	100		112	80-120			
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\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### Inorganic Compounds - Quality Control

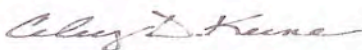
#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1101905 - SPLP 1312</b>										
<b>LCS Dup (1101905-BS1)</b>					Prepared: 17-Oct-11 Analyzed: 20-Oct-11					
Chloride	108	4.00	mg/L	100		108	80-120	3.64	20	
<b>Batch 1102505 - Filtration</b>										
<b>Blank (1102505-BLK1)</b>					Prepared & Analyzed: 20-Oct-11					
TSS	ND	2.00	mg/L							
<b>Duplicate (1102505-DUP1)</b>					Source: H102247-01 Prepared & Analyzed: 20-Oct-11					
TSS	12.0	2.00	mg/L		11.0			8.70	20	
<b>Batch 1102605 - *** DEFAULT PREP ***</b>										
<b>Blank (1102605-BLK1)</b>					Prepared: 26-Oct-11 Analyzed: 28-Oct-11					
TDS	ND	5.00	mg/L							
<b>LCS (1102605-BS1)</b>					Prepared: 26-Oct-11 Analyzed: 28-Oct-11					
TDS	244		mg/L	240		102	80-120			
<b>Duplicate (1102605-DUP1)</b>					Source: H102306-02 Prepared: 26-Oct-11 Analyzed: 28-Oct-11					
TDS	975	5.00	mg/L		1010			3.53	20	
<b>Batch 1102705 - General Prep - Wet Chem</b>										
<b>LCS (1102705-BS1)</b>					Prepared & Analyzed: 20-Oct-11					
pH	7.11		pH Units	7.00		102	90-110			
Conductivity	509		uS/cm	500		102	80-120			

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Celey D. Keene, Lab Director/Quality Manager



**Analytical Results For:**

 PRICE LLC  
 312 ENCANTADO RIDGE COURT, NE  
 RIO RANCHO NM, 87124

 Project: BUCKEYE BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 10:55

**Inorganic Compounds - Quality Control**
**Cardinal Laboratories**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 1102705 - General Prep - Wet Chem**

<b>Duplicate (1102705-DUP1)</b>		<b>Source: H102247-01</b>		<b>Prepared &amp; Analyzed: 20-Oct-11</b>						
pH	7.75	0.100	pH Units		7.73			0.258	20	
Conductivity	1410	1.00	uS/cm		1410			0.00	20	

**Batch 1103102 - General Prep - Wet Chem**

<b>Blank (1103102-BLK1)</b>		<b>Prepared &amp; Analyzed: 28-Oct-11</b>								
Sulfate	ND	10.0	mg/L							
<b>LCS (1103102-BS1)</b>		<b>Prepared &amp; Analyzed: 28-Oct-11</b>								
Sulfate	20.9	10.0	mg/L	20.0		104	80-120			
<b>LCS Dup (1103102-BSD1)</b>		<b>Prepared &amp; Analyzed: 28-Oct-11</b>								
Sulfate	18.2	10.0	mg/L	20.0		91.0	80-120	13.8	20	
<b>Duplicate (1103102-DUP1)</b>		<b>Source: H102247-01</b>		<b>Prepared &amp; Analyzed: 28-Oct-11</b>						
Sulfate	70.1	10.0	mg/L		67.5			3.78	20	

**Batch 1110307 - General Prep - Wet Chem**

<b>Duplicate (1110307-DUP1)</b>		<b>Source: H102247-01</b>		<b>Prepared &amp; Analyzed: 28-Oct-11</b>						
Specific Gravity @ 60° F	0.9950	0.000	[blank]		0.9969			0.194	200	

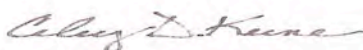
**Batch 1111413 - General Prep**

<b>Blank (1111413-BLK1)</b>		<b>Prepared: 25-Oct-11 Analyzed: 26-Oct-11</b>								
Cyanide (total)	ND	0.005	mg/L							

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 PRICE LLC  
 312 ENCANTADO RIDGE COURT, NE  
 RIO RANCHO NM, 87124

 Project: BUCKEYE BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 10:55

**Inorganic Compounds - Quality Control**
**Cardinal Laboratories**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 1111413 - General Prep**
**LCS (1111413-BS1)**

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

Cyanide (total)	0.042		mg/L	0.0500		85.0	85-115			
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**LCS Dup (1111413-BSD1)**

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

Cyanide (total)	0.047		mg/L	0.0500		94.8	85-115	10.9	20	
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**Batch 1111414 - General Prep**
**Blank (1111414-BLK1)**

Prepared &amp; Analyzed: 01-Nov-11

Fluoride	ND	0.200	mg/L							
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**LCS (1111414-BS1)**

Prepared &amp; Analyzed: 01-Nov-11

Fluoride	1.09		mg/L	1.00		109	80-120			
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**LCS Dup (1111414-BSD1)**

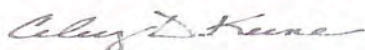
Prepared &amp; Analyzed: 01-Nov-11

Fluoride	1.09		mg/L	1.00		109	80-120	0.00	20	
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Celey D. Keene, Lab Director/Quality Manager



### Analytical Results For:

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: BUCKEYE BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 10:55

### Dissolved Metals - Quality Control

#### Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
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#### Batch 1111410 - EPA 3005

##### Blank (1111410-BLK1)

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

Boron	ND	0.300	mg/L						
Calcium	ND	1.00	mg/L						
Magnesium	ND	1.00	mg/L						
Sodium	ND	1.00	mg/L						
Aluminum	ND	0.0500	mg/L						
Iron	ND	0.060	mg/L						
Potassium	ND	1.00	mg/L						

##### LCS (1111410-BS1)

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

Calcium	3.90		mg/L	4.00		97.5	85-115		
Magnesium	19.9		mg/L	20.0		99.5	85-115		
Potassium	7.71		mg/L	8.00		96.4	85-115		
Sodium	6.34		mg/L	6.48		97.8	85-115		
Aluminum	3.94		mg/L	4.00		98.5	85-115		
Boron	3.86		mg/L	4.00		96.5	85-115		
Iron	3.89		mg/L	4.00		97.2	85-115		

##### LCS Dup (1111410-BSD1)

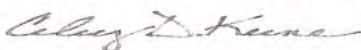
Prepared: 25-Oct-11 Analyzed: 26-Oct-11

Aluminum	3.95		mg/L	4.00		98.8	85-115	0.253	20
Calcium	3.91		mg/L	4.00		97.8	85-115	0.256	20
Potassium	8.08		mg/L	8.00		101	85-115	4.69	20
Boron	3.89		mg/L	4.00		97.2	85-115	0.774	20
Iron	3.92		mg/L	4.00		98.0	85-115	0.768	20
Magnesium	20.1		mg/L	20.0		100	85-115	1.00	20
Sodium	6.40		mg/L	6.48		98.8	85-115	0.942	20

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Celey D. Keene, Lab Director/Quality Manager

**Notes and Definitions**

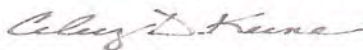
Z-01	Saturated >25000
GAL	Analysis subcontracted to Green Analytical Laboratories, a subsidiary of Cardinal Laboratories.
BS1	Blank spike recovery above laboratory acceptance criteria. Results for analyte potentially biased high.
B1	Target analyte detected in method blank at or above method reporting limit. Sample concentration found to be 10 times above the concentration found in the method blank or less than the reporting limit.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C Samples reported on an as received basis (wet) unless otherwise noted on report

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Celest D. Keene, Lab Director/Quality Manager



## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

<b>Company Name:</b> Puma LLC <b>Project Manager:</b> Lester Wayne Puma Jr. <b>Address:</b> 700 Encanto Rd, Santa Fe, NM <b>City:</b> Santa Fe <b>State:</b> NM <b>Zip:</b> 87505 <b>Phone #:</b> 505-762-5500 <b>Fax #:</b> <b>Project #:</b> <b>Project Name:</b> Bunker Ranch Well <b>Project Location:</b> <b>Sampler Name:</b> Lester Wayne Puma Jr.			<b>BILL TO</b> <b>P.O. #:</b> 2140 <b>Company:</b> PUMA, CORP. <b>Attn:</b> <b>Address:</b> <b>City:</b> Santa Fe <b>State:</b> NM <b>Zip:</b> 87505 <b>Phone #:</b> 505-762-5500 <b>Fax #:</b>			<b>ANALYSIS REQUEST</b>															
<b>FOR LAB USE ONLY</b>			<b>MATRIX</b> GROUNDWATER WASTEWATER SOIL OIL SLUDGE OTHER:			<b>PRESERV.</b> ACID/BASE ICE / COOL OTHER:			<b>SAMPLING</b> DATE TIME		New Check on 10/11/05 - Fine Gold ore 11000 Marb. Total Cigarette										
<b>Lab I.D.</b> H1D22441			<b>Sample I.D.</b> 1A: Freshwater 2A: Brine Water			(GRAB OR COMP.) # CONTAINERS			DATE TIME			X X X X									

PLEASE NOTE: Liability and Damages, Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

<b>Relinquished By:</b> Lester Wayne Puma Jr.		<b>Date:</b> 10/11/05 <b>Time:</b> 4:30		<b>Received By:</b> Lodi Benson		<b>Phone Result:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Fax Result:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>REMARKS:</b>	
<b>Delivered By: (Circle One)</b> Sampler - UPS - Bus - Other:		<b>Sample Condition</b> Cool Intact <input type="checkbox"/> Yes <input type="checkbox"/> No		<b>CHECKED BY:</b> (Initials) LWB		<b>Add'l Phone #:</b> <b>Add'l Fax #:</b>	

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

## Appendix “E”

- C-103 for Annual Test
- MIT Test Results-Chart
- Well Bore Sketch



Submit 1 Copy To Appropriate District Office

District I - (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II - (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III - (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV - (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

HOBBS OGD

OIL CONSERVATION DIVISION

NOV 09 2011 1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-103

Revised August 1, 2011

WELL API NO. 30-025-26883
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 25-26883
7. Lease Name or Unit Agreement Name Eidson Brine Station, BW-004
8. Well Number 1
9. OGRID Number 130851
10. Pool name or Wildcat BSW Salado
11. Elevation (Show whether DR, RKB, RT, GR, etc.)

SUNDRY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well: Oil Well ☐ Gas Well ☐ Other Brine Well ☒

2. Name of Operator  
Wasserhund, Inc.

3. Address of Operator  
P.O. Box 2140, Lovington, NM 88260

4. Well Location  
Unit Letter M : 567.4 feet from the South line and 162.7 feet from the West line  
Section 31 Township 16s Range 35e NMPM County Lea

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☒ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☐

OTHER: integrity test ☐

OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Please see attached:

Chart

Well Bore Diagram

Last time pulled packer test - 10/06/08

\* ORIGINAL CHART MAILED TO  
SANTA FE. (JIM GRISWOLD)

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Larry Gandy TITLE Secretary/Treasurer DATE 11/04/11

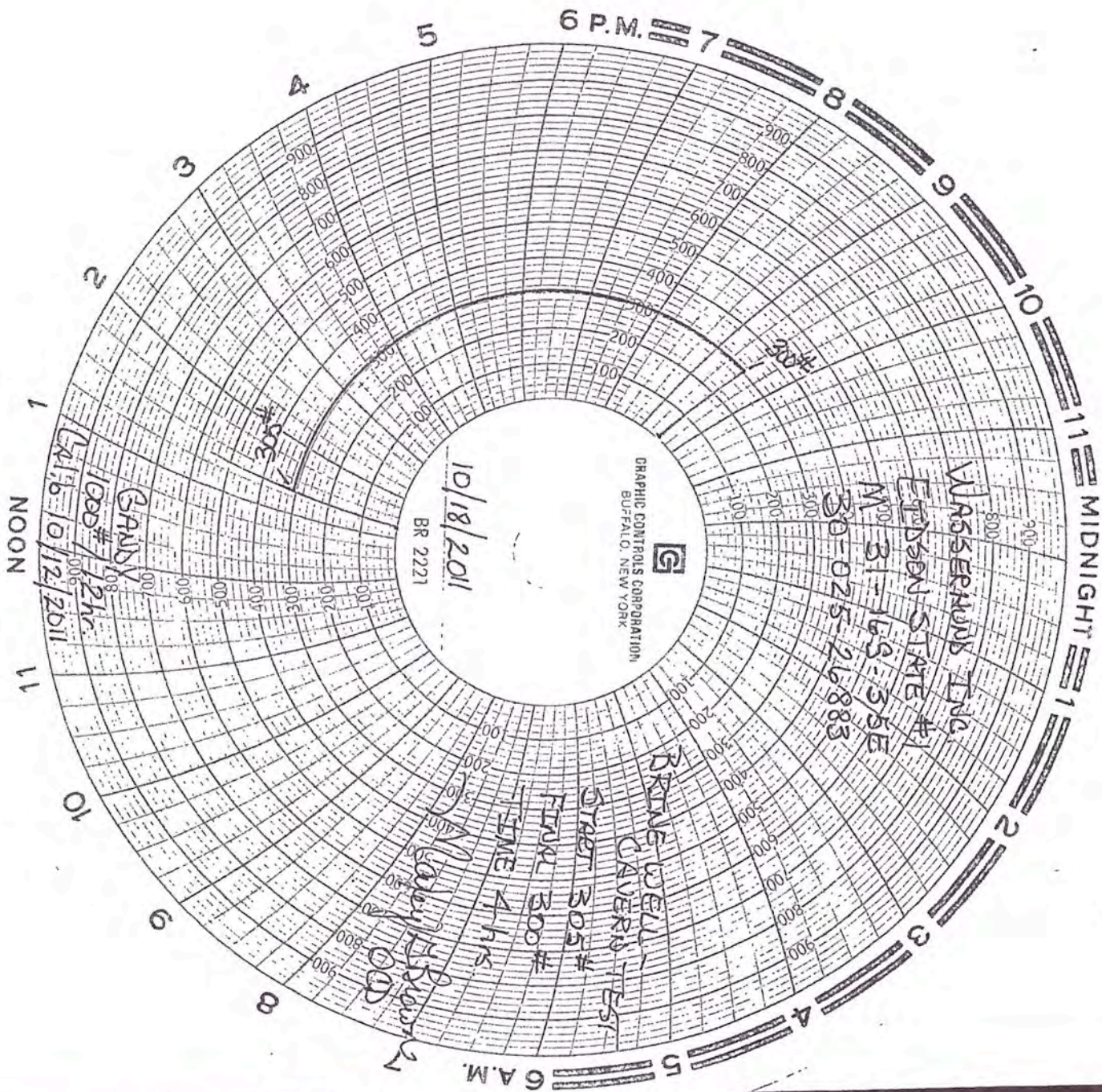
Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

For State Use Only

APPROVED BY: Mary Brown TITLE Compliance Officer DATE 11/10/2011

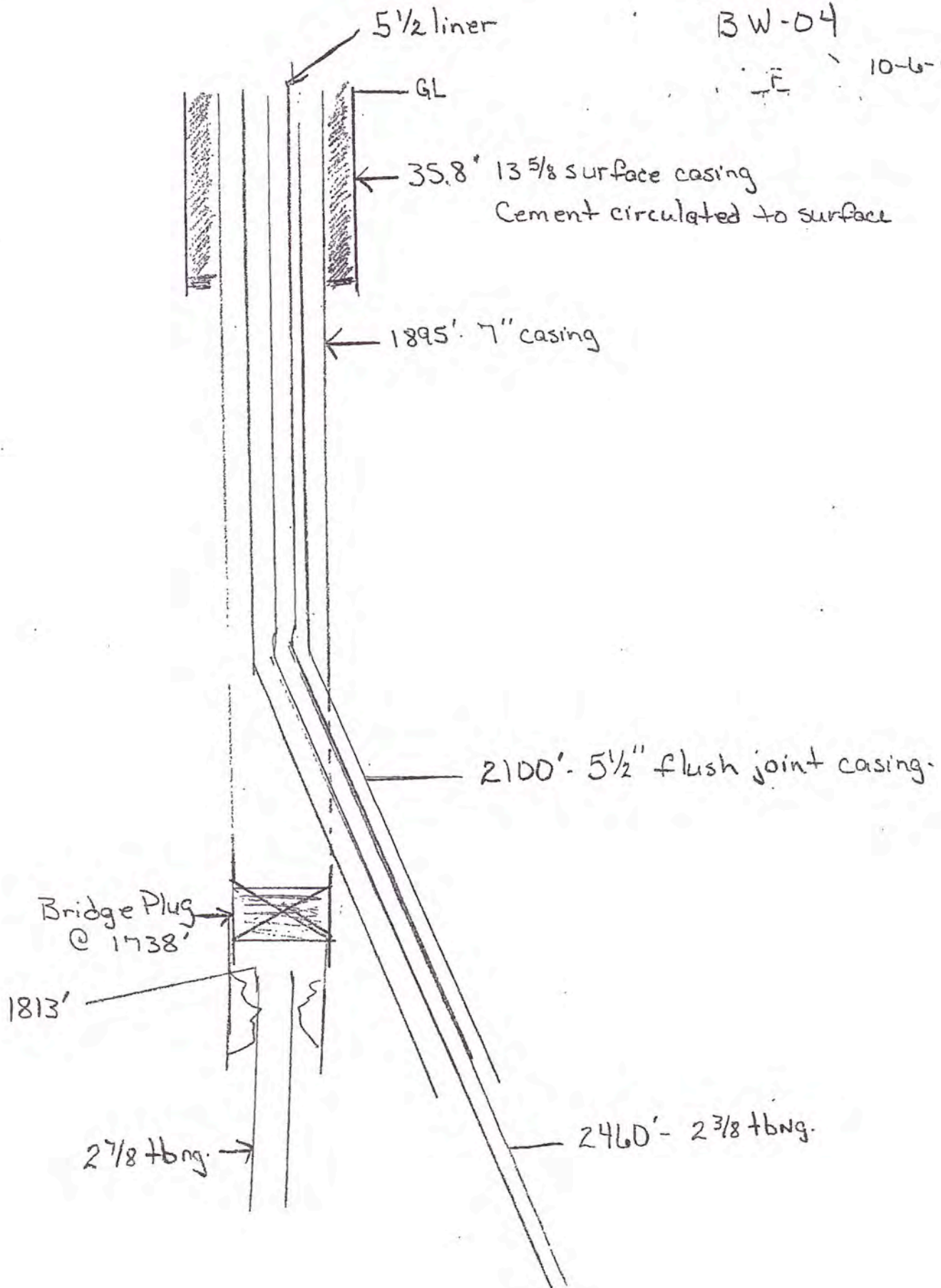
Conditions of Approval (if any):





Gandy Corporation  
Edison Brine Strat.  
BW-04

10-6-08

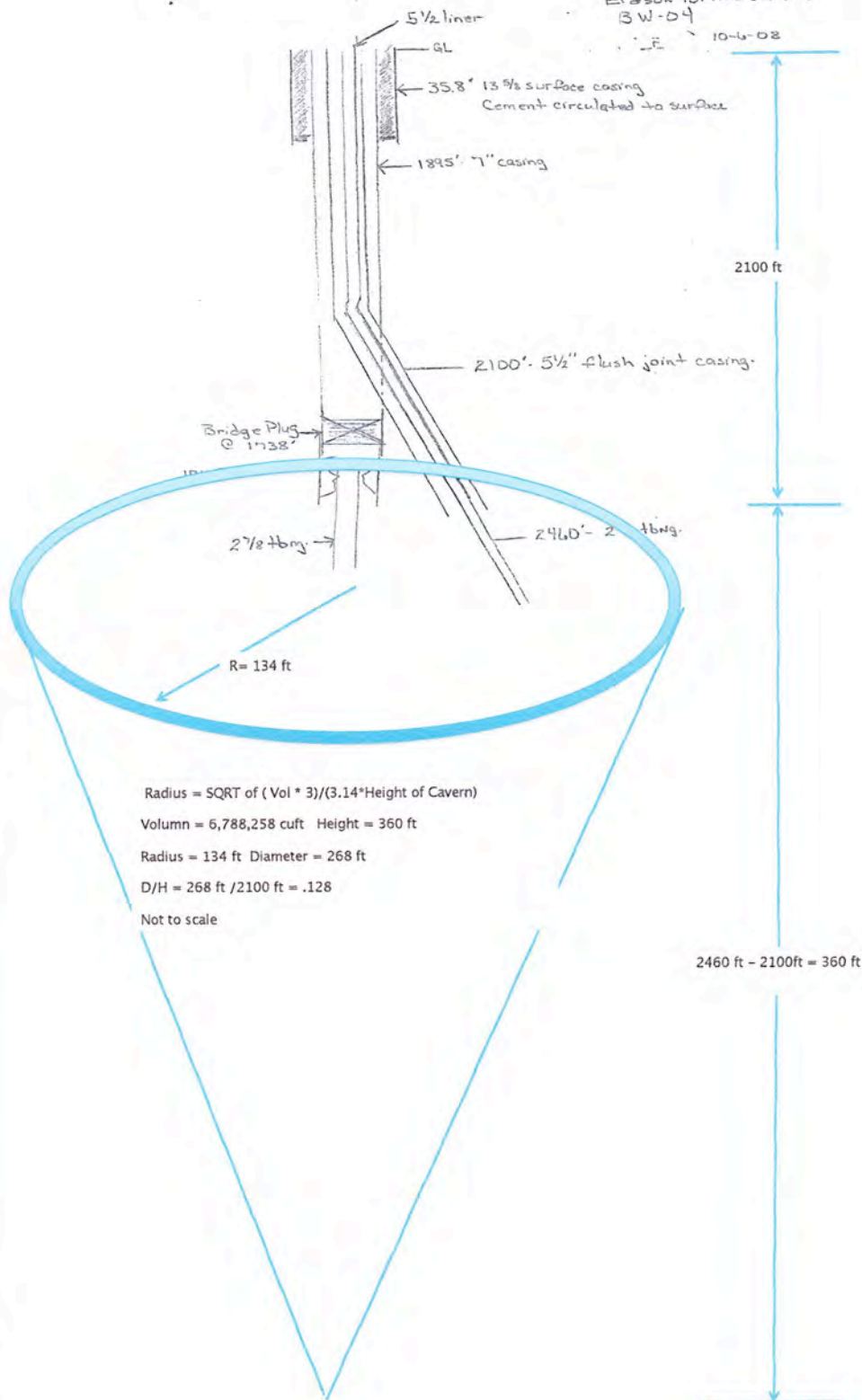


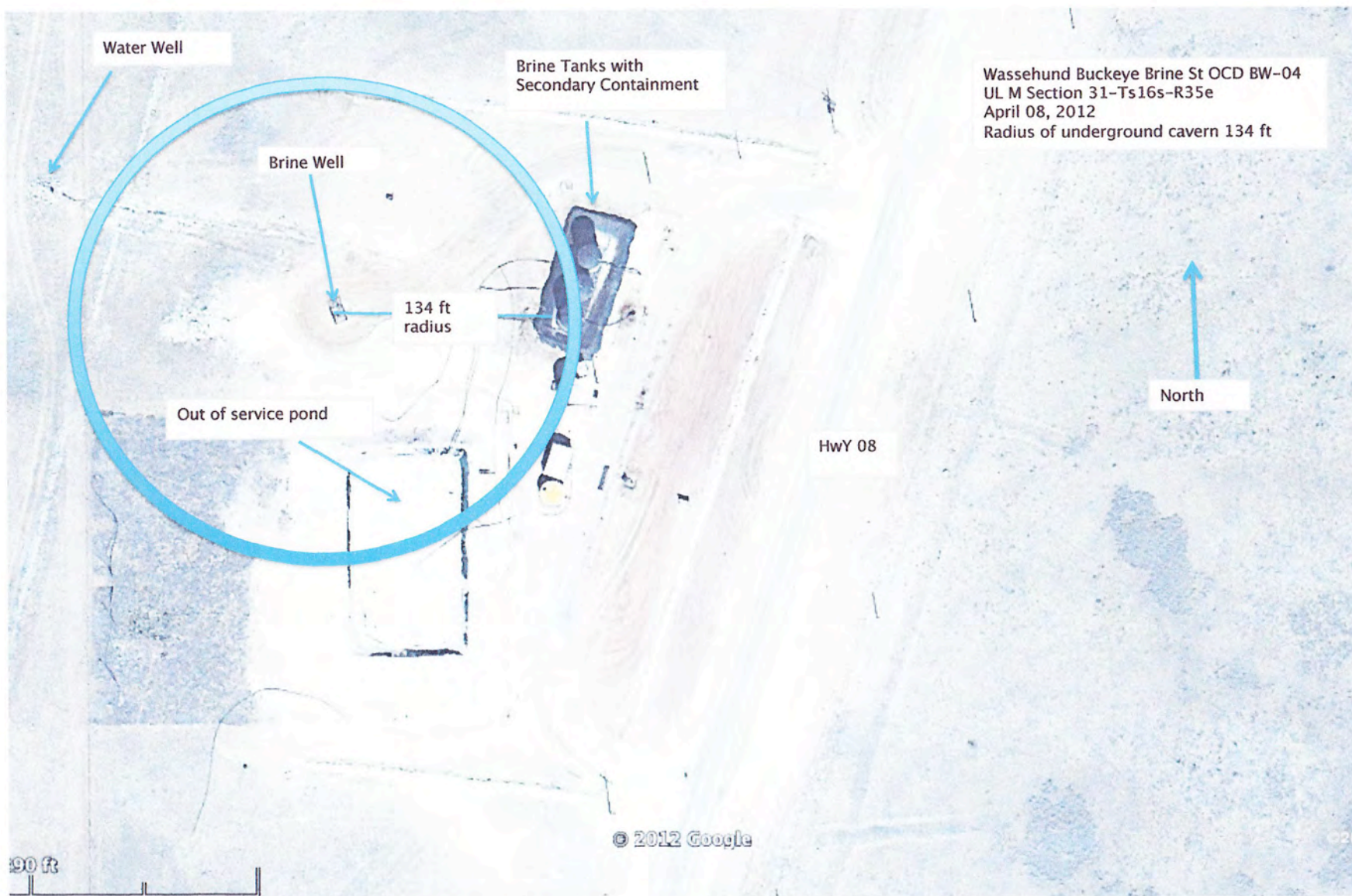


## Appendix “F”

- Brine Cavity Calculations with Wellbore Sketch
- D/H Calculations
- Aerial View showing Cavern Radius

Landry Corporation  
Edison Brine Strat.  
BW-04





## Appendix “G”

- AOR Well Status List
- AOR Plot Plan
- OCD Well Records Search
- OCD Well Records for Wells In Critical AOR

# 2011 BW-04 AOR Review-- Well Status List

up-dated Jan 01, 2012

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program Checked	Cased/Cemented across salt section	Corrective Action Required	
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA	
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	1 1	yes	no	yes
1	30-025-35678	Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	1 1	yes	no	yes

2 2

2 Total # of wells in adjacent quarter-sections

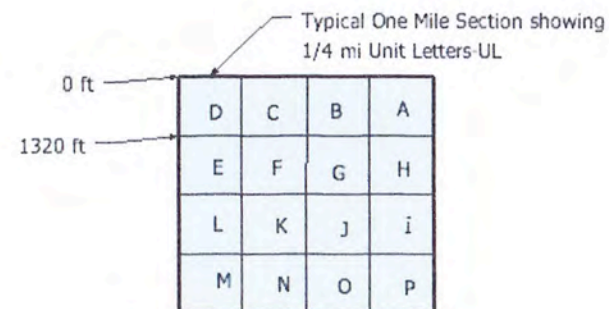
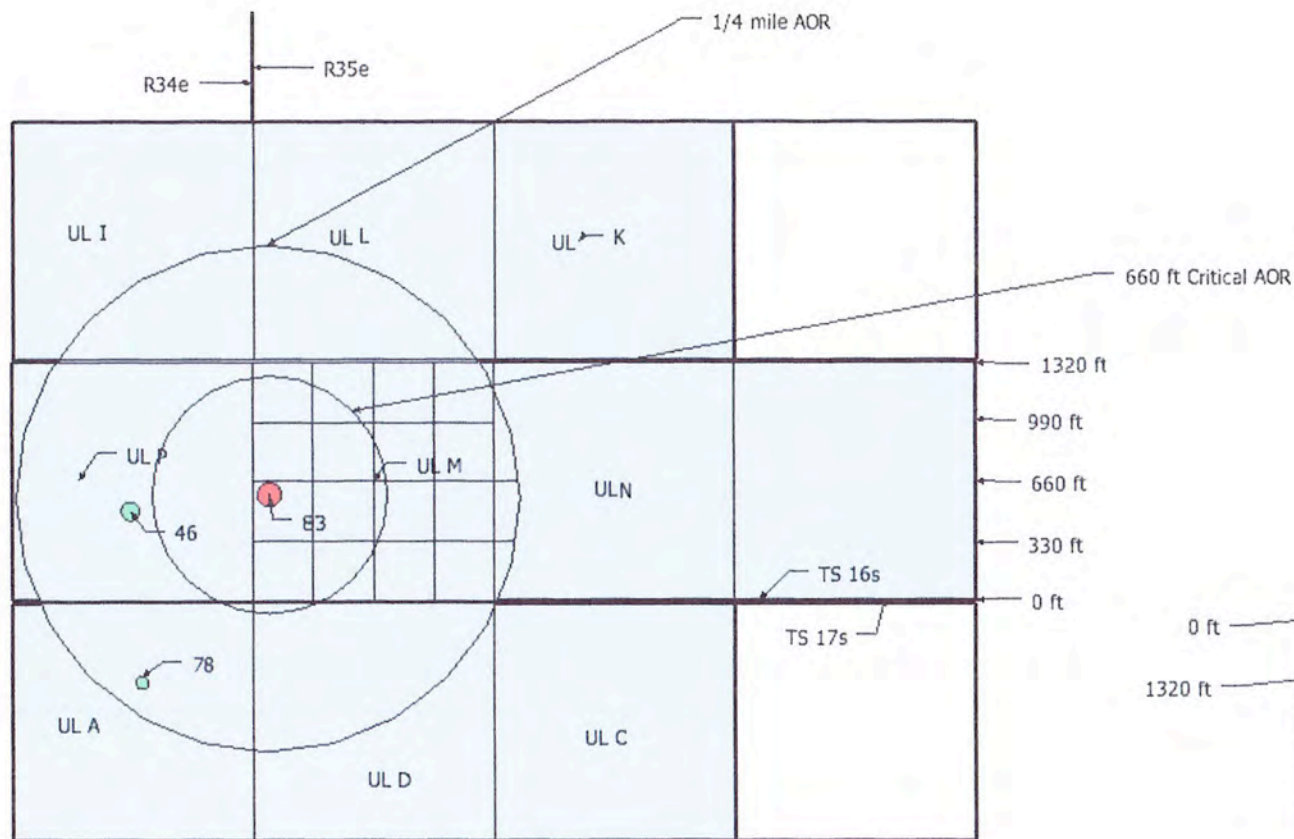
2 Total # of wells in 1/4 mile AOR

2 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

## Notes:

\* Means the well is within 660 ft or Critical AOR of the outside radius of the brine well and casing program will be checked annually.





Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2011	Location: UL M-Sec 31-Ts16s-R35e	

WASSERHUND BW-4  
2012 APR  
N

## Well File Search - Select API Number to View

Please select the API Number you wish to view from the list below by clicking the radio button next to the API Number. Then click the "Continue" button to see the thumbnails for the API you selected. The search results are broken out by groups of 25 on each page. Switching pages can be done by clicking the "Next 25" or "Previous 25" links.

3 Records Found

Displaying Screen 1 of 1

- | API Number                                   | ULSTR         | Footages           |   |
|--|---------------|--------------------|---|
| <input type="radio"/> 3002526883             | M -31-16S-35E | 567 FSL & 162 FWL  | ✓ |
| Well Name & Number: EIDSON STATE No. 001     |               |                    |   |
| Operator: WASSERHUND INC                     |               |                    |   |
| <input type="radio"/> 3002531621             | L -31-16S-35E | 1980 FSL & 660 FWL | ✓ |
| Well Name & Number: VACUUM 9205 JV-P No. 001 |               |                    |   |
| Operator: BTA OIL PRODUCERS, LLC             |               |                    |   |
| <input type="radio"/> 3002532958             | O -31-16S-35E | 660 FSL & 1980 FEL |   |
| Well Name & Number: VACUUM 31 No. 001        |               |                    |   |
| Operator: MERIT ENERGY COMPANY, LLC          |               |                    |   |

3 Records Found

Displaying Screen 1 of 1

Continue

Go Back

## Well File Search - Select API Number to View

Please select the API Number you wish to view from the list below by clicking the radio button next to the API Number. Then click the "Continue" button to see the thumbnails for the API you selected. The search results are broken out by groups of 25 on each page. Switching pages can be done by clicking the "Next 25" or "Previous 25" links.

Bw-4  
2012 AOR  
J

10 Records Found

Displaying Screen 1 of 1

- | API Number   | ULSTR         | Footages            |
|--|---------------|---------------------|
| <input type="radio"/> 3002524594                                   | N -36-16S-34E | 460 FSL & 1980 FWL  |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 001 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002524648                                   | L -36-16S-34E | 1780 FSL & 460 FWL  |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 162 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002525146                                   | P -36-16S-34E | 460 FSL & 660 FEL ✓ |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 001 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002525170                                   | O -36-16S-34E | 460 FSL & 1980 FEL  |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 002 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002533184                                   | F -36-16S-34E | 1980 FNL & 1650 FWL |
| <b>Well Name &amp; Number:</b> EUREKA 36 STATE No. 001             |               |                     |
| <b>Operator:</b> CIMAREX ENERGY CO. OF COLORADO                    |               |                     |
| <input type="radio"/> 3002534356                                   | M -36-16S-34E | 660 FSL & 660 FWL   |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 163 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002536389                                   | N -36-16S-34E | 810 FSL & 1860 FWL  |
| <b>Well Name &amp; Number:</b> EUREKA 36 STATE No. 002             |               |                     |
| <b>Operator:</b> CIMAREX ENERGY CO. OF COLORADO                    |               |                     |
| <input type="radio"/> 3002537018                                   | O -36-16S-34E | 608 FSL & 1777 FEL  |
| <b>Well Name &amp; Number:</b> NORTH VACUUM ABO NORTH UNIT No. 123 |               |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC                  |               |                     |
| <input type="radio"/> 3002537993                                   | J -36-16S-34E | 1330 FSL & 1750 FEL |
| <b>Well Name &amp; Number:</b> ENCORE 36 STATE No. 001             |               |                     |
| <b>Operator:</b> QUANTUM RESOURCES MANAGEMENT, LLC                 |               |                     |
| <input type="radio"/> 3002539149                                   | A -36-16S-34E | 1311 FNL & 1101 FEL |
| <b>Well Name &amp; Number:</b> ENCORE 36 STATE No. 002A            |               |                     |
| <b>Operator:</b> QUANTUM RESOURCES MANAGEMENT, LLC                 |               |                     |

10 Records Found

Displaying Screen 1 of 1

Continue

Go Back



BW-4  
2012 AOR  
JP

- ☐ Well Name & Number: STATE VI No. 001  
Operator: CHESAPEAKE OPERATING, INC.  
3002529037 C -1-17S-34E 1320 FNL & 1980 FWL  
Well Name & Number: PRE-ONGARD WELL No. 001  
Operator: PRE-ONGARD WELL OPERATOR
- ☐ 3002531341 O -1-17S-34E 660 FSL & 1980 FEL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002531342 M -1-17S-34E 760 FSL & 660 FWL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002532243 K -1-17S-34E 1980 FSL & 1980 FWL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002532244 I -1-17S-34E 1980 FSL & 660 FEL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002532721 G -1-17S-34E 1980 FNL & 1980 FEL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 073  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002535678 A -1-17S-34E 660 FNL & 660 FEL ✓  
Well Name & Number: STATE VII No. 007  
Operator: CHESAPEAKE OPERATING, INC.
- ☐ 3002536333 D -1-17S-34E 820 FNL & 1310 FWL  
Well Name & Number: BUCKEYE 1 STATE No. 001  
Operator: FASKEN OIL & RANCH LTD
- ☐ 3002536889 F -1-17S-34E 1830 FNL & 1830 FWL  
Well Name & Number: BUCKEYE 1 STATE No. 002  
Operator: FASKEN OIL & RANCH LTD
- ☐ 3002539295 N -1-17S-34E 1136 FSL & 2503 FWL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 023  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002539524 M -1-17S-34E 1200 FSL & 1310 FWL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 024  
Operator: SHERIDAN PRODUCTION COMPANY, LLC
- ☐ 3002539662 F -1-17S-34E 2490 FNL & 1481 FWL  
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 012  
Operator: SHERIDAN PRODUCTION COMPANY, LLC



## Well File Search - Select API Number to View

Please select the API Number you wish to view from the list below by clicking the radio button next to the API Number. Then click the "Continue" button to see the thumbnails for the API you selected. The search results are broken out by groups of 25 on each page. Switching pages can be done by clicking the "Next 25" or "Previous 25" links.

BW-4  
2012 AOR  
JP

28 Records Found

Displaying Screen 1 of 2

[ < > ]

API Number	ULSTR	Footages
<input type="radio"/> 3002501948	M -1-17S-34E	330 FSL & 330 FWL
Well Name & Number: PRE-ONGARD WELL No. 001		
Operator: PRE-ONGARD WELL OPERATOR		
<input type="radio"/> 3002501949	N -1-17S-34E	330 FSL & 1650 FWL
Well Name & Number: PRE-ONGARD WELL No. 002		
Operator: PRE-ONGARD WELL OPERATOR		
<input type="radio"/> 3002501950	P -1-17S-34E	330 FSL & 330 FEL
Well Name & Number: PRE-ONGARD WELL No. 001		
Operator: PRE-ONGARD WELL OPERATOR		
<input type="radio"/> 3002523945	N -1-17S-34E	460 FSL & 1980 FWL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524176	J -1-17S-34E	1780 FSL & 2000 FEL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524302	L -1-17S-34E	1980 FSL & 860 FWL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524341	P -1-17S-34E	660 FSL & 860 FEL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524487	F -1-17S-34E	2180 FNL & 1980 FWL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524631	B -1-17S-34E	800 FNL & 2120 FEL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002524645	H -1-17S-34E	1980 FNL & 860 FEL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002525059	D -1-17S-34E	860 FNL & 660 FWL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 001		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002525206	E -1-17S-34E	1980 FNL & 860 FWL
Well Name & Number: NORTH VACUUM ABO NORTH UNIT No. 002		
Operator: SHERIDAN PRODUCTION COMPANY, LLC		
<input type="radio"/> 3002527953	P -1-17S-34E	990 FSL & 990 FEL

X NO

## Well File Search - Select API Number to View

Please select the API Number you wish to view from the list below by clicking the radio button next to the API Number. Then click the "Continue" button to see the thumbnails for the API you selected. The search results are broken out by groups of 25 on each page. Switching pages can be done by clicking the "Next 25" or "Previous 25" links.

BW-4  
2012 AOR  
JP

8 Records Found

Displaying Screen 1 of 1

- | API Number  | ULSTR        | Footages            |
|---|--------------|---------------------|
| <input type="radio"/> 3002502814                          | L -6-17S-35E | 1650 FSL & 330 FWL  |
| <b>Well Name &amp; Number:</b> PRE-ONGARD WELL No. 001    |              |                     |
| <b>Operator:</b> PRE-ONGARD WELL OPERATOR                 |              |                     |
| <input type="radio"/> 3002525032                          | N -6-17S-35E | 660 FSL & 1980 FWL  |
| <b>Well Name &amp; Number:</b> STATE SECTION 6 No. 001    |              |                     |
| <b>Operator:</b> SOUTHWEST ROYALTIES INC                  |              |                     |
| <input type="radio"/> 3002525282                          | L -6-17S-35E | 1980 FSL & 660 FWL  |
| <b>Well Name &amp; Number:</b> STATE K 6119 COM No. 001   |              |                     |
| <b>Operator:</b> SOUTHWEST ROYALTIES INC                  |              |                     |
| <input type="radio"/> 3002535513                          | F -6-17S-35E | 1650 FNL & 1650 FWL |
| <b>Well Name &amp; Number:</b> KAGEBRUSH No. 001          |              |                     |
| <b>Operator:</b> SAGE ENERGY CO                           |              |                     |
| <input type="radio"/> 3002536166                          | E -6-17S-35E | 2286 FNL & 660 FWL  |
| <b>Well Name &amp; Number:</b> SAGEBRUSH No. 001          |              |                     |
| <b>Operator:</b> SHERIDAN PRODUCTION COMPANY, LLC         |              |                     |
| <input type="radio"/> 3002536358                          | J -6-17S-35E | 1980 FSL & 1780 FEL |
| <b>Well Name &amp; Number:</b> STATE SECTION 6 No. 002    |              |                     |
| <b>Operator:</b> SOUTHWEST ROYALTIES INC                  |              |                     |
| <input type="radio"/> 3002538000                          | F -6-17S-35E | 1650 FNL & 1650 FWL |
| <b>Well Name &amp; Number:</b> ENCORE 6 STATE COM No. 001 |              |                     |
| <b>Operator:</b> QUANTUM RESOURCES MANAGEMENT, LLC        |              |                     |
| <input type="radio"/> 3002538368                          | A -6-17S-35E | 1190 FNL & 790 FEL  |
| <b>Well Name &amp; Number:</b> ENCORE 6 STATE COM No. 002 |              |                     |
| <b>Operator:</b> QUANTUM RESOURCES MANAGEMENT, LLC        |              |                     |

8 Records Found

Displaying Screen 1 of 1

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RECEIVED

JUN 01 2010

HOBBSOCD

CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

WELL API NO.

30-025-25146

5. Indicate Type of Lease

STATE ☒ FEE ☐

6. State Oil &amp; Gas Lease No.

7. Lease Name or Unit Agreement Name

NORTH VACUUM ABO NORTH UNIT  
12-A

8. Well Number

1

9. OGRID Number

252496

10. Pool name or Wildcat

VACUUM; ABO NORTH

SUNDRY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A  
DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH  
PROPOSALS.)1. Type of Well: Oil Well ☒ Gas Well ☐ Other

2. Name of Operator

SHERIDAN PRODUCTION COMPANY, LLC

3. Address of Operator

9 GREENWAY PLAZA, SUITE 1300, HOUSTON, TX 77046

4. Well Location

Unit Letter P : 460 feet from the SOUTH line and 660 feet from the EAST line

Section 36 Township 16S Range 34E NMPM County LEA

11. Elevation (Show whether DR, RKB, RT, GR, etc.)

4037'GR

## 12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

## NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☒  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐

## SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☐OTHER: ☐OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Sheridan Production Company proposes to plug and abandon the NVANU 12A #1 API 30-025-25146. The 2-3/8" tubing has been cemented inside the 4-1/2" casing. The procedure includes the following:

1. ND Wellhead.
2. PU 1-1/4" workstring and tapered mill. Mill thru tight spot in 2-3/8" tubing from 1872'-1895'.
3. Set CIBP in tubing at 5700'. Test plug to 500 psi. Spot 5 sacks cement on top of plug.
4. Perf thru tubing, cement & casing at 2675'. Squeeze 10 sacks of cement.
5. Perf thru tubing, cement & casing at 1700'. Squeeze 15 sacks of cement.
6. Perf thru tubing and casing at 575' circulating cement to surface.
7. Cut wellhead & anchors. Install dry hole marker and remediate location.

Spud Date:

10/19/75

Rig Release Date:

11/13/75

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Joyce A. Williams TITLE OPERATIONS TECH DATE 05/25/10Type or print name JOYCE A WILLIAMS E-mail address: jwilliams@sheridanproduction.com PHONE: 713-548-1070

For State Use Only

APPROVED BY: [Signature] TITLE STAFF MGR DATE 6-1-10

Conditions of Approval (if any):

THE OIL CONSERVATION DIVISION MUST  
BE NOTIFIED 24 HOURS PRIOR TO THE  
BEGINNING OF PLUGGING OPERATIONS

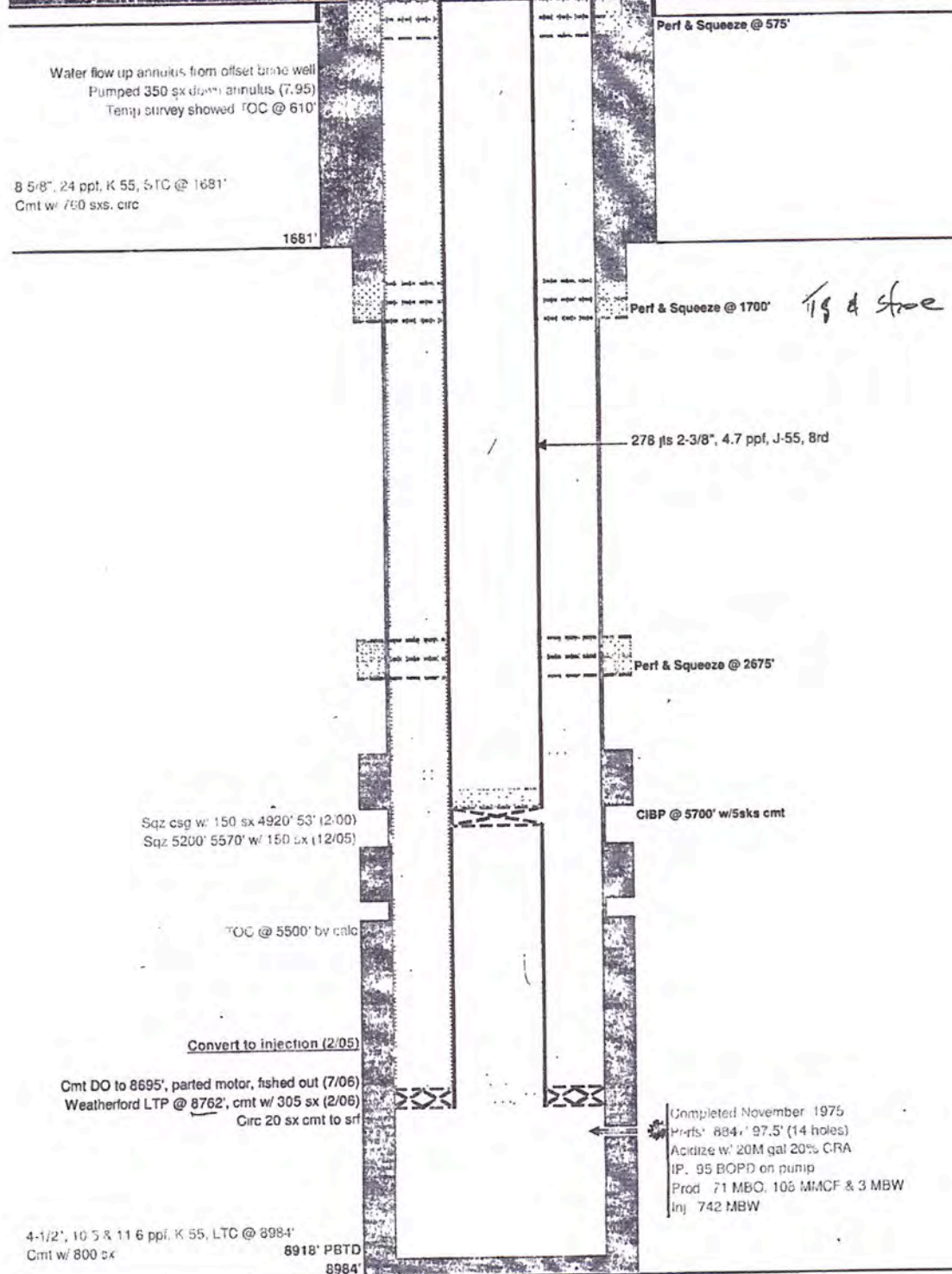


# SHERIDAN PRODUCTION PARTNERS

## PROPOSED WELLBORE SCHEMATIC

OPERATOR: Sheridan Production Partners	REV DATE: 9/12/2007	
WELL NAME: NVANU 12A-1	TD:	DRILL DATE:
FIELD / PROSPECT: NVANU CO: Lea	STATE: New Mexico	GL: 4037' KB: 4049'
SURFACE LOCATION:	BHL:	
COMPLETED ZONE(S):	PB ZONE(S):	
RECOMP ZONE(S):	TAG DEPTH:	RC TAG DATE:
TBG/TAC/RODS/PUMP:	MISC: 30-025-25146	
WELLBORE:	Original Completion	<input checked="" type="checkbox"/> Proposed Completion
		Current Completion

<b>DRILLING &amp; MECHANICAL</b>	<b>PRODUCTION</b>
(Casing, tubing, cement, fish, pkr)	(perf, stim, zone info)



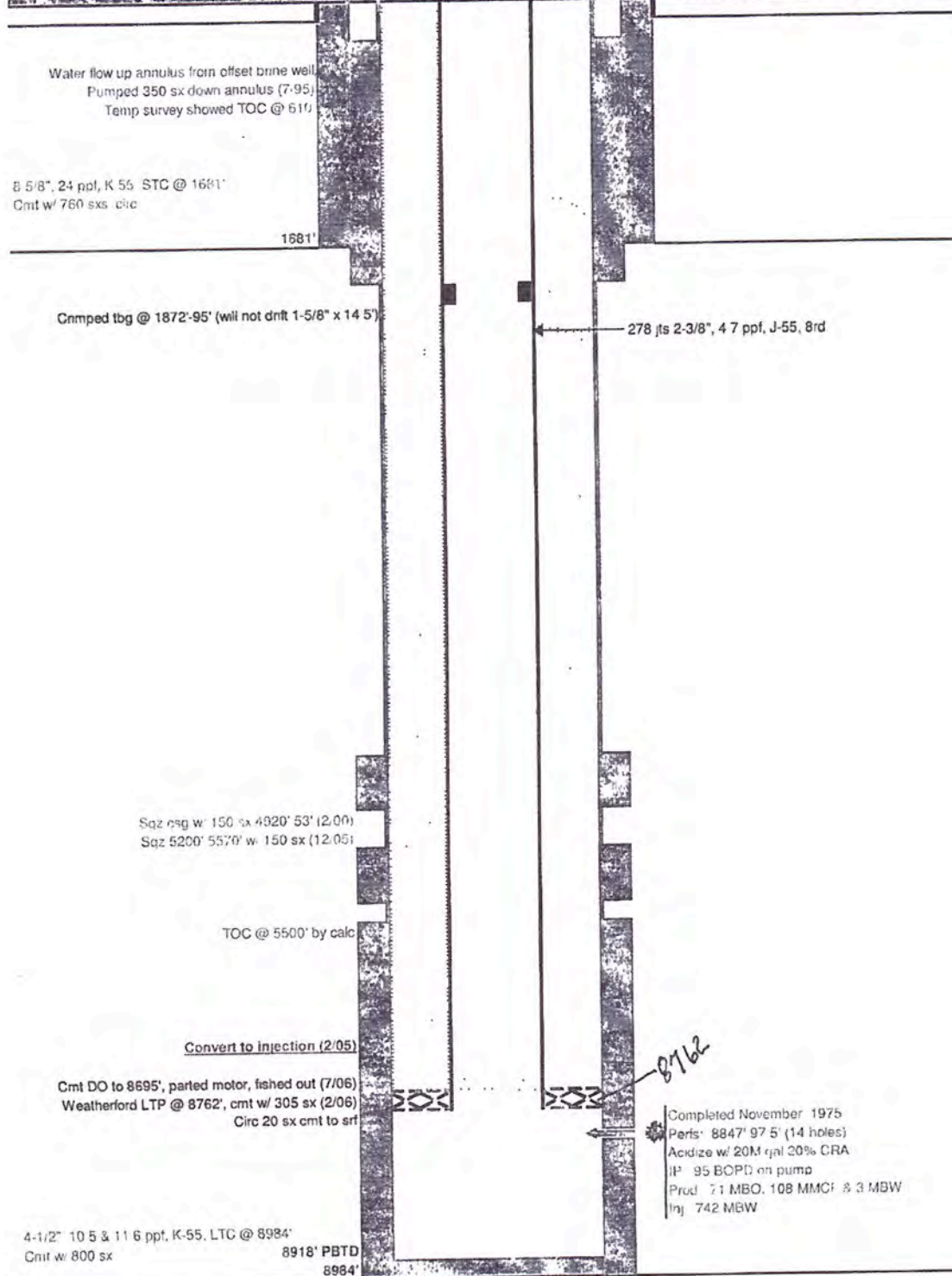


# SHERIDAN PRODUCTION PARTNERS

## WELLBORE SCHEMATIC

OPERATOR: Sheridan Production Partners		REV DATE: 9/12/2007
WELL NAME: NVANU 12A-1	TD:	DRILL DATE:
FIELD / PROSPECT: NVU CO Lea	STATE: New Mexico	GL: 4037' KB: 4049'
SURFACE LOCATION:	BHL:	
COMPLETED ZONE(S):	PB ZONE(S):	
RECOMP ZONE(S):	TAG DEPTH:	RC: TAG DATE:
TBG/TAC/RODS/PUMP:	MISC: 30-025-25146	
WELLBORE:	Original Completion	Proposed Completion
		<input checked="" type="checkbox"/> Current Completion

DRILLING & MECHANICAL	PRODUCTION
(Casing, tubing, cement, fish, pkr)	(perfs, stim, zone info)





Submit 3 Copies To Appropriate District Office  
District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Ave., Artesia, NM 88210  
District III  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
May 27, 2004

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

WELL API NO. <b>30-025-25146</b>
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. <b>S B-936</b>
7. Lease Name or Unit Agreement Name <b>NORTH VACUUM ABO</b> <b>NORTH UNIT '12A'</b>
8. Well Number <b>1</b>
9. OGRID Number <b>20054</b>
10. Pool name or Wildcat <b>NORTH VACUUM ABO</b>

Pit or Below-grade Tank Application ☐ or Closure ☐

Pit type \_\_\_\_\_ Depth to Groundwater \_\_\_\_\_ Distance from nearest fresh water well \_\_\_\_\_ Distance from nearest surface water \_\_\_\_\_

Pit Liner Thickness: \_\_\_\_\_ mft Below-Grade Tank: Volume \_\_\_\_\_ bbls; Construction Material \_\_\_\_\_

**SUNDRY NOTICES AND REPORTS ON WELLS**  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well: Oil Well ☐ Gas Well ☒ Other **WATER INJECTION**

2. Name of Operator **SAGE ENERGY COMPANY**

3. Address of Operator  
**P.O. Box 3068, Midland, TX, 79702**

4. Well Location  
Unit Letter **P** : **460** feet from the **SOUTH** line and **660** feet from the **EAST** line  
Section **36** Township **16-S** Range **34-E** NMPM County **LEA**

11. Elevation (Show whether DR, RKB, RT, GR etc.)  
**4,037'**

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

<b>NOTICE OF INTENTION TO:</b>		<b>SUBSEQUENT REPORT OF:</b>	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	P AND A <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	MULTIPLE COMPL <input type="checkbox"/>	CASING/CEMENT JOB <input type="checkbox"/>	
OTHER: <b>SLIM HOLE COMPLETION</b> <input type="checkbox"/>		OTHER: <input type="checkbox"/>	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

**PLEASE SEE ATTACHMENT.**



I hereby certify that the information above is true and complete to the best of my knowledge and belief. I further certify that any pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐ or an (attached) alternative OCD-approved plan ☐.

SIGNATURE George M. Harris Jr. TITLE DIST. ENG. DATE 1/26/04  
Type or print name GEORGE M. HARRIS JR E-mail address: gharris@sagemid.com Telephone No. 432 683-5271  
**For State Use Only** OC FIELD REPRESENTATIVE II/STAFF MANAGER  
APPROVED BY: Gary W. Wink TITLE \_\_\_\_\_ DATE FEB 01 2006



**Sage Energy Company  
Attachment To C-103  
NVANU 12A#1**

**Item #13:**

This well was drilled and completed with 4-1/2" casing in 1975. In 2000 a casing leak was located between 4920'-53' and successfully squeezed with 150 sacks of cement. In January, 2005 a leak was suspected between 5522'-57' however we were unable to pump into it. We came back to this well in September and shot squeeze holes at 5570' and were able to circulate through the squeeze holes and around to the casing tubing annulus. Further packer testing revealed bad pipe up the hole to about 5250'. We rigged back up on this well and squeezed it in December from 5200' down to 5584' with 150 sacks and obtained a good squeeze. Upon drilling the squeeze out, the well continued to leak off between 5422' to 5570'. Based on our past experience in this field we do not believe we can successfully squeeze this wellbore.

At this point, Sage would like to cement 2-7/8" tubing in the hole in order to convert this well to water injection service (previously approved under Administrative Order WFX-810, January 20, 2005). The injection interval is 8847' to 8898'. We would like to set a packer at 8775' on 2-7/8" tubing. The mandrel on this packer would be filled with cement so that once set, circulation would be established above the packer to the tubing/casing annulus. We would then pump approximately 125 sacks of 'Lite' cement followed by 150 sacks of Class 'C' cement. These volumes would place the Class 'C' cement top at about 4400' with the 'Lite' cement all the way to surface. The cement filled mandrel would then be drilled out and the well put into water injection service.

*Jan 26, 2006  
George M. Harris Jr.  
SAGE ENERGY Co.*



NO. OF COPIES RECEIVED	
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SANTA FE	
FILE	
U.S.G.S.	
LAND OFFICE	
OPERATOR	

Form C-105  
Revised 1-1-65

# NEW MEXICO OIL CONSERVATION COMMISSION WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease  
State ☒ Fee ☐  
5. State Oil & Gas Lease No.  
B-936

14. TYPE OF WELL  
OIL WELL ☒ GAS WELL ☐ DRY ☐ OTHER ☐  
5. TYPE OF COMPLETION  
NEW WELL ☒ WORK OVER ☐ DEEPEN ☐ PLUG BACK ☐ DIFF. RESV. ☐ OTHER ☐  
6. Name of Operator  
K. K. Amini  
7. Unit Agreement Name  
8. Farm or Lease Name  
Exxon "A" State  
9. Well No.  
1  
10. Field and Pool, or Wildcat  
North Vacuum Abo

4. Location of Well  
UNIT LETTER P LOCATED 460 FEET FROM THE South LINE AND 660 FEET FROM THE East LINE OF SEC. 36 TWP. 16S RGE. 34E  
12. County  
Lea

15. Date Spudded 10/19/75 16. Date T.D. Reached 11/13/75 17. Date Compl. (Ready to Prod.) 12/1/75 19. Elevations (DF, RKB, RT, GR, etc.) 4036.7 GL 19. Elev. Casinghead

20. Total Depth 8980' 21. Plug Back T.D. 22. If Multiple Compl., How Many 23. Intervals Drilled By Rotary Tools Cable Tools X

24. Producing Interval(s), of this completion -- Top, Bottom, Name 8847' - 8897.5' 25. Was Directional Survey Made No

26. Type Electric and Other Logs Run Sidewall Neutron Porosity Log 27. Was Well Cored No

28. CASING RECORD (Report all strings set in well)					
CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8 5/8"	24#	1680'	12 1/4"	760	-0-
4 1/2"	10.5# & 11.6#	8980'	7 7/8"	800	-0-

29. LINER RECORD				30. TUBING RECORD		
SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN	SIZE	DEPTH SET
					2 3/8"	8837

31. Perforation Record (Interval, size and number)  
17 shots Select Fire .46  
8847, 8848, 8849, 8850, 8851, 8852, 8877,  
8878, 8879, 8880, 8881, 8882, 8883, 8884,  
8885, 8896.5, 8897.5  
32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.  
DEPTH INTERVAL AMOUNT AND KIND MATERIAL USED  
8847 - 8897.5 20,000 gals. acid

33. PRODUCTION  
Date First Production 12/1/75 Production Method (Flowing, gas lift, pumping - Size and type pump) Pumping 2" x 1 1/4" x 18' RHBC Well Status (Prod. or Shut-in) Producing  
Date of Test 12/2/75 Hours Tested 24 Choke Size Prod'n. For Test Period 95 Oil - Bbl. 95 Gas - MCF 93 Water - Bbl. TSM Gas - Oil Ratio 975-1  
Flow Tubing Press. Casing Pressure 35 Calculated 24-Hour Rate 95 Gas - MCF 93 Water - Bbl. TSM Oil Gravity - API (Corr.) 36

34. Disposition of Gas (Sold, used for fuel, vented, etc.) Vented Test Witnessed By Joel Lawhorn

35. List of Attachments  
Sidewall Neutron Porosity Log

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED [Signature] TITLE Comptroller DATE 12/3/75



STATE	
FILE	
U.S.G.S.	
LAND OFFICE	
TRANSPORTER	OIL GAS
OPERATOR	
PRODUCTION OFFICE	

# REQUEST FOR ALLOWABLE AND AUTHORIZATION TO TRANSPORT OIL AND NATURAL GAS

Form OCS-1  
Supersedes OCS-101 and OCS-110  
Effective 1-1-65

Operator K. K. Amini	
Address P. O. Drawer 3068, Midland, Texas 79701	
Reason(s) for filing (Check proper box)	
New Well <input checked="" type="checkbox"/>	Change in Transporter of:
Recompletion <input type="checkbox"/>	Oil <input type="checkbox"/> Dry Gas <input type="checkbox"/>
Change in Ownership <input type="checkbox"/>	Coatinghead Gas <input type="checkbox"/> Condensate <input type="checkbox"/>

Other (Please explain)  
**CASINGHEAD GAS MUST NOT BE  
USED AFTER 2/1/76  
UNLESS AN EXCEPTION TO R-4070  
IS OBTAINED.**

If change of ownership give name  
and address of previous owner

THIS WELL HAS BEEN PLACED IN THE POOL  
DESIGNATED BELOW. IF YOU DO NOT CONCUR  
NOTIFY THIS OFFICE. **R-5162**

## I. DESCRIPTION OF WELL AND LEASE

Lease Name Exxon "A" State	Well No. 1	Pool Name, including Formation North Vacuum Abo	Kind of Lease State, Federal or Fee State	Lease No. B-936
Location				
Unit Letter: P	460	Feet From The South	Line and 660	Feet From The East
Line of Section 36	Township 16S	Range 34E	N.M.P.M.	Lea County

## II. DESIGNATION OF TRANSPORTER OF OIL AND NATURAL GAS

Name of Authorized Transporter of Oil <input checked="" type="checkbox"/> or Condensate <input type="checkbox"/>	Address (Give address to which approved copy of this form is to be sent) P. O. Box 3119, Midland, Texas 79701	
Name of Authorized Transporter of Casinghead Gas <input type="checkbox"/> or Dry Gas <input type="checkbox"/>	Address (Give address to which approved copy of this form is to be sent)	
If well produces oil or liquids, give location of tanks.	Unit P	Sec. 36
	Twp. 16S	Rge. 34E
Is gas actually connected?	No	When

If this production is commingled with that from any other lease or pool, give commingling order number:

## III. COMPLETION DATA

Designate Type of Completion - (X)	Oil Well <input checked="" type="checkbox"/>	Gas Well <input type="checkbox"/>	New Well <input checked="" type="checkbox"/>	Workover <input type="checkbox"/>	Deepen <input type="checkbox"/>	Plug Back <input type="checkbox"/>	Same Res'ty. <input type="checkbox"/>	Diff. Res'ty. <input type="checkbox"/>
Date Spudded 10/19/75	Date Compl. Ready to Prod. 12/1/75	Total Depth 8980'	P.B.T.D.					
Elevations (DF, RKB, RT, GR, etc.) 4036.7 GL	Name of Producing Formation Abo	Top Oil/Gas Pay 8847'	Tubing Depth 8837'					
Perforations 8847 - 8897.5'	Depth Casing Shoe							

## TUBING, CASING, AND CEMENTING RECORD

HOLE SIZE	CASING & TUBING SIZE	DEPTH SET	SACKS CEMENT
12 1/4"	8 5/8"	1680'	760
7 7/8"	4 1/2"	8980'	800
	2 3/8"	8837'	-0-

## IV. TEST DATA AND REQUEST FOR ALLOWABLE OIL WELL

(Test must be after recovery of total volume of load oil and must be equal to or exceed top allowable for this depth or be for full 24 hours)


Date First New Oil Run To Tanks 12/1/75	Date of Test 12/2/75	Producing Method (Flow, pump, gas lift, etc.) Pumping	
Length of Test 24 hours	Tubing Pressure	Casing Pressure 35	Choke Size
Actual Prod. During Test 95	Oil-Bbls. 95	Water-Bbls. TSM	Gas-MCF 93

## GAS WELL

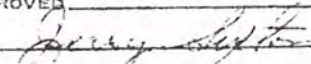
Actual Prod. Test-MCF/D	Length of Test	Bbls. Condensate/MMCF	Gravity of Condensate
Testing Method (pilot, back pr.)	Tubing Pressure (Shut-in)	Casing Pressure (Shut-in)	Choke Size

## V. CERTIFICATE OF COMPLIANCE

I hereby certify that the rules and regulations of the Oil Conservation Commission have been complied with and that the information given above is true and complete to the best of my knowledge and belief.

  
(Signature)  
Comptroller  
12/3/75  
(Date)

## OIL CONSERVATION COMMISSION

APPROVED \_\_\_\_\_, 19\_\_\_\_  
BY   
TITLE \_\_\_\_\_

This form is to be filed in compliance with RULE 1104.  
If this is a request for allowable for a newly drilled or deepened well, this form must be accompanied by a tabulation of the deviation tests taken on the well in accordance with RULE 111.  
All portions of this form must be filled out and filed in accordance with new and recompleted wells.  
Fill out only Sections I, II, III, and VI for changes of owner, well name or number, or transporter or other such change of condition.



## INSTRUCTIONS

This form is to be filed with the appropriate District Office of the Commission not later than 30 days after the completion of any newly-drilled or deepened well. It shall be accompanied by one copy of all electrical and radio-activity logs run on the well and a summary of all special tests conducted, including drill stem tests. All depths reported shall be measured depths. In the case of directionally drilled wells, true vertical depths shall also be reported. For multiple completions, Items 30 through 34 shall be reported for each zone. The form is to be filed in quintuplicate except on state land, where six copies are required. See Rule 1105.

INDICATE FORMATION TOPS IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE

### Southeastern New Mexico

## Northwestern New Mexico

T. Anhy _____	T. Canyon _____	T. Ojo Alamo _____	T. Penn. "B" _____
T. Salt _____	T. Strawn _____	T. Kirtland-Fruitland _____	T. Penn. "C" _____
B. Salt _____	T. Atoka _____	T. Pictured Cliffs _____	T. Penn. "D" _____
T. Yates _____	T. Miss _____	T. Cliff House _____	T. Leadville _____
T. 7 Rivers _____	T. Devonian _____	T. Menefee _____	T. Madison _____
T. Queen _____	T. Silurian _____	T. Point Lookout _____	T. Elbert _____
T. Grayburg _____	T. Montoya _____	T. Mancos _____	T. McCracken _____
T. San Andres _____	T. Simpson _____	T. Gallup _____	T. Ignacio Qtzite _____
T. Glorieta _____	T. McKee _____	Base Greenhorn _____	T. Granite _____
T. Paddock _____	T. Ellenburger _____	T. Dakota _____	T. _____
T. Blinebry _____	T. Gr. Wash _____	T. Morrison _____	T. _____
T. Tubb _____	T. Granite _____	T. Todilto _____	T. _____
T. Drinkard _____	T. Delaware Sand _____	T. Entrada _____	T. _____
T. Abo _____	T. Bone Springs _____	T. Wingate _____	T. _____
T. Wolfcamp _____	T. _____	T. Chinle _____	T. _____
T. Penn. _____	T. _____	T. Permian _____	T. _____
T. Cisco (Bough C) _____	T. _____	T. Penn. "A" _____	T. _____

FORMATION RECORD (Attach additional sheets if necessary)

From	To	Thickness in Feet	Formation	From	To	Thickness in Feet	Formation
8847	8897.5	17	Abo				

DEVIATION REPORT

Exxon "A" State No. 1  
Section 36, T16S, R34E,  
Lea County, New Mexico

<u>DEPTH</u>	<u>DEVIATION</u>
530'	1/4°
975'	3/4°
1458'	1°
2075'	3/4°
2578'	1 1/4°
2890'	1 1/2°
3142'	1°
3488'	3/4°
3679'	3/4°
4140'	1°
4703'	3/4°
5225'	1°
5731'	1°
6240'	3/4°
6711'	1°
7212'	1°
7716'	3/4°
8183'	1 1/2°
8520'	1°

K. K. AMINI



By. W. Glenn Burton  
Comptroller

STATE OF TEXAS    X  
COUNTY OF MIDLAND X

The foregoing instrument was acknowledged before me this 3rd day of  
December, 1975, by W. Glenn Burton on behalf of  
K. K. Amini.

My Commission Expires  
September 10, 1977

Pauline Stover  
Notary Public in and for  
Midland County, Texas



*Staples*  
DISTRICT I  
P.O. Box 1980, Hobbs, NM 88240  
DISTRICT II  
P.O. Drawer DD, Artesia, NM 88210  
DISTRICT III  
1000 Rio Brazos Rd., Aztec, NM 87410

**OIL CONSERVATION DIVISION**  
2040 Pacheco St.  
Santa Fe, NM 87505

WELL API NO.

30-025-35678

5. Indicate Type of Lease

STATE ☒

FEE ☐

6. State Oil & Gas Lease No.

28798

7. Lease Name or Unit Agreement Name

STATE VII

8. Well No.

7

9. Pool name or Wildcat

Vacuum - Atoka, Morrow North

**SUNDRY NOTICES AND REPORTS ON WELLS**

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well:

OIL WELL ☐

GAS WELL ☒

OTHER

2. Name of Operator

Ricks Exploration, Inc.

3. Address of Operator

210 Park Ave., Suite 3000

4. Well Location

Unit Letter A : 660' Feet From The North Line and 660' Feet From The East Line  
Section 1 Township 17S Range 34E NMPM Lea County

10. Elevation (Show whether DF, RKB, RT, CR, etc.)

GL: 4033'

11. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

**NOTICE OF INTENTION TO:**

PERFORM REMEDIAL WORK ☐

PLUG AND ABANDON ☐

TEMPORARILY ABANDON ☐

CHANGE PLANS ☐

PULL OR ALTER CASING ☐

OTHER: Add perforations ☐

**SUBSEQUENT REPORT OF:**

REMEDIAL WORK ☐

ALTERING CASING ☐

COMMENCE DRILLING OPNS. ☐

PLUG AND ABANDONMENT ☐

CASING TEST AND CEMENT JOB ☐

OTHER: ☐

12. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

RU S/L Unit. Run in hole w/GR and tag TOF to verify W/L fish is still @12070' in the 2-3/8" tbg string. Set collar stop and W/L plug @12000'. RU W/L and perforate 4 holes in 2-3/8" tbg., 1 jt above W/L plug @12000'. Swab FL to 4000'. Release Retrievable Packer & TOH w/2-3/8" production string. RU W/L, tag Profile Nipple in 2-3/8" tailpipe below permanent Packer @12446', set W/L plug just above Nipple. TIH w/Model R Retrievable Packer on 2-3/8" tbg to 12298', & circ. Set Packer and pressure test plug in permanent Packer. Release Packer, spot acid from 12298-9200'. TOH w/tbg & Packer. RU W/L and perforate interval from 12280-12298', w/3-1/8" csg guns, 4 SPF, 90 deg phasing. TIH w/X-Nipple (PX plug in place), 10' Sub, AS1X Retrievable Packer, set @12200'+/-. Acidize, swab, & test. Evaluate ~~results~~ and frac if necessary. Return well to production. Procedure to be completed in September, 2002, or as soon as possible.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE

*Lynne Suchy*

TITLE

Drilling Asstnt

DATE

8/21/02

TYPE OR PRINT NAME

Lynne Suchy

TELEPHONE NO.

405/516-110

(This space for State Use)

APPROVED BY

TITLE

DATE

AUG 26 2002

CONDITIONS OF APPROVAL, IF ANY:

ORIGINAL SIGNED BY  
GARY W. WINK

QC FIELD REPRESENTATIVE/STAFF



Submit 3 Copies To Appropriate District  
Office  
District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Ave., Artesia, NM 88210  
District III  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM  
87505

State of New Mexico  
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-103  
Revised March 25, 1999

WELL API NO. 30-025-35678
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name:  State <u>VII</u>
8. Well No. <u>7</u>
9. Pool name or Wildcat Vacuum-Atoka, Morrow North

SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input checked="" type="checkbox"/> Other	
2. Name of Operator Ricks Exploration, Inc	
3. Address of Operator 210 Park Ave, STE 3000 Oklahoma City, OK 73102	
4. Well Location  Unit Letter <u>A</u> : <u>660</u> feet from the <u>North</u> line and <u>660</u> feet from the <u>East</u> line  Section <u>1</u> Township <u>17S</u> Range <u>34E</u> NMPM Lea County	
10. Elevation (Show whether DR, RKB, RT, GR, etc.) 4033' GR	

11. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data	
NOTICE OF INTENTION TO:	SUBSEQUENT REPORT OF:
PERFORM REMEDIAL WORK <input checked="" type="checkbox"/> PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/> ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/> CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/> PLUG AND ABANDONMENT <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/> MULTIPLE COMPLETION <input type="checkbox"/>	CASING TEST AND CEMENT JOB <input type="checkbox"/>
OTHER: <input type="checkbox"/>	OTHER: <input type="checkbox"/>

12. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompilation.

1. RU BJ Services. RU to accept returns via 11 1/4" X 8 5/8" annulus. Establish circulation dn 4 1/2" X 8 5/8" annulus. Pump Cl C cement (14.8 ppg Yield 1.34 ft3/sx) until cement is circulated to surface (Estimated 300 sx). RD BJ.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Bryan Rother TITLE Engineer DATE 11/12/01  
Type or print name Bryan Rother Telephone No. 405/516/1100  
(This space for State use)

APPROVED BY \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_  
Conditions of approval, if any:



# RICKS EXPLORATION INC.

## State VII #1

Sec. 1-17S-34E

Lea Co., NM

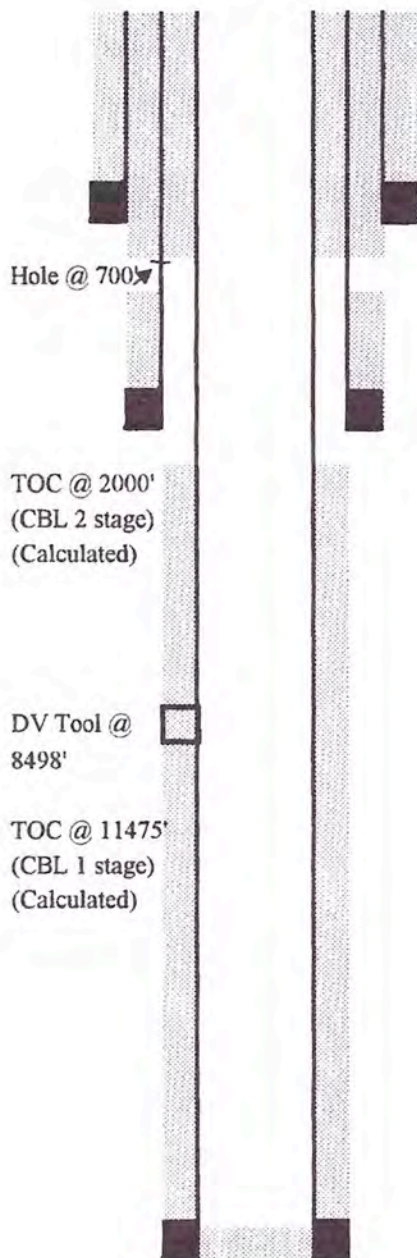
Spud Date: 9/02/01

Proposed 8 5/8" casing repair

GL: 4033'

DF: 4052'

KB: 4053'



### SURFACE CASING:

11-3/4" 42# H40 set @ 1610'

CMT w/ 790 sxs to surf

### INTERMEDIATE CASING:

8-5/8" 32# K-55 set @ 5020'

CMT w/ 1190 sxs. Did not circ to surf.

TOC @ 1740' (Temp Survey)

Hole indicated in 8 5/8" @ 700'

Pump CI C neat cmt dn 4 1/2" X 8 5/8" annulus until cmt returns to sfc  
Est 300 sx

### ATOKA PERFORATIONS

11528' - 11553' 4/SPF (1/93)

Loc set Pkr @ 11682' w/ on/off tool & plug set in R nipple @ 11750'  
(4" TCP gun in hole)

11902' - 11914' 4/SPF (2/83)

### PRODUCTION CASING:

4-1/2" 11.6# P110 LT&C @ 12732'

Cement w/ 1380 sx

PBTD: 12722'

TD: 12750'

BJR 11/12/01

15 10 17 12 12 52  
11/12/01  
HARRIS  
UCD



District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
811 South First, Artesia, NM 88210  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico  
Energy Minerals and Natural Resources

Oil Conservation Division  
2040 South Pacheco  
Santa Fe, NM 87505

Form C-101  
Revised March 17, 1999

Submit to appropriate District Office  
State Lease - 6 Copies  
Fee Lease - 5 Copies

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

Operator Name and Address RICKS EXPLORATION, INC. 210 PARK AVE OKLAHOMA CITY, OKLAHOMA 73102		LYNN SUCHY 405-516-1130	OGRID Number 168489
Property Code 28798		STATE VII	API Number 30-025-35678
		Well No. 7	

Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A/1	1	17S	34E		660'	NORTH	660'	EAST	LEA

Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
VACUUM-ATOKA, MORROW NORTH (86800)					Proposed Pool 2				

Work Type Code N	Well Type Code G	Cable/Rotary ROTARY	Lease Type Code 5	Ground Level Elevation 4033'
Multiple NO	Proposed Depth 13,000'	Formation Atoka - Morrow	Contractor PATTERSON	Spud Date WHEN APPROVED

Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
25"	20"	Conductor	40'	Redi-mix	surface
14 3/4"	11 3/4"	42	1600'	780 Sx	surface
12 1/4"	8 5/8"	24	5000'	1190 Sx.	1100' FS
7 7/8"	5 1/2"	17	13,000'	670	7500' FS

Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone.

Describe the blowout prevention program, if any. Use additional sheets if necessary.

1. Drill 25" hole to 40'. Set 40' of 20" conductor and cement to surface with Redi-mix.
2. Drill 14 3/4" hole to 1600'. Run and set 1600' of 11 3/4" J-55 42# ST&C casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1/4# Flocele/Sx. circulate cement to surface.
3. Drill 12 1/4" hole to 5000'. Run and set 5000' of 8 5/8" 24&32# J-55 ST&C casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1/4# Flocele/Sx. estimate top of cement 1100'.
4. Drill 7 7/8" hole to 13,000'. Run and set 13,000' of 5 1/2" 17# N-80 LT&C casing. Cement with 670 Sx. of Class "H" Premium Plus cement + additives. Top of cement at least 500' above upper most Perforation.

Permit Expires 1 Year From Approval  
Date Unless Drilling Underway

I hereby certify that the information given above is true and complete to the best of my knowledge and belief. Signature: <i>Joe T. Janice</i> Printed name: Joe T. Janice Title: Agent Date: 08/28/01		OIL CONSERVATION DIVISION Approved by: <i>[Signature]</i> Title: <i>AUG</i> Approval Date: <i>2001</i> Expiration Date: Conditions of Approval:	
--	--	--	--

J  
C  
A

B  
MP

**Wasserhund Inc.**

P.O. Box 2140

575-396-0522

FAX 575-396-0797

Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2012**

Wasserhund Inc.

Buckeye Brine Station

OCD Permit BW-04

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

March 31, 2013

## Section 1- Summary of Operations:

(Permit Condition 21.L.2. "Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Include copy of C-103 if appropriate.")

During the 2012 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in **Appendix A**).*

Inspections revealed that the loading area concrete sump was not tested in 2012. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 30, 2013.

September 05, 2012 the OCD held a Brine Well Operator's meeting in Hobbs, NM to discuss up-coming permit changes. The most notable change from Wasserhund Inc., standpoint was the removing of the annual "open-to-formation" pressure test requirement. Wasserhund Inc., as most operators, did not run an MIT in 2012.

Wasserhund Inc., has installed approved best management practices at the facility pursuant to the permit conditions. This consisted of three new brine storage tanks installed on a 60 mil liner complete with berms. *(**Appendix "A"** contains a new aerial view that shows site significant features, the new tank locations, and photos.)* The plat shows an annotated up-dated calculated cavern radius. These calculations are discussed in more detail in section 8 below.

The brine well was drilled in 1980 and has been in operation for approximately 33 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Section 8 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

The last Casing MIT hydrostatic test was successfully performed in October of 2008. Since the OCD generally requires a MIT at least once every five years, this well is due to be tested in 2013. (Copy of last Casing MIT included in **Appendix B.**)

Due to the issues mentioned, Wasserhund Inc., respectfully **request a waiver** on having to pull the tubing for the next MIT/Braden head casing test since re-entry will virtually be impossible. Instead, we would like to purpose using a Nitrogen “Leak Off” Test, which may be considerably more accurate than the OCD standard MIT hydro-test.

On October 13, 2011, the brine well operations were transferred from the Gandy Corporation to Wasserhund Inc. In addition, a brine well renewal application was submitted to OCD with filing fee in June of 2011. **Appendix B** contains the change of operator, renewal application and 2008 MIT test chart.

A Pro-active well “Area of Review” has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Section 8 below.

While this is an older well, it still has not reached its productive end of life and is deemed very safe and an extremely valuable asset for the oil and gas industry.

## **Section 2- Production Volumes:**

*(Permit condition 21.L.3. “Production volumes as required from 21.G. including a running total to be carried over to each year. The maximum and average injection pressure.”)*

(21.G. Requires “The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.”)

Sales tickets and flow meters are used to monitor both water injected and brine produced.

### **Monthly, Yearly and Lifetime Injection and Production Volumes:**

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2012 brine production volume was 730,041 bbls and the lifetime production volume is 7,519,299 bbls.

Enclosed in **Appendix C** is the injection and production and a comparison chart of injected water to produced water with comments.

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the permit maximum pressure of 375 psig.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

**Section 3- Chemical Analysis:**

(Permit condition 21.L.4. "A copy of the chemical analysis as required in 21H. "Analysis of injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.")

Please find attached in **Appendix D** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected November 29, 2012 and analyzed by Trace Analysis, Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and report for general chemistry i.e. major cations and anions, WQCC metals and cyanide.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with minor constituents of calcium, magnesium, and potassium combined with sulfate and bi-carbonate. This analysis is very representative of Salado "Salt" formation waters found in the area.

The specific gravity of the brine water was 1.15 on the day of testing, which equates to 9.60 lb/gal. This is slightly lower than the usual 10 lb/gal normally produced but very acceptable. This lower density is most likely attributed to the current demand for brine in the area, which has decreased the cavity residence time, thus producing lower density brines.

#### **Section 4- Mechanical Integrity:**

(Permit condition 21.L.5. "A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.")

The BW-04 discharge permit condition 21.E set forth the criteria for running MIT's for this well. This condition also includes a schedule for which type of test is required to be run during various years of the permit. As mentioned above, there was no test performed in the year 2012 and according to the permit conditions, a casing MIT or approved alternate will be performed in 2013.

#### **Section 5- Deviations from Normal Production Methods:**

(Permit condition 21.L.6. "Brief explanation describing deviations from normal production methods.")

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc has attempted to change the flow pattern and as of date, 10# brine cannot be made with conventional-flow. Wasserhund inc., will continue to investigate the reason for this problem.

#### **Section 6- Leak and Spill Reports:**

(Permit condition 21.L.7. "A copy of any leaks and spill reports.")

There were no reportable leaks and spills in 2012.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.



## **Section 7- Groundwater Monitoring:**

(Permit condition 21.L.8. "If applicable, results of any groundwater monitoring.")

The BW-04 facility does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

## **Section 8- Brine Cavity/Subsidence Information:**

(Permit condition 21.L.9. Information required from cavity/subsidence 21.F. "The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment.")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "upright cone". The volume of the cavern is calculated using the lifetime brine production volumes and using a "rule of thumb" conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix F**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 7.52 million barrels of brine produced as of December 2012. The maximum diameter was calculated to be approximately 282 feet with a corresponding D/H ratio of .134 updated for the 2012 year.

Comparing the current D/H ratio of .134 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix F** is an aerial view showing the 141-foot radius superimposed around the brine well and station. The radius has increased by 7 feet from last year.

### **Section 9- Area of Review Update Summary:**

(Permit condition 21.L.10. "An Area of Review (AOR) Summary.")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc., used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix G**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since any future brine well will certainly be limited in size, a critical AOR of 660 feet was initially established and all wells within that radius will be researched in greater detail.

Using the current estimated diameter of the brine well i.e. 282 feet (R = 141 ft) up-dated for 2012, and added a 10:1 safety factor which equates to about 1410 ft. As the brine well grows, the critical AOR will be expanded and new wells will be added or existing wells restudied.

The rationale of this approach is the fact that brine wells are non-static in terms of size and configuration and the fact that Wasserhund Inc has no direct control on wells drilled in close proximity. By just initially focusing on the current wells in the ¼ mile AOR and assuming the status of these wells will remain the same, could be a mistake. Therefore, Wasserhund Inc is taking a more dynamic approach and will re-study wells as the brine well grows, especially wells located in a critical zone.

In the 2012 review, there was one well added to the list, which was the BTA Oil Producers, API # 30-025-31621 located in UL L-Section 31-Ts 16s-R35e. **Appendix G** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

In 2012, there are three wells located within these adjacent units. These wells are within the ¼ miles radius of the brine well and are in the 1410-foot, critical zone. The critical zone was investigated by checking the OCD on-line well records.

The three wells located in the new critical zone i.e. within 1410 feet, were reinvestigated by checking the OCD on-line well records. **Appendix G** contains the last recorded file records for the three wells located in the critical AOR. They are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621.

The Findings are as follows:

**API # 30-025-25146:** The Sheridan NVANU 12-A well #1, according to OCD records (**See Appendix G**), is located 460 FSL & 660 FEL of UL P Section 36-Ts16s-R34e. It is shown to be located approximately 700 ft to the WSW of the BW-04 well. This well was drilled in 1975 with surface casing set at 1680 ft and cemented with 760 sacks. A 4-1/2 inch production casing was set at 8980 feet and cemented with 800 sacks.

According to well records in 2011 there appeared to be no cement behind the 4-1/2 casing from 1681 feet to 5500 feet, leaving the salt section exposed to the 4-1/2 casing.

In 2000, a number of casing leaks were noted to be between 4920 feet to 5570 feet. In 2007, a Sheridan well bore schematic noted a water flow up annulus from off-set brine well.

Wasserhund Inc., Price LLC, and OCD reviewed this scenario, and there was no indication that this water was from the brine well. This area is known for being pressured up and the flow was most likely produced water, not brine water. In addition, the brine well as never lost integrity, discounting the Sheridan report.

In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well has been properly plugged and abandoned in September of 2012, and was approved by OCD. **Appendix G contains the latest OCD P&A reports for this well.**

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records (**attached in Appendix G**), is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

This well was drilled in 2001 with surface casing set at 1610 feet bgl and cemented with 790 sacks circulated to surface. Intermediate casing was set at 5020 feet and cemented

with 1190 sacks with top of cement @ 1740 feet (temp survey). A long string was ran and set at 12,732 feet and cemented with 1380 sacks with top of cement at approximately 2000 feet. From this analysis, it appears that maybe some of casing is exposed to the salt section without adequate cement.

Conclusions: It is unclear from the reports filed with OCD how the well was actually completed. The description above was taken from C-103's "Notice of Intent", but no final approved C-103 Subsequent report was found. This well was transferred to Chevron USA in 2012 and no issues have been reported to Wasserhund Inc.

Corrective actions: Wasserhund Inc. will check with the OCD to determine if the well has been properly completed and approved. Any corrective actions should be between OCD and Chevron.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. A copy of the completion report C-105 is included in Appendix G for reference.

Corrective Actions: No Corrective actions required.

#### **Section 10- Certification (Permit Condition 22.L.11)**

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



---

Larry Gandy  
Principal- Wasserhund Inc.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos
- Discharge Plan BW- **04**

Water Well

New Tanks

BW-04

R=141 ft

Out of Service  
Brine Pit

HWY 8

Wasserhund Inc. BW-04  
Buckeye Brine Station  
March 25, 2013





BW-04 New Brine Water Tanks on 60 Mil Liner with Berms. Looking South between existing tanks on left, and new tanks on right.



Same as above, looking North.





# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**

Governor

**Joanna Prukop**

Cabinet Secretary

**Mark E. Fesmire, P.E.**

Director

Oil Conservation Division

January 24, 2008

Mr. Larry Gandy  
Gandy Corporation  
P.O. Box 827  
Tatum, New Mexico 88267

Re: Discharge Permit Wasserhund Eidson State Well No. 1 Brine Well (BW-004) Renewal

Dear Mr. Gandy:

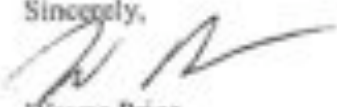
Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the Wasserhund Eidson (*Owner/Operator*) brine well BW 004 (API# 30-025-26883) located in the SW/4, SW/4 of Section 31, Township 16 South, and Range 35 East, NMPM, Lea County, New Mexico, under the conditions specified in the enclosed **Attachment To The Discharge Permit**.

Enclosed are two copies of the conditions of approval. Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail [carlj.chavez@state.nm.us](mailto:carlj.chavez@state.nm.us). On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

  
Wayne Price  
Environmental Bureau Chief

LWP/cc  
Attachments-1  
cc: OCD District Office

RECEIVED  
2008 JAN 12 PM 12 44



**ATTACHMENT TO THE DISCHARGE PERMIT  
Wasserhund Eldson Brine Well (BW-004)  
DISCHARGE PERMIT APPROVAL CONDITIONS**

January 24, 2008

**Please remit a check for \$1700.00 made payable to Water Quality Management Fund:**

**Water Quality Management Fund  
C/o Oil Conservation Division  
1220 S. Saint Francis Drive  
Santa Fe, New Mexico 87505**

- 1. Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of \$100.00, plus a renewal flat fee (see WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required \$100.00 filing fee. However, the owner/operator still owes the required \$1700.00 permit fee for a Class III Brine Well.
- 2. Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on June 11, 2011** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. *Expired permits are a violation of the Water Quality Act [Chapter 74, Article 6, NMSA1978] and civil penalties may be assessed accordingly.*
- 3. Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.
- 4. Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its August 2, 2006 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.
- 5. Modifications:** WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify

the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

**6. Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

**A. OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

**B. Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

**7. Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

**8. Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

**9. Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

**10. Labeling:** The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

**11. Below-Grade Tanks/Sumps and Pits/Ponds.**

**A.** All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

**B.** All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

**C.** The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

**D.** The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**12. Underground Process/Wastewater Lines:**

**A.** The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for



atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

**B.** The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

**13. Class V Wells:** The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

**14. Housekeeping:** The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

**15. Spill Reporting:** The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

**16. OCD Inspections:** The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

**17. Storm Water:** The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

**18. Unauthorized Discharges:** The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in

20.6.2.3[01 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein. ~~An~~  
unauthorized discharge is a violation of this permit.

19. **Vadose Zone and Water Pollution:** The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. **Additional Site Specific Conditions:** N/A

21. **Brine Well(s) Identification, Operation, Monitoring, Bonding and Reporting.**

A. Well Identification: API # 30-025-26883

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Fresh water will be injected down the casing and brine shall be recovered up the tubing. Reverse flow will be allowed only once a month for up to 24 hours for clean out. Operators may request long term reverse operation if they can demonstrate that additional casing and monitoring systems are installed and approved by OCD. Operating in the reverse mode for more than 24 hours unless approved otherwise is a violation of this permit.

D. Well Pressure Limits: ~~The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed 375 psig unless otherwise approved by the OCD.~~ The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failures. Systems requiring test pressures less than 300 psig must be approved by OCD prior to testing. At least once every five years and during well work-overs the salt cavern formation will be isolated from the casing/tubing annulus and the casing

pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

**Testing Schedule:**

2007- 30 minute @ 300 psig casing test only (set packer to isolate formation)  
2008- 4 hour @ 300 psig casing open to formation test  
2009- 4 hour @ 300 psig casing open to formation test  
2010- 4 hour @ 300 psig casing open to formation test  
2011- 4 hour @ 300 psig casing open to formation test

- F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

**Any subsidence must be reported within 24 hours of discovery.**

- G. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.
- H. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.
- I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from the brine well.
- J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.
- K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond in the amount of \$50,000.00 to restore the site, plug and abandon



the well by January 1, 2008, pursuant to OCD rules and regulations. If warranted, OCD may require additional financial assurance.

**L. Annual Report:** All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Brine Well Report, name of operator, BW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

**22. Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

**23. Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

**24. Certification:** Gandy Corporation (Owner/Operator), by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. Owner/Operator further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Mr. Larry Gandy  
Eldon State Well No. 1 (BW-004)  
January 24, 2008  
Page 9 of 9

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

Gandy Corporation  
Company Name-print name above

Larry Gandy  
Company Representative- print name

Larry Gandy  
Company Representative- signature

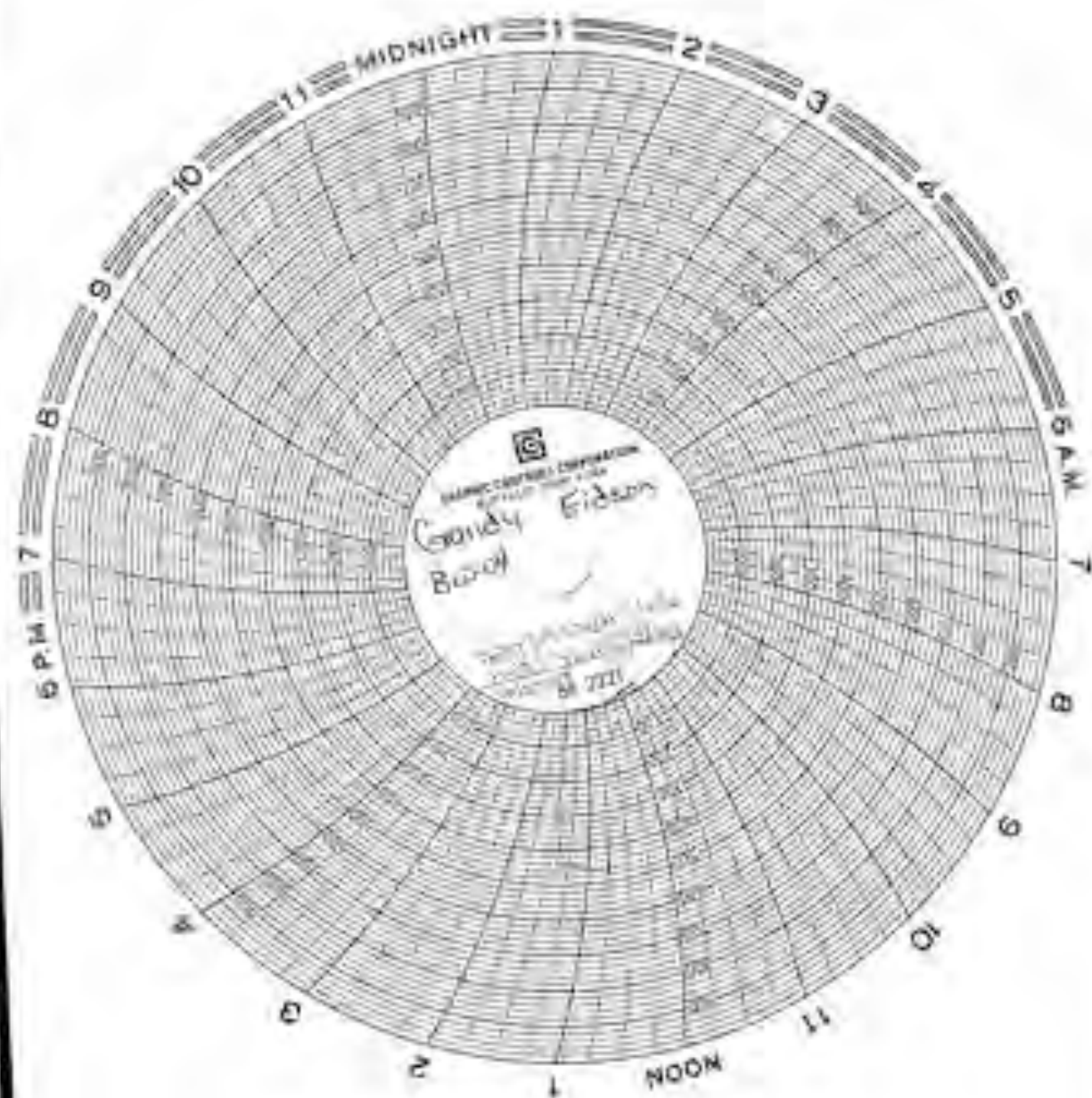
Title Sec/Treas

Date: 2-18-08



## Appendix “B”

- 2008 MIT Chart
- Change of Operator
- Permit Renewal Application





District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Avenue, Artesia, NM 88210  
District III  
1000 Rio Grande Road, Artesia, NM 88210  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources Department  
Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Revised June 10, 2011  
Submit Original  
Plus 1 Copy  
to Santa Fe  
1 Copy to Appropriate  
District Office

## DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITIES

(Refer to the OCD Guidelines for assistance in completing the application)

☐ New ☒ XX Renewal

- I. Facility Name: Eidson Brine Station-BW-04  
II. Operator: Gandy Corporation  
Address: P.O. Box 827 Tatum, NM 88267  
Contact Person: Larry Gandy Phone: 505-398-4940

### Request, Commitments and Attachments:

Pursuant to WQCC 20.6.2.5003.A NMAC "Existing Facilities" and per WQCC 20.6.2.5003.B, Gandy Corporation is requesting that the previously submitted information be referenced for this permit renewal application and Gandy Corporation hereby commits to continue and operate pursuant to the existing permit on-file with OCD until renewed by OCD. Required \$100.00 filing fee is attached hereto.

- III. Location: SW/4 SW/4 Section 31 Township 16S Range 35E  
Submit large scale topographic map showing exact location.- **ON File with OCD**  
IV. Attach the name and address of the landowner of the facility site.-**ON File with OCD**  
V. Attach a description of the types and quantities of fluids at the facility.-**ON File with OCD**  
VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.-**ON File with OCD**  
VII. Attach a description of underground facilities (i.e. brine extraction well).-**ON File with OCD**  
VIII. Attach a contingency plan for reporting and clean-up of spills or releases.-**ON File with OCD**  
IX. Attach geological/hydrological evidence demonstrating that brine extraction operations will not adversely impact fresh water.-**ON File with OCD**  
X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.-**ON File with OCD**  
XI. CERTIFICATION:

*I hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.*

Name: Wayne Price-Price LLC

Title: Agent for Gandy Corporation

Signature: 

Date: June 09, 2011

E-mail Address: wayneprice77@earthlink.net

## Appendix “C”

- Injection and Production Volumes/Comparison Charts
- Monthly/Quarterly Data Sheets



## Appendix “D”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: December 21, 2012

Work Order: 12120307



Project Location: Buckeye, NM  
Project Name: Wasserhund

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
315453	Brine	water	2012-11-29	09:45	2012-12-01
315454	Fresh	water	2012-11-29	09:45	2012-12-01

### Sample: 315453 - Brine

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.005
Total Aluminum		<0.0500	mg/L	0.05
Hydroxide Alkalinity		<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		<b>102</b>	mg/L as CaCo3	20
Total Alkalinity		<b>102</b>	mg/L as CaCo3	20
Total Arsenic		<0.0100	mg/L	0.01
Total Boron		<b>3.23</b>	mg/L	0.01
Total Barium		<b>0.0580</b>	mg/L	0.01
Total Beryllium		<0.00500	mg/L	0.005
Dissolved Calcium		<b>1190</b>	mg/L	1
Dissolved Potassium		<b>1640</b>	mg/L	1
Dissolved Magnesium		<b>1200</b>	mg/L	1
Dissolved Sodium		<b>84200</b>	mg/L	1
Total Cadmium		<0.0100	mg/L	0.01
Total Cobalt		<0.0100	mg/L	0.01
Specific Conductance		<b>346000</b>	uMHOS/cm	
Total Chromium		<0.0100	mg/L	0.01
Total Copper		<0.00500	mg/L	0.005
Density		<b>1.15</b>	g/ml	
Total Iron		<b>0.0470</b>	mg/L	0.01

*continued ...*



*sample 315453 continued ...*

Param	Flag	Result	Units	RL
Total Mercury		<0.000200	mg/L	0.0002
Fluoride		<50.0	mg/L	0.5
Chloride		<b>244000</b>	mg/L	2.5
Sulfate		<b>4150</b>	mg/L	2.5
Total Manganese		<b>0.0450</b>	mg/L	0.005
Total Molybdenum		<0.0500	mg/L	0.05
Total Nickel		<0.0100	mg/L	0.01
Nitrate-N		<4.00	mg/L	0.04
Total Lead		<0.0100	mg/L	0.01
pH		<b>7.02</b>	s.u.	2
Total Antimony		<0.0500	mg/L	0.05
Total Selenium		<0.0200	mg/L	0.02
Total Dissolved Solids		<b>255200</b>	mg/L	10
Total Thallium		<0.0500	mg/L	0.05
Total Cyanide		<0.0150	mg/L	0.015
Total Uranium		<0.0300	mg/L	0.03
Total Zinc		<b>0.0390</b>	mg/L	0.01

**Sample: 315454 - Fresh**

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.005
Total Aluminum		<0.0500	mg/L	0.05
Hydroxide Alkalinity		<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		<b>142</b>	mg/L as CaCo3	20
Total Alkalinity		<b>142</b>	mg/L as CaCo3	20
Total Arsenic		<0.0100	mg/L	0.01
Total Boron		<0.0100	mg/L	0.01
Total Barium		<b>0.0820</b>	mg/L	0.01
Total Beryllium		<0.00500	mg/L	0.005
Dissolved Calcium		<b>94.2</b>	mg/L	1
Dissolved Potassium		<b>12.1</b>	mg/L	1
Dissolved Magnesium		<b>13.5</b>	mg/L	1
Dissolved Sodium		<b>192</b>	mg/L	1
Total Cadmium		<0.0100	mg/L	0.01
Total Cobalt		<0.0100	mg/L	0.01
Specific Conductance		<b>1470</b>	uMHOS/cm	
Total Chromium		<0.0100	mg/L	0.01
Total Copper		<0.00500	mg/L	0.005
Density		<b>0.990</b>	g/ml	
Total Iron		<b>0.467</b>	mg/L	0.01
Total Mercury		<0.000200	mg/L	0.0002
Fluoride		<b>0.586</b>	mg/L	0.5
Chloride		<b>316</b>	mg/L	2.5
Sulfate		<b>53.0</b>	mg/L	2.5

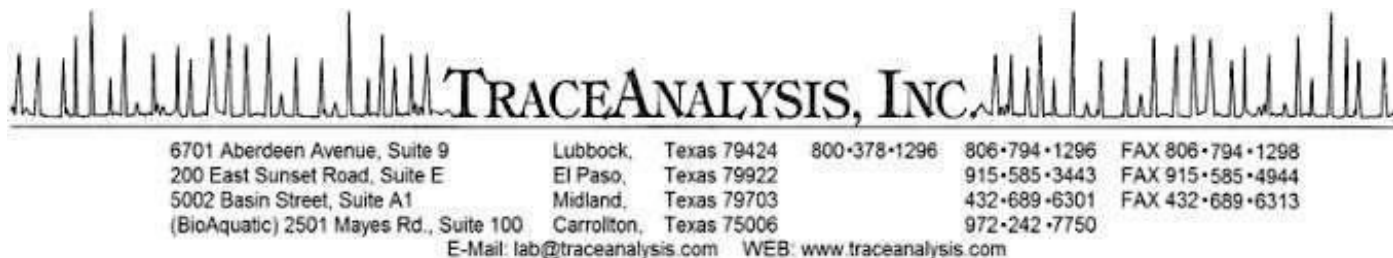
*continued ...*

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*sample 315454 continued ...*

Param	Flag	Result	Units	RL
Total Manganese		<0.00500	mg/L	0.005
Total Molybdenum		<0.0500	mg/L	0.05
Total Nickel		<0.0100	mg/L	0.01
Nitrate-N		<b>1.52</b>	mg/L	0.04
Total Lead		<0.0100	mg/L	0.01
pH		<b>7.98</b>	s.u.	2
Total Antimony		<0.0500	mg/L	0.05
Total Selenium		<0.0200	mg/L	0.02
Total Dissolved Solids		<b>768.0</b>	mg/L	10
Total Thallium		<0.0500	mg/L	0.05
Total Cyanide		<0.0150	mg/L	0.015
Total Uranium		<0.0300	mg/L	0.03
Total Zinc		<0.0100	mg/L	0.01

---



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: December 21, 2012

Work Order: 12120307



Project Location: Buckeye, NM  
Project Name: Wasserhund  
Project Number: Wasserhund-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
315453	Brine	water	2012-11-29	09:45	2012-12-01
315454	Fresh	water	2012-11-29	09:45	2012-12-01

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 69 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager

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# Case Narrative

Samples for project Wasserhund were received by TraceAnalysis, Inc. on 2012-12-01 and assigned to work order 12120307. Samples for work order 12120307 were received intact at a temperature of 3.8 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Ag, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Alkalinity	SM 2320B	82400	2012-12-08 at 11:19	97314	2012-12-11 at 13:57
Al, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
As, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Ba, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Be, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
B, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Ca, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Cd, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Chloride (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Conductivity	SM 2510B	82309	2012-12-04 at 11:00	97106	2012-12-04 at 14:00
Co, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Cr, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Cu, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Density	ASTM D854-92	82732	2012-12-21 at 11:50	97653	2012-12-21 at 12:10
Fe, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Fluoride (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Hg, Total	S 7470A	82287	2012-12-04 at 11:30	97089	2012-12-04 at 13:01
K, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Mg, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Mn, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Mo, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Na, Dissolved	S 6010C	82293	2012-12-04 at 11:53	97265	2012-12-10 at 16:13
Ni, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
NO3 (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
Pb, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
pH	SM 4500-H+	82481	2012-12-07 at 10:00	97327	2012-12-11 at 16:35
Sb, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Se, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
SO4 (IC)	E 300.0	82305	2012-12-04 at 12:00	97164	2012-12-04 at 15:30
TDS	SM 2540C	82308	2012-12-04 at 12:00	97104	2012-12-04 at 15:00
Tl, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Total Cyanide	SM 4500-CN C,E	82281	2012-12-04 at 09:15	97087	2012-12-04 at 11:34
U, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48
Zn, Total	S 6010C	82312	2012-12-05 at 09:45	97267	2012-12-10 at 16:48

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.



A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 12120307 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

# Analytical Report

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Ag, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Silver	U	1	<0.00500	mg/L	1	0.00500

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Al, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Aluminum	U	1	<0.0500	mg/L	1	0.0500

## Sample: 315453 - Brine

Laboratory: Lubbock  
Analysis: Alkalinity  
QC Batch: 97314  
Prep Batch: 82400

Analytical Method: SM 2320B  
Date Analyzed: 2012-12-11  
Sample Preparation: 2012-12-08

Prep Method: N/A  
Analyzed By: DM  
Prepared By: DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		1	<b>102</b>	mg/L as CaCo3	1	20.0
Total Alkalinity		1	<b>102</b>	mg/L as CaCo3	1	20.0

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	As, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Arsenic	u	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	B, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Boron		1	<b>3.23</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Ba, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Barium		1	<b>0.0580</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Be, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Beryllium	u	1	<0.00500	mg/L	1	0.00500

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**Sample: 315453 - Brine**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Cations	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97265	Sample Preparation:	2012-12-04	Prepared By:	KV
Prep Batch:	82293				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		1	1190	mg/L	10	1.00
Dissolved Potassium		1	1640	mg/L	10	1.00
Dissolved Magnesium		1	1200	mg/L	10	1.00
Dissolved Sodium		1	84200	mg/L	100	1.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Cd, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cadmium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Co, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cobalt	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock	Analytical Method:	SM 2510B	Prep Method:	N/A
Analysis:	Conductivity	Date Analyzed:	2012-12-04	Analyzed By:	RL
QC Batch:	97106	Sample Preparation:	2012-12-04	Prepared By:	RL
Prep Batch:	82309				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Conductance		1	<b>346000</b>	uMHOS/cm	4	0.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Cr, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Chromium	u	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Cu, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Copper	u	1	<0.00500	mg/L	1	0.00500

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Density	Analytical Method:	ASTM D854-92	Prep Method:	N/A
QC Batch:	97653	Date Analyzed:	2012-12-21	Analyzed By:	AK
Prep Batch:	82732	Sample Preparation:	2012-12-21	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.15</b>	g/ml	1	0.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock				
Analysis:	Fe, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Iron		1	<b>0.0470</b>	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Hg, Total  
QC Batch: 97089  
Prep Batch: 82287

Analytical Method: S 7470A  
Date Analyzed: 2012-12-04  
Sample Preparation: 2012-12-04

Prep Method: N/A  
Analyzed By: TP  
Prepared By: TP

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Mercury	U	1	<0.000200	mg/L	1	0.000200

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Ion Chromatography  
QC Batch: 97164  
Prep Batch: 82305

Analytical Method: E 300.0  
Date Analyzed: 2012-12-04  
Sample Preparation: 2012-12-04

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Fluoride	U	1	<50.0	mg/L	100	0.500
Chloride		1	<b>244000</b>	mg/L	10000	2.50
Sulfate		1	<b>4150</b>	mg/L	100	2.50

**Sample: 315453 - Brine**

Laboratory: Lubbock  
Analysis: Mn, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Manganese		1	<b>0.0450</b>	mg/L	1	0.00500

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Mo, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Molybdenum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Ni, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Nickel	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	NO3 (IC)	Analytical Method:	E 300.0
QC Batch:	97164	Date Analyzed:	2012-12-04
Prep Batch:	82305	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Nitrate-N	U	1	<4.00	mg/L	100	0.0400

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Pb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Lead	U	1	<0.0100	mg/L	1	0.0100

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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	97327	Date Analyzed:	2012-12-11
Prep Batch:	82481	Sample Preparation:	2012-12-07
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.02	s.u.	1	2.00

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Sb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Antimony	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Se, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Selenium	U	1	<0.0200	mg/L	1	0.0200

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	97104	Date Analyzed:	2012-12-04
Prep Batch:	82308	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	255200	mg/L	1	10.00



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**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Tl, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Thallium	u	1	<0.0500	mg/L	1	0.0500

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Total Cyanide	Analytical Method:	SM 4500-CN C,E
QC Batch:	97087	Date Analyzed:	2012-12-04
Prep Batch:	82281	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cyanide	u	1	<0.0150	mg/L	1	0.0150

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	U, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Uranium	u		<0.0300	mg/L	1	0.0300

**Sample: 315453 - Brine**

Laboratory:	Lubbock		
Analysis:	Zn, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Zinc		1	<b>0.0390</b>	mg/L	1	0.0100

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Ag, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Silver	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Al, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Aluminum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Alkalinity	Analytical Method:	SM 2320B
QC Batch:	97314	Date Analyzed:	2012-12-11
Prep Batch:	82400	Sample Preparation:	2012-12-08
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	1	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		1	<b>142</b>	mg/L as CaCo3	1	20.0
Total Alkalinity		1	<b>142</b>	mg/L as CaCo3	1	20.0

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	As, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Report Date: December 21, 2012  
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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Arsenic	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: B, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Boron	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Ba, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Barium		1	<b>0.0820</b>	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Be, Total  
QC Batch: 97267  
Prep Batch: 82312

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-05

Prep Method: S 3010A  
Analyzed By: RR  
Prepared By: KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Beryllium	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory: Lubbock  
Analysis: Cations  
QC Batch: 97265  
Prep Batch: 82293

Analytical Method: S 6010C  
Date Analyzed: 2012-12-10  
Sample Preparation: 2012-12-04

Prep Method: S 3005A  
Analyzed By: RR  
Prepared By: KV

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		1	<b>94.2</b>	mg/L	1	1.00
Dissolved Potassium		1	<b>12.1</b>	mg/L	1	1.00
Dissolved Magnesium		1	<b>13.5</b>	mg/L	1	1.00
Dissolved Sodium		1	<b>192</b>	mg/L	1	1.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Cd, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cadmium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Co, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cobalt	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	SM 2510B	Prep Method:	N/A
Analysis:	Conductivity	Date Analyzed:	2012-12-04	Analyzed By:	RL
QC Batch:	97106	Sample Preparation:	2012-12-04	Prepared By:	RL
Prep Batch:	82309				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Conductance		1	<b>1470</b>	uMHOS/cm	1	0.00

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Cr, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Chromium	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Cu, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Copper	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	97653	Date Analyzed:	2012-12-21
Prep Batch:	82732	Sample Preparation:	2012-12-21
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.990</b>	g/ml	1	0.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Fe, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Iron		1	<b>0.467</b>	mg/L	1	0.0100

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 7470A	Prep Method:	N/A
Analysis:	Hg, Total	Date Analyzed:	2012-12-04	Analyzed By:	TP
QC Batch:	97089	Sample Preparation:	2012-12-04	Prepared By:	TP
Prep Batch:	82287				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Mercury	U	1	<0.000200	mg/L	1	0.000200

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Ion Chromatography	Date Analyzed:	2012-12-04	Analyzed By:	RL
QC Batch:	97164	Sample Preparation:	2012-12-04	Prepared By:	RL
Prep Batch:	82305				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Fluoride		1	<b>0.586</b>	mg/L	1	0.500
Chloride		1	<b>316</b>	mg/L	10	2.50
Sulfate		1	<b>53.0</b>	mg/L	10	2.50

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Mn, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Manganese	U	1	<0.00500	mg/L	1	0.00500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3010A
Analysis:	Mo, Total	Date Analyzed:	2012-12-10	Analyzed By:	RR
QC Batch:	97267	Sample Preparation:	2012-12-05	Prepared By:	KV
Prep Batch:	82312				

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*sample 315454 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Molybdenum	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	Ni, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Nickel	U	1	<0.0100	mg/L	1	0.0100

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	NO3 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	97164	Date Analyzed:	2012-12-04	Analyzed By:	RL
Prep Batch:	82305	Sample Preparation:	2012-12-04	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Nitrate-N		1	<b>1.52</b>	mg/L	1	0.0400

**Sample: 315454 - Fresh**

Laboratory:	Lubbock				
Analysis:	Pb, Total	Analytical Method:	S 6010C	Prep Method:	S 3010A
QC Batch:	97267	Date Analyzed:	2012-12-10	Analyzed By:	RR
Prep Batch:	82312	Sample Preparation:	2012-12-05	Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Lead	U	1	<0.0100	mg/L	1	0.0100

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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	97327	Date Analyzed:	2012-12-11
Prep Batch:	82481	Sample Preparation:	2012-12-07
		Prep Method:	N/A
		Analyzed By:	DM
		Prepared By:	DM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.98	s.u.	1	2.00

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Sb, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Antimony	U	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Se, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Selenium	U	1	<0.0200	mg/L	1	0.0200

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	97104	Date Analyzed:	2012-12-04
Prep Batch:	82308	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	768.0	mg/L	1	10.00



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**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Tl, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Thallium	u	1	<0.0500	mg/L	1	0.0500

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Total Cyanide	Analytical Method:	SM 4500-CN C,E
QC Batch:	97087	Date Analyzed:	2012-12-04
Prep Batch:	82281	Sample Preparation:	2012-12-04
		Prep Method:	N/A
		Analyzed By:	AK
		Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Cyanide	u	1	<0.0150	mg/L	1	0.0150

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	U, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Uranium	u		<0.0300	mg/L	1	0.0300

**Sample: 315454 - Fresh**

Laboratory:	Lubbock		
Analysis:	Zn, Total	Analytical Method:	S 6010C
QC Batch:	97267	Date Analyzed:	2012-12-10
Prep Batch:	82312	Sample Preparation:	2012-12-05
		Prep Method:	S 3010A
		Analyzed By:	RR
		Prepared By:	KV

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Zinc	u	1	<0.0100	mg/L	1	0.0100

## Method Blanks

### Method Blank (1)      QC Batch: 97087

QC Batch: 97087      Date Analyzed: 2012-12-04      Analyzed By: AK  
Prep Batch: 82281      QC Preparation: 2012-12-04      Prepared By: AK

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cyanide		1	<0.0115	mg/L	0.015

### Method Blank (1)      QC Batch: 97089

QC Batch: 97089      Date Analyzed: 2012-12-04      Analyzed By: TP  
Prep Batch: 82287      QC Preparation: 2012-12-04      Prepared By: TP

Parameter	Flag	Cert	MDL Result	Units	RL
Total Mercury		1	<0.0000675	mg/L	0.0002

### Method Blank (1)      QC Batch: 97104

QC Batch: 97104      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82308      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<5.000	mg/L	10

### Method Blank (1)      QC Batch: 97106

QC Batch: 97106      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82309      QC Preparation: 2012-12-04      Prepared By: RL

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Parameter	Flag	Cert	MDL Result	Units	RL
Specific Conductance		1	2.06	uMHOS/cm	

**Method Blank (1)**      QC Batch: 97164

QC Batch: 97164      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82305      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Nitrate-N		1	<0.0119	mg/L	0.04

**Method Blank (1)**      QC Batch: 97164

QC Batch: 97164      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82305      QC Preparation: 2012-12-04      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Fluoride		1	<0.0388	mg/L	0.5
Chloride		1	<0.209	mg/L	2.5
Sulfate		1	<0.145	mg/L	2.5

**Method Blank (1)**      QC Batch: 97265

QC Batch: 97265      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82293      QC Preparation: 2012-12-04      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Calcium		1	<0.146	mg/L	1
Dissolved Potassium		1	<0.0879	mg/L	1
Dissolved Magnesium		1	<0.0537	mg/L	1
Dissolved Sodium		1	<0.172	mg/L	1

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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Silver		1	<0.00130	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Aluminum		1	<0.00340	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Arsenic		1	<0.00290	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Boron		1	<0.00440	mg/L	0.01

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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Barium		1	<0.00180	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Beryllium		1	<0.00240	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cadmium		1	<0.00470	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Cobalt		1	<0.00430	mg/L	0.01

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**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Chromium		1	<0.00160	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Copper		1	<0.00180	mg/L	0.005

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Iron		1	<0.00190	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch:    97267                      Date Analyzed:    2012-12-10                      Analyzed By:    RR  
Prep Batch:   82312                      QC Preparation:    2012-12-05                      Prepared By:    KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Manganese		1	<0.00290	mg/L	0.005

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**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Molybdenum		1	<0.00550	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Nickel		1	<0.00160	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Lead		1	<0.00820	mg/L	0.01

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Antimony		1	<0.00860	mg/L	0.05

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**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Selenium		1	<0.00540	mg/L	0.02

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Thallium		1	<0.00260	mg/L	0.05

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Uranium			<0.0116	mg/L	0.03

**Method Blank (1)**      QC Batch: 97267

QC Batch: 97267      Date Analyzed: 2012-12-10      Analyzed By: RR  
Prep Batch: 82312      QC Preparation: 2012-12-05      Prepared By: KV

Parameter	Flag	Cert	MDL Result	Units	RL
Total Zinc		1	<0.00530	mg/L	0.01



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**Method Blank (1)**      QC Batch: 97314

QC Batch: 97314      Date Analyzed: 2012-12-11      Analyzed By: DM  
Prep Batch: 82400      QC Preparation: 2012-12-08      Prepared By: DM

Parameter	Flag	Cert	MDL Result	Units	RL
Hydroxide Alkalinity		1	<1.00	mg/L as CaCo3	20
Carbonate Alkalinity		1	<1.00	mg/L as CaCo3	20
Bicarbonate Alkalinity		1	<1.00	mg/L as CaCo3	20
Total Alkalinity		1	<20.0	mg/L as CaCo3	20

**Method Blank (1)**      QC Batch: 97653

QC Batch: 97653      Date Analyzed: 2012-12-21      Analyzed By: AK  
Prep Batch: 82732      QC Preparation: 2012-12-21      Prepared By: AK

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.987	g/ml	

**Duplicates (1)**      Duplicated Sample: 315546

QC Batch: 97104      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82308      QC Preparation: 2012-12-04      Prepared By: RL

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	670.0	700.0	mg/L	1	4	10

**Duplicates (1)**      Duplicated Sample: 315454

QC Batch: 97106      Date Analyzed: 2012-12-04      Analyzed By: RL  
Prep Batch: 82309      QC Preparation: 2012-12-04      Prepared By: RL

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Conductance	1	1460	1470	uMHOS/cm	1	1	20

**Duplicates (1)** Duplicated Sample: 315708

QC Batch: 97314 Date Analyzed: 2012-12-11 Analyzed By: DM  
Prep Batch: 82400 QC Preparation: 2012-12-08 Prepared By: DM

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	1	<1.00	<1.00	mg/L as CaCo3	1	0	20
Carbonate Alkalinity	1	<1.00	<1.00	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity	1	395	390	mg/L as CaCo3	1	1	20
Total Alkalinity	1	395	390	mg/L as CaCo3	1	1	20

**Duplicates (1)** Duplicated Sample: 315667

QC Batch: 97327 Date Analyzed: 2012-12-11 Analyzed By: DM  
Prep Batch: 82481 QC Preparation: 2012-12-07 Prepared By: DM

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	7.95	7.91	s.u.	1	0	20

**Duplicates (1)** Duplicated Sample: 316264

QC Batch: 97653 Date Analyzed: 2012-12-21 Analyzed By: AK  
Prep Batch: 82732 QC Preparation: 2012-12-21 Prepared By: AK

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.19	1.19	g/ml	1	0	20

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 97089  
Prep Batch: 82287

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: TP  
Prepared By: TP

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury		1	0.00395	mg/L	1	0.00400	<0.0000675	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury		1	0.00398	mg/L	1	0.00400	<0.0000675	100	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97104  
Prep Batch: 82308

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	969	mg/L	1	1000	<5.00	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	1	1000	<5.00	101	90 - 110	4	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Nitrate-N		1	5.16	mg/L	1	5.00	<0.0119	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Nitrate-N		1	5.23	mg/L	1	5.00	<0.0119	105	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Fluoride		1	5.14	mg/L	1	5.00	<0.0388	103	90 - 110
Chloride		1	24.2	mg/L	1	25.0	<0.209	97	90 - 110
Sulfate		1	25.9	mg/L	1	25.0	<0.145	104	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Fluoride		1	5.19	mg/L	1	5.00	<0.0388	104	90 - 110	1	20
Chloride		1	25.1	mg/L	1	25.0	<0.209	100	90 - 110	4	20
Sulfate		1	26.9	mg/L	1	25.0	<0.145	108	90 - 110	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97265  
Prep Batch: 82293

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-04

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		1	52.5	mg/L	1	52.5	<0.146	100	85 - 115
Dissolved Potassium		1	49.7	mg/L	1	52.5	<0.0879	95	85 - 115
Dissolved Magnesium		1	50.7	mg/L	1	52.5	<0.0537	96	85 - 115
Dissolved Sodium		1	51.2	mg/L	1	52.5	<0.172	98	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		1	53.2	mg/L	1	52.5	<0.146	101	85 - 115	1	20
Dissolved Potassium		1	50.5	mg/L	1	52.5	<0.0879	96	85 - 115	2	20
Dissolved Magnesium		1	53.5	mg/L	1	52.5	<0.0537	102	85 - 115	5	20
Dissolved Sodium		1	51.6	mg/L	1	52.5	<0.172	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver		1	0.122	mg/L	1	0.125	<0.00130	98	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver		1	0.127	mg/L	1	0.125	<0.00130	102	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum		1	1.11	mg/L	1	1.00	<0.00340	111	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum		1	1.10	mg/L	1	1.00	<0.00340	110	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic		1	0.504	mg/L	1	0.500	<0.00290	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic		1	0.502	mg/L	1	0.500	<0.00290	100	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Boron		1	0.0470	mg/L	1	0.0500	<0.00440	94	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Boron		1	0.0460	mg/L	1	0.0500	<0.00440	92	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium		1	1.13	mg/L	1	1.00	<0.00180	113	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium		1	1.12	mg/L	1	1.00	<0.00180	112	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Beryllium		1	0.0230	mg/L	1	0.0250	<0.00240	92	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Beryllium		1	0.0246	mg/L	1	0.0250	<0.00240	98	85 - 115	7	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium		1	0.252	mg/L	1	0.250	<0.00470	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium		1	0.250	mg/L	1	0.250	<0.00470	100	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cobalt		1	0.248	mg/L	1	0.250	<0.00430	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cobalt		1	0.246	mg/L	1	0.250	<0.00430	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium		1	0.0990	mg/L	1	0.100	<0.00160	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium		1	0.0980	mg/L	1	0.100	<0.00160	98	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Copper		1	0.128	mg/L	1	0.125	<0.00180	102	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Copper		1	0.127	mg/L	1	0.125	<0.00180	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



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### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron		1	0.560	mg/L	1	0.500	<0.00190	112	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron		1	0.538	mg/L	1	0.500	<0.00190	108	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Manganese		1	0.248	mg/L	1	0.250	<0.00290	99	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Manganese		1	0.267	mg/L	1	0.250	<0.00290	107	85 - 115	7	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Molybdenum		1	0.530	mg/L	1	0.500	<0.00550	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Molybdenum		1	0.526	mg/L	1	0.500	<0.00550	105	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Nickel		1	0.271	mg/L	1	0.250	<0.00160	108	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Nickel		1	0.249	mg/L	1	0.250	<0.00160	100	85 - 115	8	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead		1	0.537	mg/L	1	0.500	<0.00820	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead		1	0.530	mg/L	1	0.500	<0.00820	106	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Antimony		1	0.242	mg/L	1	0.250	<0.00860	97	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Antimony		1	0.243	mg/L	1	0.250	<0.00860	97	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium		1	0.478	mg/L	1	0.500	<0.00540	96	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium		1	0.475	mg/L	1	0.500	<0.00540	95	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Thallium		1	0.537	mg/L	1	0.500	<0.00260	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Thallium		1	0.547	mg/L	1	0.500	<0.00260	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Uranium			0.526	mg/L	1	0.500	<0.0116	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Uranium			0.538	mg/L	1	0.500	<0.0116	108	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Zinc		1	0.252	mg/L	1	0.250	<0.00530	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Zinc		1	0.255	mg/L	1	0.250	<0.00530	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 315454

QC Batch: 97087  
Prep Batch: 82281

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: AK  
Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cyanide		1	0.105	mg/L	1	0.120	<0.0115	88	10 - 170

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cyanide		1	0.104	mg/L	1	0.120	<0.0115	87	10 - 170	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315388

QC Batch: 97089  
Prep Batch: 82287

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: TP  
Prepared By: TP

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury		1	0.00358	mg/L	1	0.00400	<0.0000675	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury		1	0.00350	mg/L	1	0.00400	<0.0000675	88	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315615

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Nitrate-N		1	49.4	mg/L	10	50.0	<0.119	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Nitrate-N		1	50.3	mg/L	10	50.0	<0.119	101	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315615

QC Batch: 97164  
Prep Batch: 82305

Date Analyzed: 2012-12-04  
QC Preparation: 2012-12-04

Analyzed By: RL  
Prepared By: RL

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Fluoride		1	48.8	mg/L	10	50.0	<0.388	98	80 - 120
Chloride		1	288	mg/L	10	250	53.8	94	80 - 120
Sulfate		1	436	mg/L	10	250	164	109	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Fluoride		1	50.7	mg/L	10	50.0	<0.388	101	80 - 120	4	20
Chloride		1	297	mg/L	10	250	53.8	97	80 - 120	3	20
Sulfate		1	437	mg/L	10	250	164	109	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (xMS-1)** Spiked Sample:

QC Batch: 97265  
Prep Batch: 82293

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-04

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		1	665	mg/L	1	525	132	102	75 - 125
Dissolved Potassium		1	513	mg/L	1	525	3.35	97	75 - 125
Dissolved Magnesium		1	555	mg/L	1	525	47.7	97	75 - 125
Dissolved Sodium		1	637	mg/L	1	525	138	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		1	659	mg/L	1	525	132	100	75 - 125	1	20
Dissolved Potassium		1	509	mg/L	1	525	3.35	96	75 - 125	1	20
Dissolved Magnesium		1	562	mg/L	1	525	47.7	98	75 - 125	1	20
Dissolved Sodium		1	645	mg/L	1	525	138	96	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver		1	0.113	mg/L	1	0.125	<0.00130	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver		1	0.117	mg/L	1	0.125	<0.00130	94	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum		1	0.978	mg/L	1	1.00	0.028	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum		1	0.952	mg/L	1	1.00	0.028	92	75 - 125	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic		1	0.477	mg/L	1	0.500	<0.00290	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic		1	0.472	mg/L	1	0.500	<0.00290	94	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Boron		1	3.32	mg/L	1	0.0500	3.27	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Boron		1	3.32	mg/L	1	0.0500	3.27	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium		1	0.917	mg/L	1	1.00	0.026	89	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium		1	0.927	mg/L	1	1.00	0.026	90	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Beryllium		1	0.0242	mg/L	1	0.0250	<0.00240	97	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Beryllium		1	0.0242	mg/L	1	0.0250	<0.00240	97	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium		1	0.237	mg/L	1	0.250	<0.00470	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium		1	0.241	mg/L	1	0.250	<0.00470	96	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cobalt		1	0.241	mg/L	1	0.250	<0.00430	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cobalt		1	0.242	mg/L	1	0.250	<0.00430	97	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium		1	0.0870	mg/L	1	0.100	<0.00160	87	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium		1	0.0960	mg/L	1	0.100	<0.00160	96	75 - 125	10	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Copper		1	0.122	mg/L	1	0.125	0.019	82	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Copper		1	0.130	mg/L	1	0.125	0.019	89	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron		1	3.79	mg/L	1	0.500	3.23	112	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron		1	3.78	mg/L	1	0.500	3.23	110	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Manganese		1	0.387	mg/L	1	0.250	0.136	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Manganese		1	0.385	mg/L	1	0.250	0.136	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Molybdenum		1	0.478	mg/L	1	0.500	<0.00550	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Molybdenum		1	0.483	mg/L	1	0.500	<0.00550	97	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Nickel		1	0.238	mg/L	1	0.250	<0.00160	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Nickel		1	0.246	mg/L	1	0.250	<0.00160	98	75 - 125	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead		1	0.459	mg/L	1	0.500	<0.00820	92	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead		1	0.482	mg/L	1	0.500	<0.00820	96	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Antimony		1	0.238	mg/L	1	0.250	<0.00860	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Antimony		1	0.248	mg/L	1	0.250	<0.00860	99	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
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Analyzed By: RR  
Prepared By: KV

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium		1	0.447	mg/L	1	0.500	<0.00540	89	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium		1	0.449	mg/L	1	0.500	<0.00540	90	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Thallium		1	0.436	mg/L	1	0.500	<0.00260	87	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Thallium		1	0.462	mg/L	1	0.500	<0.00260	92	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Uranium			0.474	mg/L	1	0.500	<0.0116	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Uranium			0.483	mg/L	1	0.500	<0.0116	97	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)**      Spiked Sample: 315451

QC Batch: 97267  
Prep Batch: 82312

Date Analyzed: 2012-12-10  
QC Preparation: 2012-12-05

Analyzed By: RR  
Prepared By: KV

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Zinc		1	0.258	mg/L	1	0.250	0.01	99	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Zinc		1	0.261	mg/L	1	0.250	0.01	100	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 97087 Date Analyzed: 2012-12-04 Analyzed By: AK

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cyanide		1	mg/L	0.120	0.128	107	85 - 115	2012-12-04

### Standard (CCV-1)

QC Batch: 97087 Date Analyzed: 2012-12-04 Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cyanide		1	mg/L	0.120	0.126	105	85 - 115	2012-12-04

### Standard (CCV-1)

QC Batch: 97089 Date Analyzed: 2012-12-04 Analyzed By: TP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Mercury		1	mg/L	0.00500	0.00503	101	90 - 110	2012-12-04

### Standard (CCV-2)

QC Batch: 97089 Date Analyzed: 2012-12-04 Analyzed By: TP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Mercury		1	mg/L	0.00500	0.00493	99	90 - 110	2012-12-04

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#### Standard (ICV-1)

QC Batch: 97106                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Specific Conductance		1	uMHOS/cm	1410	1440	102	90 - 110	2012-12-04

#### Standard (CCV-1)

QC Batch: 97106                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Specific Conductance		1	uMHOS/cm	1410	1430	101	90 - 110	2012-12-04

#### Standard (CCV-1)

QC Batch: 97164                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Nitrate-N		1	mg/L	5.00	5.11	102	90 - 110	2012-12-04

#### Standard (CCV-1)

QC Batch: 97164                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Fluoride		1	mg/L	5.00	5.03	101	90 - 110	2012-12-04
Chloride		1	mg/L	25.0	24.0	96	90 - 110	2012-12-04
Sulfate		1	mg/L	25.0	26.3	105	90 - 110	2012-12-04



**Standard (CCV-2)**

QC Batch: 97164                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Nitrate-N		1	mg/L	5.00	5.04	101	90 - 110	2012-12-04

**Standard (CCV-2)**

QC Batch: 97164                      Date Analyzed: 2012-12-04                      Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Fluoride		1	mg/L	5.00	5.14	103	90 - 110	2012-12-04
Chloride		1	mg/L	25.0	24.3	97	90 - 110	2012-12-04
Sulfate		1	mg/L	25.0	25.7	103	90 - 110	2012-12-04

**Standard (ICV-1)**

QC Batch: 97265                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		1	mg/L	51.0	52.3	102	90 - 110	2012-12-10
Dissolved Potassium		1	mg/L	55.0	55.2	100	90 - 110	2012-12-10
Dissolved Magnesium		1	mg/L	51.0	52.6	103	90 - 110	2012-12-10
Dissolved Sodium		1	mg/L	51.0	51.7	101	90 - 110	2012-12-10

**Standard (CCV-1)**

QC Batch: 97265                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		1	mg/L	51.0	50.9	100	90 - 110	2012-12-10
Dissolved Potassium		1	mg/L	55.0	54.4	99	90 - 110	2012-12-10

*continued ...*

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*standard continued ...*

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Magnesium		1	mg/L	51.0	51.3	100	90 - 110	2012-12-10
Dissolved Sodium		1	mg/L	51.0	51.7	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Silver		1	mg/L	0.125	0.127	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Aluminum		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Boron		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Barium		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Beryllium		1	mg/L	1.00	0.997	100	90 - 110	2012-12-10

### Standard (ICV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cadmium		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

### Standard (ICV-1)

QC Batch: 97267

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Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cobalt		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Copper		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Iron		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267 Date Analyzed: 2012-12-10 Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Manganese		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Molybdenum		1	mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Nickel		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Lead		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Antimony		1	mg/L	1.00	1.00	100	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Selenium		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Thallium		1	mg/L	1.00	1.03	103	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Uranium			mg/L	1.00	1.02	102	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Zinc		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Silver		1	mg/L	0.125	0.118	94	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Aluminum		1	mg/L	1.00	0.978	98	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Arsenic		1	mg/L	1.00	0.920	92	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Boron		1	mg/L	1.00	0.910	91	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Barium		1	mg/L	1.00	0.956	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Beryllium		1	mg/L	1.00	0.936	94	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cadmium		1	mg/L	1.00	0.962	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR



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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Cobalt		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Chromium		1	mg/L	1.00	0.962	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Copper		1	mg/L	1.00	0.970	97	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Iron		1	mg/L	1.00	0.997	100	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Manganese		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Molybdenum		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Nickel		1	mg/L	1.00	0.960	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Lead		1	mg/L	1.00	1.01	101	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267                      Date Analyzed: 2012-12-10                      Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Antimony		1	mg/L	1.00	0.961	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Selenium		1	mg/L	1.00	0.920	92	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Thallium		1	mg/L	1.00	0.959	96	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

Date Analyzed: 2012-12-10

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Uranium			mg/L	1.00	0.983	98	90 - 110	2012-12-10

#### Standard (CCV-1)

QC Batch: 97267

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Analyzed By: RR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Total Zinc		1	mg/L	1.00	0.973	97	90 - 110	2012-12-10

#### Standard (ICV-1)

QC Batch: 97314

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Carbonate Alkalinity		1	mg/L as CaCo3	0.00	255		-	2012-12-11
Bicarbonate Alkalinity		1	mg/L as CaCo3	0.00	35.0		-	2012-12-11
Total Alkalinity		1	mg/L as CaCo3	250	255	102	90 - 110	2012-12-11

#### Standard (CCV-1)

QC Batch: 97314

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Carbonate Alkalinity		1	mg/L as CaCo3	0.00	230		-	2012-12-11
Bicarbonate Alkalinity		1	mg/L as CaCo3	0.00	<20.0		-	2012-12-11
Total Alkalinity		1	mg/L as CaCo3	250	249	100	90 - 110	2012-12-11

#### Standard (ICV-1)

QC Batch: 97327

Date Analyzed: 2012-12-11

Analyzed By: DM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2012-12-11

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Standard (CCV-1)

QC Batch: 97327				Date Analyzed: 2012-12-11			Analyzed By: DM	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2012-12-11

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-12-8	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.





— (1)	Arsenic (As)	0.1 mg/l
— (2)	Barium (Ba)	1.0 mg/l
— (3)	Cadmium (Cd)	0.01 mg/l
— (4)	Chromium (Cr)	0.05 mg/l
(5)	Cyanide (CN)	0.2 mg/l
(6)	Fluoride (F)	1.6 mg/l
— (7)	Lead (Pb)	0.05 mg/l
— (8)	Total Mercury (Hg)	0.002 mg/l
(9)	Nitrate (NO <sub>3</sub> as N)	10.0 mg/l
— (10)	Selenium (Se)	0.05 mg/l
— (11)	Silver (Ag)	0.05 mg/l
— (12)	Uranium (U)	0.03 mg/l
(13)	Radioactivity: Combined Radium-226 & Radium-228	30 pCi/l
(14)	Benzene	0.01 mg/l
(15)	Polychlorinated biphenyls (PCB's)	0.001 mg/l
(16)	Toluene	0.75 mg/l
(17)	Carbon Tetrachloride	0.01 mg/l
(18)	1,2-dichloroethane (EDC)	0.01 mg/l
(19)	1,1-dichloroethylene (1,1-DCE)	0.005 mg/l
(20)	1,1,2,2-tetrachloroethylene (PCE)	0.02 mg/l
(21)	1,1,2-trichloroethylene (TCE)	0.1 mg/l
(22)	ethylbenzene	0.75 mg/l
(23)	total xylenes	0.62 mg/l
(24)	methylene chloride	0.1 mg/l
(25)	chloroform	0.1 mg/l
(26)	1,1-dichloroethane	0.025 mg/l
(27)	ethylene dibromide (EDB)	0.0001 mg/l
(28)	1,1,1-trichloroethane	0.06 mg/l
(29)	1,1,2-trichloroethane	0.01 mg/l
(30)	1,1,2,2-tetrachloroethane	0.01 mg/l
(31)	vinyl chloride	0.001 mg/l

- (32) PAHs: total naphthalene plus monomethylnaphthalenes.....0.03 mg/l
- (33) benzo-a-pyrene.....0.0007 mg/l

**B. Other Standards for Domestic Water Supply**

- (1) Chloride (Cl) .....250.0 mg/l
- (2) Copper (Cu) .....1.0 mg/l
- (3) Iron (Fe) .....1.0 mg/l
- (4) Manganese (Mn) .....0.2 mg/l
- (6) Phenols.....0.005 mg/l
- (7) Sulfate (SO<sub>4</sub>) .....600.0 mg/l
- (8) Total Dissolved Solids (TDS) .....1000.0 mg/l
- (9) Zinc (Zn) .....10.0 mg/l
- (10) pH.....between 6 and 9

**C. Standards for Irrigation Use - Ground water shall meet the standards of Subsection A, B, C of this section unless otherwise provided.**

- (1) Aluminum (Al) .....5.0 mg/l
- (2) Boron (B) .....0.75 mg/l
- (3) Cobalt (Co) .....0.05 mg/l
- (4) Molybdenum (Mo) .....1.0 mg/l
- (5) Nickel (Ni) .....0.2 mg/l

1-77, 1-29-82, 11-17-83, 3-3-86, 12-1-95; 20.6.2.3103 NMAC - Rn, 20 NMAC 6.2.III.3103, 1-15-01; A, 9-26-



Trace Analytical Services, Inc.  
600 Rowley Road, Suite 224  
Greenville, SC 29615  
(724) 631-1889

December 18, 2012

Liz Greens  
TraceAnalytical, Inc.  
8701 Aberdeen Avenue, Suite 9  
Lubbock, TX 79424

RE: Project 315453, 315454  
Pace Project No. 3063063

Dear Liz Greens:

Enclosed are the analytical results for sample(s) received by the laboratory on December 04, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me:

Sincerely,

Jacquelyn Collins

[jqcollins@traceatsc.com](mailto:jqcollins@traceatsc.com)  
Project Manager

Enclosure



#### REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, copied, or  
otherwise the written consent of Trace Analytical Services, Inc.

## CERTIFICATIONS

Phone: (770) 962-1399

Fax: (770) 962-1399

### Pennsylvania Certification IDs

11251 Pottsville Rd Suite 2 354 Commerce, PA 17021  
ACI/ACI (DO-ELAP Accreditation # A26, 1544)  
Alabama Certification # 41590  
Arizona Certification # AC1704  
Arkansas Certification  
California/TN Certification # 0422202A  
Colorado Certification  
Connecticut Certification # PH-0863  
Delaware Certification  
Florida/TN Certification # 031883  
Guam/PADEP Certification  
Hawaii/PADEP Certification  
Idaho Certification  
Illinois/PADEP Certification  
Indiana/PADEP Certification  
Iowa Certification # 501  
Kansas/TN Certification # E-10366  
Kentucky Certification # 90153  
Louisiana/TN Certification # LA000002  
Louisiana/TN Certification # 4086  
Maine Certification # PH0001  
Maryland Certification # 326  
Massachusetts Certification # MPA1437

### Michigan/PADEP Certification

Michigan Certification # 235  
Minnesota Certification # Cert 0000  
Nevada Certification  
New Hampshire/TN Certification # 2872  
New Jersey/TN Certification # NJ 051  
New Mexico Certification  
New York/TN Certification # 10083  
North Carolina Certification # 47700  
Oregon/TN Certification # PA200002  
Pennsylvania/TN Certification # 65-02002  
Puerto Rico Certification # PA01457  
South Dakota Certification  
Tennessee Certification # TN0002  
Texas/TN Certification # T 104704186  
Utah/TN Certification # A/STE  
Virgin Island/PADEP Certification  
Virginia Certification # 00112  
Virginia/VELAP Certification # 997168  
Washington Certification # C86A  
West Virginia Certification # 143  
Wisconsin/PADEP Certification  
Wyoming Certification # 87N012

## REPORT OF LABORATORY ANALYSIS

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distributed without written consent of Pace Analytical Services, Inc.

### SAMPLE SUMMARY

Project: 215453, 215454

Pace Project No: 3033063

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3063463001	215453	Water	11/29/12 09:45	12/04/12 09:45
3063463002	215454	Water	11/29/12 09:45	12/04/12 09:45

### REPORT OF LABORATORY ANALYSIS

"This report shall not be intentionally altered in any way without the written consent of Pace Analytical Services, Inc."

Page 5 of 11

# SAMPLE ANALYTE COUNT

Project: 315453, 315454  
Pace Project No: 0063083

Lab ID	Sample ID	Method	Analyte	Analytes Reported
303000001	315453	STP 003.1	SLA	1
		STP 004.0	SAW	1
303000002	315454	STP 003.1	SLA	1
		STP 004.0	SAW	1

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: 315453, 315454  
Pace Project No.: 3053063

---

Method: EPA 903.1  
Description: 903.1 Radon 226  
Client: Pace Analytical, Inc.  
Date: December 18, 2012

### General Information:

2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method required hold time with any exceptions noted below.

### Method Blank:

All analyzed were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike components were within QC limits with any exceptions noted below.

### Matrix Spike:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, copied or full,  
without the written consent of Pace Analytical Services, Inc.

## PROJECT NARRATIVE

Project: 315453, 315454

Pace Project No.: 3063063

---

Method: EPA 904.0

Description: 904.0 Rotum 229

Client: TraceAnalysis, Inc.

Date: December 18, 2012

### General Information:

7 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

### Hold Time:

The samples were analyzed within the method specified hold times with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

### Laboratory Control Spikes:

All laboratory control spike compounds were within 12% limit with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, copied, or distributed without the written consent of Pace Analytical Services, Inc.



# ANALYTICAL RESULTS

Project: 315432 315434

Pace Project No.: 3000003

Sample: 315433	Lab ID: 3083063001	Collected: 11/29/12 09:45	Received: 12/04/12 09:45	Matrix: Water		
Env:	Site ID:	Sample Type:				
Parameters	Method	Act & Use (MCL)	Units	Analyzed	CAS No.	Qual
Radon-226	ESA 902.1	7.71 ± 2.54 (1.85)	pCi/L	12/13/12 14:04	13982-63-2	
Radon-228	ESA 904.0	63.9 ± 4.33 (8.82)	pCi/L	12/13/12 14:26	13982-63-1	

Sample: 315434	Lab ID: 3083063002	Collected: 11/29/12 09:45	Received: 12/04/12 09:45	Matrix: Water		
Env:	Site ID:	Sample Type:				
Parameters	Method	Act & Use (MCL)	Units	Analyzed	CAS No.	Qual
Radon-226	ESA 902.1	0.458 ± 0.457 (0.802)	pCi/L	12/13/12 14:04	13982-63-2	
Radon-228	ESA 904.0	0.219 ± 0.295 (0.823)	pCi/L	12/13/12 14:26	13982-63-1	

# QUALITY CONTROL DATA

Project: 115483, 115454

Phase Project No.: 3060063

QC Batch: RAD214059

Analysis Method: EPA 900.1

QC Batch Method: EPA 900.1

Analysis Description: 90.1 Radium-226

Associated Lab Samples: 3063063001, 3063063002

METHOD BLANK: 50999

Matrix: Water

Associated Lab Samples: 3063063001, 3063063002

Parameter	Net ± 1σ (MC)	Unit	Sampled	Location
Radium-226	-0.058 ± 0.300 (3.594)	pCi/L	1/21/12 (2:42)	

### QUALITY CONTROL DATA

Project: 315453, 315454

Pace Project no: 3063063

QC Batch: RAD014058

Analysis Method: 1019.004.0

QC Batch Method: F19.004.0

Analysis Description: 104.0-Fluorim 228

Associated Lab Samples: 3063063001, 3063063002

METHOD BLANK: 532926

Matrix: Water

Associated Lab Samples: 3063063001, 3063063002

Parameter	Rel. Unc. (MCR)	Unit	Analysis	Qualification
Radiation-228	5.762 ± 0.467 (0.755)	pCi/L	12/18/12 (11.8)	

## QUALIFIERS

Project: 015455, 015454

Phase Project No.: 0063063

### DEFINITIONS

DF - Dilution Factor. If reporting, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit

L - Estimated concentration above the validated method detection limit and below the adjusted reporting limit

MDL - Adjusted Method Detection Limit

PRC - Pace Reporting Limit

RL - Reporting Limit

S - Sample

1,3-Diphenylisoxane (SD70 listed analyte) decomposes in Acetonitrile

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and PRC values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable

SD - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for but not detected.

1,3-diphenylisoxane decomposes and cannot be separated from 1,3-diphenylisoxane using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Maximum Detectable Concentration

Pace Analytical is TM accepted. Contact your Project PM for the current list of accepted analytes

TR - This NELAP method

## TraceAnalysis, Inc.

6101 Industrial Avenue, Suite 401  
 Lakeland, Texas 76044  
 Tel: (817) 505-4501  
 Fax: (817) 505-4501  
 E-mail: info@traceanalysis.com

Local Sales Office, Suite 401  
 Lakeland, Texas 76044  
 Tel: (817) 505-4501  
 Fax: (817) 505-4501

300 East Street, Suite 401  
 Lakeland, Texas 76044  
 Tel: (817) 505-4501  
 Fax: (817) 505-4501

Industrial Group  
 2311 Wilson St., Ste. 100  
 Carrollton, Texas 75006  
 Tel: (972) 342-7750

Company Name:

Address: (Street, City, Zip)

Contact Person:

Phone:

(If different from above)

Project #:

Project Location (Including State):

Sample Signature:

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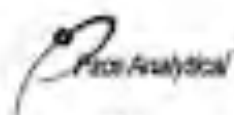
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## Sample Condition Upon Receipt

Client Name: TraceProject # 3063063Carrier: ☒ FedEx ☐ UPS ☐ USPS ☐ Other ☐ Other ☐ OtherTracking #: 794207946396Custody Seal on Cooler/Box Present: ☒ Yes ☐ No Seal intact: ☒ Yes ☐ NoPacking Material: ☐ Bubble Wrap ☐ Bubble Sheet ☒ None ☐ OtherThermometer Used: 5 8 7Type of Ice: White Blue None☐ Samples on ice, cooling process has begunCooler Temperature: 4.2Biological Tissue is Frozen: Yes No(Date and initials of person performing contents: SMB 12/4/12)

Temp should be above freezing in RTC

Comments:

Chain of Custody Present:	<u>Yes</u> <u>No</u> <u>Other</u>	1
Chain of Custody Filled Out:	<u>Yes</u> <u>No</u> <u>Other</u>	2
Chain of Custody Requisitioned:	<u>Yes</u> <u>No</u> <u>Other</u>	3
Sample Name & Signature on COC:	<u>Yes</u> <u>No</u> <u>Other</u>	4
Sample Arrived within Hold Time:	<u>Yes</u> <u>No</u> <u>Other</u>	5
Start Hold Time Analysis (472hr):	<u>Yes</u> <u>No</u> <u>Other</u>	6
Reach Turn Around Time Requested:	<u>Yes</u> <u>No</u> <u>Other</u>	7
Sufficient Volume:	<u>Yes</u> <u>No</u> <u>Other</u>	8
Correct Containers Used:	<u>Yes</u> <u>No</u> <u>Other</u>	9
Other Containers Used:	<u>Yes</u> <u>No</u> <u>Other</u>	
Containers Intact:	<u>Yes</u> <u>No</u> <u>Other</u>	10
Filtered volume removed for Diagnostics tests:	<u>Yes</u> <u>No</u> <u>Other</u>	11
Sample Labels match COC:	<u>Yes</u> <u>No</u> <u>Other</u>	12
Includes date/time/analyte: <u>Multicheck</u>		
All containers meeting preservation have been checked:	<u>Yes</u> <u>No</u> <u>Other</u>	13
All containers meeting preservation are found to be in compliance with EPA recommendations:	<u>Yes</u> <u>No</u> <u>Other</u>	
includes: VOA, column, TIC, GC/MS (GC/MS) (GC/MS)	<u>Yes</u> <u>No</u> <u>Other</u>	
Initial when completed: <u>SMB</u>	Can it be used for preservation?	
Samples checked for decomposition:	<u>Yes</u> <u>No</u> <u>Other</u>	14
Preservation in VOA Vials (10mL):	<u>Yes</u> <u>No</u> <u>Other</u>	15
Trip Blank Present:	<u>Yes</u> <u>No</u> <u>Other</u>	16
Trip Blank Custody Seal Present:	<u>Yes</u> <u>No</u> <u>Other</u>	
Pres Trip Blank Lot # (if purchased):		

Client Notification/Resolution:

Field Data Received?

Y / N

Person Contacted:

Date/Time:

Continental Resolution:

Project Manager Review:

SMB

Date:

12/4/12

(Note: Whenever there is a discrepancy affecting North Carolina compliance involving a copy of this form will be sent to the North Carolina Office of Certification and Compliance (NCCO) and all of local, regional preservation, and all of local, regional compliance.)



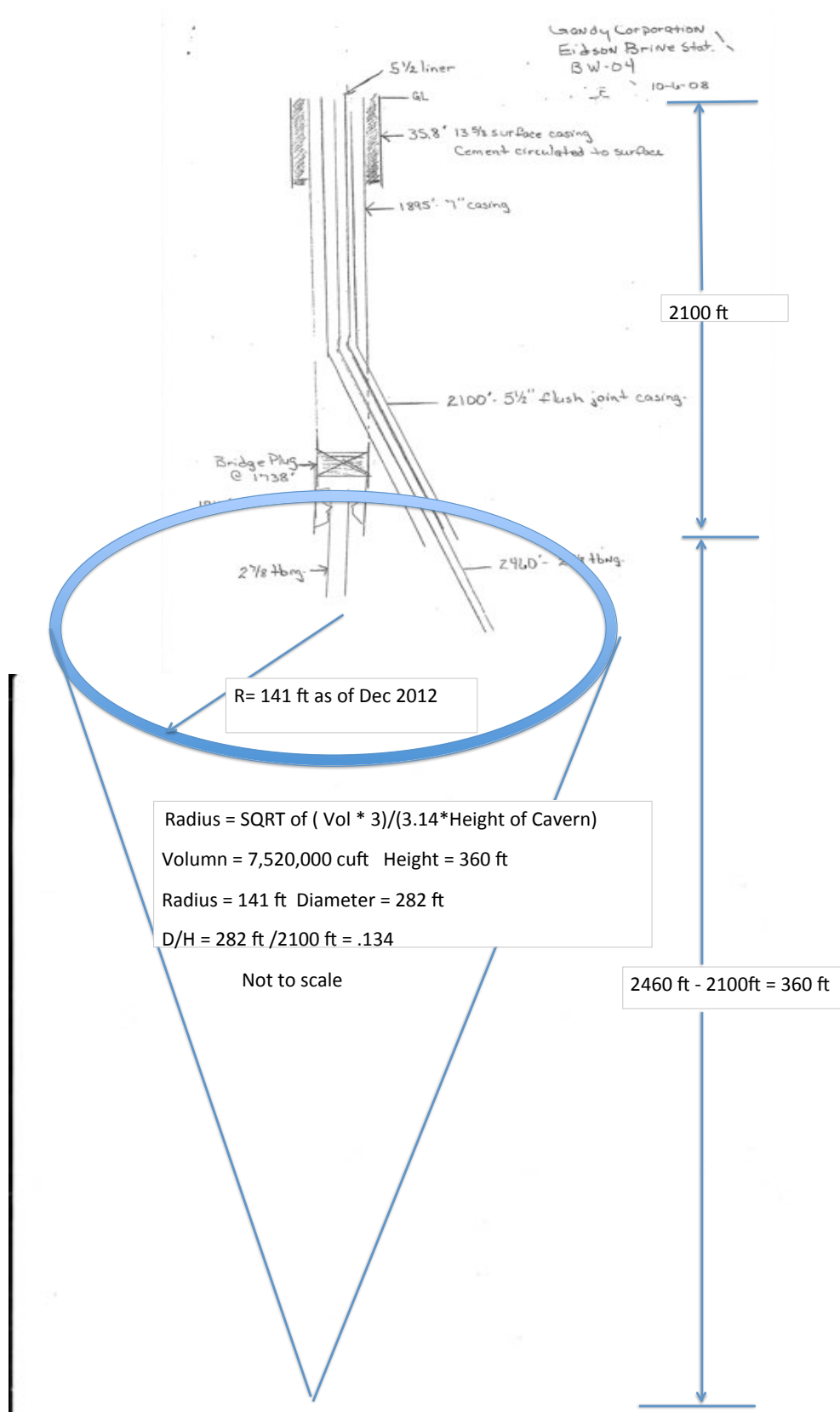
## Appendix “E”

Blank- No Inserts



## Appendix “F”

- Brine Cavity Calculations with Wellbore Sketch
- D/H Calculations
- Aerial View showing Cavern Radius



Water Well

New Tanks

BW-04

R=141 ft

Out of Service  
Brine Pit

HWY 8

Wasserhund Inc. BW-04  
Buckeye Brine Station  
March 25, 2013



## Appendix “G”

- AOR Well Status List
- AOR Plot Plan
- OCD Well Records for Wells In Critical AOR

## 2012 BW-04 AOR Review- Well Status List

up-dated Mar 26, 2013

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	567 FSL & 162 FW	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWI	Yes*	yes	yes	no

2 2

3 Total # of wells in adjacent quarter-sections

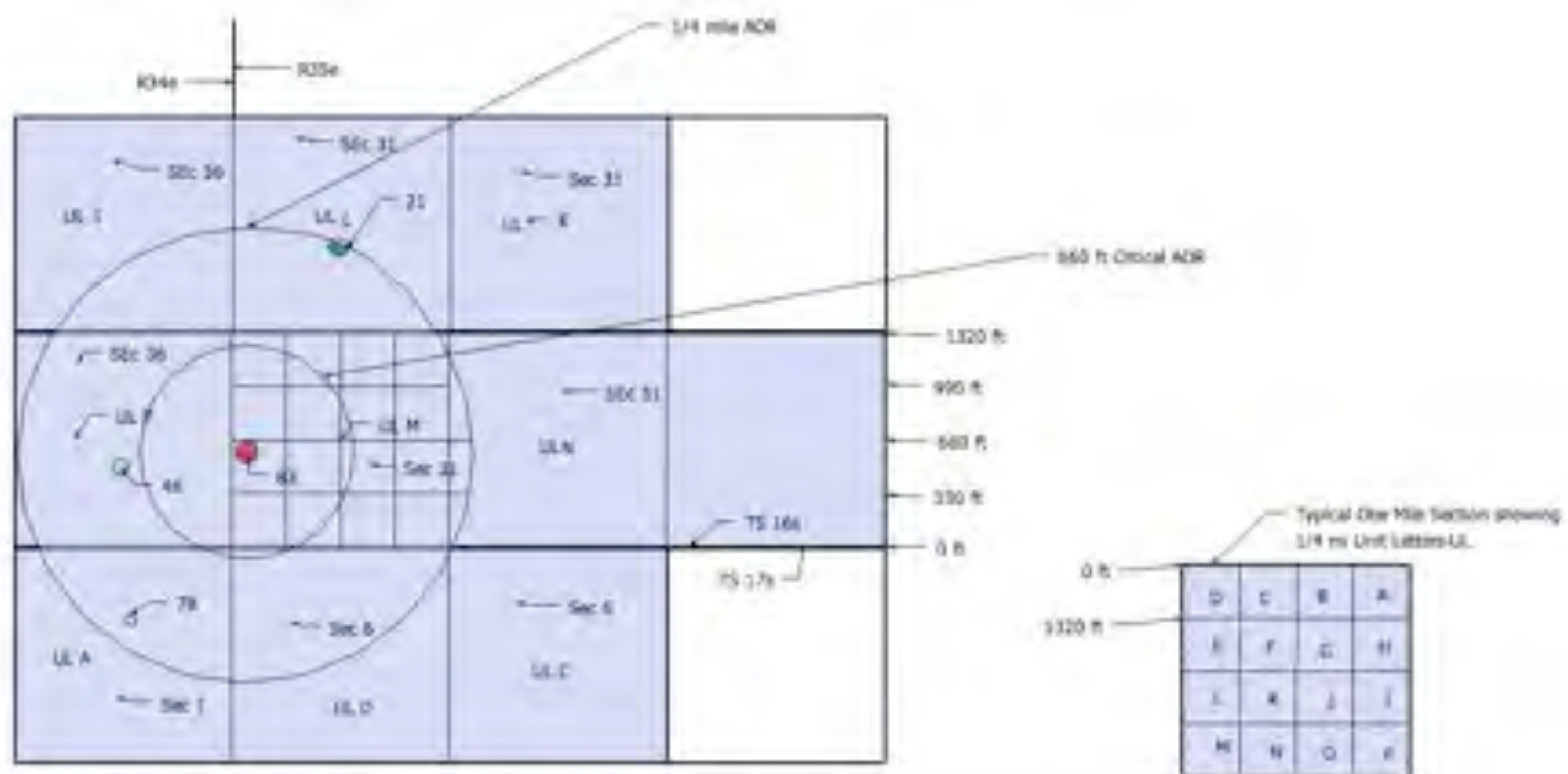
3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

\* Means the well is within 660 ft or Critical AOR (1410 ft) of the outside radius of the brine well and casing program will be checked annually.





Drill Well Area of Review (AOR) UL Plot Plan	Well API# 30-025-26853	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wassmund DE	Permit # Btl-04	
AOR Year: 2012	Location: UL M-Sec II-Tal6a-R35e	

Sheridan NVAN 12-A Well #1

API 30-025-25146



## OIL CONSERVATION DIVISION

1220 South St. Francis Dr.  
Santa Fe, NM 87505

WILL APP NO: 30-0285-25146  
 1. Initial Type of Lease: RAYE ☒ FRI ☐  
 2. State Oil & Conservation No.  
 3. Lease Name or Unit Agreement Name: FIVE M. VACUUM OBSERVATION 120 A  
 4. Well Number: 4  
 5. DRILLING Number: 251496  
 6. Pool name or Well: vacuum, 120 North  
 7. Date from the First lease: NMPM County: FRI

## 12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

## NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK	<input type="checkbox"/>	PLUS AND ABANDON	<input type="checkbox"/>
TEMPORARILY ABANDON	<input type="checkbox"/>	CHANGE PLANT	<input type="checkbox"/>
PULL OR ALTER CASING	<input type="checkbox"/>	MULTIPLE COMPL.	<input type="checkbox"/>
CONTINUE COMBING	<input type="checkbox"/>		

## SUBSEQUENT REPORT OF

REMEAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OHS ☐ P. AND A. ☒  
CASING/CEMENT JOBS ☐

OTHER  OTHER 

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE: 84ILP 19.13.7 14 NMAC. For Multiple Completions: Attach 900000 diagram of proposed completion or recommendation.

8-17-10 Notified BLM of Flapping

8-13-10 Mnd & Sat 203xClass C Cut @ 17x4' - 100% 4 Hrs - Tag Cut @ 730'

8-12-10 Ref. Casam @ 573' - Circulate Cont to Surf. of  $8\frac{1}{2}$ " Cong w/ 14022 Class C

8-19-10 Cut off w/ #3 Bar - Install Marker. RDMO

### Spinal Cord

The Release Unit

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE C. J. Miller TITLE Plumbing Supervisor DATE 8-20-10

Typical print name: Carly Beaton E-mail address: CarlyBeaton@msn.com PHONE: 452-523-5786  
Fax: Same as phone

APPROVED BY: Mahy S. Saeed TITLE Compliance Officer DATE 9/12/2012  
 Conditions of Approval (if any)

SEP 2 2007





# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

Suzanne Martinez  
Governor

John H. Berry  
Cabinet Secretary

Bob A. Woods, Ph.D.  
Deputy Cabinet Secretary

Jami Bulley  
Deputy Director  
Oil Conservation Division

Inspection Required - Oilfield Facilities

12 May 12

SIBERIAN PRODUCTION COMPANY, LLC  
FOOTENWAY PLAZA SUITE 1700  
HOUSTON TX 77056

HOBBS OGD

MAY 15 2012

RECEIVED

LETTER OF VIOLATION - Inspection

Dear Operator:

The following inspection(s) indicate that the well, equipment, location or operational status of the well(s) failed to meet standards of the New Mexico Oil Conservation Division as designated in the attached notification letter. To comply with standards imposed by Rules and Regulations of the Division, corrective action must be taken immediately and the violation brought into compliance. The attached section indicates preliminary findings and/or probable nature of the violation. This determination is based on an inspection of your well or facility by an inspector employed by the Oil Conservation Division on the date(s) indicated.

Please notify the proper District Office of the Division, in writing, of the date corrective actions are scheduled to be made or that no further action can be made (re-inspect the well and/or facility).

## INSPECTION DETAIL SECTION

NORTH VACUUM AND NORTH UNIT No.111				P.O. No. 165-34E	AL-025-25146-101-000		
Inspection Date	Type Inspection	Inspector	Violated?	Significant Non-Compliance?	Corrective Action Due By	Inspection No.	
05/10/2012	Plugged Well Surface	Hobbs Mandy Brown	Yes	No	6/17/2012	MOB1213553387	

Comments on Inspection: DEFLECT RELEASE WIRE IN IS 25 IN. NEED TO MAKE ADJUSTIONS IF THIS HAD BEEN NEED FIRST LETTER OR FOR TAGE. NEED TO SUBMIT C-103 SUBSEQUENT FOR PLUGGING. ALSO THIS WELL IS IN THE 1 YEAR TIME FRAME FOR CLEANUP AND RELEASE OF LUGARS. REMOVE SIGN, MISC HUNK AND FLOWLINE AS INDICATED IN PHOTO. THIS IS 1ST LETTER OF NON-COMPLIANCE. MLR

NO  
C-103  
FILED  
AFTER  
P+R

NORTH VACUUM AND NORTH UNIT No.123				P.O. No. 165-34E	AL-025-37018-101-000		
Inspection Date	Type Inspection	Inspector	Violated?	Significant Non-Compliance?	Corrective Action Due By	Inspection No.	
05/10/2012	Running Production	Mandy Brown	Yes	No	6/17/2012	MOB1213558245	

Comments on Inspection: RELEASED THE HEAD OF INITIAL RELEASE. THIS IS 1ST LETTER OF NON-COMPLIANCE. MLR

MAY 15 2012



to the extent that a contractor is required to provide a written statement of objection by the "Contracting Action Plan" (CAP) (not signed) jointly, in order to proceed with work. Each contractor may ask the officer applying to the Division for an extension of time to a date set by the Division. It is the contractor's responsibility to ensure that the CAP is completed and submitted to the Division. Each contractor must also be responsible for ensuring that the CAP is completed and submitted to the Division.

Attest:



**COMPLIANCE OFFICER**

By the ECD District Office

The undersigned hereby certifies that the foregoing is a true and correct copy of the original document as filed with the Division of Contracting and Construction, and that the same is a true and correct copy of the original document as filed with the Division of Contracting and Construction.

P/A'D. OK TO RELEASE

DATE: 9/12/2012

COMPANY: LIME ROCK RESOURCES

LEASE NAME and # NORTH VACUUM ABO NORTH UNIT # 1

API# 30-025-25146

UL P SECTION 36 TOWNSHIP 16S RANGE 34E

SIGNED: Mary Brown

Chevron USA- Chesapeake VII #7  
API 30-025-35678



# RICKS EXPLORATION INC.

State VII #1

Sec. 1-178-34E

Lea Co., NM

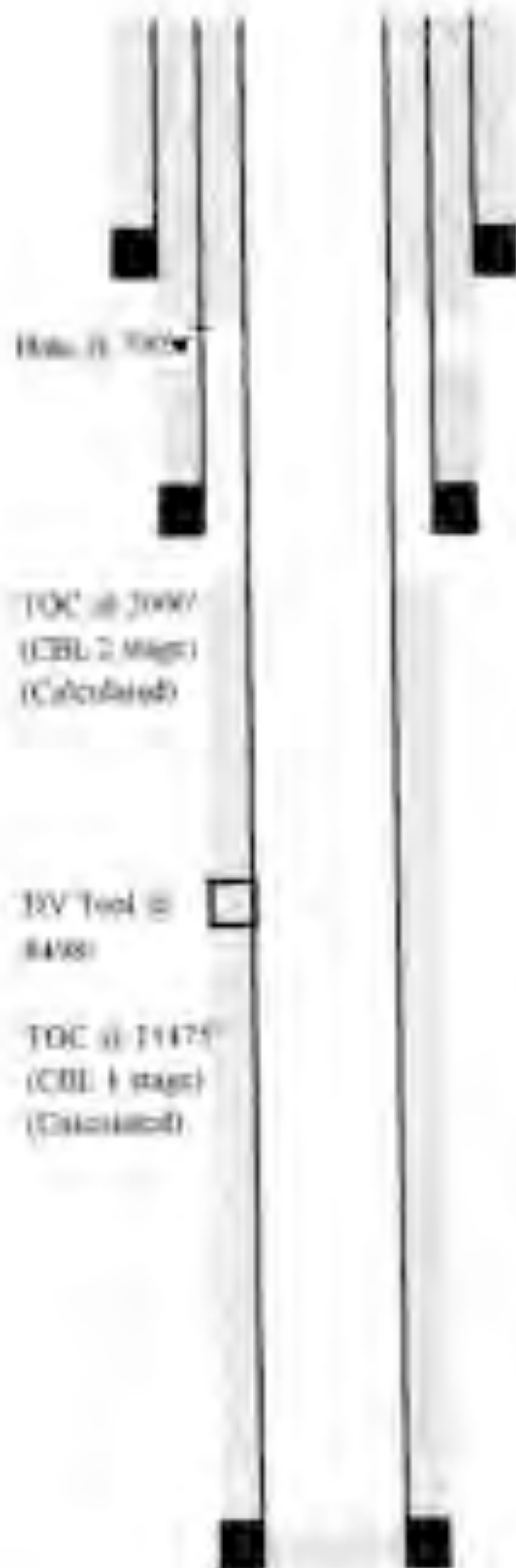
Spud Date: 9/02/01

Proposed 8 5/8" casing repair

GL: 4033'

DF: 4052'

NB: 4053'



## SURFACE CASING:

11-3/4" 42# H40 wt @ 1010'

CMT w/ 700 ccs to diff

## INTERMEDIATE CASING:

8-5/8" 32# K-55 wt @ 5070'

CMT w/ 1100 ccs - Diff not cmt to diff

TOC @ 1740' (Temp Survey)

Hole indicated in 8 5/8" @ 700'

Pump Cl C seat cmt dn 4 1/2" X 8 5/8" annulus until cmt returns to sh

Est 300 ccs

## ATOKA PERFORATIONS

11528' - 11555' 4/SPF (1/93)

Loc on Pkr @ 11682' w/ w/oil tool & plug set in R. Apple @ 11750'  
(4" TCP jam in hole)

11902' - 11934' 4/SPF (10/3)

## PRODUCTION CASING:

4-1/2" E138 P110 LT&C @ 12732

Cement w/ 1100 ccs

PBTD: 12722'

TD: 12750'

BOH 11/12/01



District I  
 1422 N. French Dr., Roswell, NM 87203  
 District II  
 1111 South First, Amarillo, NM 87510  
 District III  
 1100 Elm Street Road, Alameda, NM 87410  
 District IV  
 2540 South Pacheco, Santa Fe, NM 87505

State of New Mexico  
 Energy Minerals and Natural Resources

Form C-101  
 Revised March 17, 1990

Oil Conservation Division  
 2040 South Pacheco  
 Santa Fe, NM 87505

Submit to appropriate District Office  
 State Lease - 6 Copies  
 Fee Lease - 5 Copies

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

Operator Name and Address BLICKS EXPLORATION, INC. 210 PARK AVE OKLAHOMA CITY, OKLAHOMA 73102		Lease Number 188489
Lessee Name LYNN SUCHY 405-516-1130		APN Number M-025-35678
Property Code 28998	STATE UTI	Well No. ?

Surface Location

LL well No.	Section	Township	Range	Location	Footwall No.	North/South line	Footwall No.	East/West line	County
Δ/1	1	17S	34E		660'	NORTH	660'	EAST	LEA

Proposed Bottom Hole Location If Different From Surface

LL well No.	Section	Township	Range	Location	Footwall No.	North/South line	Footwall No.	East/West line	County
Proposed Foot 1 VACUUM-ATOKA, MORROW NORTH (068005)					Proposed Foot 2				

Well Type Code B	Well Type Code G	Casing/Screen ROYALTY	Lease Type Code 15	Overall Lease Extension 4033'
Example NO	Proposed Depth 11,000'	Remarks Alaska - Morrow	Casing/Screen PATTERSON	Special Note WHEN APPROVED

Proposed Casing and Cement Program

Casing Size	Casing Foot	Casing Weight/Foot	String Depth	Cement	Remarks/DOC
21"	20'	Conductor	40'	Redi-mix	surface
14 3/4"	11 3/4"	42	1600'	180 Sx	surface
12 1/2"	8 5/8"	24	5000'	1190 Sx	1100' JS
7 7/8"	3 1/2"	17	13,000'	670'	7500' JS

\* Describe the proposed program. If not applicable, it is OK to check PLUGBACK, give the date of the permit expiration date and proposed new production date.

Describe the planned prevention program, if any. Use additional sheets if necessary.

1. Drill 21" hole to 40'. Set 40' of 20" conductor and cement to surface with Redi-mix.
2. Drill 14 3/4" hole to 1600'. Run and set 1600' of 11 3/4" J-55 42# STAG casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1% Fluoride/Sx. Circulate cement to surface.
3. Drill 12 1/2" hole to 5000'. Run and set 5000' of 8 5/8" 24032# J-55 STAG casing. Cement with 1190 Sx. of Class "C" cement + 2% CaCl + 1% Fluoride/Sx. Circulate top of cement 1100'.
4. Drill 7 7/8" hole to 13,000'. Run and set 13,000' of 3 1/2" 17# K-80 17# casing. Cement with 670 Sx. of Class "B" Premium Plus cement + additives. Top of cement at least 100' above upper most Perforation.

Permit Expires 1 Year From Approval  
 Date Mining Drilling Underway

\* I hereby certify that the information given above is true and correct to the best of my knowledge and belief.

Signature: *Joe T. Janice*  
 Printed name: Joe T. Janice

Title: Agent

Date: 10/18/91

Phone: 405-391-8501

OIL CONSERVATION DIVISION

Approved by: *[Signature]*

Per: *[Signature]*

Approved Date: *[Signature]*

Expiration Date: *[Signature]*

Signature of Applicant: *[Signature]*

100

100



INSTRUMENT  
F.O. Am. 1940, State, NM 88340

INSTRUMENT  
F.O. License 20, Ariz., NM 88317

INSTRUMENT  
1000 Nat. Bureau Bld., Ariz., NM 87413

**OIL CONSERVATION DIVISION**  
2040 Pacheco St.  
Santa Fe, NM 87305

WELL API NO.

10-6025-15678

1. Indicate Type of Lease

STATE ☒ FEDERAL ☐

2. State Oil & Gas Lease No.

28798

3. Lease Name or Other Agreement Name

STATE VII

4. Well No.

7

5. Pool name or Wellhead

Vacuum - Atoka, Morrow North

**SUNDY NOTICES AND REPORTS ON WELLS**  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM G-101) FOR SUCH PROPOSALS.)

1. Type of Well

Oil Well ☐

Gas Well ☒

Other

2. Name of Operator

Rice Exploration, Inc.

3. Address of Operator

210 Park Ave., Suite 3000

4. Well Location

East Line 5 - 400' Feet From The North Line 650' Feet From The East Line

Section 1 Township 17S Range 14E NMPM 140 East County

15. Township (State number 10, 11, 12, etc.)

17S

11. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐

PLUG AND ABANDON ☐

TEMPORARILY ABANDON ☐

CHANGE PLANS ☐

PULL OR ALTER CASING ☐

OTHER: Add perforations ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐

ALTERING CASING ☐

COMMENCE DRILLING OPS. ☐

PLUG AND ABANDONMENT ☐

CASING TEST AND CEMENT JOB ☐

OTHER ☐

12. Describe Proposed or Completed Operations (Clearly state all proposed details and give pertinent data, including estimated date of putting any proposed work) SEE RULE 100.

Re: S/L Unit. Run in hole w/Oil and tag TCF to verify W/L. Fish is still @12070' in the 2-1/8" tbg string. Set collar stop and W/L plug @12000'. Set W/L and perforate 4 holes in 2-1/8" tbg., 1 ft above W/L plug @12000'. Set FL to 4000'. Release Retrievable Packer & TCH w/1-1/8" production string. Run W/L, tag Profile Nipple in 2-3/8" casings below permanent packer @12445', set W/L plug just above Nipple. TCH w/Model 8 Retrievable Packer on 2-1/8" tbg to 12298', & circ. Set Packer and pressure test plug in permanent Packer. Release Packer, spot acid from 12298'-12305'. TCH w/tbg & Packer. Run W/L and perforate interval from 12280'-12298', w/1-1/8" casings, 4 SP, 40 deg phasing. TCH w/3-Nipples (1X plug in place, 10' 3in, 15X Retrievable Packer, set @12200'+/-). Acidize, seal, & test. Evaluate production and treat if necessary. Return well to production. Procedure to be completed in September, 2002, or as soon as possible.

I hereby certify that the information given in this well location is the best of my knowledge and belief.

SIGNATURE

*Lyne Rudy*

TITLE

STILLING ENGINEER

DATE

8/21/02

171

406/516-111

TELEPHONE NO.

TYPE OR PRINT NAME

Lyne Rudy

(The name for the well)

APPROVED BY

(Signature of Operator, if any)

OK WITH PERMIT

TITLE

AUG 21 2002



Submit 3 Copies To Appropriate District  
Office  
District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1501 W. Grand Ave., Amarillo, NM 89101  
District III  
1000 Rio Bruma Rd., Alamogordo, NM 87418  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM  
87505

State of New Mexico  
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-104  
Revised March 15, 1999

<b>SUNDRY NOTICES AND REPORTS ON WELLS</b> (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. 10-075-15678
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input checked="" type="checkbox"/> Other <input type="checkbox"/>		5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
2. Name of Operator Rocka Exploration, Inc.		6. State Oil & Gas Lease No.
3. Address of Operator 210 Park Ave, STE 1000, Oklahoma City, OK 73102		7. Lease Name or Unit Agreement Name: State VII
4. Well Location Unit Layer: A 150 feet from the North line and 150 feet from the East line Section 1 Township 17S Range 34E NMPM Lea County		8. Well No. <del>34</del> 7
10. Elevation (Show whether DR, PCH, RT, GR, etc.) 4633' GR.		9. Foot name of Wellcat Vaguan-Aldex, Morris North

11. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data  
**NOTICE OF INTENTION TO:**

PERFORM REMEDIAL WORK ☒ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPLETION ☐  
OTHER ☐

**SUBSEQUENT REPORT OF:**  
REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPERATIONS ☐ PLUG AND ABANDONMENT ☐  
CASING TEST AND CEMENT JOB ☐  
OTHER ☐

12. Describe proposed or completed operations. (Clearly state all pertinent details and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1405. For Multiple Completions: Attach wellbore diagram of proposed completion re-completion.

( R/L R/L Services. R/L to accept return via 11 1/2" X 8 5/8" annulus. Establish circulation via 4 1/4" X 8 5/8" annulus. Pump CI C cement (14.8 ppb) Yield (1.34 (b) (a)) until cement is circulated to surface (Estimate: 30) (a). R/L R/L

I hereby certify that the information shown is true and complete to the best of my knowledge and belief.

SIGNATURE [Signature] TITLE Engineer DATE 11/14/91

Type or print name Bryan Rether Telephone No. 405/510/1100

(This space for State use)

APPROVED BY \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_  
(Indicate if approval, if any)



## RECEIVED

District I  
 1625 N. French Dr., Hobbs, NM 88240  
 Phone (505) 393-4141 Fax (505) 393-0726  
 District II  
 811 S. First St., Artesia, NM 88211  
 Phone (505) 748-1242 Fax (505) 748-9726  
 District III  
 1000 E. Broadway Rd., Alamogordo, NM 88410  
 Phone (505) 334-4178 Fax (505) 334-4179  
 District IV  
 1220 S. St. Francis Dr., Santa Fe, NM 87503  
 Phone (505) 435-3479 Fax (505) 435-3481

State of New Mexico  
 Energy, Minerals and Natural  
 Resources

Oil Conservation Division  
 1220 S. St Francis Dr.  
 Santa Fe, NM 87505

Form C-145  
 August 1, 2011  
 Permit 155721

## Change of Operator

## Previous Operator Information

OGRID: 147179  
 Name: CHOCOLA LAKE OPERATING, INC.  
 Address: P.O. Box 18496  
 City, State, Zip: Oklahoma City, OK 73154

## New Operator Information

Effective Date: Effective on the date of approval by the OCD  
 OGRID: 4323  
 Name: CHEVRON U S A INC  
 Address: Attn: Sandy Seidman-Daniel  
 P.O. Box 2100  
 City, State, Zip: Houston, TX 77252

I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information on this form and the certified list of wells is true to the best of my knowledge and belief.

Additionally, by signing below, CHEVRON U S A INC certifies that it has read and understands the following synopsis of applicable rules.

PREVIOUS OPERATOR certifies that all below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells being transferred are either (1) in compliance with 19.15.17 NMAC, (2) have been closed pursuant to 19.15.17.13 NMAC or (3) have been retrofitted to comply with Paragraphs 1 through 4 of 19.15.17.11(f) NMAC.

CHEVRON U S A INC understands that the OCD's approval of this operator change:

1. constitutes approval of the transfer of the permit for any permitted pit, below-grade tank or closed-loop system associated with the selected wells; and
2. constitutes approval of the transfer of any below-grade tanks constructed and installed prior to June 16, 2008 associated with the selected wells, regardless of whether the transferor has disclosed the existence of those below-grade tanks to the transferee or to the OCD, and regardless of whether the below-grade tanks are in compliance with 19.15.17 NMAC.





information, and I am responsible for updating that information when it changes. See 19.15.B.5.C. NMAC. I understand that I can update that information on the OGD's website under "Electronic Permitting."

10. If I transfer well operations to another operator, the OCD must approve the change before the new operator can begin operations. See 19.15.9.9.B NMAC. I remain responsible for the well and related facilities and all related regulatory filings until the OCD approves the operator change. I understand that the transfer will not relieve me of responsibility or liability for any act or omission which occurred while I operated this well and related facilities.

Previous Operator

Survivors

Printed Name:

Dagfinn A. Isachsen

44

Executive Vice President  
Accountants & Consultants

Date:

50093513 Phone: 406-833-5000

### New Operator

## Summary

Dedicated

## History

TEAM

Down

**NMOCD Approval**

Electronic Signature: Randy Dade, District 2

Date: October 09, 2012

BTA Oil Producers

API 30-025-31621



Submit to Appropriate  
District Office  
State Lease - 5 copies  
Fee Lease - 3 copies  
DISTRICT 1  
P.O. Box 1982, Hobbs, NM 88240

DISTRICT 2  
P.O. District 2D, Artesia, NM 88210

DISTRICT 3  
1000 Rio Grande S.E., Alamogordo, NM 87410

State of New Mexico  
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION  
P.O. Box 2088  
Santa Fe, New Mexico 87504-2088

Form C-100  
Revised 1-1-89

WELL APHS

30-025-31621

5. Lease Type of Lease

STATE ☒

FEE ☐

6. State Oil & Gas Lease No.

Y-3836

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

1A. Type of Well: OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER ☐

5. Type of Completion:

NEW ☒ MOD. ☐ REPAIR ☐ PLUG BACK ☐ STOP ☐ OTHER ☐

2. Name of Operator

ATA Oil Products

3. Address of Operator

104 S. Pecos, Midland, TX 79701

4. Well Location

Unit Lease: 1-1-1980, Deck From The South, Case and 600 Feet From The West Line

Section 31 Township 16S Range 35E NE/4 Sec 31

10. Date Spudded: 1-8-92 11. Date TD Reached: 8-13-92 12. Date Compl. (Ready to Prod): 8/24/92 13. Dimensions (D/A R/B, RT. GR. etc.): 4025' CG 4042' R/B 14. Elev. Casings: 12,415-12,425 (Atoka)

15. Total Depth: 12,900 16. Plug Back TD: 12,823 17. If Multiple Completions, How Many Zones? 18. (Inventory Control by) 12,900 19. Cable Tools

20. Producing Interval(s) of this completion - Top, Bottom, Name

12,415-12,425 (Atoka)

21. Was Orientation Survey Made

No

22. Type Electric and Other Log(s) Run

LOG-EDT

23. Was Wire Core?

No

24. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB/FT	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT FILLED
13-1/8	58	423	17-1/2	580 cu - Circ	
8-5/8	32	4795	11	2300 cu - Circ	
5-1/2	17 & 20	10800	7-1/8	2100 cu - Circ	

25. LINER RECORD

SIZE	TOP	BOTTOM	BACKS CEMENT	SCREEN	SIZE	DEPTH SET	PACKER SET
					7-7/8	12,328	12,153

26. Perforation record (interval, size, and number)

DEPT. INTERVAL	AMOUNT AND KIND MATERIAL USED
12,415-12,425 (21 holes)	A/W 470 gr/s
W/L SPE	

27. PRODUCTION

Date First Production 08/20/92	Production Method (Flowing, gas lift, pumping - Size and type pump) Flowing					Well Status (Prod. or Shut-In) Shut-In	
Date of Test 8-25-92	Hours Tested 24	Choke Size 48/64	Pressure Test Period	Oil - Bbl 11	Gas - MCF 756	Water - Bbl 0	Gas - Oil Ratio 11.0/1
Flow Testing From (20)	Casing Pressure 80+	Estimated 14-Flow Rate	Oil - Bbl 12	Gas - MCF 156	Water - Bbl 0	Oil Gravity - API - (Calc) 49.0	

28. Disposition of Gas (Vent, used for fuel, re-inject, etc.)

SI pending pipeline connection

Test Witnessed By

Tom Williams

29. Log Attachments

C 100, Log, inclination

30. I hereby certify that the information shown on each page of this form is true and complete to the best of my knowledge and belief

Signature: Dorothy Houghton Printed Name: Dorothy Houghton Title: Sup. Admin. Date: 9-10-92



# INSTRUCTIONS

This form is to be filed with the appropriate District Office of the Division not later than 20 days after the completion of any newly-drilled or deepened well. It shall be accompanied by one copy of all electrical and radio-activity logs run on the well and a summary of all special tests conducted, including drill stem tests. All depths reported shall be measured depths. In the case of directionally drilled wells, true vertical depths shall also be reported. For multiple completions, items 25 through 29 shall be reported for each zone. The form is to be filed in quadruplicate except on state land, where no copies are required. See Rule 1105.

## INDICATE FORMATION TOPS IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE

### Southeastern New Mexico

T. Adley	T. Canyon
T. Salt	T. Strawn 11761
B. Salt	T. Anoka
T. Yates	T. Miss 12504
T. T. Rivers	T. Devonian
T. Queen	T. Silurian
T. Grayburg	T. Monrovia
T. San Andres	T. Simpson
T. Giarata 6225	T. McKee
T. Paddock	T. Ellenburger
T. Blinney	T. Gr. Wash
T. Tubb 7518	T. Delaware Sand
T. Drinkard	T. Blue Springs
T. Abo 8185	T.
T. Wolfcamp	T.
T. Perm	T.
T. Coo (Bough C)	T.

### Northwestern New Mexico

T. Ojo Alamo	T. Perm. "B"
T. Kinland-Fossiland	T. Perm. "C"
T. Pictured Cliffs	T. Perm. "D"
T. Cliff House	T. Leakeville
T. Mesquite	T. Madison
T. Point Lookout	T. Elbert
T. Mancos	T. McCracken
T. Gallup	T. Ignacio Oaks
Blue Greenhorn	T. Granite
T. Dakota	T.
T. Morrison	T.
T. Todillo	T.
T. Escada	T.
T. Wingate	T.
T. Chino	T.
T. Permian	T.
T. Perm "A"	T.

### OIL OR GAS SANDS OR ZONES

No. 1, from 12513 to 12523  
No. 2, from to  
No. 3, from to  
No. 4, from to

### IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from to feet  
No. 2, from to feet  
No. 3, from to feet

### LITHOLOGY RECORD (Attach additional sheet if necessary)

From	To	Thickness in Feet	Lithology	From	To	Thickness in Feet	Lithology
Surface	423	423	Surface rock & sand				
423	1800	1377	Anhydrite				
1800	3013	1865	Salt & Anhydrite				
3013	4105	1090	Shale & anhydrite				
4105	5890	1785	Anhydrite, Dolomite, Shale & Sand				
5890	6815	925	Dolomite & Shale				
6815	8875	2060	Dolomite				
8875	9755	880	Dolomite, Anhydrite, & Lime				
9755	10134	379	Lime & Shale				
10134	12045	1911	Lime & Shale				
12045	12900	855	Lime, Sand, & Shale				

RECEIVED

SEP 17 1952

DEPT. OF MINES OFFICE



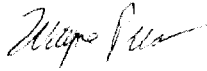
**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2013**

Wasserhund Inc.  
Tatum Brine Station  
OCD Permit BW-22  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e  
May 30, **2014**

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

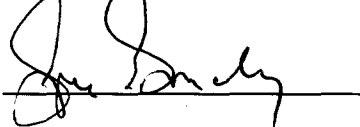
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.")

During the 2013 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in Appendix "A").*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. **(Appendix "A" shows system filling station photos.)**

Inspections revealed that the loading area concrete sump was not tested in 2013 as planned. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 01, 2014, next annual report.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test. The next scheduled 5-year test was due in 2013, and a successful test was performed in September of 2013.

The brine well was drilled in 1980 and has been in operation for approximately 34 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.



A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2013 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2013 brine production volume was 763,400 bbls and the lifetime production volume is 8,282,699 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

**Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 "A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.")

Please find attached in **Appendix "C"** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected April 14, 2014 and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with a high density of 1.19 specific gravity. This analysis is very representative of Salado "Salt" formation waters found in the area.

**Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc;")

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013 for the past year. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix "D"** a copy of the test chart and meter calibration record.

**Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 "Brief explanation describing deviations from normal operations.")

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

#### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 "Results of any leaks and spill reports;")

There were no reportable leaks and spills in 2013.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

#### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 "An Area of Review (AOR) update summary;")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix "E"**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix "E"**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well i.e. 296 feet (R = 148 ft) up-dated for 2013, a 10:1 safety factor is applied that equates to about 1480 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2013 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1480 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1480 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** The Sheridan NVANU 12-A well #1, according to OCD records is located 460 FSL & 660 FEL of UL P Section 36-Ts16s-R34e. It is shown to be located approximately 700 ft to the WSW of the BW-04 well. This well was drilled in 1975 with surface casing set at 1680 ft and cemented with 760 sacks. A 4-1/2 inch production casing was set at 8980 feet and cemented with 800 sacks.

According to well records in 2011 there appeared to be no cement behind the 4-1/2 casing from 1681 feet to 5500 feet, leaving the salt section exposed to the 4-1/2 casing.

In 2000, a number of casing leaks were noted to be between 4920 feet to 5570 feet. In 2007, a Sheridan well bore schematic noted a water flow up annulus from the off set brine well.

Wasserhund Inc., Price LLC, and OCD reviewed this scenario, and there was no indication that this water was from the brine well. This area is known for being pressured up and the flow was most likely produced water, not brine water. In addition, the brine well as never lost integrity, discounting the Sheridan report.

In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

This well was drilled in 2001 with surface casing set at 1610 feet bgl and cemented with 790 sacks circulated to surface. Intermediate casing was set at 5020 feet and cemented with 1190 sacks with top of cement @ 1740 feet (temp survey). A long string was ran and set at 12,732 feet and cemented with 1380 sacks with top of cement at approximately 2000 feet. From this analysis, it appears that maybe some of casing is exposed to the salt section without adequate cement.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a bradenhead issue, and required corrective actions and a Mechanical Integrity Test. (*see copy included in Appendix "E"*).

Conclusions: It is unclear from the reports filed with OCD how the well was actually completed. The description above was taken from C-103's "Notice of Intent", but no final approved C-103 Subsequent report was found. This well was transferred to Chevron USA in 2013 and no issues have been reported to Wasserhund Inc.

Corrective Actions and Recommendation: Wasserhund Inc. will notify OCD if any suspected issue arises from this well and any corrective action should be between OCD and Chevron. Wasserhund Inc. does recommend that OCD require Chevron to isolate the salt section, as most wells are completed in the area.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "upright cone". The volume of the cavern is calculated using the lifetime brine production volumes and using a "rule of thumb" conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix "F"**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 8.28 million barrels of brine produced as of December 2013. The maximum diameter was calculated to be approximately 296 feet with a corresponding D/H ratio of .141 updated for the 2013 year.

Comparing the current D/H ratio of .141 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 148-foot radius superimposed around the brine well and station. The radius has increased by 7.0 feet from last year.

**Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. “Solution Cavern Monitoring Plan Program”. A copy of the proposal is included in **Appendix “G”** for OCD review and approval.

Special Note: Wasserhund Inc. **request a Minor Modifications** that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an “Induced Current Method” and report these results in the next annual report.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

### **Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 “A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;”)*

*See Bullet Point #2 for summary.*

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee’s cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

**Appendix “H”** contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

### **Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 “Annual Certification in accordance with Permit Condition 2.B.3. “**2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.”)*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.



**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the final results concerning groundwater will be listed in the 2014 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- Discharge Plan BW-04





**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**



State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## **DISCHARGE PERMIT BW-4**

### **1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.



**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD



Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts

2013 Wasserhund Inc OCD BW-04 Annual Production Data										
				Brine-BBLS	Fresh-BBLS		Plus numbers represent more fresh injected than			
							% diff			
Jan				88235	88460		0.26%			
Feb				66445	66760		0.47%			
Mar				70978	71273		0.42%			
Apr				67760	67935		0.26%			
May				58395	58590		0.33%			
Jun				60925	61150		0.37%			
Jul				59405	59550		0.24%			
Aug				65676	65775		0.15%			
Sept				54094	54294		0.37%			
Oct				60555	60677		0.20%			
Nov				48488	48489		0.00%			
Dec				62444	62571		0.20%			
2013 Total				763,400	765,524		0.28%			
Total Brine Water Production Carry Over from Years Past BBLs				7,519,299						
Total Production year ending 2013				8,282,699	bbls					

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

### Sample: 359859 - BW-4 Fresh

Param	Flag	Result	Units	RL
Chloride		399	mg/L	2.5
pH		7.77	s.u.	2
Specific Gravity		1.00	g/ml	
Total Dissolved Solids		1000	mg/L	2.5

### Sample: 359860 - BW-4 Brine

Param	Flag	Result	Units	RL
Chloride		219000	mg/L	2.5
Dissolved Sodium		101000	mg/L	1
pH		6.99	s.u.	2
Specific Gravity		1.19	g/ml	
Total Dissolved Solids		132000	mg/L	2.5

### Sample: 359861 - BW-22 Fresh

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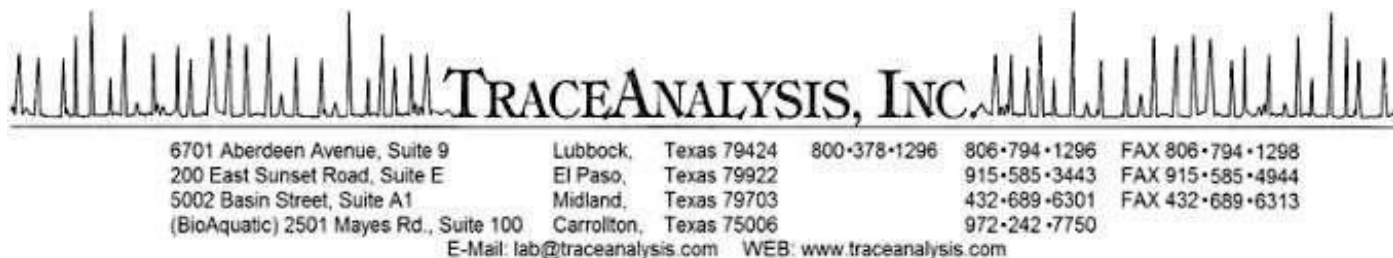
Param	Flag	Result	Units	RL
Chloride		<b>406</b>	mg/L	2.5
pH		<b>7.99</b>	s.u.	2
Specific Gravity		<b>0.996</b>	g/ml	
Total Dissolved Solids		<b>1240</b>	mg/L	2.5

---

**Sample: 359862 - BW-22 Brine**

Param	Flag	Result	Units	RL
Chloride		<b>19300</b>	mg/L	2.5
Dissolved Sodium		<b>10400</b>	mg/L	1
pH		<b>6.41</b>	s.u.	2
Specific Gravity		<b>1.03</b>	g/ml	
Total Dissolved Solids		<b>31900</b>	mg/L	2.5

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## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM, 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 18 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich".

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager



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## Case Narrative

Samples for project Annual Report were received by TraceAnalysis, Inc. on 2014-04-08 and assigned to work order 14040811. Samples for work order 14040811 were received intact at a temperature of 2.9 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	94115	2014-04-10 at 16:00	111321	2014-04-10 at 17:33
Chloride (IC)	E 300.0	94116	2014-04-10 at 16:00	111322	2014-04-10 at 17:33
Na, Dissolved	S 6010C	94164	2014-04-22 at 18:51	111398	2014-04-23 at 11:10
pH	SM 4500-H+	93825	2014-04-08 at 13:44	110975	2014-04-08 at 13:45
Specific Gravity	ASTM D1429-95	93887	2014-04-10 at 09:20	111053	2014-04-10 at 09:45
TDS	SM 2540C	94005	2014-04-09 at 16:00	111195	2014-04-09 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14040811 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

# Analytical Report

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-04-10	Analyzed By:	RL
QC Batch:	111321	Sample Preparation:	2014-04-10	Prepared By:	RL
Prep Batch:	94115				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	399	mg/L	10	2.50

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-04-08	Analyzed By:	AT
QC Batch:	110975	Sample Preparation:	2014-04-08	Prepared By:	AT
Prep Batch:	93825				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.77	s.u.	1	2.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-04-10	Analyzed By:	CF
QC Batch:	111053	Sample Preparation:	2014-04-10	Prepared By:	CF
Prep Batch:	93887				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.00	g/ml	1	0.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-04-09	Analyzed By:	RL
QC Batch:	111195	Sample Preparation:	2014-04-09	Prepared By:	RL
Prep Batch:	94005				

Report Date: April 23, 2014  
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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1000</b>	mg/L	20	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	111321	Date Analyzed:	2014-04-10	Analyzed By:	RL
Prep Batch:	94115	Sample Preparation:	2014-04-10	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>219000</b>	mg/L	5000	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	111398	Date Analyzed:	2014-04-23	Analyzed By:	LM
Prep Batch:	94164	Sample Preparation:	2014-04-22	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	<b>101000</b>	mg/L	100	1.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110975	Date Analyzed:	2014-04-08	Analyzed By:	AT
Prep Batch:	93825	Sample Preparation:	2014-04-08	Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>6.99</b>	s.u.	1	2.00

Report Date: April 23, 2014  
BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.19</b>	g/ml	1	0.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>132000</b>	mg/L	1000	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	111321	Date Analyzed:	2014-04-10
Prep Batch:	94115	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B	1	<b>406</b>	mg/L	50	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

*continued ...*

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Buckeye(BW-4) Tatum (BW-22)

*sample 359861 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>7.99</b>	s.u.	1	2.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
QC Batch:	111053	Date Analyzed:	2014-04-10	Analyzed By:	CF
Prep Batch:	93887	Sample Preparation:	2014-04-10	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.996</b>	g/ml	1	0.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	111195	Date Analyzed:	2014-04-09	Analyzed By:	RL
Prep Batch:	94005	Sample Preparation:	2014-04-09	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1240</b>	mg/L	20	2.50

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	111322	Date Analyzed:	2014-04-10	Analyzed By:	RL
Prep Batch:	94116	Sample Preparation:	2014-04-10	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>19300</b>	mg/L	1000	2.50

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**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	111398	Date Analyzed:	2014-04-23
Prep Batch:	94164	Sample Preparation:	2014-04-22
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	10400	mg/L	100	1.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	6.41	s.u.	1	2.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.03	g/ml	1	0.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	31900	mg/L	200	2.50

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Buckeye(BW-4) Tatum (BW-22)

## Method Blanks

### Method Blank (1)      QC Batch: 111053

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.998	g/ml	

### Method Blank (1)      QC Batch: 111195

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 111321

QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      QC Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.61	mg/L	2.5

### Method Blank (1)      QC Batch: 111322

QC Batch: 111322      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94116      QC Preparation: 2014-04-10      Prepared By: RL



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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.23	mg/L	2.5

**Method Blank (1)**      QC Batch: 111398

QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      QC Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		1	<0.172	mg/L	1

**Duplicates (1)**      Duplicated Sample: 359865

QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      QC Preparation: 2014-04-08      Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	8.45	8.46	s.u.	1	0	20

**Duplicates (1)**      Duplicated Sample: 359862

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.03	1.03	g/ml	1	0	200

**Duplicates (1)**      Duplicated Sample: 360017

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

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---

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	1690	1720	mg/L	20	2	10

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 111195  
Prep Batch: 94005

Date Analyzed: 2014-04-09  
QC Preparation: 2014-04-09

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	1020	mg/L	10	1000	<25.0	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	10	1000	<25.0	101	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.2	mg/L	1	25.0	1.61	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.1	mg/L	1	25.0	1.61	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	53.0	mg/L	1	50.0	<0.172	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	53.1	mg/L	1	50.0	<0.172	106	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 359861

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1840	mg/L	50	1250	406	115	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1850	mg/L	50	1250	406	116	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)** Spiked Sample: 360083

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	19000	mg/L	500	12500	4720	114	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	19200	mg/L	500	12500	4720	116	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)** Spiked Sample: 360135

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	617	mg/L	1	500	82.16	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	582	mg/L	1	500	82.16	100	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.2	105	90 - 110	2014-04-10

### Standard (CCV-2)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

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#### Standard (CCV-1)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (CCV-2)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (ICV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	49.2	96	90 - 110	2014-04-23

#### Standard (CCV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	50.5	99	90 - 110	2014-04-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-14-10	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments



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Buckeye(BW-4) Tatum (BW-22)

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

Company Name: <b>WASSER HUDD INC</b>		Phone #: <b>575-399-5721</b>											
Address: (Street, City, Zip)		Fax #:											
Contact Person: <b>WAYNE PRICE</b>		E-mail:											
Invoice to: <b>WASSER HUDD 16235 MAIN LEXINGTON NM 88260</b>													
Project #: <b>BW-4 + BW-22</b>		Project Name: <b>ANNUAL REPORT</b>											
Project Location (including state): <b>BUCKEYE (BW-4) TATUM BW-22</b>		Sampler Signature: <i>[Signature]</i>											
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX	PRESERVATIVE METHOD					SAMPLING			
					WATER	SOIL	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE
35989	BW-4 FRESH	1	1000 mL	X								4/4/14 11:43 AM	
860	BW-4 BRINE	1	"	X								4/4/14 11:45 AM	
861	BW-22 FRESH	1	"	X								4/4/14 2:45 PM	
862	BW-22 BRINE	1	"	X								4/4/14 2:49 PM	
ANALYSIS REQUEST (Circle or Specify Method No.)													
Turn Around Time if different from standard													
Hold													

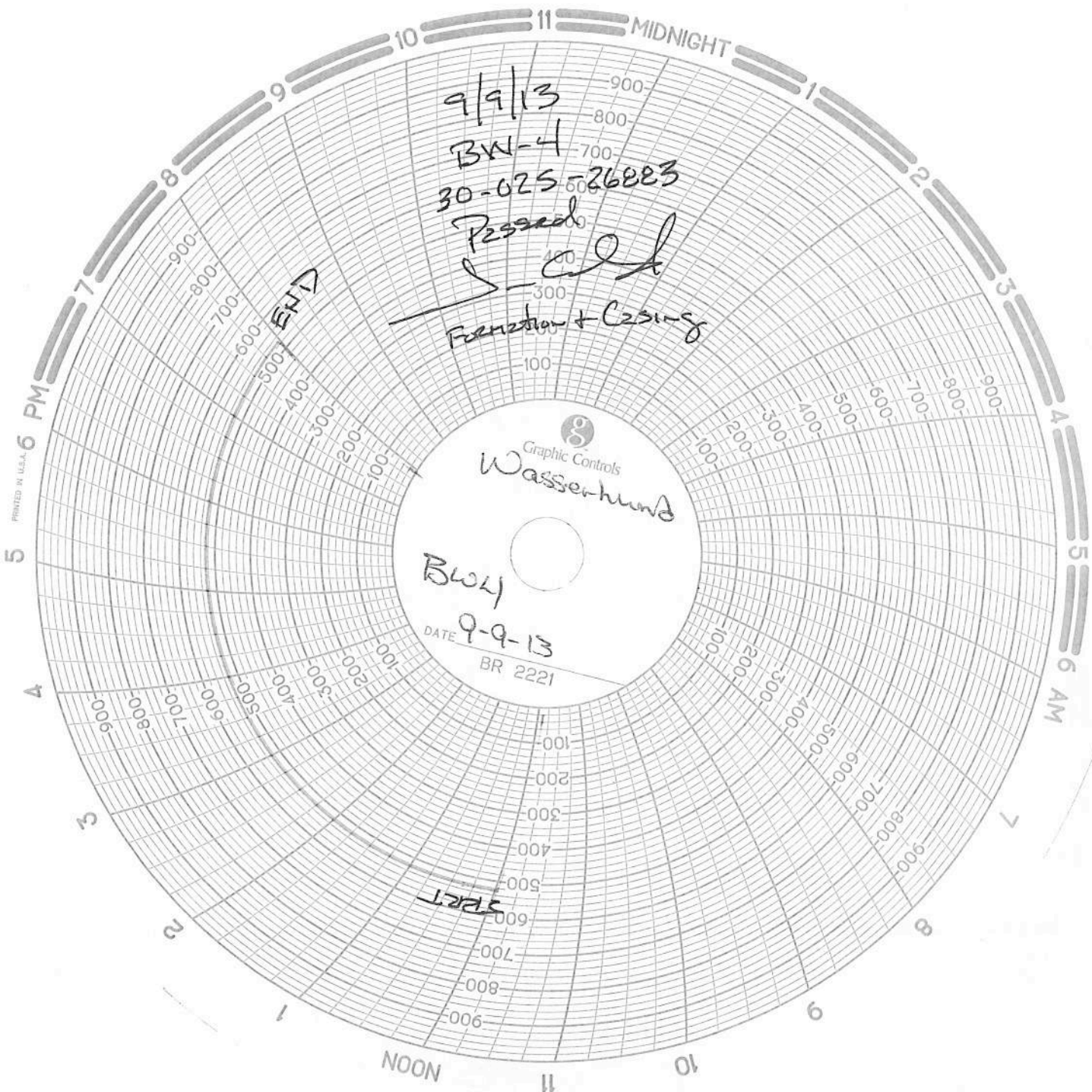
Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## Appendix “D”

- 2013 MIT Chart





9/9/13

BW-4

30-025-26883

Passed

*[Signature]*

Friction + Casing

END

BW4

DATE 9-9-13

BR 2221

START

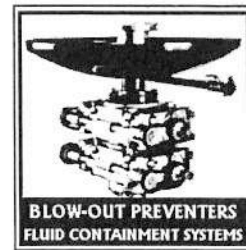
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

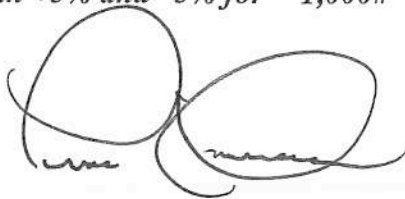
**Unit:** 2

**Model:** 8" Chart recorder

**Pressure Rating:** 1,000#

**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*



\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan
- Field Verification by Price LLC check-off list.
- API # 30-025-35678 Chevron USA LOV Letter

## 2013 BW-04 AOR Review- Well Status List

up-dated May 05, 2014

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>167 FSL &amp; 162 FW</u>	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation by OCD
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWI	Yes*	yes	yes	no

2 2

3 Total # of wells in adjacent quarter-sections

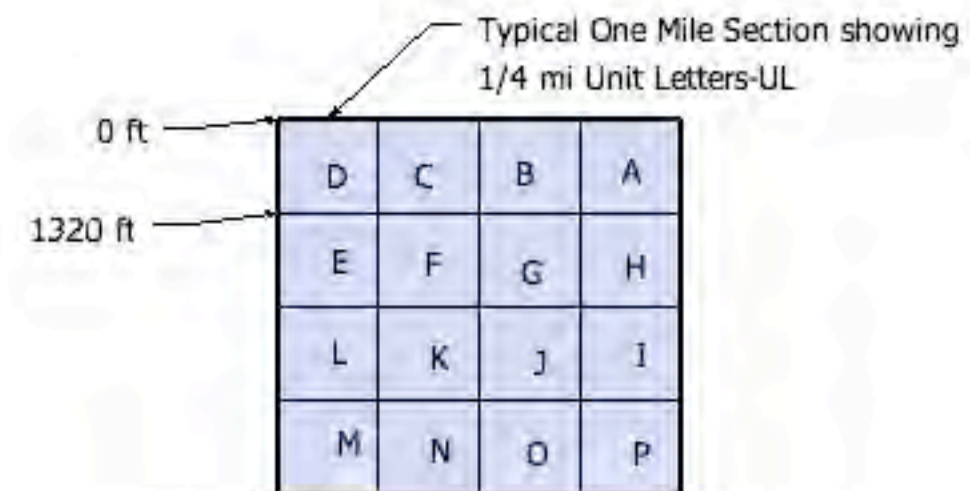
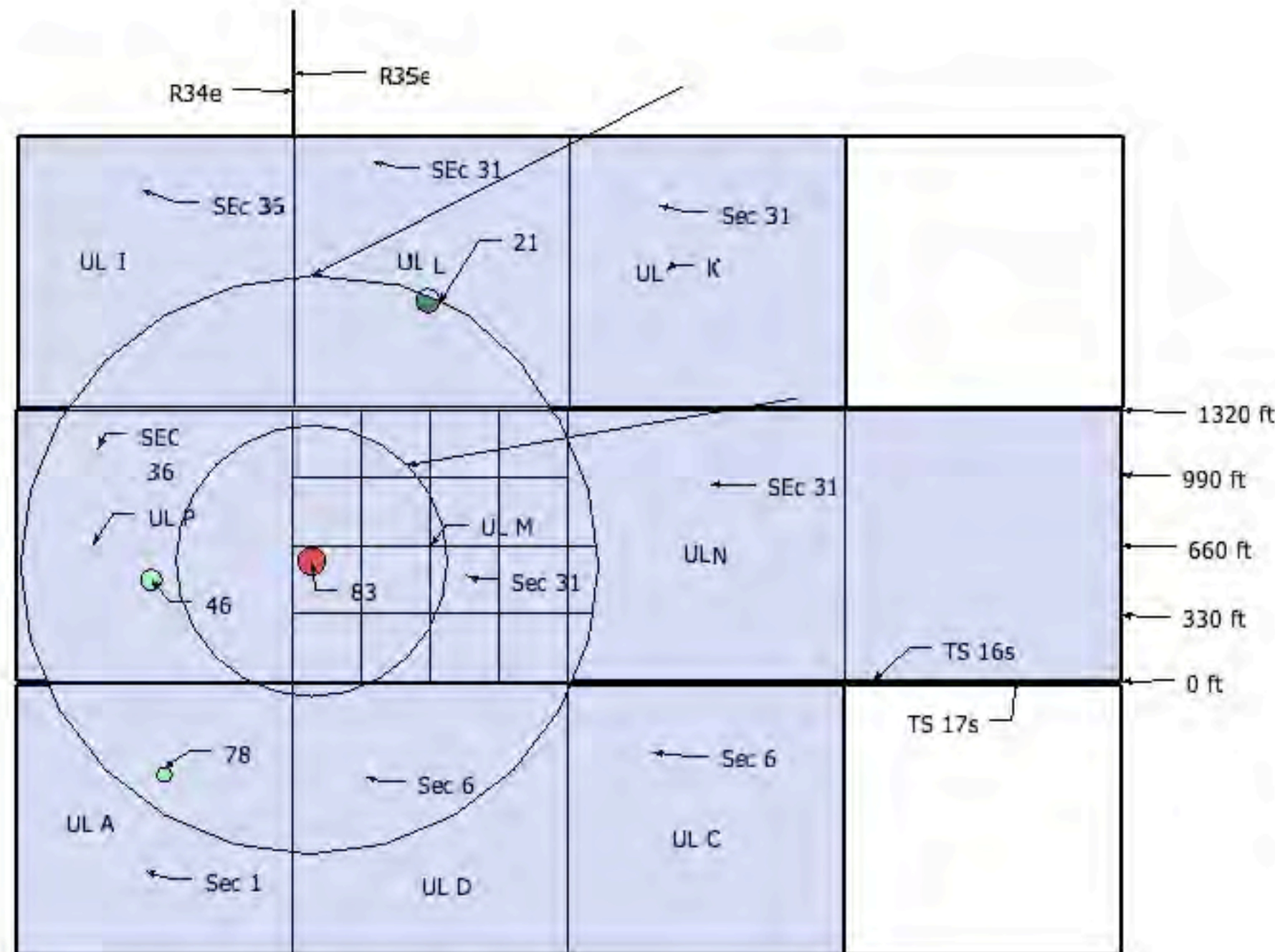
3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

\* Means the well is within 660 ft or Critical AOR (1410 ft) of the outside radius of the brine well and casing program will be checked annually.





Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2013	Location: UL M-Sec 31-Ts16s-R35e	







State of New Mexico  
Energy, Minerals and Natural Resources Department

Susana Martinez  
Governor

HOBBS OCD

John H. Bemis  
Cabinet Secretary

NOV 04 2013

Jami Bailey, Division Director  
Oil Conservation Division

Brett F. Woods, Ph.D.  
Deputy Cabinet Secretary

RECEIVED



**\*Response Required - Deadline**

*Underground Injection Control Program  
"Protecting Our Underground Sources of Drinking"*

01-Nov-13

CHEVRON USA INC.  
ATTN: REGULATORY / NEW MEXICO  
15 SMITH ROAD  
MIDLAND, TX 79705

**LETTER OF VIOLATION and SHUT-IN  
DIRECTIVE Failed Mechanical Integrity Test**

Dear Operator:

The following test(s) were performed on the listed dates on the following well(s) shown below in the test detail section.

The test(s) indicates that the well or wells failed to meet mechanical integrity standards of the New Mexico Oil Conservation Division. To comply with guidelines established by the U.S. Environmental Protection Agency, the well(s) must be shut-in immediately until it is successfully repaired. The test detail section which follows indicates preliminary findings and/or probable causes of the failure. This determination is based on a test of your well or facility by an inspector employed by the Oil Conservation Division. Additional testing during the repair operation may be necessary to properly identify the nature of the well failure.

Please notify the proper district office of the Division at least 48 hours prior to the date and time that the well(s) will be retested so the test may be witnessed by a field representative.

**MECHANICAL INTEGRITY TEST DETAIL SECTION**

QUAIL QUEEN UNIT No.014

30-025-25493-00-00  
G-14-19S-34E

Active Injection - (All Types)		
Test Date:	10/2/2013	Permitted Injection PSI:
Test Reason:	Annual IMIT	Test Result: F
Test Type:	Bradenhead Test	FAIL TYPE: Operational Violation
Comments on MIT:	PRODUCTION CASING RESPONSE ON BHT FORM IS UNCLEAR; NOI TO P&A WELL ON FILE APRVD 4/8/2013;MIRU TO P&A 7/22/2013; WELL SHOWS PLUG AND ABANDONMENT NOT COMPLETED. **TEST RESULTS NOT CLEAR AND/OR IN CONJUNCTION WITH STATUS OF WELL ON RECORD*** OPERATOR IN VIOLATION OF NMOCD RULE 19.15.26.11***	
		Actual PSI:
		Repair Due: 1/5/2014
		FAIL CAUSE:

NOV 04 2013

November 1, 2013

Page 2

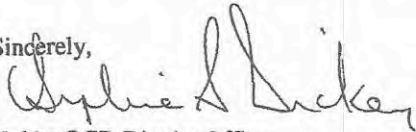
STATE VII No.007

30-025-35678-00-00  
A-1-17S-34E

Test Date:	10/17/2013	Active Gas (Producing)	Permitted Injection PSI:	Actual PSI:	
Test Reason:	Annual IMIT	Test Result:	F	Repair Due:	1/20/2014
Test Type:	Bradenhead Test	FAIL TYPE:	Operational Violation	FAIL CAUSE:	
Comments on MIT:	***FAILED BHT 10/17/2013***OPERATOR IN VIOLATION OF NMOC D RULE 19.15.26.11*** RESULTS OF CASING SHOWS A LIGHT FLOW THAT CONTINUES FOR 5 MINUTES. WELL RECORDS SHOW WELL TO BE A FLOWING GAS WELL WITH PACKER @ 12476; **NOTE OPERATOR NEEDS TO JUSTIFY MECHANICAL INTEGRITY OF CASING RESULTS TO ELIMINATE POSSIBILITY OF PACKER, TUBING AND/OR CASING PROBLEM***				

In the event that a satisfactory response is not received to this letter of direction by the "Repair Due:" date shown above, or if the well(s) are not immediately shut-in, further enforcement will occur. Such enforcement may include this office applying to the Division for an order summoning you to a hearing before a Division Examiner in Santa Fe to show cause why you should not be ordered to permanently plug and abandon this well.

Sincerely,



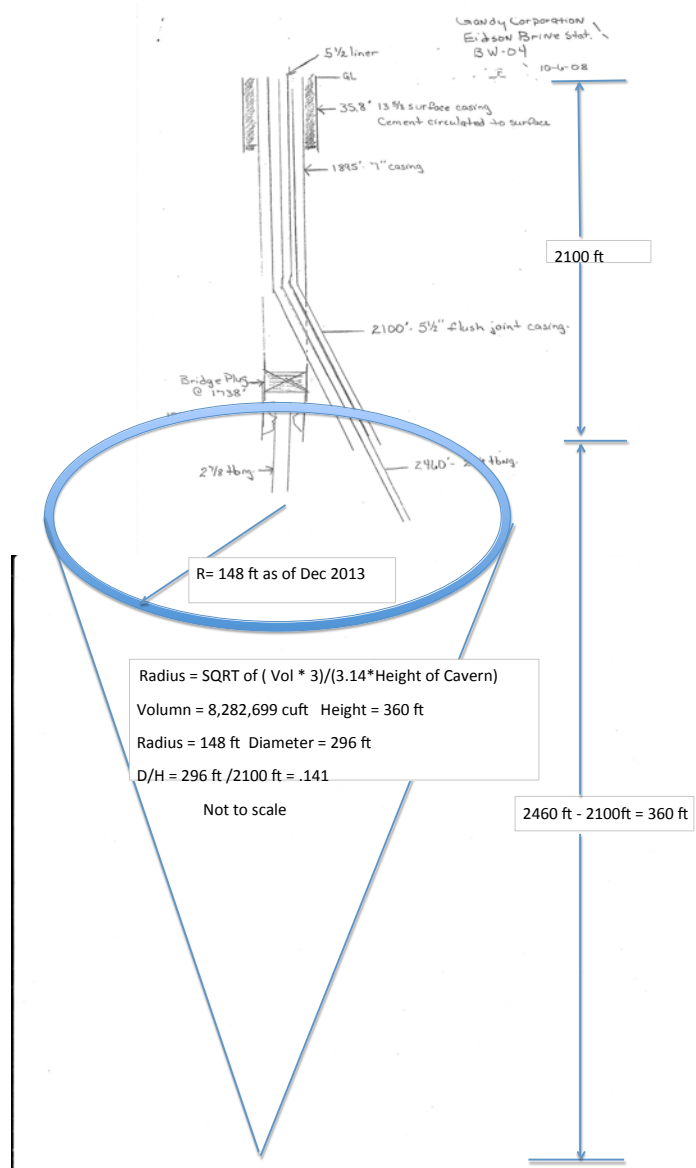
Hobbs OCD District Office

**COMPLIANCE OFFICER**

Note: Pressure Tests are performed prior to initial injection, after repairs and otherwise, every 5 years; Bradenhead Tests are performed annually. Information in Detail Section comes directly from field inspector data entries - not all blanks will contain data. "Failure Type" and "Failure Cause" and any Comments are not to be interpreted as a diagnosis of the condition of the wellbore. Additional testing should be conducted by the operator to accurately determine the nature of the actual failure. \* Significant Non-Compliance events are reported directly to the EPA, Region VI, Dallas, Texas.

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2013 Radius and D/H calculations.
- Aerial View showing Cavern Radius







## Appendix “G”

- Solution Cavern Monitoring Plan Program

# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

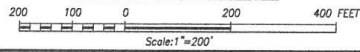
The data will be tabulated and a graph be maintained for each point over the life of the system.

Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only



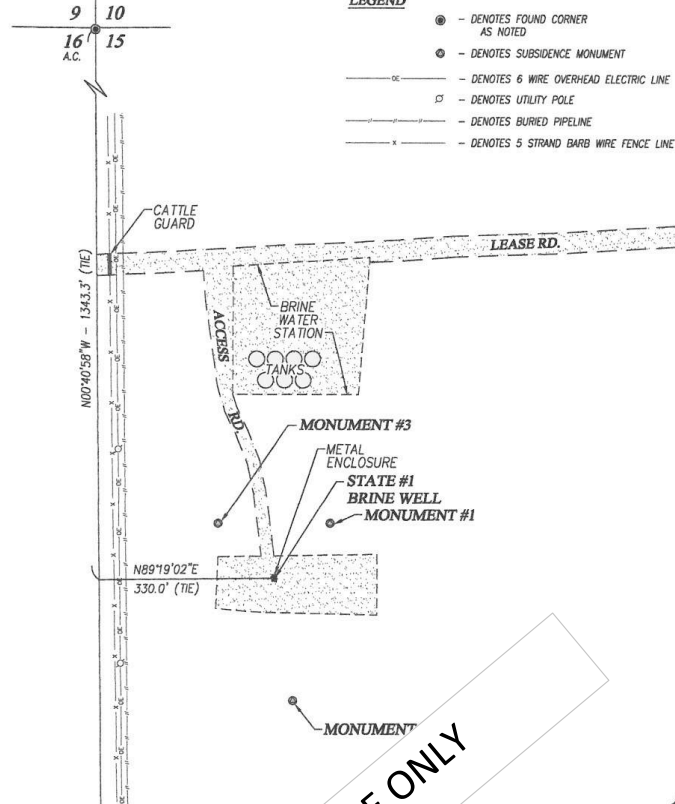
# TOPOGRAPHIC MAP

Figure 4



## LEGEND

- - DENOTES FOUND CORNER AS NOTED
- - DENOTES SUBSIDENCE MONUMENT
- - DENOTES 6 WIRE OVERHEAD ELECTRIC LINE
- - DENOTES UTILITY POLE
- |—|—|— - DENOTES BURIED PIPELINE
- x— - DENOTES 5 STRAND BARB WIRE FENCE LINE



## NOTE

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.



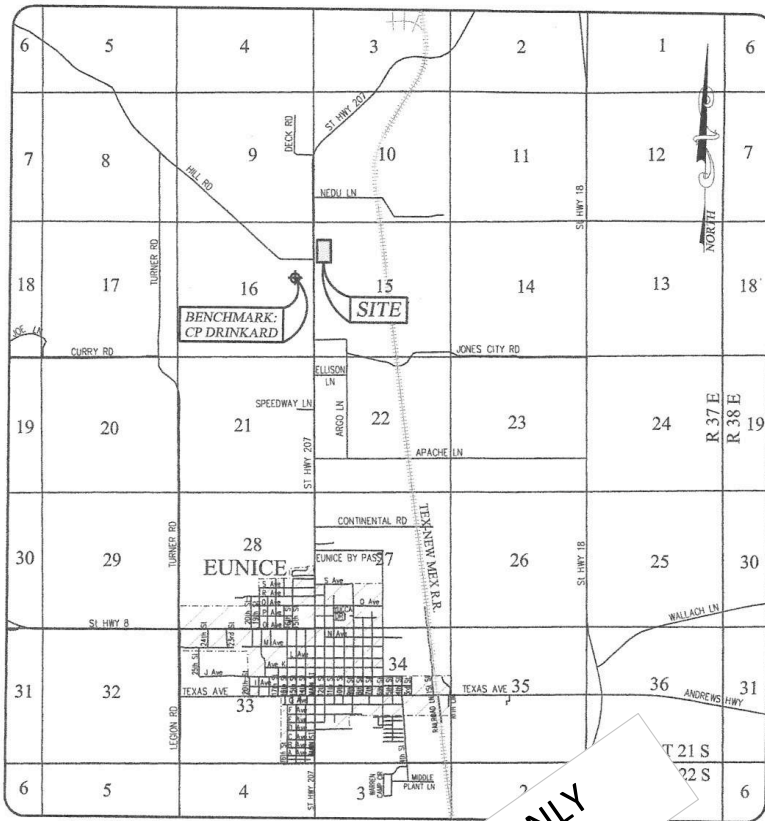
PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mex5\Tracts\Subsidence Monitoring\Key Energy Services, LLC\State #1 Brine Well Enclosure Lea County NM\12111721

VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WEST SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC

MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Figure 2

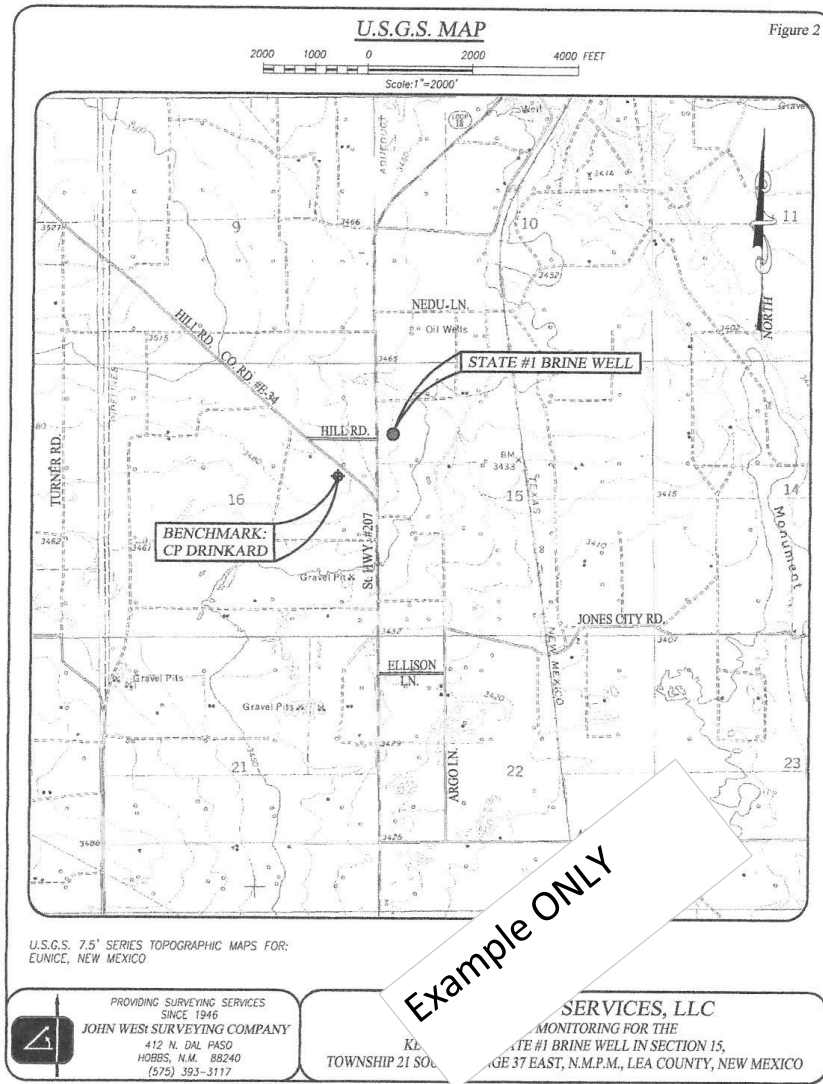
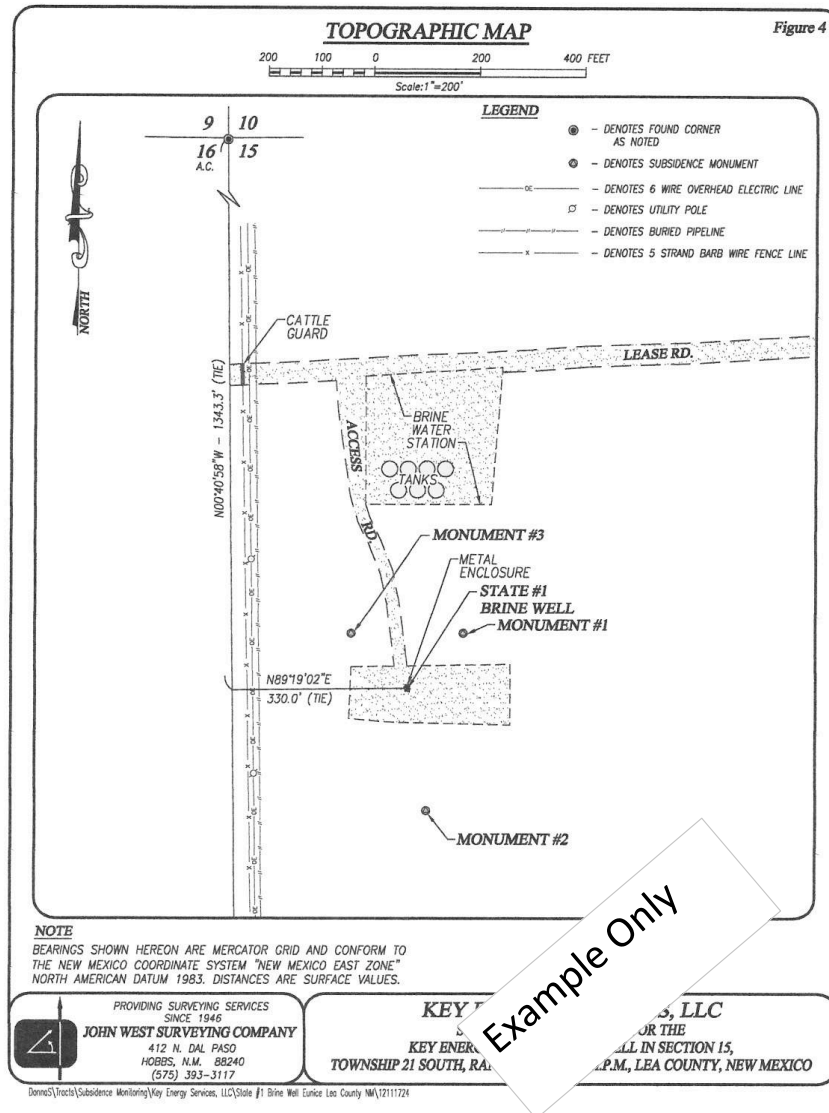
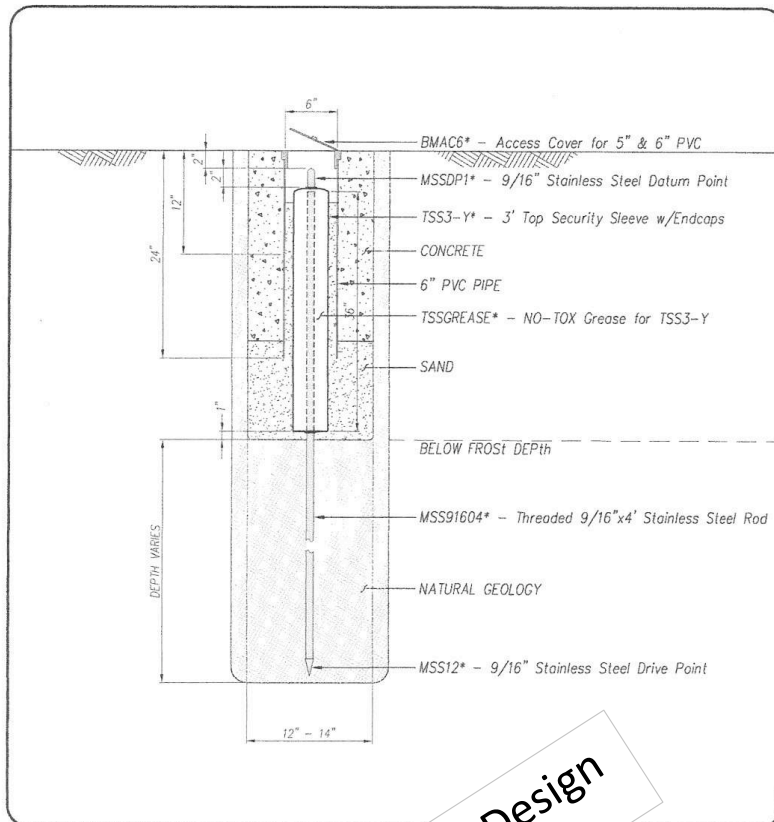


Figure 4



**BERNTSEN MONUMENT INSTALLATION DETAIL**  
NOT TO SCALE

Figure 6



\*REFERENCE:  
www.berntsen.com  
9/16" STAINLESS STEEL TOP SECURITY SLEEVE MONUMENT

Actual Design

PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WESI SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

# ADJUSTED ELEVATIONS

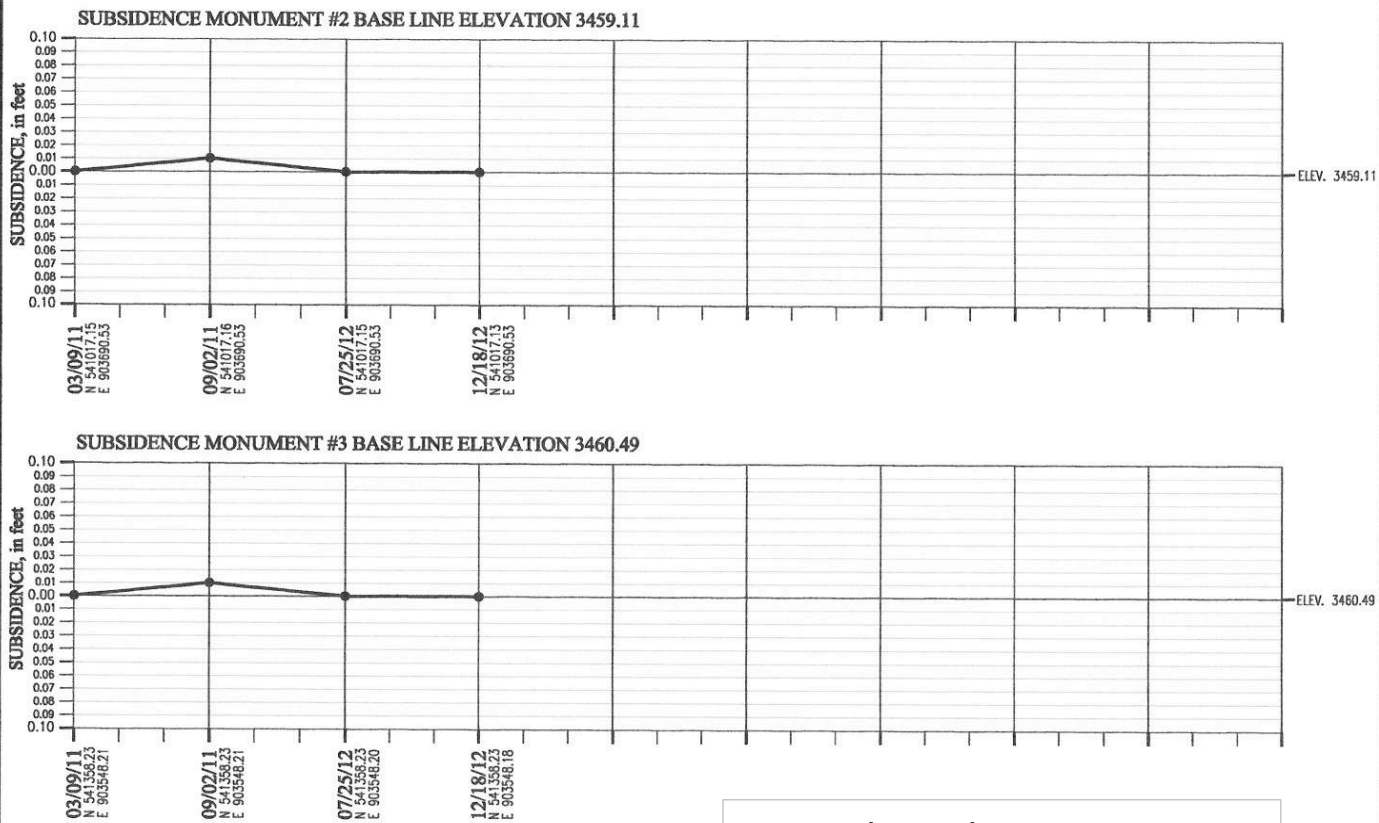
Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only



### VERTICAL SUBSIDENCE TABLE



## Example Only

**Figure 7B**



PROVIDING SURVEYING SERVICES  
SINCE 1946

**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**NOTE:**

HORIZONTAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.02$  FT.  
VERTICAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.01$  FT.

KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO



## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2013 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

Pulling Unit Rig	\$25,000
Halliburton Cement Job	\$8,000.00
Post Subsidence Monitoring 5 years	\$15,000.00
Tank Removal, Pad Clean-Up	\$30,000.00
Consulting fees	\$10,000.00
Total Estimate	\$88,000

**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Livingston, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2014**

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04

*Expiration Date: November 08, 2018*

API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

May 30, 2015

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

Wayne Price-LLC

Larry Gandy

Jon Gandy

  
\_\_\_\_\_  
  
\_\_\_\_\_  
  
\_\_\_\_\_

**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2014 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04 and aerial photo is included for reference in Appendix "A").*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. **(Appendix "A" shows system filling station photos.)**

Inspections revealed that the loading area concrete sump was not tested in 2014 as planned. A third party consultant will schedule and perform the hydrostatic test and the results reported by June 01, 2015, next annual report.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in Appendix "D"). The next scheduled 5-year test will be due in 2018.

The brine well was drilled in 1980 and has been in operation for approximately 34 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2014 brine production volume was 602,196 bbls and the lifetime production volume is 8,884,895 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 “A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.”)

Please find attached in **Appendix “C”** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected April 14, 2014 and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed that the brine water is predominately sodium chloride with a high density of 1.20 specific gravity. This analysis is very representative of Salado “Salt” formation waters found in the area. During the year, it appeared the weight of the brine ranged from 1.2 SG down to 1.12 SG, and averaged 1.17 SG for the year equating to 9.75 lbs/gal, which is normally acceptable to Wasserhund customers. Wasserhund is in the process of double-checking the reason for the lighter weight product noticed at the end of the year.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 “Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.”)

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix “D”** a copy of the test chart and meter calibration record.

#### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD's previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e. reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

#### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 "Results of any leaks and spill reports;")

There were no reportable leaks and spills in 2014.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

#### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 "An Area of Review (AOR) update summary;")

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix "E"**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix "E"**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 308 feet (R = 154 ft) up-dated for 2014, a 10:1 safety factor is applied that equates to about 1540 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.



Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2014 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1540 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1540 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

Conclusions: This is a Gas producing well, but records indicate it did not produce during the 2014 year and possible OCD evaluation is still on-going.

Corrective Actions and Recommendation: This well appears to be in a temporary status for gas production and no issues have been experienced with the Wasserhund Brine Well BW-04.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered.

Corrective Actions: No Corrective actions required.

### **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probably of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “upright cone”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “rule of thumb” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 8.884million barrels of brine produced as of December 2014. The maximum diameter was calculated to be approximately 308 feet with a corresponding D/H ratio of .147 updated for the 2014 year.

Comparing the current D/H ratio of .147 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 154-foot radius superimposed around the brine well and station. The radius has increased by 6.0 feet from last year.

#### **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. “Solution Cavern Monitoring Plan Program”. A copy of the proposal is included in **Appendix “G”** for OCD review and approval.

Special Note: Wasserhund Inc. request a Minor Modifications that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an “Induced Current Method” and report these results in the next annual report.

The ‘Induced Current’ Method has not been successful, primarily to bad connections and low voltage used. Wasserhund will continue trying this method and others as approved by OCD. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 “A summary of the ratio of the volume of injected fluids to the volume of produced brine;”)*

*See Bullet Point #3 and Appendix “B” for comparison chart numbers.*

Special Note: **Key requests a minor modification of the permit requirement**

**3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

Dear Jim Giswold-NMOCD Environmental Bureau Chief: As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations. Notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency. Currently the permit reads as follows:

The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

#### **Bullet Point #12- Summary of Activities**

(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "H" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

#### **Bullet Point #13- Annual Certification**

(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. **"2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the Wasserhund has received OCD approved in install a down-gradient Monitoring Well in the 2015 year. The results concerning groundwater will be listed in the 2016 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.

## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- Discharge Plan BW-04







# BW-4

Wasserhund/Buckeye  
Eidson State #1

Permit Renewal  
11/8/13



State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## **DISCHARGE PERMIT BW-4**

### **1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or



c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD



Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts

2014 Wasserhund Inc OCD BW-04 Annual Production Data												
								Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.				
				Brine-BBLS		Fresh-BBLS		% diff				
Jan				67469		67634		0.24%				
Feb				58509		58704		0.33%				
Mar				74385		74568		0.25%				
Apr				45348		45463		0.25%				
May				42171		42290		0.28%				
Jun				29669		29784		0.39%				
Jul				36626		36776		0.41%				
Aug				40187		40165		-0.05%				
Sept				42350		42513		0.38%				
Oct				50114		50399		0.57%				
Nov				50837		51032		0.38%				
Dec				64531		64696		0.26%				
2014 Total				602,196		604,024		0.30%				
Total Brine Water Production Carry Over from Years Past BBLs				8,282,699								
Total Production year ending 2014				8,884,895	bbls							

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

### Sample: 359859 - BW-4 Fresh

Param	Flag	Result	Units	RL
Chloride		<b>399</b>	mg/L	2.5
pH		<b>7.77</b>	s.u.	2
Specific Gravity		<b>1.00</b>	g/ml	
Total Dissolved Solids		<b>1000</b>	mg/L	2.5

### Sample: 359860 - BW-4 Brine

Param	Flag	Result	Units	RL
Chloride		<b>219000</b>	mg/L	2.5
Dissolved Sodium		<b>101000</b>	mg/L	1
pH		<b>6.99</b>	s.u.	2
Specific Gravity		<b>1.19</b>	g/ml	
Total Dissolved Solids		<b>132000</b>	mg/L	2.5

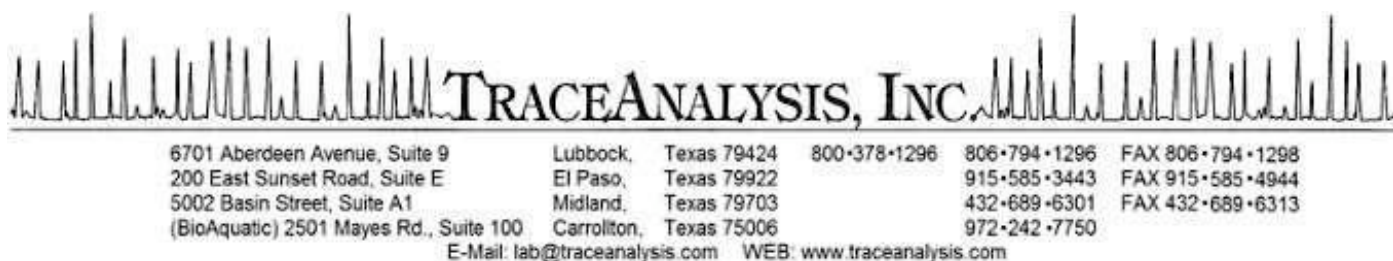
### Sample: 359861 - BW-22 Fresh

Param	Flag	Result	Units	RL
Chloride		<b>406</b>	mg/L	2.5
pH		<b>7.99</b>	s.u.	2
Specific Gravity		<b>0.996</b>	g/ml	
Total Dissolved Solids		<b>1240</b>	mg/L	2.5

**Sample: 359862 - BW-22 Brine**

Param	Flag	Result	Units	RL
Chloride		<b>19300</b>	mg/L	2.5
Dissolved Sodium		<b>10400</b>	mg/L	1
pH		<b>6.41</b>	s.u.	2
Specific Gravity		<b>1.03</b>	g/ml	
Total Dissolved Solids		<b>31900</b>	mg/L	2.5





## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Wasserhund Inc.  
P.O. Box 2140  
Lovington, NM, 88260

Report Date: April 23, 2014

Work Order: 14040811



Project Location: Buckeye(BW-4) Tatum (BW-22)  
Project Name: Annual Report  
Project Number: BW-4 & BW-22

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
359859	BW-4 Fresh	water	2014-04-04	11:43	2014-04-08
359860	BW-4 Brine	water	2014-04-04	11:40	2014-04-08
359861	BW-22 Fresh	water	2014-04-04	14:45	2014-04-08
359862	BW-22 Brine	water	2014-04-04	14:49	2014-04-08

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 18 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich".

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager

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## Case Narrative

Samples for project Annual Report were received by TraceAnalysis, Inc. on 2014-04-08 and assigned to work order 14040811. Samples for work order 14040811 were received intact at a temperature of 2.9 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	94115	2014-04-10 at 16:00	111321	2014-04-10 at 17:33
Chloride (IC)	E 300.0	94116	2014-04-10 at 16:00	111322	2014-04-10 at 17:33
Na, Dissolved	S 6010C	94164	2014-04-22 at 18:51	111398	2014-04-23 at 11:10
pH	SM 4500-H+	93825	2014-04-08 at 13:44	110975	2014-04-08 at 13:45
Specific Gravity	ASTM D1429-95	93887	2014-04-10 at 09:20	111053	2014-04-10 at 09:45
TDS	SM 2540C	94005	2014-04-09 at 16:00	111195	2014-04-09 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14040811 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

# Analytical Report

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-04-10	Analyzed By:	RL
QC Batch:	111321	Sample Preparation:	2014-04-10	Prepared By:	RL
Prep Batch:	94115				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	399	mg/L	10	2.50

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-04-08	Analyzed By:	AT
QC Batch:	110975	Sample Preparation:	2014-04-08	Prepared By:	AT
Prep Batch:	93825				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	7.77	s.u.	1	2.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-04-10	Analyzed By:	CF
QC Batch:	111053	Sample Preparation:	2014-04-10	Prepared By:	CF
Prep Batch:	93887				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.00	g/ml	1	0.00

## Sample: 359859 - BW-4 Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-04-09	Analyzed By:	RL
QC Batch:	111195	Sample Preparation:	2014-04-09	Prepared By:	RL
Prep Batch:	94005				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1000</b>	mg/L	20	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      Sample Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>219000</b>	mg/L	5000	2.50

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      Sample Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	<b>101000</b>	mg/L	100	1.00

**Sample: 359860 - BW-4 Brine**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      Sample Preparation: 2014-04-08      Prepared By: AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>6.99</b>	s.u.	1	2.00

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**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.19</b>	g/ml	1	0.00

**Sample: 359860 - BW-4 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>132000</b>	mg/L	1000	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	111321	Date Analyzed:	2014-04-10
Prep Batch:	94115	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B	1	<b>406</b>	mg/L	50	2.50

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

*continued ...*

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*sample 359861 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	<b>7.99</b>	s.u.	1	2.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
QC Batch:	111053	Date Analyzed:	2014-04-10	Analyzed By:	CF
Prep Batch:	93887	Sample Preparation:	2014-04-10	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.996</b>	g/ml	1	0.00

**Sample: 359861 - BW-22 Fresh**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	111195	Date Analyzed:	2014-04-09	Analyzed By:	RL
Prep Batch:	94005	Sample Preparation:	2014-04-09	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	<b>1240</b>	mg/L	20	2.50

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	111322	Date Analyzed:	2014-04-10	Analyzed By:	RL
Prep Batch:	94116	Sample Preparation:	2014-04-10	Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	<b>19300</b>	mg/L	1000	2.50



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**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	111398	Date Analyzed:	2014-04-23
Prep Batch:	94164	Sample Preparation:	2014-04-22
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		1	10400	mg/L	100	1.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	110975	Date Analyzed:	2014-04-08
Prep Batch:	93825	Sample Preparation:	2014-04-08
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1	6.41	s.u.	1	2.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	111053	Date Analyzed:	2014-04-10
Prep Batch:	93887	Sample Preparation:	2014-04-10
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			1.03	g/ml	1	0.00

**Sample: 359862 - BW-22 Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	111195	Date Analyzed:	2014-04-09
Prep Batch:	94005	Sample Preparation:	2014-04-09
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1	31900	mg/L	200	2.50

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Buckeye(BW-4) Tatum (BW-22)

## Method Blanks

### Method Blank (1)      QC Batch: 111053

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.998	g/ml	

### Method Blank (1)      QC Batch: 111195

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 111321

QC Batch: 111321      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94115      QC Preparation: 2014-04-10      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.61	mg/L	2.5

### Method Blank (1)      QC Batch: 111322

QC Batch: 111322      Date Analyzed: 2014-04-10      Analyzed By: RL  
Prep Batch: 94116      QC Preparation: 2014-04-10      Prepared By: RL

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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.23	mg/L	2.5

**Method Blank (1)**      QC Batch: 111398

QC Batch: 111398      Date Analyzed: 2014-04-23      Analyzed By: LM  
Prep Batch: 94164      QC Preparation: 2014-04-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		1	<0.172	mg/L	1

**Duplicates (1)**      Duplicated Sample: 359865

QC Batch: 110975      Date Analyzed: 2014-04-08      Analyzed By: AT  
Prep Batch: 93825      QC Preparation: 2014-04-08      Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1	8.45	8.46	s.u.	1	0	20

**Duplicates (1)**      Duplicated Sample: 359862

QC Batch: 111053      Date Analyzed: 2014-04-10      Analyzed By: CF  
Prep Batch: 93887      QC Preparation: 2014-04-10      Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.03	1.03	g/ml	1	0	200

**Duplicates (1)**      Duplicated Sample: 360017

QC Batch: 111195      Date Analyzed: 2014-04-09      Analyzed By: RL  
Prep Batch: 94005      QC Preparation: 2014-04-09      Prepared By: RL

Report Date: April 23, 2014  
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Buckeye(BW-4) Tatum (BW-22)

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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1	1690	1720	mg/L	20	2	10

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Report Date: April 23, 2014  
BW-4 & BW-22

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Buckeye(BW-4) Tatum (BW-22)

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 111195  
Prep Batch: 94005

Date Analyzed: 2014-04-09  
QC Preparation: 2014-04-09

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1	1020	mg/L	10	1000	<25.0	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1	1010	mg/L	10	1000	<25.0	101	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.2	mg/L	1	25.0	1.61	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.1	mg/L	1	25.0	1.61	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	26.0	mg/L	1	25.0	1.23	99	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	53.0	mg/L	1	50.0	<0.172	106	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	53.1	mg/L	1	50.0	<0.172	106	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 359861

QC Batch: 111321  
Prep Batch: 94115

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1840	mg/L	50	1250	406	115	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1850	mg/L	50	1250	406	116	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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**Matrix Spike (MS-1)**      Spiked Sample: 360083

QC Batch: 111322  
Prep Batch: 94116

Date Analyzed: 2014-04-10  
QC Preparation: 2014-04-10

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	19000	mg/L	500	12500	4720	114	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	19200	mg/L	500	12500	4720	116	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

**Matrix Spike (MS-1)**      Spiked Sample: 360135

QC Batch: 111398  
Prep Batch: 94164

Date Analyzed: 2014-04-23  
QC Preparation: 2014-04-22

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		1	617	mg/L	1	500	82.16	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		1	582	mg/L	1	500	82.16	100	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



## Calibration Standards

### Standard (ICV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.00	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 110975

Date Analyzed: 2014-04-08

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1	s.u.	7.00	7.01	100	98 - 102	2014-04-08

### Standard (CCV-1)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.2	105	90 - 110	2014-04-10

### Standard (CCV-2)

QC Batch: 111321

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

Report Date: April 23, 2014  
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Buckeye(BW-4) Tatum (BW-22)

#### Standard (CCV-1)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (CCV-2)

QC Batch: 111322

Date Analyzed: 2014-04-10

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	26.0	104	90 - 110	2014-04-10

#### Standard (ICV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	49.2	96	90 - 110	2014-04-23

#### Standard (CCV-1)

QC Batch: 111398

Date Analyzed: 2014-04-23

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		1	mg/L	51.0	50.5	99	90 - 110	2014-04-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704219-14-10	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

## Attachments

Report Date: April 23, 2014  
BW-4 & BW-22

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Annual Report

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Buckeye(BW-4) Tatum (BW-22)

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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

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email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

[illegible]

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: July 31, 2014

Work Order: 14072110



Project Location: Buckeye, NM-Tatum, NM  
Project Name: Quarterly Samples  
Project Number: Buckeye Station-Tatum Station

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
368929	BS FW	water	2014-07-17	13:05	2014-07-17
368930	BS BW	water	2014-07-17	13:08	2014-07-17
368931	TS FW	water	2014-07-17	13:59	2014-07-17
368932	TS BW	water	2014-07-17	14:03	2014-07-17

**Sample: 368929 - BS FW**

Param	Flag	Result	Units	RL
Chloride		<b>341</b>	mg/L	2.5
Density		<b>0.995</b>	g/ml	
pH		<b>7.62</b>	s.u.	2
Total Dissolved Solids	Qr	<b>864</b>	mg/L	2.5

**Sample: 368930 - BS BW**

Param	Flag	Result	Units	RL
Chloride		<b>200000</b>	mg/L	2.5
Density		<b>1.20</b>	g/ml	
Dissolved Sodium		<b>149000</b>	mg/L	1
pH		<b>6.90</b>	s.u.	2
Total Dissolved Solids		<b>295000</b>	mg/L	2.5

**Sample: 368931 - TS FW**

---

Param	Flag	Result	Units	RL
Chloride		<b>76.8</b>	mg/L	2.5
Density		<b>0.994</b>	g/ml	
pH		<b>9.30</b>	s.u.	2
Total Dissolved Solids		<b>639</b>	mg/L	2.5

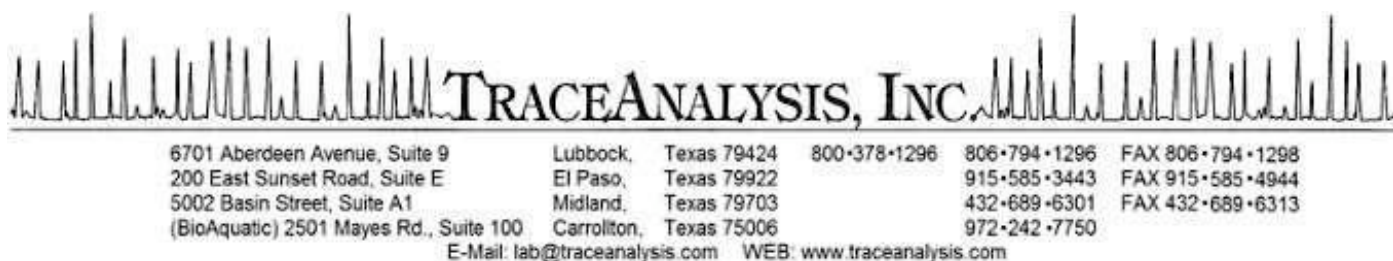
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**Sample: 368932 - TS BW**

Param	Flag	Result	Units	RL
Chloride		<b>17900</b>	mg/L	2.5
Density		<b>1.02</b>	g/ml	
Dissolved Sodium		<b>11300</b>	mg/L	1
pH		<b>6.21</b>	s.u.	2
Total Dissolved Solids		<b>34600</b>	mg/L	2.5

---





## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
 Price LLC  
 312 Encantado Ridge Ct. NE  
 Rio Rancho, NM, 87124

Report Date: July 31, 2014

Work Order: 14072110



Project Location: Buckeye, NM-Tatum, NM  
 Project Name: Quarterly Samples  
 Project Number: Buckeye Station-Tatum Station

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
368929	BS FW	water	2014-07-17	13:05	2014-07-17
368930	BS BW	water	2014-07-17	13:08	2014-07-17
368931	TS FW	water	2014-07-17	13:59	2014-07-17
368932	TS BW	water	2014-07-17	14:03	2014-07-17

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 19 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
 James Taylor, Assistant Director



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## Case Narrative

Samples for project Quarterly Samples were received by TraceAnalysis, Inc. on 2014-07-17 and assigned to work order 14072110. Samples for work order 14072110 were received intact at a temperature of 1.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	96480	2014-07-29 at 16:46	114086	2014-07-29 at 16:46
Density	ASTM D854-92	96429	2014-07-28 at 11:00	114019	2014-07-28 at 11:15
Na, Dissolved	S 6010C	96355	2014-07-24 at 13:18	114016	2014-07-25 at 15:56
pH	SM 4500-H+	96321	2014-07-23 at 10:49	113880	2014-07-23 at 10:50
TDS	SM 2540C	96388	2014-07-23 at 11:00	113960	2014-07-23 at 11:00
TDS	SM 2540C	96452	2014-07-25 at 11:40	114047	2014-07-25 at 11:40

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14072110 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

# Analytical Report

## Sample: 368929 - BS FW

Laboratory: El Paso  
Analysis: Chloride (IC)  
QC Batch: 114086  
Prep Batch: 96480

Analytical Method: E 300.0  
Date Analyzed: 2014-07-29  
Sample Preparation: 2014-07-29

Prep Method: N/A  
Analyzed By: JR  
Prepared By: JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	341	mg/L	10	2.50

## Sample: 368929 - BS FW

Laboratory: Lubbock  
Analysis: Density  
QC Batch: 114019  
Prep Batch: 96429

Analytical Method: ASTM D854-92  
Date Analyzed: 2014-07-28  
Sample Preparation: 2014-07-28

Prep Method: N/A  
Analyzed By: CF  
Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.995	g/ml	1	0.00

## Sample: 368929 - BS FW

Laboratory: Lubbock  
Analysis: pH  
QC Batch: 113880  
Prep Batch: 96321

Analytical Method: SM 4500-H+  
Date Analyzed: 2014-07-23  
Sample Preparation: 2014-07-23

Prep Method: N/A  
Analyzed By: AT  
Prepared By: AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	7.62	s.u.	1	2.00

## Sample: 368929 - BS FW

Laboratory: Lubbock  
Analysis: TDS  
QC Batch: 114047  
Prep Batch: 96452

Analytical Method: SM 2540C  
Date Analyzed: 2014-07-25  
Sample Preparation: 2014-07-25

Prep Method: N/A  
Analyzed By: CF  
Prepared By: CF

Report Date: July 31, 2014  
Buckeye Station-Tatum Station

Work Order: 14072110  
Quarterly Samples

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids	Qr	2,3,5,7,8	<b>864</b>	mg/L	20	2.50

**Sample: 368930 - BS BW**

Laboratory: El Paso  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 114086      Date Analyzed: 2014-07-29      Analyzed By: JR  
Prep Batch: 96480      Sample Preparation: 2014-07-29      Prepared By: JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>200000</b>	mg/L	5000	2.50

**Sample: 368930 - BS BW**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 114019      Date Analyzed: 2014-07-28      Analyzed By: CF  
Prep Batch: 96429      Sample Preparation: 2014-07-28      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.20</b>	g/ml	1	0.00

**Sample: 368930 - BS BW**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 114016      Date Analyzed: 2014-07-25      Analyzed By: LM  
Prep Batch: 96355      Sample Preparation: 2014-07-24      Prepared By: LM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		3,5,7,8	<b>149000</b>	mg/L	10000	1.00

Report Date: July 31, 2014  
Buckeye Station-Tatum Station

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**Sample: 368930 - BS BW**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	113880	Date Analyzed:	2014-07-23
Prep Batch:	96321	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>6.90</b>	s.u.	1	2.00

**Sample: 368930 - BS BW**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	113960	Date Analyzed:	2014-07-23
Prep Batch:	96388	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>295000</b>	mg/L	2000	2.50

**Sample: 368931 - TS FW**

Laboratory:	El Paso		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	114086	Date Analyzed:	2014-07-29
Prep Batch:	96480	Sample Preparation:	2014-07-29
		Prep Method:	N/A
		Analyzed By:	JR
		Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>76.8</b>	mg/L	10	2.50

**Sample: 368931 - TS FW**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	114019	Date Analyzed:	2014-07-28
Prep Batch:	96429	Sample Preparation:	2014-07-28
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

*continued ...*

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*sample 368931 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.994</b>	g/ml	1	0.00

**Sample: 368931 - TS FW**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	113880	Date Analyzed:	2014-07-23	Analyzed By:	AT
Prep Batch:	96321	Sample Preparation:	2014-07-23	Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>9.30</b>	s.u.	1	2.00

**Sample: 368931 - TS FW**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	113960	Date Analyzed:	2014-07-23	Analyzed By:	CF
Prep Batch:	96388	Sample Preparation:	2014-07-23	Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>639</b>	mg/L	10	2.50

**Sample: 368932 - TS BW**

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	114086	Date Analyzed:	2014-07-29	Analyzed By:	JR
Prep Batch:	96480	Sample Preparation:	2014-07-29	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,4,6	<b>17900</b>	mg/L	500	2.50

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**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	114019	Date Analyzed:	2014-07-28
Prep Batch:	96429	Sample Preparation:	2014-07-28
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.02</b>	g/ml	1	0.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	114016	Date Analyzed:	2014-07-25
Prep Batch:	96355	Sample Preparation:	2014-07-24
		Prep Method:	S 3005A
		Analyzed By:	LM
		Prepared By:	LM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		3,5,7,8	<b>11300</b>	mg/L	100	1.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	113880	Date Analyzed:	2014-07-23
Prep Batch:	96321	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		2,3,7,8	<b>6.21</b>	s.u.	1	2.00

**Sample: 368932 - TS BW**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	113960	Date Analyzed:	2014-07-23
Prep Batch:	96388	Sample Preparation:	2014-07-23
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		2,3,5,7,8	<b>34600</b>	mg/L	1000	2.50

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Buckeye Station-Tatum Station

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## Method Blanks

### Method Blank (1)      QC Batch: 113960

QC Batch: 113960      Date Analyzed: 2014-07-23      Analyzed By: CF  
Prep Batch: 96388      QC Preparation: 2014-07-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		2,3,5,7,8	<2.50	mg/L	2.5

### Method Blank (1)      QC Batch: 114016

QC Batch: 114016      Date Analyzed: 2014-07-25      Analyzed By: LM  
Prep Batch: 96355      QC Preparation: 2014-07-24      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		3,5,7,8	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 114019

QC Batch: 114019      Date Analyzed: 2014-07-28      Analyzed By: CF  
Prep Batch: 96429      QC Preparation: 2014-07-28      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.995	g/ml	

### Method Blank (1)      QC Batch: 114047

QC Batch: 114047      Date Analyzed: 2014-07-25      Analyzed By: CF  
Prep Batch: 96452      QC Preparation: 2014-07-25      Prepared By: CF



Report Date: July 31, 2014  
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---

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		2,3,5,7,8	<2.50	mg/L	2.5

---

**Method Blank (1)**      QC Batch: 114086

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

---

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,4,6	<0.00680	mg/L	2.5

---

## Duplicates

### Duplicates (1) Duplicated Sample: 368940

QC Batch: 113880 Date Analyzed: 2014-07-23 Analyzed By: AT  
Prep Batch: 96321 QC Preparation: 2014-07-23 Prepared By: AT

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	2,3,7,8	8.16	8.20	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 369075

QC Batch: 113960 Date Analyzed: 2014-07-23 Analyzed By: CF  
Prep Batch: 96388 QC Preparation: 2014-07-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	2,3,5,7,8	381	380	mg/L	10	0	10

### Duplicates (1) Duplicated Sample: 368932

QC Batch: 114019 Date Analyzed: 2014-07-28 Analyzed By: CF  
Prep Batch: 96429 QC Preparation: 2014-07-28 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.02	1.02	g/ml	1	0	20

### Duplicates (1) Duplicated Sample: 369374

QC Batch: 114047 Date Analyzed: 2014-07-25 Analyzed By: CF  
Prep Batch: 96452 QC Preparation: 2014-07-25 Prepared By: CF

Param				Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	Qr	Qr	2,3,5,7,8	2660	2300	mg/L	50	14	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 113960  
Prep Batch: 96388

Date Analyzed: 2014-07-23  
QC Preparation: 2014-07-23

Analyzed By: CF  
Prepared By: CF

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		2,3,5,7,8	1000	mg/L	1	1000	<2.50	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		2,3,5,7,8	1040	mg/L	1	1000	<2.50	104	90 - 110	4	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 114016  
Prep Batch: 96355

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-24

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		3,5,7,8	49.5	mg/L	1	52.5	<0.0184	94	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		3,5,7,8	50.2	mg/L	1	52.5	<0.0184	96	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 114047  
Prep Batch: 96452

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-25

Analyzed By: CF  
Prepared By: CF

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		2,3,5,7,8	972	mg/L	1	1000	<2.50	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		2,3,5,7,8	1020	mg/L	1	1000	<2.50	102	90 - 110	5	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,4,6	25.2	mg/L	1	25.0	<0.00680	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,4,6	25.1	mg/L	1	25.0	<0.00680	100	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 368864

QC Batch: 114016  
Prep Batch: 96355

Date Analyzed: 2014-07-25  
QC Preparation: 2014-07-24

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		3,5,7,8	4530	mg/L	10	525	4100	82	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		3,5,7,8	4540	mg/L	10	525	4100	84	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 368931

QC Batch: 114086  
Prep Batch: 96480

Date Analyzed: 2014-07-29  
QC Preparation: 2014-07-29

Analyzed By: JR  
Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,4,6	1480	mg/L	55.6	1390	76.8	101	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,4,6	1480	mg/L	55.6	1390	76.8	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 113880

Date Analyzed: 2014-07-23

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		2,3,7,8	s.u.	7.00	7.01	100	98 - 102	2014-07-23

### Standard (CCV-1)

QC Batch: 113880

Date Analyzed: 2014-07-23

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		2,3,7,8	s.u.	7.00	7.01	100	98 - 102	2014-07-23

### Standard (ICV-1)

QC Batch: 114016

Date Analyzed: 2014-07-25

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		3,5,7,8	mg/L	51.0	48.8	96	90 - 110	2014-07-25

### Standard (CCV-1)

QC Batch: 114016

Date Analyzed: 2014-07-25

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		3,5,7,8	mg/L	51.0	49.9	98	90 - 110	2014-07-25

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#### Standard (CCV-1)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	24.8	99	90 - 110	2014-07-29

#### Standard (CCV-2)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	25.0	100	90 - 110	2014-07-29

#### Standard (CCV-3)

QC Batch: 114086

Date Analyzed: 2014-07-29

Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,4,6	mg/L	25.0	25.2	101	90 - 110	2014-07-29



## Appendix

### Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

### Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-103	El Paso
2	PJLA	L14-93	Lubbock
3	Kansas	Kansas E-10317	Lubbock
4	LELAP	LELAP-02002	El Paso
5	LELAP	LELAP-02003	Lubbock
6	NELAP	T104704221-12-3	El Paso
7	NELAP	T104704219-14-10	Lubbock
8		2013-083	Lubbock

### Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.

F	Description
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

---

## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

## TraceAnalysis, Inc.

email: lab@traceanalysis.com

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313  
1 (800) 588-3443

BioAquatic Testing  
2501 Mayes Rd., Ste. 100  
Carrollton, Texas 75006  
Tel (972) 242-7750

Company Name: PRICE LLC Phone #: 505-715-2809

Address: (Street, City, Zip) 312 Encinitas, Ridge County NE Rio Rancho NM 87131 Fax #: 505-892-6643

Contact Person: WAYNE PRICE E-mail: wayne.price@earthlink.net

Invoice to: (If different from above) Wassonbund 1623 S. Main Lovington NM 88660

Project #: Buckeye Station Tatum Station Project Name: Quarterly Samples

Project Location (including state): Buckeye NM, Tatum NM Sampler Signature: LUPAR

LAB # (LAB USE ONLY) FIELD CODE

CONTAINERS # CONTAINERS

VOLUME / AMOUNT

MATRIX WATER SOIL AIR SLUDGE

PRESERVATIVE METHOD HCl HNO<sub>3</sub> H<sub>2</sub>SO<sub>4</sub> NaOH ICE NONE

SAMPLING DATE TIME

34924 BS FW 1 Plastic 7/17/14 1:06 PM

930 BS BW 1 Plastic 7/17/14 1:08 PM

931 TS FW 1 Plastic 7/17/14 1:59 PM

932 TS BW 1 Plastic 7/17/14 2:03 PM

MTBE 8021 / 602 / 8260 / 624

BTEX 8021 / 602 / 8260 / 624

TPH 418.1 / TX1005 / TX1005 Ext(C35)

TPH 8015 GRO / DRO / TVHC

PAH 8270 / 625

Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7

TCLP Metals Ag As Ba Cd Cr Pb Se Hg

TCLP Volatiles

TCLP Semi Volatiles

TCLP Pesticides

RCI

GC/MS Vol. 8260 / 624

GC/MS Semi. Vol. 8270 / 625

PCB's 8082 / 608

Pesticides 8081 / 608

BOD, TSS, pH

Moisture Content

Cl, F, SO<sub>4</sub>, NO<sub>3</sub>-N, NO<sub>2</sub>-N, PO<sub>4</sub>-P, Alkalinity

Na, Ca, Mg, K, TDS, EC

PH, S&P, TOS, CHLORIDES

Sodium, Na Density 1.020 g/mL

Turn Around Time if different from standard

## ANALYSIS REQUEST

(Circle or Specify Method No.)

REMARKS:

LAB USE ONLY

NA

Interd Y / N

Headspace Y / N / NA

Log-In-Review

Dry Weight Basis Required  
TRRP Report Required  
Check If Special Reporting  
Limits Are Needed

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

Carrier #

ORIGINAL COPY

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: October 31, 2014

Work Order: 14102105



Project Location: Buckeye New Mexico  
Project Name: Brine Well

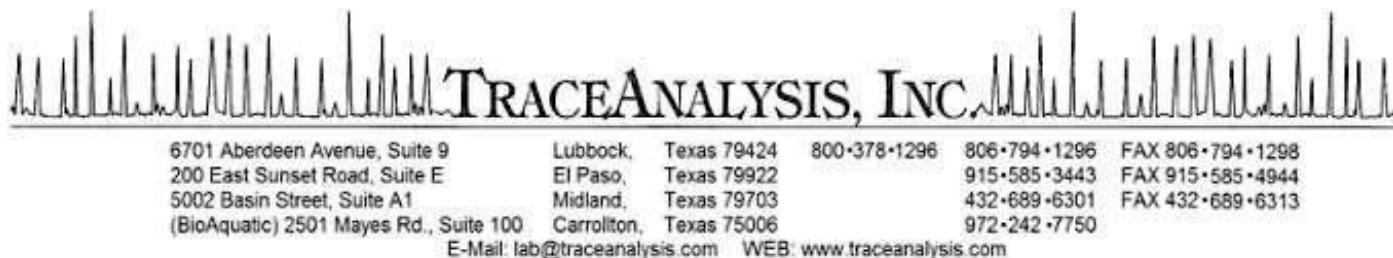
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
377442	Fresh	water	2014-10-16	13:19	2014-10-17
377443	Brine	water	2014-10-16	13:39	2014-10-17

### Sample: 377442 - Fresh

Param	Flag	Result	Units	RL
Chloride		<b>330</b>	mg/L	2.5
pH		<b>7.46</b>	s.u.	2
Specific Gravity		<b>0.9953</b>	g/ml	
Total Dissolved Solids		<b>938</b>	mg/L	2.5

### Sample: 377443 - Brine

Param	Flag	Result	Units	RL
Chloride		<b>132000</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>94600</b>	mg/L	1
pH		<b>7.03</b>	s.u.	2
Specific Gravity		<b>1.154</b>	g/ml	
Total Dissolved Solids		<b>229000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: October 31, 2014

Work Order: 14102105



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
377442	Fresh	water	2014-10-16	13:19	2014-10-17
377443	Brine	water	2014-10-16	13:39	2014-10-17

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2014-10-17 and assigned to work order 14102105. Samples for work order 14102105 were received intact at a temperature of 1.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	98705	2014-10-28 at 15:00	116735	2014-10-28 at 16:01
Chloride (IC)	E 300.0	98782	2014-10-30 at 10:00	116834	2014-10-30 at 11:59
Na, Dissolved	S 6010C	98605	2014-10-23 at 14:50	116734	2014-10-29 at 10:25
pH	SM 4500-H+	98540	2014-10-21 at 16:30	116526	2014-10-21 at 16:30
Specific Gravity	ASTM D1429-95	98592	2014-10-23 at 10:30	116586	2014-10-23 at 10:45
TDS	SM 2540C	98719	2014-10-23 at 10:00	116755	2014-10-23 at 16:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14102105 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: October 31, 2014  
Brine Well

Work Order: 14102105  
Brine Well

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# Analytical Report

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-10-28	Analyzed By:	RL
QC Batch:	116735	Sample Preparation:		Prepared By:	RL
Prep Batch:	98705				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>330</b>	mg/L	10	2.50

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-10-21	Analyzed By:	JP
QC Batch:	116526	Sample Preparation:		Prepared By:	JP
Prep Batch:	98540				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.46</b>	s.u.	1	2.00

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2014-10-23	Analyzed By:	CF
QC Batch:	116586	Sample Preparation:	2014-10-23	Prepared By:	CF
Prep Batch:	98592				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9953</b>	g/ml	1	0.000

## Sample: 377442 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2014-10-23	Analyzed By:	RL
QC Batch:	116755	Sample Preparation:		Prepared By:	RL
Prep Batch:	98719				



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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>938</b>	mg/L	20	2.50

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2014-10-30	Analyzed By:	RL
QC Batch:	116834	Sample Preparation:		Prepared By:	RL
Prep Batch:	98782				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>132000</b>	mg/L	5000	2.50

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2014-10-29	Analyzed By:	LM
QC Batch:	116734	Sample Preparation:	2014-10-23	Prepared By:	LM
Prep Batch:	98605				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>94600</b>	mg/L	1000	1.00

**Sample: 377443 - Brine**

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2014-10-21	Analyzed By:	JP
QC Batch:	116526	Sample Preparation:		Prepared By:	JP
Prep Batch:	98540				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.03</b>	s.u.	1	2.00

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Brine Well

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**Sample: 377443 - Brine**

Laboratory: Lubbock  
Analysis: Specific Gravity  
QC Batch: 116586  
Prep Batch: 98592

Analytical Method: ASTM D1429-95  
Date Analyzed: 2014-10-23  
Sample Preparation: 2014-10-23

Prep Method: N/A  
Analyzed By: CF  
Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.154</b>	g/ml	1	0.000

**Sample: 377443 - Brine**

Laboratory: Lubbock  
Analysis: TDS  
QC Batch: 116755  
Prep Batch: 98719

Analytical Method: SM 2540C  
Date Analyzed: 2014-10-23  
Sample Preparation:

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>229000</b>	mg/L	2000	2.50

Report Date: October 31, 2014  
Brine Well

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## Method Blanks

**Method Blank (1)**      QC Batch: 116586

QC Batch: 116586      Date Analyzed: 2014-10-23      Analyzed By: CF  
Prep Batch: 98592      QC Preparation: 2014-10-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			1.002	g/ml	

**Method Blank (1)**      QC Batch: 116734

QC Batch: 116734      Date Analyzed: 2014-10-29      Analyzed By: LM  
Prep Batch: 98605      QC Preparation: 2014-10-23      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

**Method Blank (1)**      QC Batch: 116735

QC Batch: 116735      Date Analyzed: 2014-10-28      Analyzed By: RL  
Prep Batch: 98705      QC Preparation: 2014-10-28      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	1.11	mg/L	2.5

**Method Blank (1)**      QC Batch: 116755

QC Batch: 116755      Date Analyzed: 2014-10-23      Analyzed By: RL  
Prep Batch: 98719      QC Preparation: 2014-10-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

Method Blank (1)      QC Batch: 116834

QC Batch:    116834

Date Analyzed:    2014-10-30

Prep Batch:    98782

QC Preparation:    2014-10-30

Analyzed By:    RL

Prepared By:    RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	1.26	mg/L	2.5

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Brine Well

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## Duplicates

### Duplicates (1) Duplicated Sample: 377452

QC Batch: 116526 Date Analyzed: 2014-10-21 Analyzed By: JP  
Prep Batch: 98540 QC Preparation: 2014-10-21 Prepared By: JP

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	6.33	6.34	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 377452

QC Batch: 116586 Date Analyzed: 2014-10-23 Analyzed By: CF  
Prep Batch: 98592 QC Preparation: 2014-10-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.009	1.035	g/ml	1	2	200

### Duplicates (1) Duplicated Sample: 377727

QC Batch: 116755 Date Analyzed: 2014-10-23 Analyzed By: RL  
Prep Batch: 98719 QC Preparation: 2014-10-23 Prepared By: RL

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1830	1830	mg/L	20	0	10

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 116734  
Prep Batch: 98605

Date Analyzed: 2014-10-29  
QC Preparation: 2014-10-23

Analyzed By: LM  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	54.9	mg/L	1	52.5	<0.0184	104	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	53.4	mg/L	1	52.5	<0.0184	102	85 - 115	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 116735  
Prep Batch: 98705

Date Analyzed: 2014-10-28  
QC Preparation: 2014-10-28

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.4	mg/L	1	25.0	1.11	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	1.11	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 116755  
Prep Batch: 98719

Date Analyzed: 2014-10-23  
QC Preparation: 2014-10-23

Analyzed By: RL  
Prepared By: RL

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	986	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	969	mg/L	10	1000	<25.0	97	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 116834  
Prep Batch: 98782

Date Analyzed: 2014-10-30  
QC Preparation: 2014-10-30

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.1	mg/L	1	25.0	1.26	95	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.0	mg/L	1	25.0	1.26	95	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 376967

QC Batch: 116734  
Prep Batch: 98605

Date Analyzed: 2014-10-29  
QC Preparation: 2014-10-23

Analyzed By: LM  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium	Qs	Qs	2,3,4,5	5740	mg/L	100	525	5457	54 75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium	Qs	Qs	2,3,4,5	5800	mg/L	100	525	5457	65 75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 377451

QC Batch: 116735  
Prep Batch: 98705

Date Analyzed: 2014-10-28  
QC Preparation: 2014-10-28

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			1,2,3,4,5	340	mg/L	10	250	75.5	106 80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			1,2,3,4,5	339	mg/L	10	250	75.5	105 80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 378037

QC Batch: 116834  
Prep Batch: 98782

Date Analyzed: 2014-10-30  
QC Preparation: 2014-10-30

Analyzed By: RL  
Prepared By: RL



Report Date: October 31, 2014  
Brine Well

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	393	mg/L	10	250	110	113	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	377	mg/L	10	250	110	107	80 - 120	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 116526

Date Analyzed: 2014-10-21

Analyzed By: JP

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98 - 102	2014-10-21

### Standard (CCV-1)

QC Batch: 116526

Date Analyzed: 2014-10-21

Analyzed By: JP

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98 - 102	2014-10-21

### Standard (ICV-1)

QC Batch: 116734

Date Analyzed: 2014-10-29

Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2014-10-29

### Standard (CCV-1)

QC Batch: 116734

Date Analyzed: 2014-10-29

Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	52.5	103	90 - 110	2014-10-29

Report Date: October 31, 2014  
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#### Standard (CCV-1)

QC Batch: 116735

Date Analyzed: 2014-10-28

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.5	102	90 - 110	2014-10-28

#### Standard (CCV-2)

QC Batch: 116735

Date Analyzed: 2014-10-28

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.4	102	90 - 110	2014-10-28

#### Standard (CCV-1)

QC Batch: 116834

Date Analyzed: 2014-10-30

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.2	101	90 - 110	2014-10-30

#### Standard (CCV-2)

QC Batch: 116834

Date Analyzed: 2014-10-30

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.2	101	90 - 110	2014-10-30

## Appendix

### Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

### Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

### Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 14102105

# TraceAnalysis, Inc.

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

6701 Aberdeen Avenue, Suite 9  
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200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
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Fax (915) 585-4944  
1 (888) 588-3443

**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

Company Name:	PRICE LLC	Phone #:	505-892-6643
Address:	(Street, City, Zip) 312 Encanto Ridge Court NE NM 87124	Fax #:	505-892-6643
Contact Person:	Lester Wayne Price Jr	E-mail:	waprice23@hotmail.com
Invoice to: (if different from above)	WASSERHUND		
Project #:	NA	Project Name:	BRINE WELL
Project Location (including state):	BUCKEYE NM	Sampler Signature:	LUPAR

[illegible]

Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR:
FOSTER-WAYNE PRICE JR	PRICE LLC	10/17/14	4:00PM	BCT	BCT	10-17-14	4:10	INST OBS COR:
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR:
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST OBS COR:

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## ANALYSIS REQUEST

(Circle or Specify Method No.)

[illegible]

LAB USE ONLY	Intact <u>Y</u> / <u>N</u>	REMARKS:  COC # 1
	Headspace <u>Y</u> / <u>N</u> / <u>NA</u> <input type="checkbox"/> Dry Weight Basis Required <input type="checkbox"/> TRRP Report Required <input type="checkbox"/> Check if Special Reporting Limits Are Needed Log-in-Review <u>A</u>	

25 ZR 292510

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well

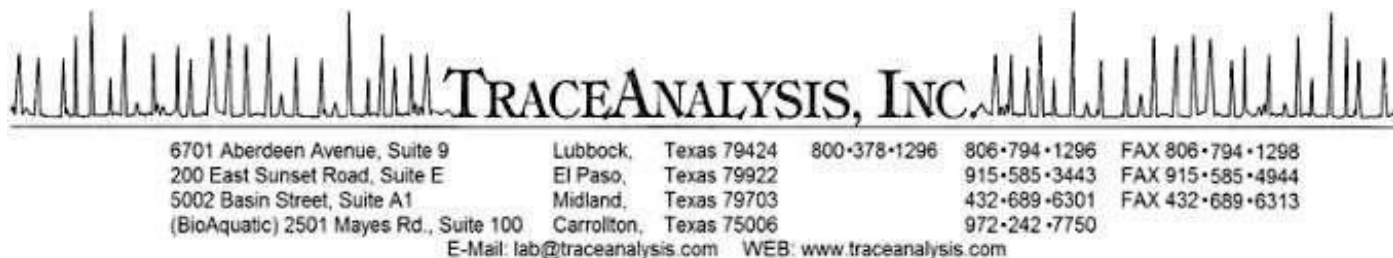
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

### Sample: 385130 - Fresh

Param	Flag	Result	Units	RL
Chloride	H	<b>338</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>221</b>	mg/L	1
pH		<b>8.03</b>	s.u.	2
Specific Gravity		<b>0.9918</b>	g/ml	
Total Dissolved Solids		<b>806</b>	mg/L	2.5

### Sample: 385131 - Brine

Param	Flag	Result	Units	RL
Chloride	H	<b>106000</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>81300</b>	mg/L	1
pH		<b>7.12</b>	s.u.	2
Specific Gravity		<b>1.124</b>	g/ml	
Total Dissolved Solids		<b>186000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well  
Project Number: Brine Well-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, appearing to read "Blair Leftwich".

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager



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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012306. Samples for work order 15012306 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	100982	2015-02-16 at 12:00	119410	2015-02-16 at 12:53
Na, Dissolved	S 6010C	100546	2015-01-27 at 17:40	119127	2015-02-06 at 09:23
pH	SM 4500-H+	100544	2015-01-27 at 04:00	118893	2015-01-27 at 16:44
Specific Gravity	ASTM D1429-95	100533	2015-01-27 at 13:00	118885	2015-01-27 at 13:10
TDS	SM 2540C	100553	2015-01-26 at 09:00	118905	2015-01-26 at 17:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15012306 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

# Analytical Report

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-02-16	Analyzed By:	RL
QC Batch:	119410	Sample Preparation:		Prepared By:	RL
Prep Batch:	100982				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>338</b>	mg/L	10	2.50

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-02-06	Analyzed By:	RR
QC Batch:	119127	Sample Preparation:	2015-01-27	Prepared By:	RR
Prep Batch:	100546				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>221</b>	mg/L	1	1.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-01-27	Analyzed By:	AT
QC Batch:	118893	Sample Preparation:	2015-01-27	Prepared By:	AT
Prep Batch:	100544				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>8.03</b>	s.u.	1	2.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-01-27	Analyzed By:	CF
QC Batch:	118885	Sample Preparation:	2015-01-27	Prepared By:	CF
Prep Batch:	100533				

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

Page Number: 5 of 16  
Buckeye, NM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9918</b>	g/ml	1	0.000

**Sample: 385130 - Fresh**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>806</b>	mg/L	20	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Chloride (IC)

QC Batch: 119410

Prep Batch: 100982

Analytical Method: E 300.0

Date Analyzed: 2015-02-16

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>106000</b>	mg/L	5000	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 119127

Prep Batch: 100546

Analytical Method: S 6010C

Date Analyzed: 2015-02-06

Sample Preparation: 2015-01-27

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>81300</b>	mg/L	1000	1.00

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

Page Number: 6 of 16  
Buckeye, NM

**Sample: 385131 - Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	118893	Date Analyzed:	2015-01-27
Prep Batch:	100544	Sample Preparation:	2015-01-27
		Prep Method:	N/A
		Analyzed By:	AT
		Prepared By:	AT

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.12</b>	s.u.	1	2.00

**Sample: 385131 - Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	118885	Date Analyzed:	2015-01-27
Prep Batch:	100533	Sample Preparation:	2015-01-27
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.124</b>	g/ml	1	0.000

**Sample: 385131 - Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	118905	Date Analyzed:	2015-01-26
Prep Batch:	100553	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>186000</b>	mg/L	2000	2.50

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

Page Number: 7 of 16  
Buckeye, NM

## Method Blanks

### Method Blank (1)      QC Batch: 118885

QC Batch: 118885      Date Analyzed: 2015-01-27      Analyzed By: CF  
Prep Batch: 100533      QC Preparation: 2015-01-27      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9916	g/ml	

### Method Blank (1)      QC Batch: 118905

QC Batch: 118905      Date Analyzed: 2015-01-26      Analyzed By: RL  
Prep Batch: 100553      QC Preparation: 2015-01-26      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 119127

QC Batch: 119127      Date Analyzed: 2015-02-06      Analyzed By: RR  
Prep Batch: 100546      QC Preparation: 2015-01-27      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 119410

QC Batch: 119410      Date Analyzed: 2015-02-16      Analyzed By: RL  
Prep Batch: 100982      QC Preparation: 2015-02-16      Prepared By: RL

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

---

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.767	mg/L	2.5

---

## Duplicates

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118885 Date Analyzed: 2015-01-27 Analyzed By: CF  
Prep Batch: 100533 QC Preparation: 2015-01-27 Prepared By: CF

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity	1.074	1.072	g/ml	1	0	200

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118893 Date Analyzed: 2015-01-27 Analyzed By: AT  
Prep Batch: 100544 QC Preparation: 2015-01-27 Prepared By: AT

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	6.79	6.78	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 385130

QC Batch: 118905 Date Analyzed: 2015-01-26 Analyzed By: RL  
Prep Batch: 100553 QC Preparation: 2015-01-26 Prepared By: RL

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	850	806	mg/L	20	5	10



Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 118905  
Prep Batch: 100553

Date Analyzed: 2015-01-26  
QC Preparation: 2015-01-26

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	988	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	978	mg/L	10	1000	<25.0	98	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.0	mg/L	1	52.5	<0.0184	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	57.2	mg/L	1	52.5	<0.0184	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.0	mg/L	1	25.0	0.767	93	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	23.5	mg/L	1	25.0	0.767	91	90 - 110	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

## Matrix Spikes

### Matrix Spike (xMS-1) Spiked Sample: 385041

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	1660	mg/L	1	525	1210	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param			MSD	Units	Dil.	Spike	Matrix	Rec.	Rec.	RPD	RPD	
	F	C	Result			Amount	Result		Limit		Limit	
Dissolved Sodium	Q <sub>s</sub>	Q <sub>s</sub>	2,3,4,5	1580	mg/L	1	525	1210	70	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 386889

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3350	mg/L	100	2500	812	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3290	mg/L	100	2500	812	99	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (CCV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (ICV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2015-02-06

### Standard (CCV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	55.9	110	90 - 110	2015-02-06

Standard (CCV-1)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.8	95	90 - 110	2015-02-16

Standard (CCV-2)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.9	96	90 - 110	2015-02-16

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

[illegible]

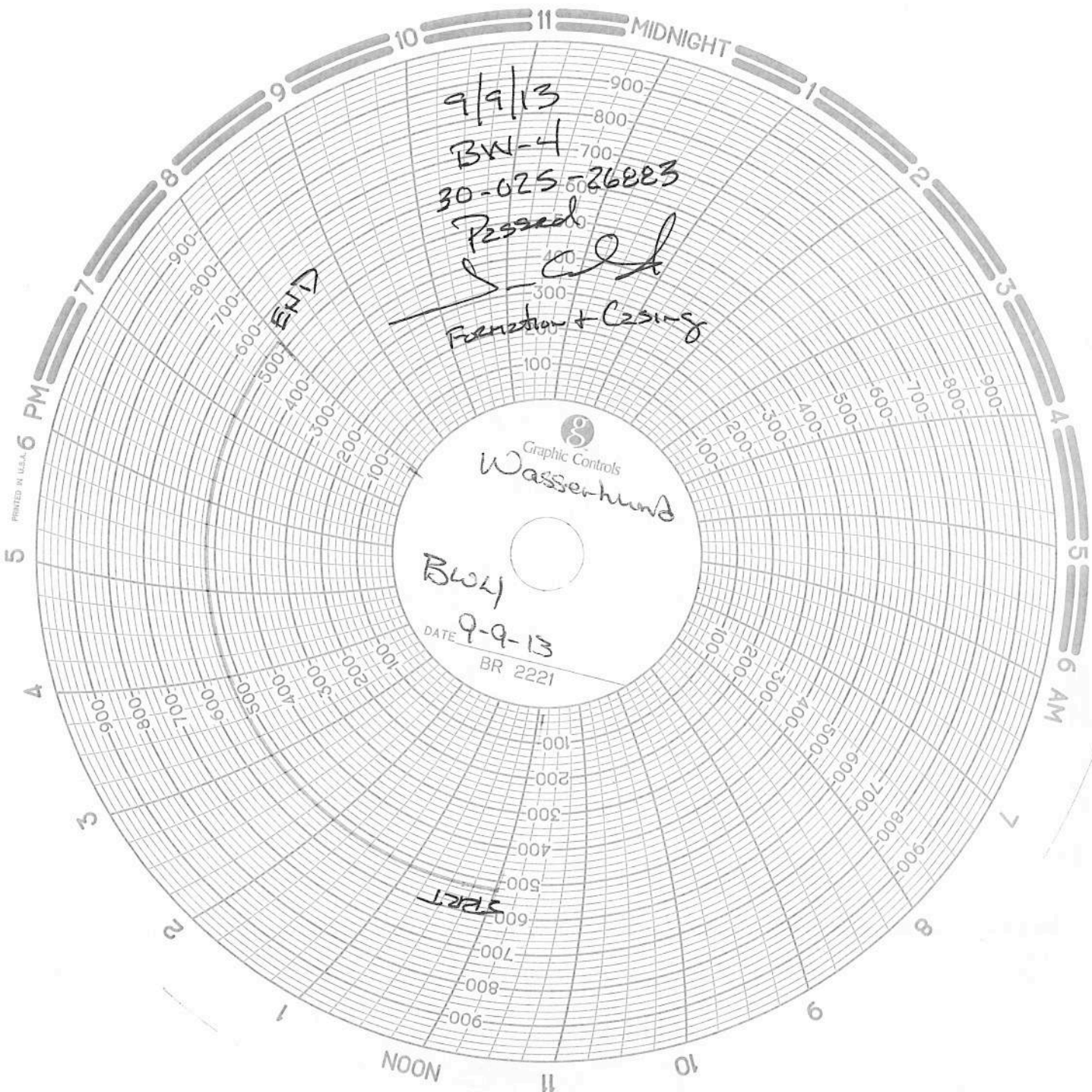
Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY



## Appendix “D”

- 2013 MIT Chart



9/9/13  
BW-4  
30-025-26883  
Passed

*[Signature]*  
Friction + Casing

END

BLU  
DATE 9-9-13  
BR 2221

START

Graphic Controls  
Wasserhund

PRINTED IN U.S.A.

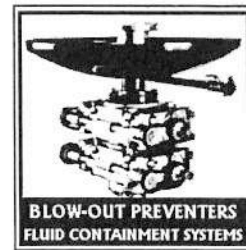
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

**Unit:** 2

**Model:** 8" Chart recorder

**Pressure Rating:** 1,000#

**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*

A handwritten signature in black ink, consisting of a large, stylized 'I' followed by a series of loops and a long horizontal stroke.

\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

## 2014 BW-04 AOR Review- Well Status List

up-dated Apr 28, 2015

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program Checked	Cased/Cemented across salt section	Corrective Action Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	567 FSL & 162 FWL	NA	NA	NA	NA
1	30-025-25146	Sheridan-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	Chevron-Chesapeake St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Under Evaluation by OCD
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	no

2 2

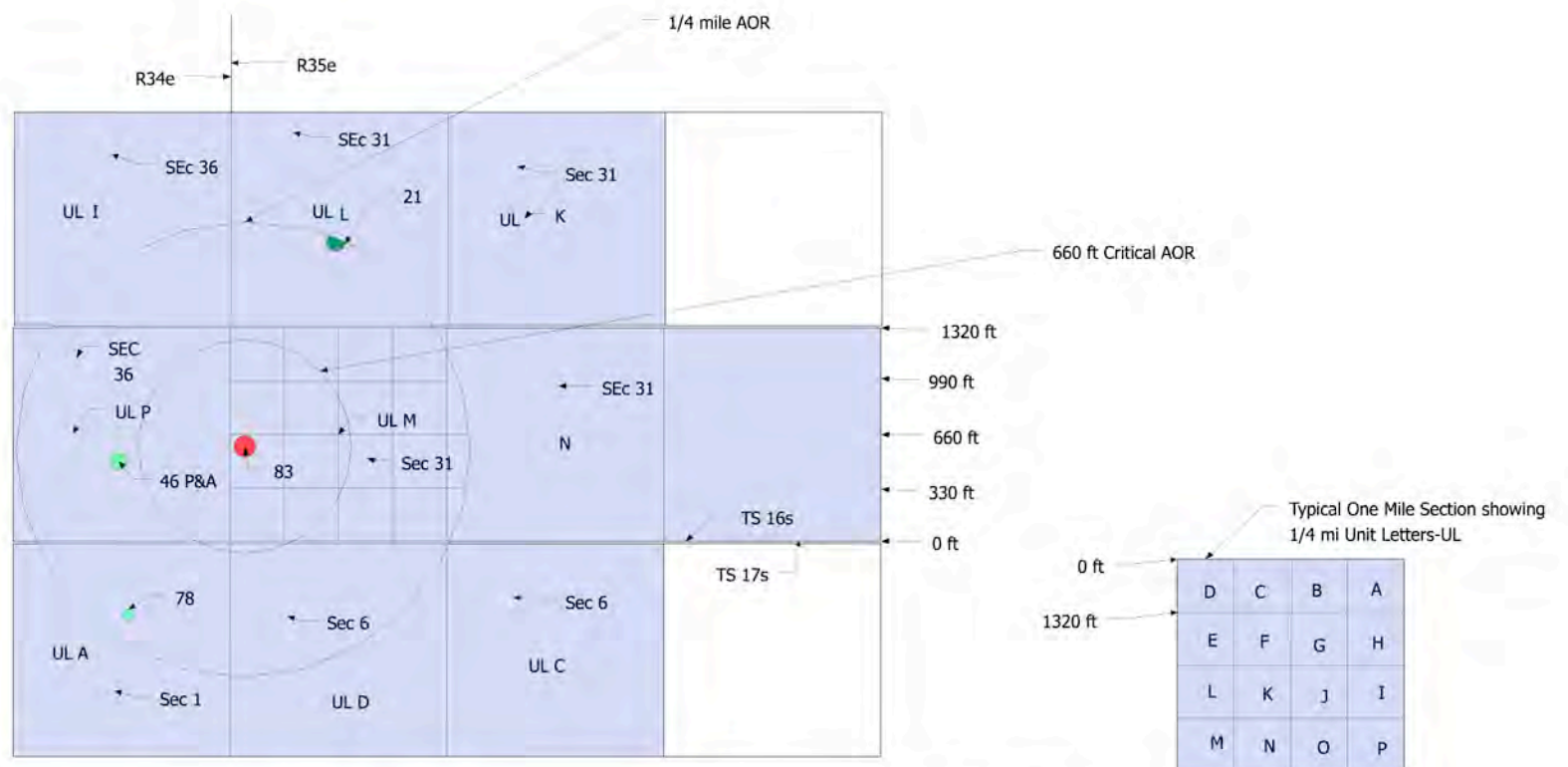
3 Total # of wells in adjacent quarter-sections

3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

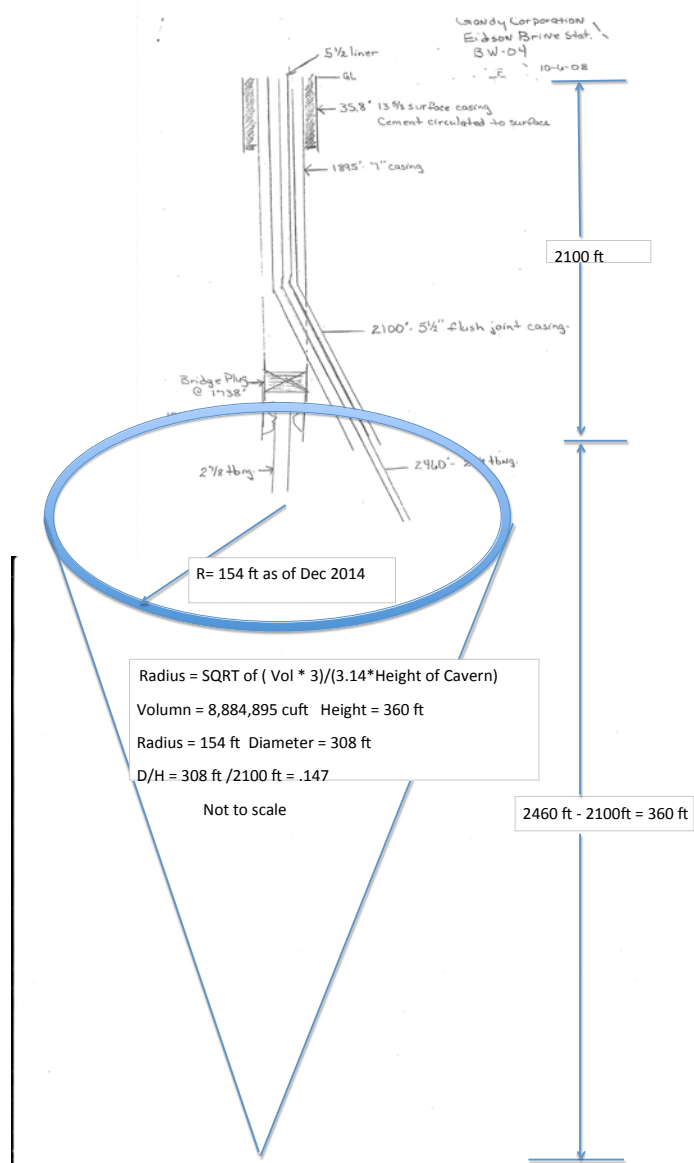
\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.



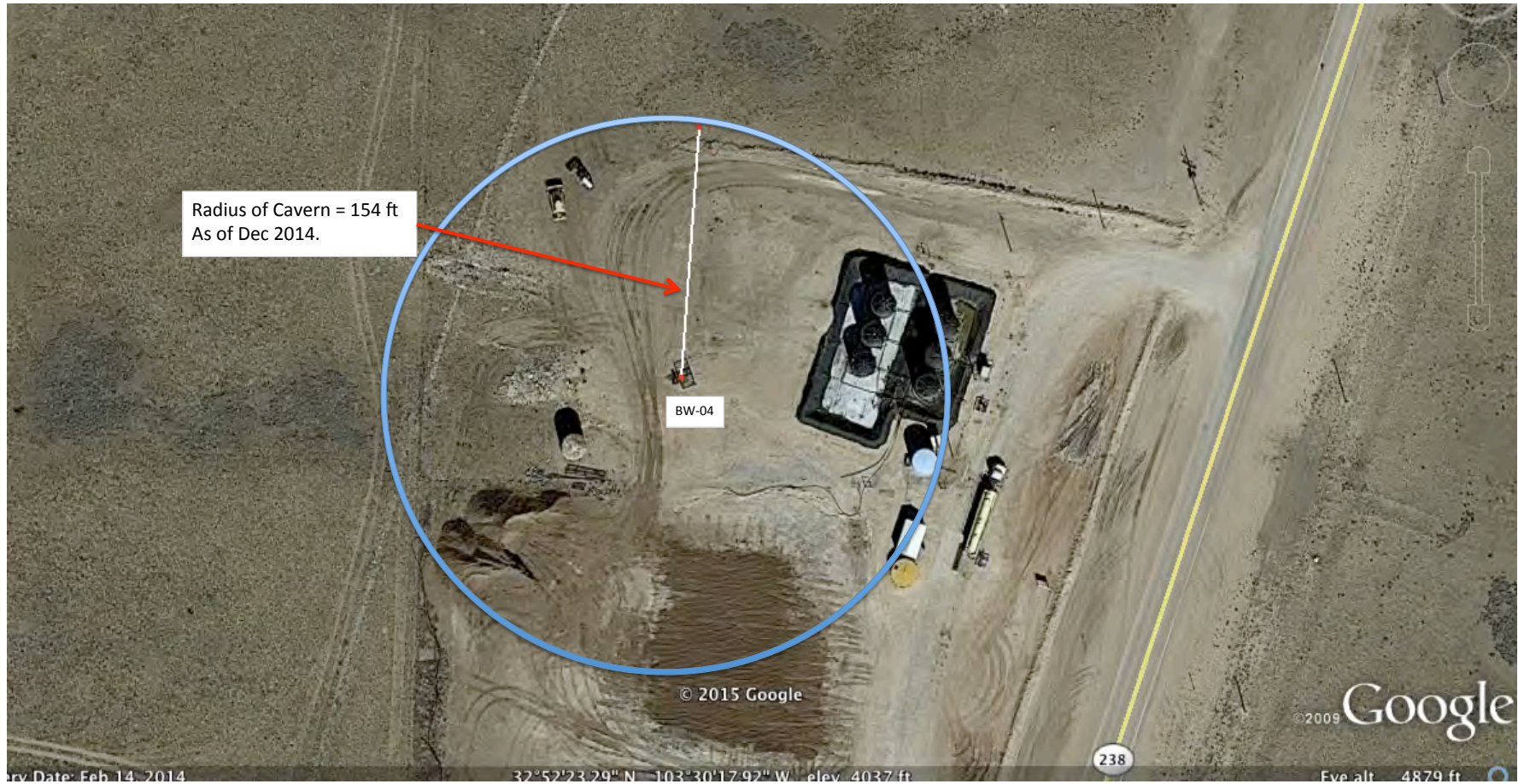
Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2014	Location: UL M-Sec 31-Ts16s-R35e	

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2014 Radius and D/H calculations.
- Aerial View showing Cavern Radius







Radius of Cavern = 154 ft  
As of Dec 2014.

BW-04

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Acq. Date: Feb 14, 2014

32°52'23.29" N 103°30'17.92" W elev. 4037 ft

Elev. alt 4879 ft

## Appendix “G”

- Solution Cavern Monitoring Plan Program

# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

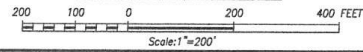
Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

The data will be tabulated and a graph be maintained for each point over the life of the system.

Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only

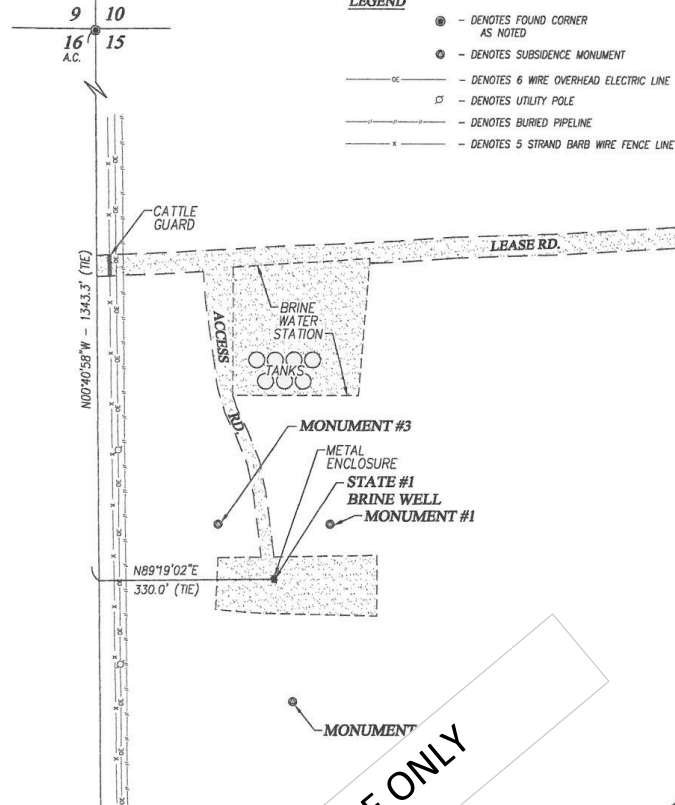
# TOPOGRAPHIC MAP

Figure 4



## LEGEND

- - DENOTES FOUND CORNER AS NOTED
- - DENOTES SUBSIDENCE MONUMENT
- - DENOTES 6 WIRE OVERHEAD ELECTRIC LINE
- - DENOTES UTILITY POLE
- |—|—|— - DENOTES BURIED PIPELINE
- x— - DENOTES 5 STRAND BARB WIRE FENCE LINE



## NOTE

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.



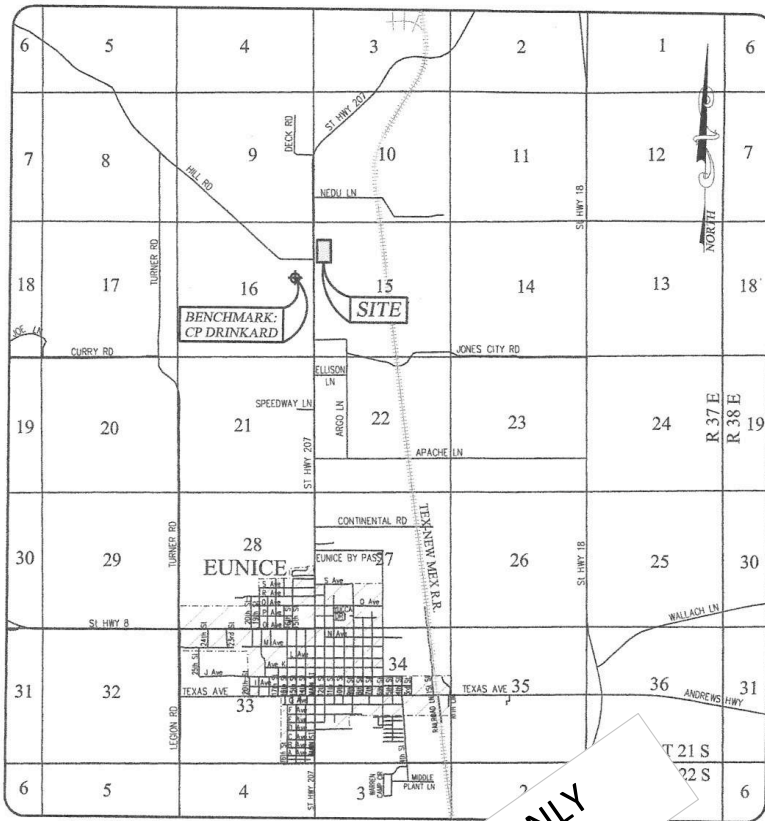
PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mex5\Tracts\Subsidence Monitoring\Key Energy Services, LLC\State #1 Brine Well Eunice Lea County NM\12111721

VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WEST SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC  
MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO



Figure 2

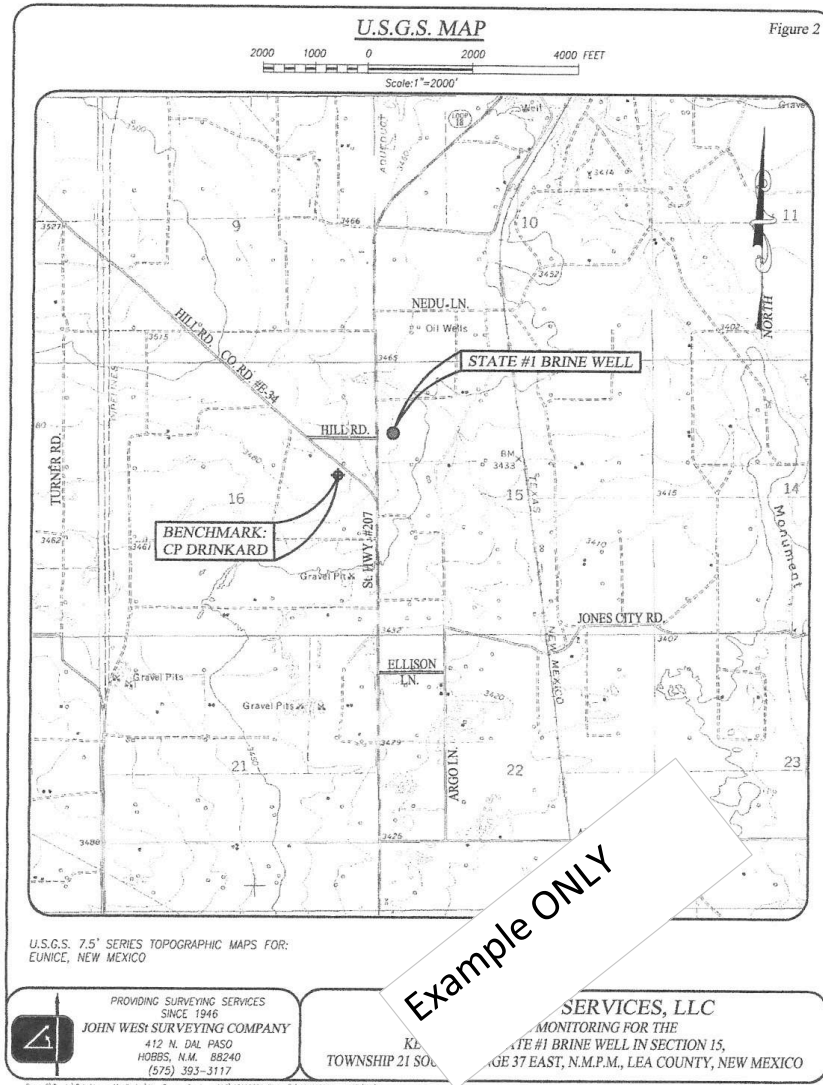
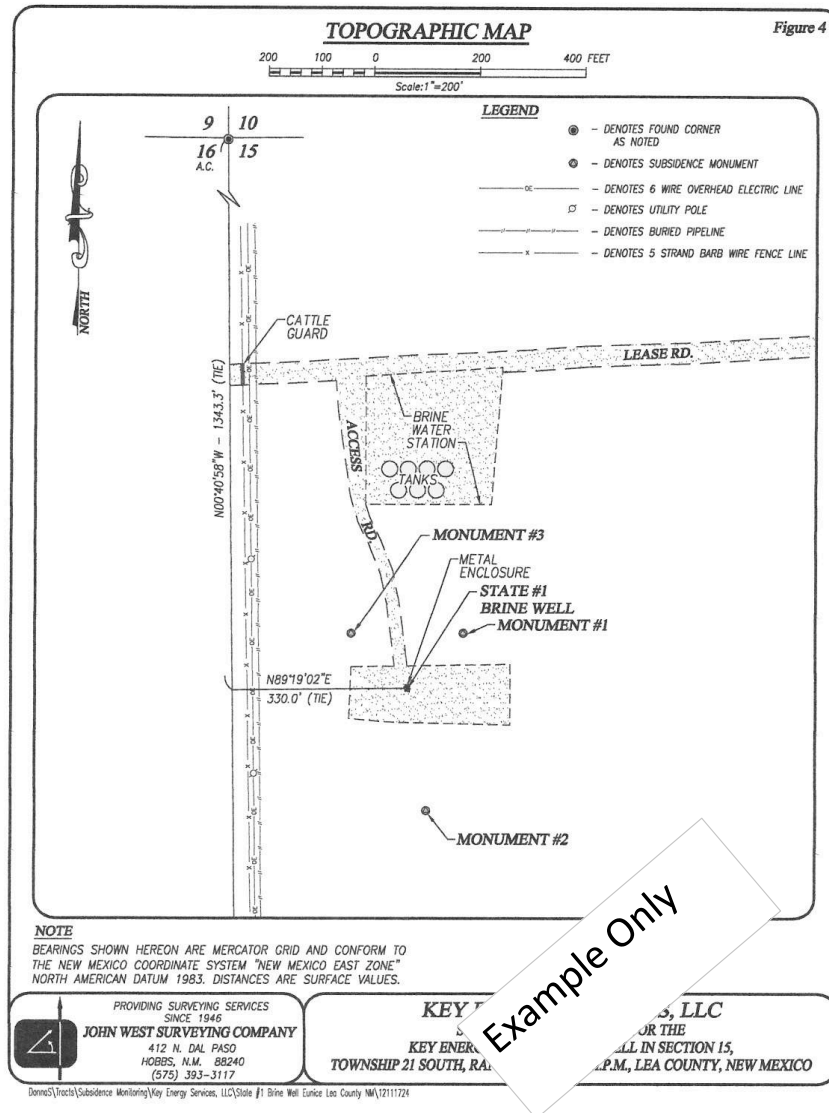
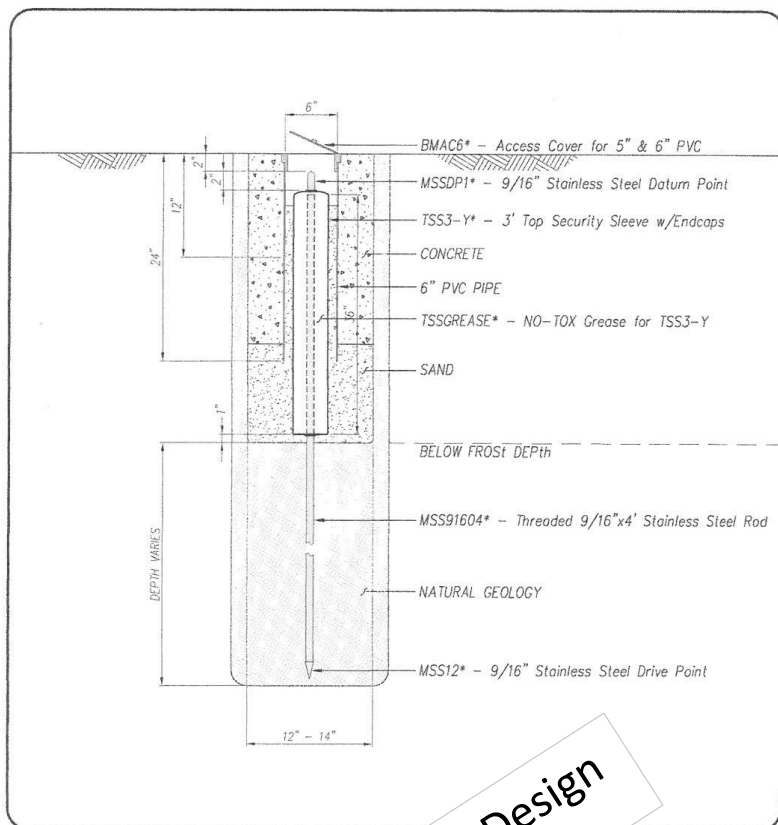


Figure 4



**BERNTSEN MONUMENT INSTALLATION DETAIL**  
NOT TO SCALE

Figure 6



\*REFERENCE:  
www.berntsen.com  
9/16" STAINLESS STEEL TOP SECURITY SLEEVE MONUMENT

Actual Design



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WES SURVEYING COMPANY  
412 N. DAL PASO  
HOBBBS, N.M. 88240  
(575) 393-3117

ENERGY SERVICES, LLC  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO



11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

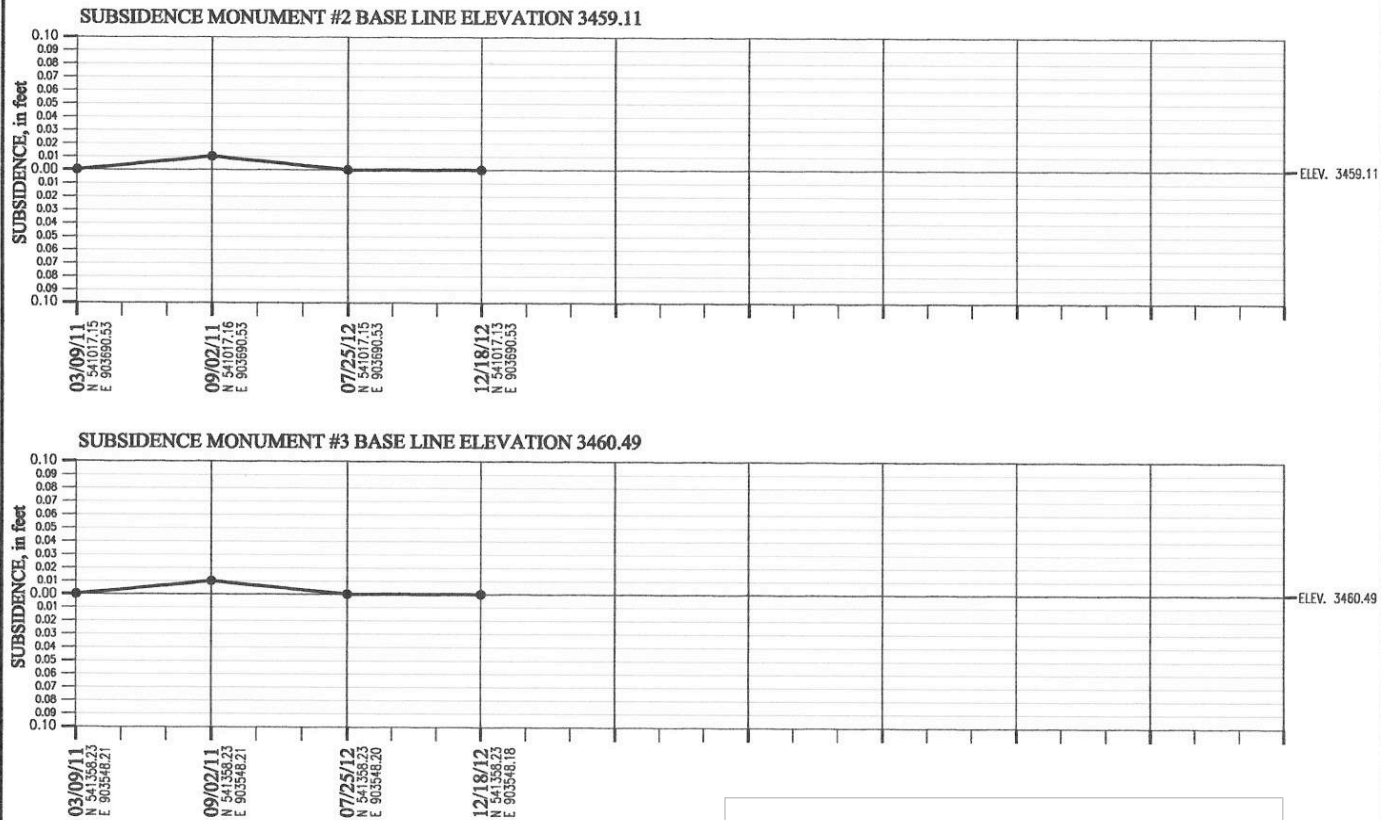
# ADJUSTED ELEVATIONS

Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only

## VERTICAL SUBSIDENCE TABLE



Example Only

Figure 7B

PROVIDING SURVEYING SERVICES  
SINCE 1946

**JOHN WEST SURVEYING COMPANY**

412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**NOTE:**  
HORIZONTAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.02$  FT.  
VERTICAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.01$  FT.

SUBSIDENCE MONITORING FOR THE  
**KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO**

## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2014 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

Pulling Unit Rig	\$25,000
Halliburton Cement Job	\$8,000.00
Post Subsidence Monitoring 5 years	\$15,000.00
Tank Removal, Pad Clean-Up	\$30,000.00
Consulting fees	\$10,000.00
Total Estimate	\$88,000



**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2015**

**Wasserhund Inc.**

**Buckeye Brine Station**

**OCD Permit BW-04**

***Expiration Date: November 08, 2018***

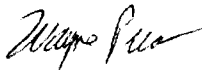
**API No. 30-025-26883 Eidson #1**

**Unit Letter M-Section 31-Ts 16s – R35e**

**April 30, 2016**

**Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.**

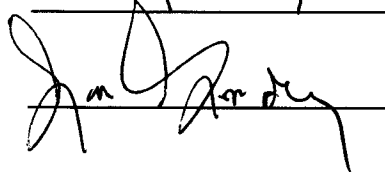
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2015 year there was no major remedial work on the brine well. General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the BW-04 permit conditions. *(A copy of the most recent OCD approved Discharge Plan permit BW-04, Aerial photo, and inspection report is included for reference in **Appendix "A"**).*

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services. **(Appendix "A" shows system filling station photos.)**

Inspections revealed that the loading area concrete sump was not tested in 2014 as planned. The sump was drained in 2015 and routine maintenance was performed, by adding another coat of epoxy. A third party consultant (Price LLC) scheduled and performed a hydrostatic test and the results showed no head loss during the 24 hours.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in Appendix "D"). The next scheduled 5-year test will be due in 2018.

The brine well was drilled in 1980 and has been in operation for approximately 35 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

A Pro-active well "Area of Review" has been conducted and will continue to ensure the safety of the well system, including cavern subsidence monitoring as required or directed by OCD. Currently, this well does not have subsidence devices installed.

A yearly cavity size calculation and evaluation of the last sonar test has been conducted to determine cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2015 brine production volume was 415,784 bbls and the lifetime production volume is 9,111,275 bbls.

Enclosed in **Appendix "B"** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- "Injection Pressure Data."**

(Permit condition 2.J.4 "Injection Pressure Data")

Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 340 psig, which is approximately 35 pounds below the recommended maximum surface pressure of 380 psig, utilizing a .70 psi/ft brine well gradient, measured from the top to the casing shoe.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.



#### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 "A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.")

Please find attached in **Appendix "C"** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2015 year and analyzed by Trace Analysis in Lubbock, Texas. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed the brine water is predominately sodium chloride with a high density of 1.194 specific gravity. This analysis is very representative of Salado "Salt" formation waters found in the area. During the year, it appeared the weight of the brine ranged from 1.124 SG to 1.194 SG, with a weighted averaged of 1.15 SG for the year, equating to 9.57 lbs/gal, which has been normally acceptable to Wasserhund customers.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

The Sodium-Chloride ratio for the year averaged .69, which is above the .648 ratio theoretical value of sodium chloride. It's not unusual for salt caverns to produced super-saturated brine waters.

#### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.")

A Mechanical Integrity Test (MIT) was successfully ran and passed on September 09, 2013. The next scheduled MIT will occur in 2018 as approved by OCD.

Please find in **Appendix "D"** a copy of the test chart and meter calibration record.

### **Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

### **Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 “Results of any leaks and spill reports;”)

There were no reportable leaks and spills in 2015.

The loading areas are concrete with an integral concrete sump with spill containers under the hose connections, which are designed to catch de-minimis drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

### **Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 “An Area of Review (AOR) update summary;”)

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix “E”**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 312 feet (R = 156 ft) up-dated for 2015, a 10:1 safety factor is applied that equates to about 1560 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2015 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1560 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1560 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been approved by OCD for recompletion, which would appear to have the salt zone "Salado" casing cemented. See Copy of proposed recompletion diagram in **Appendix "E"**.

Conclusions: OCD has approved the proposed re-completion.

Corrective Actions and Recommendation: If completed as proposed, this well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

*(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")*

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as "catastrophic collapses", have a higher probability when

the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “upright cone”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “rule of thumb” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.11 million barrels of brine produced as of December 2015. The maximum diameter was calculated to be approximately 312 feet with a corresponding D/H ratio of .148 updated for the 2015 year.

Comparing the current D/H ratio of .148 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

Included in **Appendix “F”** is an aerial view showing the 156-foot radius superimposed around the brine well and station. The radius has increased by 2.0 feet from last year.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the*

*subsidence.*

Wasserhund Inc. hereby, submits a subsidence monitoring plan pursuant to Permit Condition 2.B. "Solution Cavern Monitoring Plan Program". A copy of the proposal is included in **Appendix "G"** for OCD review and approval.

Special Note: Wasserhund Inc. **request a Minor Modifications** that allows the results be supplied in the annual report, unless there is an exceedance as noted in the permit.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an "Induced Current Method" and report these results in the next annual report.

The "Induced Current" Method has not been successful, primarily to bad connections and low voltage used. Wasserhund will continue trying this method and others as approved by OCD. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 "A summary of the ratio of the volume of injected fluids to the volume of produced brine;")*

*See Bullet Point #3 and Appendix "B" for comparison chart numbers.*

Special Note: **Key requests a minor modification of the permit requirement 3.K** *"The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours."*

Dear Jim Giswold-NMOCD Environmental Bureau Chief: As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this

as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations. Notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency. Currently the permit reads as follows:

The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.

#### **Bullet Point #12- Summary of Activities**

(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "H" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

#### **Bullet Point #13- Annual Certification**

(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. **"2.B.3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")

**Operator Response:** Based on all current information and actual on-site

observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")

The BW-04 Wasserhund Inc. Buckeye facility, currently does not have groundwater monitoring at this site. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

The closure of the "out-of-service" brine storage pit was started in December of 2013 and the Wasserhund has received OCD approved in install a down-gradient Monitoring Well. The results concerning groundwater will be listed in the 2016 annual report.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and one hard copy.



## Appendix “A”

- Aerial View Plot Plan
- Site Photos-New Flowpoint Dispensing System
- 3<sup>rd</sup> Party Field Inspection Report
- Discharge Plan BW-04







Brine Well Inspection Sheet:

Permit # BW-04  
 API# 30-025-26883 Eidson #1  
 Operator: Wasserhund Inc.  
 Location: Unit Letter M-Section 31-Ts 16s – R35e

- |   | Yes    | No   |
|---|--------|--|
| 1 Any reportable leaks or spills noted at time of inspection? |        | X  |
| 2 Any observed radial cracks or any evidence of subsidence?   |        | X  |
| 3 Load/unload pots in place?                                  | X      |  |
| 4 Any New Wells IN AOR?                                       |        | X  |
| 5 Observed Injection Pressure on Well?                        | X      | 220 psig.                                  |
| 6 Is operator experiencing any downhole issues?               |        | X None Noted at this time.                 |
| 7 Do brine Tanks have secondary containment?                  | X      |  |
| 8 Samples Collected?  | X      | Fresh + Brine                              |
| 9 Brine well Operated Normal or Reverse Flow?                 | Normal |  |
| 10 Checked Sumps?   | X      | Holding Water no observed drop in 24 hours |
| 11 Groundwater Monitor Wells on-site?                         |        | X  |
| 12 Subsidence Monitors on-site?                               |        | X  |
| 13 Equipment failures?  |        | X  |

Photos Taken:

2 see attached

Date of Inspection:

2/17/16

Inspector: Wayne Price Jr. Price LLC

Inspector Signature:



A photograph of a water treatment facility. In the center, there are five large, black, cylindrical storage tanks. To the left of the tanks is a small blue building with a white roof. A dirt road curves from the foreground towards the tanks. In the foreground, there is a pile of rocks and gravel. The sky is blue with scattered white clouds. A utility pole with a wire is visible on the right side of the image.

Wasserhund Buckeye BW-04  
Feb 17, 2016-Looking SW  
BY: Price LLC



Wasserhund BW-04 Well Head Pressure Gage  
Feb 17, 2016 Photo by Price LLC



# BW-4

Wasserhund/Buckeye  
Eidson State #1

Permit Renewal  
11/8/13

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru .3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office



## **DISCHARGE PERMIT BW-4**

### **1. GENERAL PROVISIONS:**

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND**

**PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.

a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a



non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

### **3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

### **3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

### **3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts

2015 Wasserhund Inc OCD BW-04 Annual Production Data									
							Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.		
				Brine-BBLS	Fresh-BBLS	% diff			
Jan				64,531.00	64,647.00	0.18%			
Feb				43,305.00	43,439.00	0.31%			
Mar				38,845.00	38,974.00	0.33%			
Apr				28,060.00	28,175.00	0.41%			
May				24,125.00	24,275.00	0.62%			
Jun				36,901	37,005	0.28%			
Jul				30,752	30,567	-0.60%			
Aug				23,952	24,331	1.58%			
Sept				26,863	27,020	0.58%			
Oct				33,537	33,669	0.39%			
Nov				32,346	32,461	0.36%			
Dec				31,071	31,221	0.48%			
2014 Total				414,288	415,784	0.36%			
Total Brine Water Production Carry Over from Years Past BBLs				8,696,987					
Total Production year ending 2015				9,111,275	bbls				

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

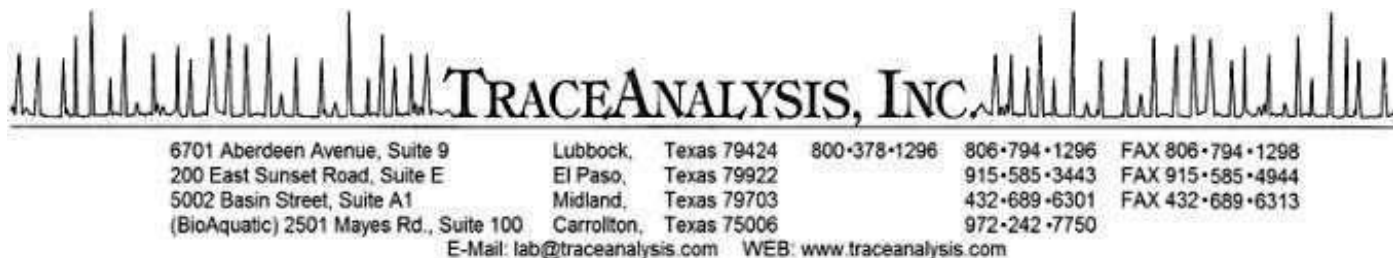
### Sample: 385130 - Fresh

Param	Flag	Result	Units	RL
Chloride	H	<b>338</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>221</b>	mg/L	1
pH		<b>8.03</b>	s.u.	2
Specific Gravity		<b>0.9918</b>	g/ml	
Total Dissolved Solids		<b>806</b>	mg/L	2.5

### Sample: 385131 - Brine

Param	Flag	Result	Units	RL
Chloride	H	<b>106000</b>	mg/L	2.5
Dissolved Sodium	Qs	<b>81300</b>	mg/L	1
pH		<b>7.12</b>	s.u.	2
Specific Gravity		<b>1.124</b>	g/ml	
Total Dissolved Solids		<b>186000</b>	mg/L	2.5





## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 17, 2015

Work Order: 15012306



Project Location: Buckeye, NM  
Project Name: Brine Well  
Project Number: Brine Well-Buckeye

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
385130	Fresh	water	2015-01-16	15:51	2015-01-21
385131	Brine	water	2015-01-16	14:10	2015-01-21

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, appearing to read "Blair Leftwich".

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012306. Samples for work order 15012306 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	100982	2015-02-16 at 12:00	119410	2015-02-16 at 12:53
Na, Dissolved	S 6010C	100546	2015-01-27 at 17:40	119127	2015-02-06 at 09:23
pH	SM 4500-H+	100544	2015-01-27 at 04:00	118893	2015-01-27 at 16:44
Specific Gravity	ASTM D1429-95	100533	2015-01-27 at 13:00	118885	2015-01-27 at 13:10
TDS	SM 2540C	100553	2015-01-26 at 09:00	118905	2015-01-26 at 17:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15012306 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Buckeye, NM

# Analytical Report

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-02-16	Analyzed By:	RL
QC Batch:	119410	Sample Preparation:		Prepared By:	RL
Prep Batch:	100982				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>338</b>	mg/L	10	2.50

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-02-06	Analyzed By:	RR
QC Batch:	119127	Sample Preparation:	2015-01-27	Prepared By:	RR
Prep Batch:	100546				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>221</b>	mg/L	1	1.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-01-27	Analyzed By:	AT
QC Batch:	118893	Sample Preparation:	2015-01-27	Prepared By:	AT
Prep Batch:	100544				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>8.03</b>	s.u.	1	2.00

## Sample: 385130 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-01-27	Analyzed By:	CF
QC Batch:	118885	Sample Preparation:	2015-01-27	Prepared By:	CF
Prep Batch:	100533				

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9918</b>	g/ml	1	0.000

**Sample: 385130 - Fresh**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 118905

Prep Batch: 100553

Analytical Method: SM 2540C

Date Analyzed: 2015-01-26

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>806</b>	mg/L	20	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Chloride (IC)

QC Batch: 119410

Prep Batch: 100982

Analytical Method: E 300.0

Date Analyzed: 2015-02-16

Sample Preparation:

Prep Method: N/A

Analyzed By: RL

Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>106000</b>	mg/L	5000	2.50

**Sample: 385131 - Brine**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 119127

Prep Batch: 100546

Analytical Method: S 6010C

Date Analyzed: 2015-02-06

Sample Preparation: 2015-01-27

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qs	2,3,4,5	<b>81300</b>	mg/L	1000	1.00

Report Date: February 17, 2015  
Brine Well-Buckeye

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**Sample: 385131 - Brine**

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-01-27	Analyzed By:	AT
QC Batch:	118893	Sample Preparation:	2015-01-27	Prepared By:	AT
Prep Batch:	100544				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.12</b>	s.u.	1	2.00

**Sample: 385131 - Brine**

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-01-27	Analyzed By:	CF
QC Batch:	118885	Sample Preparation:	2015-01-27	Prepared By:	CF
Prep Batch:	100533				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.124</b>	g/ml	1	0.000

**Sample: 385131 - Brine**

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2015-01-26	Analyzed By:	RL
QC Batch:	118905	Sample Preparation:		Prepared By:	RL
Prep Batch:	100553				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>186000</b>	mg/L	2000	2.50

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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## Method Blanks

### Method Blank (1)      QC Batch: 118885

QC Batch: 118885      Date Analyzed: 2015-01-27      Analyzed By: CF  
Prep Batch: 100533      QC Preparation: 2015-01-27      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9916	g/ml	

### Method Blank (1)      QC Batch: 118905

QC Batch: 118905      Date Analyzed: 2015-01-26      Analyzed By: RL  
Prep Batch: 100553      QC Preparation: 2015-01-26      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 119127

QC Batch: 119127      Date Analyzed: 2015-02-06      Analyzed By: RR  
Prep Batch: 100546      QC Preparation: 2015-01-27      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0184	mg/L	1

### Method Blank (1)      QC Batch: 119410

QC Batch: 119410      Date Analyzed: 2015-02-16      Analyzed By: RL  
Prep Batch: 100982      QC Preparation: 2015-02-16      Prepared By: RL

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Brine Well-Buckeye

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---

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.767	mg/L	2.5

---



## Duplicates

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118885 Date Analyzed: 2015-01-27 Analyzed By: CF  
Prep Batch: 100533 QC Preparation: 2015-01-27 Prepared By: CF

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity	1.074	1.072	g/ml	1	0	200

### Duplicates (1) Duplicated Sample: 385269

QC Batch: 118893 Date Analyzed: 2015-01-27 Analyzed By: AT  
Prep Batch: 100544 QC Preparation: 2015-01-27 Prepared By: AT

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	6.79	6.78	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 385130

QC Batch: 118905 Date Analyzed: 2015-01-26 Analyzed By: RL  
Prep Batch: 100553 QC Preparation: 2015-01-26 Prepared By: RL

Param	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	850	806	mg/L	20	5	10

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Brine Well-Buckeye

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Brine Well

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 118905  
Prep Batch: 100553

Date Analyzed: 2015-01-26  
QC Preparation: 2015-01-26

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	988	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	978	mg/L	10	1000	<25.0	98	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.0	mg/L	1	52.5	<0.0184	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	57.2	mg/L	1	52.5	<0.0184	109	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.0	mg/L	1	25.0	0.767	93	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	23.5	mg/L	1	25.0	0.767	91	90 - 110	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: February 17, 2015  
Brine Well-Buckeye

Work Order: 15012306  
Brine Well

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## Matrix Spikes

### Matrix Spike (xMS-1) Spiked Sample: 385041

QC Batch: 119127  
Prep Batch: 100546

Date Analyzed: 2015-02-06  
QC Preparation: 2015-01-27

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	1660	mg/L	1	525	1210	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param				MSD			Spike	Matrix		Rec.		RPD
	F	C		Result	Units	Dil.	Amount	Result	Rec.	Limit	RPD	Limit
Dissolved Sodium	Q <sub>s</sub>	Q <sub>s</sub>	2,3,4,5	1580	mg/L	1	525	1210	70	75 - 125	5	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 386889

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3350	mg/L	100	2500	812	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3290	mg/L	100	2500	812	99	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (CCV-1)

QC Batch: 118893

Date Analyzed: 2015-01-27

Analyzed By: AT

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.01	100	98.6 - 101.4	2015-01-27

### Standard (ICV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	51.7	101	90 - 110	2015-02-06

### Standard (CCV-1)

QC Batch: 119127

Date Analyzed: 2015-02-06

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	55.9	110	90 - 110	2015-02-06

Standard (CCV-1)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.8	95	90 - 110	2015-02-16

Standard (CCV-2)

QC Batch: 119410				Date Analyzed: 2015-02-16			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	23.9	96	90 - 110	2015-02-16

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-14-10	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: June 5, 2015

Work Order: 15050505



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station

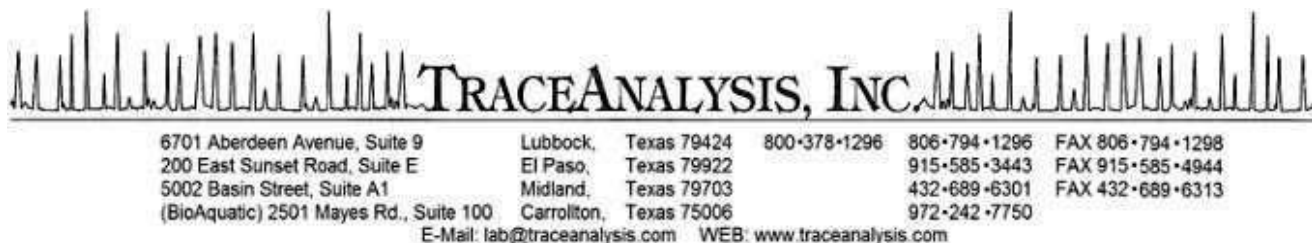
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
392447	Fresh	water	2015-04-27	16:30	2015-05-04
392448	Brine	water	2015-04-27	16:40	2015-05-04

### Sample: 392447 - Fresh

Param	Flag	Result	Units	RL
Chloride		<b>377</b>	mg/L	2.5
pH		<b>7.82</b>	s.u.	2
Specific Gravity		<b>0.9841</b>	g/ml	
Total Dissolved Solids		<b>884</b>	mg/L	2.5

### Sample: 392448 - Brine

Param	Flag	Result	Units	RL
Chloride		<b>185000</b>	mg/L	2.5
Dissolved Sodium		<b>101000</b>	mg/L	1
pH		<b>6.79</b>	s.u.	2
Specific Gravity		<b>1.194</b>	g/ml	
Total Dissolved Solids		<b>269000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Waynce Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: June 5, 2015

Work Order: 15050505



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station  
Project Number: Buckeye Fresh & Brine Station

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
392447	Fresh	water	2015-04-27	16:30	2015-05-04
392448	Brine	water	2015-04-27	16:40	2015-05-04

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink that reads "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Buckeye Fresh & Brine Station were received by TraceAnalysis, Inc. on 2015-05-04 and assigned to work order 15050505. Samples for work order 15050505 were received intact at a temperature of 0.3 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	102846	2015-05-14 at 09:30	121554	2015-05-14 at 10:32
Na, Dissolved	S 6010C	103232	2015-06-04 at 14:09	122047	2015-06-05 at 13:17
pH	SM 4500-H+	102649	2015-05-06 at 16:48	121318	2015-05-06 at 16:51
Specific Gravity	ASTM D1429-95	102660	2015-05-07 at 10:00	121329	2015-05-07 at 10:10
TDS	SM 2540C	102686	2015-05-07 at 17:44	121355	2015-05-07 at 17:46

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15050505 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

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# Analytical Report

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 121554      Date Analyzed: 2015-05-14      Analyzed By: RL  
Prep Batch: 102846      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>377</b>	mg/L	10	2.50

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 121318      Date Analyzed: 2015-05-06      Analyzed By: HJ  
Prep Batch: 102649      Sample Preparation:      Prepared By: HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.82</b>	s.u.	1	2.00

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: Specific Gravity      Analytical Method: ASTM D1429-95      Prep Method: N/A  
QC Batch: 121329      Date Analyzed: 2015-05-07      Analyzed By: CF  
Prep Batch: 102660      Sample Preparation: 2015-05-07      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9841</b>	g/ml	1	0.000

## Sample: 392447 - Fresh

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 121355      Date Analyzed: 2015-05-07      Analyzed By: HJ  
Prep Batch: 102686      Sample Preparation:      Prepared By: HJ

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>884</b>	mg/L	20	2.50

**Sample: 392448 - Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	121554	Date Analyzed:	2015-05-14	Analyzed By:	RL
Prep Batch:	102846	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>185000</b>	mg/L	5000	2.50

**Sample: 392448 - Brine**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	122047	Date Analyzed:	2015-06-05	Analyzed By:	RR
Prep Batch:	103232	Sample Preparation:	2015-06-04	Prepared By:	RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>101000</b>	mg/L	1000	1.00

**Sample: 392448 - Brine**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	121318	Date Analyzed:	2015-05-06	Analyzed By:	HJ
Prep Batch:	102649	Sample Preparation:		Prepared By:	HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>6.79</b>	s.u.	1	2.00

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**Sample: 392448 - Brine**

Laboratory:	Lubbock		
Analysis:	Specific Gravity	Analytical Method:	ASTM D1429-95
QC Batch:	121329	Date Analyzed:	2015-05-07
Prep Batch:	102660	Sample Preparation:	2015-05-07
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>1.194</b>	g/ml	1	0.000

**Sample: 392448 - Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	121355	Date Analyzed:	2015-05-07
Prep Batch:	102686	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	HJ
		Prepared By:	HJ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>269000</b>	mg/L	2000	2.50



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## Method Blanks

### Method Blank (1)      QC Batch: 121329

QC Batch: 121329      Date Analyzed: 2015-05-07      Analyzed By: CF  
Prep Batch: 102660      QC Preparation: 2015-05-07      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9884	g/ml	

### Method Blank (1)      QC Batch: 121355

QC Batch: 121355      Date Analyzed: 2015-05-07      Analyzed By: HJ  
Prep Batch: 102686      QC Preparation: 2015-05-07      Prepared By: HJ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 121554

QC Batch: 121554      Date Analyzed: 2015-05-14      Analyzed By: RL  
Prep Batch: 102846      QC Preparation: 2015-05-14      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	0.973	mg/L	2.5

### Method Blank (1)      QC Batch: 122047

QC Batch: 122047      Date Analyzed: 2015-06-05      Analyzed By: RR  
Prep Batch: 103232      QC Preparation: 2015-06-04      Prepared By: PM

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Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

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## Duplicates

### Duplicates (1) Duplicated Sample: 392489

QC Batch: 121318 Date Analyzed: 2015-05-06 Analyzed By: HJ  
Prep Batch: 102649 QC Preparation: 2015-05-06 Prepared By: HJ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	9.09	9.19	s.u.	1	1	20

### Duplicates (1) Duplicated Sample: 392450

QC Batch: 121329 Date Analyzed: 2015-05-07 Analyzed By: CF  
Prep Batch: 102660 QC Preparation: 2015-05-07 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		1.008	1.018	g/ml	1	1	200

### Duplicates (1) Duplicated Sample: 392450

QC Batch: 121355 Date Analyzed: 2015-05-07 Analyzed By: HJ  
Prep Batch: 102686 QC Preparation: 2015-05-07 Prepared By: HJ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	32400	34100	mg/L	1000	5	10

Report Date: June 5, 2015  
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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 121355  
Prep Batch: 102686

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: HJ  
Prepared By: HJ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	963	mg/L	10	1000	<25.0	96	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	970	mg/L	10	1000	<25.0	97	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	0.973	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.3	mg/L	1	25.0	0.973	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 122047  
Prep Batch: 103232

Date Analyzed: 2015-06-05  
QC Preparation: 2015-06-04

Analyzed By: RR  
Prepared By: PM

Report Date: June 5, 2015  
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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	56.8	mg/L	1	52.5	<0.0197	108	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	54.4	mg/L	1	52.5	<0.0197	104	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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Buckeye Fresh & Brine Station

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 392448

QC Batch: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	320000	mg/L	5000	125000	185000	108	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	316000	mg/L	5000	125000	185000	105	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 394405

QC Batch: 122047  
Prep Batch: 103232

Date Analyzed: 2015-06-05  
QC Preparation: 2015-06-04

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	703	mg/L	1	525	143	107	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	688	mg/L	1	525	143	104	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.00	100	98.6 - 101.4	2015-05-06

### Standard (CCV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.05	101	98.6 - 101.4	2015-05-06

### Standard (CCV-1)

QC Batch: 121554

Date Analyzed: 2015-05-14

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.8	99	90 - 110	2015-05-14

### Standard (CCV-2)

QC Batch: 121554

Date Analyzed: 2015-05-14

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.9	100	90 - 110	2015-05-14

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

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**Standard (ICV-1)**

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	52.5	103	90 - 110	2015-06-05

**Standard (CCV-1)**

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	51.0	50.5	99	90 - 110	2015-06-05



# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

Report Date: June 5, 2015  
Buckeye Fresh & Brine Station

Work Order: 15050505  
Buckeye Fresh & Brine Station

Page Number: 17 of 17  
Buckeye, NM

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F	Description
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U	The analyte is not detected above the SDL
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## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

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**BioAquatic Testing**  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

Company Name:	PRICE LLC	Phone #:	505-892-6643
Address:	(Street, City, Zip) 312 Encantado Ridge Court NE Lawrenceville, GA 30046	Fax #:	505-892-6643
Contact Person:	LESTER WAYNE PRICE JR	E-mail:	wayprice23@hotmail.com
Invoice to:	(If different from above) WASSER HUND INC. P.O. 2140		Louington NM 88360
Project #:	NA	Project Name:	BOCKEYE FOREST & BLDG NE
Project Location (including state):	BOCKEYE NM	Sampler Signature:	LWPJR

## ANALYSIS REQUEST

(Circle or Specify Method No.)

[illegible]

Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR
Lester Wayne Price Jr	Pryce LLC	5/1/15	4:00PM	Billy Bender	B+C	5-1-15	4:47PM			
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR

REMARKS:  
 COC #1  
  
 LAB USE ONLY  
☒ Inlet Y/N  
☒ Headspace Y/N/NA  
☐ Dry Weight Basis Required  
☐ TRRP Report Required  
☐ Check If Special Reporting Limits Are Needed  
 Log-in-Review BWB

Submittal of samples constitutes agreement to Terms and Conditions ~~listed~~ on reverse side of C. O. C.

ORIGINAL COPY

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: August 19, 2015

Work Order: 15081113



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station

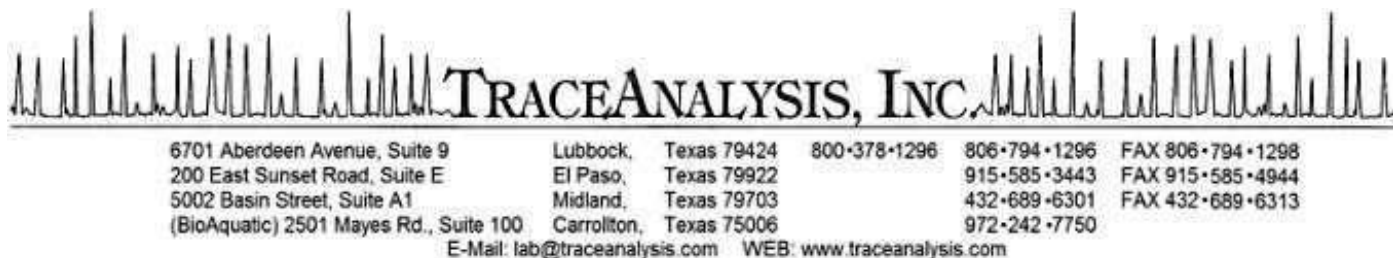
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
401720	Fresh	water	2015-07-08	16:20	2015-08-09
401721	Brine	water	2015-07-08	16:30	2015-08-09

### Sample: 401720 - Fresh

Param	Flag	Result	Units	RL
Chloride	B,H	<b>302</b>	mg/L	2.5
Dissolved Sodium		<b>156</b>	mg/L	1
pH		<b>7.77</b>	s.u.	2
Specific Gravity		<b>0.9842</b>	g/ml	
Total Dissolved Solids		<b>804</b>	mg/L	2.5

### Sample: 401721 - Brine

Param	Flag	Result	Units	RL
Dissolved Sodium		<b>124000</b>	mg/L	1



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: August 19, 2015

Work Order: 15081113



Project Location: Buckeye, NM  
Project Name: Buckeye Fresh & Brine Station  
Project Number: Buckeye Fresh & Brine Station

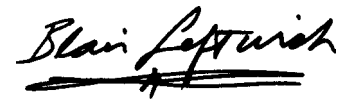
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
401720	Fresh	water	2015-07-08	16:20	2015-08-09
401721	Brine	water	2015-07-08	16:30	2015-08-09

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent flourish at the end. Below the signature is a horizontal line.

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

# Report Contents

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## Case Narrative

Samples for project Buckeye Fresh & Brine Station were received by TraceAnalysis, Inc. on 2015-08-09 and assigned to work order 15081113. Samples for work order 15081113 were received intact at a temperature of 31.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	104957	2015-08-17 at 11:00	124129	2015-08-17 at 12:10
Na, Dissolved	S 6010C	104805	2015-08-12 at 14:05	124020	2015-08-13 at 16:07
pH	SM 4500-H+	104784	2015-08-11 at 17:18	123931	2015-08-11 at 17:19
Specific Gravity	ASTM D1429-95	104834	2015-08-13 at 10:45	123992	2015-08-13 at 10:50
TDS	SM 2540C	104944	2015-08-17 at 16:36	124118	2015-08-17 at 16:37

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15081113 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.



Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 5 of 16  
Buckeye, NM

# Analytical Report

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-08-17	Analyzed By:	RL
QC Batch:	124129	Sample Preparation:		Prepared By:	RL
Prep Batch:	104957				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	B,H	1,2,3,4,5	<b>302</b>	mg/L	10	2.50

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	S 6010C	Prep Method:	S 3005A
Analysis:	Na, Dissolved	Date Analyzed:	2015-08-13	Analyzed By:	RR
QC Batch:	124020	Sample Preparation:	2015-08-12	Prepared By:	RR
Prep Batch:	104805				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>156</b>	mg/L	10	1.00

## Sample: 401720 - Fresh

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.77</b>	s.u.	1	2.00

## Sample: 401720 - Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D1429-95	Prep Method:	N/A
Analysis:	Specific Gravity	Date Analyzed:	2015-08-13	Analyzed By:	CF
QC Batch:	123992	Sample Preparation:		Prepared By:	CF
Prep Batch:	104834				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Specific Gravity			<b>0.9842</b>	g/ml	1	0.000

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 6 of 16  
Buckeye, NM

**Sample: 401720 - Fresh**

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>804</b>	mg/L	20	2.50

**Sample: 401721 - Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved  
QC Batch: 124020  
Prep Batch: 104805

Analytical Method: S 6010C  
Date Analyzed: 2015-08-13  
Sample Preparation: 2015-08-12

Prep Method: S 3005A  
Analyzed By: RR  
Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>124000</b>	mg/L	1000	1.00

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 7 of 16  
Buckeye, NM

## Method Blanks

**Method Blank (1)**      QC Batch: 123992

QC Batch: 123992      Date Analyzed: 2015-08-13      Analyzed By: CF  
Prep Batch: 104834      QC Preparation: 2015-08-13      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Specific Gravity			0.9856	g/ml	

**Method Blank (1)**      QC Batch: 124020

QC Batch: 124020      Date Analyzed: 2015-08-13      Analyzed By: RR  
Prep Batch: 104805      QC Preparation: 2015-08-12      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

**Method Blank (1)**      QC Batch: 124118

QC Batch: 124118      Date Analyzed:      Analyzed By:  
Prep Batch:      QC Preparation:      Prepared By:

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 124129

QC Batch: 124129      Date Analyzed: 2015-08-17      Analyzed By: RL  
Prep Batch: 104957      QC Preparation: 2015-08-17      Prepared By: RL

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 8 of 16  
Buckeye, NM

---

Parameter		Flag	Cert	MDL Result	Units	RL
Chloride	B	B	1,2,3,4,5	0.971	mg/L	2.5

---

Duplicates

Duplicates (1)    Duplicated Sample: 401722

QC Batch:    123931  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	8.05	8.04	s.u.	1	0	20

Duplicates (1)    Duplicated Sample: 401722

QC Batch:    123992  
Prep Batch:    104834

Date Analyzed:    2015-08-13  
QC Preparation:    2015-08-13

Analyzed By:    CF  
Prepared By:    CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Specific Gravity		0.9743	1.000	g/ml	1	3	200

Duplicates (1)    Duplicated Sample: 401720

QC Batch:    124118  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	804	804	mg/L	20	0	10

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 10 of 16  
Buckeye, NM

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 124020  
Prep Batch: 104805

Date Analyzed: 2015-08-13  
QC Preparation: 2015-08-12

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	51.4	mg/L	1	50.0	<0.0197	103	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	51.0	mg/L	1	50.0	<0.0197	102	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 124118  
Prep Batch:

Date Analyzed:  
QC Preparation:

Analyzed By:  
Prepared By:

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	999	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	987	mg/L	10	1000	<25.0	99	90 - 110	1	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 124129  
Prep Batch: 104957

Date Analyzed: 2015-08-17  
QC Preparation: 2015-08-17

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.9	mg/L	1	25.0	0.971	96	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.1	mg/L	1	25.0	0.971	96	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: August 19, 2015  
Buckeye Fresh & Brine Station

Work Order: 15081113  
Buckeye Fresh & Brine Station

Page Number: 12 of 16  
Buckeye, NM

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 401686

QC Batch: 124020  
Prep Batch: 104805

Date Analyzed: 2015-08-13  
QC Preparation: 2015-08-12

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	631	mg/L	1	500	135	99	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	620	mg/L	1	500	135	97	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 402139

QC Batch: 124129  
Prep Batch: 104957

Date Analyzed: 2015-08-17  
QC Preparation: 2015-08-17

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3270	mg/L	100	2500	657	104	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3260	mg/L	100	2500	657	104	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



## Calibration Standards

### Standard (CCV-1)

QC Batch: 123931

Date Analyzed:

Analyzed By:

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.06	101	98.6 - 101.4	2015-08-11

### Standard (ICV-1)

QC Batch: 124020

Date Analyzed: 2015-08-13

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	25.5	26.1	102	90 - 110	2015-08-13

### Standard (CCV-1)

QC Batch: 124020

Date Analyzed: 2015-08-13

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	25.0	23.5	94	90 - 110	2015-08-13

### Standard (CCV-1)

QC Batch: 124129

Date Analyzed: 2015-08-17

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.5	98	90 - 110	2015-08-17

Standard (CCV-2)

QC Batch: 124129				Date Analyzed: 2015-08-17			Analyzed By: RL	
Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.1	100	90 - 110	2015-08-17

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2014-018	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

# TraceAnalysis, Inc.

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BioAquatic Testing  
2501 Mayes Rd., Ste 100  
**Carrollton, Texas 75006**  
Tel (972) 242-7750

Company Name:	PRICE LLC	Phone #:	505-892-6643
Address:	(Street, City, Zip) P.O. RANCHO NM 87124	Fax #:	505-892-6643
Contact Person:	312 CANTARDO ROME COUNTY NC	E-mail:	LESTER WAYNE PRICE JR naprise 23@hotmail.com
Invoice to:	(If different from above) WASSERHUND INC. P.O. 2140 LOVINGTON NM 88260	Project Name:	BUCKEYE BRINE WELL
Project #:	NA	Sampler Signature:	LUPAR
Project Location (including state):	BUCKEYE NM LEA COUNTY		

[illegible]

Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR
LESTER WAYNE PRICE JR	PRICE LLC	7/19/15	4:50 PM	Dylan Barry	PRICE	7/19/15	4:50			
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST	OBS	COR

**LAB USE ONLY**

Intact Y / N

Headspace Y / N / NA

Log-In-Review OK

[illegible]

REMARKS:	<div><div><div>COC # 1</div><div>8/13/15 - notified Wayne All tests beyond the hold time except the Diss. Na. Proceed on with the Analysis. per Wayne</div></div></div>
	<div><div><div><input type="checkbox"/> Dry Weight Basis Required</div></div></div>
	<div><div><div><input type="checkbox"/> TRRP Report Required</div></div></div>
	<div><div><div><input type="checkbox"/> Check if Special Reporting Limits Are Needed</div></div></div>

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

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Tel (972) 242-7750

email: [lab@traceanalysis.com](mailto:lab@traceanalysis.com)

Company Name: PRICE LLC (Street, City, Zip) 312 ENCANTADO RIDGE COURT NE 87104 Contact Person: LESTER WAYNE PRICE JR Invoice to: WASSERHUND BANDY Project #: NA		Phone #: 505 892 6643 Fax #: 505 892 6643 E-mail: WAPRICE23@HOTMAIL.COM		Project Name: BRINE WELL Sampler Signature: LUNPOR		Project Location (including state): BUCKEYE NM						
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD			SAMPLING		
				WATER	SOIL	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	ICE	NONE
85130	FRESH	1	1 Ltr 245 ml	X						X	1/16/05	3:51 PM
131	BRINE	1	1 Ltr 100 ml	X						X	1/16/05	4:10 PM
ANALYSIS REQUEST (Circle or Specify Method No.)												
LAB USE ONLY												
REMARKS: N/A												
Turn Around Time if different from standard												
Hold												

Relinquished by: LESTER WAYNE PRICE JR	Company: PRICE LLC	Date: 1/21/05	Time: 4:50 AM	Received by: Billy Bender	Company: Braden + Clark	Date: 1-21-05	Time: 4:50 PM	INST: COR	OBS: COR
Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:	INST: COR	OBS: COR
Relinquished by: Duenda	Company:	Date:	Time:	Received by: Luback	Company:	Date:	Time:	INST: COR	OBS: COR

☐ Dry Weight Basis Required  
☐ TRRP Report Required  
☐ Check If Special Reporting Limits Are Needed

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

ORIGINAL COPY

## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: November 12, 2015

Work Order: 15102712



Project Location: Buckeye & Tatum NM  
Project Name: Brine Well 3rd QT. Sample  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
407093	BW-22 Tatum Fresh	water	2015-10-23	13:15	2015-10-26
407094	BW-22 Tatum Brine	water	2015-10-23	13:20	2015-10-26
407095	BW-4 Buckeye Fresh	water	2015-10-23	17:55	2015-10-26
407096	BW-4 Buckeye Brine	water	2015-10-23	18:00	2015-10-26

### Sample: 407093 - BW-22 Tatum Fresh

Param	Flag	Result	Units	RL
Chloride		<b>76.6</b>	mg/L	2.5
Density		<b>0.978</b>	g/ml	
pH		<b>7.79</b>	s.u.	2
Total Dissolved Solids		<b>659</b>	mg/L	2.5

### Sample: 407094 - BW-22 Tatum Brine

Param	Flag	Result	Units	RL
Chloride		<b>18000</b>	mg/L	2.5
Density		<b>1.02</b>	g/ml	
Dissolved Sodium		<b>12500</b>	mg/L	1
pH		<b>6.99</b>	s.u.	2
Total Dissolved Solids		<b>37000</b>	mg/L	2.5

### Sample: 407095 - BW-4 Buckeye Fresh

---

Param	Flag	Result	Units	RL
Chloride		<b>280</b>	mg/L	2.5
Density		<b>0.997</b>	g/ml	
pH		<b>7.61</b>	s.u.	2
Total Dissolved Solids		<b>868</b>	mg/L	2.5

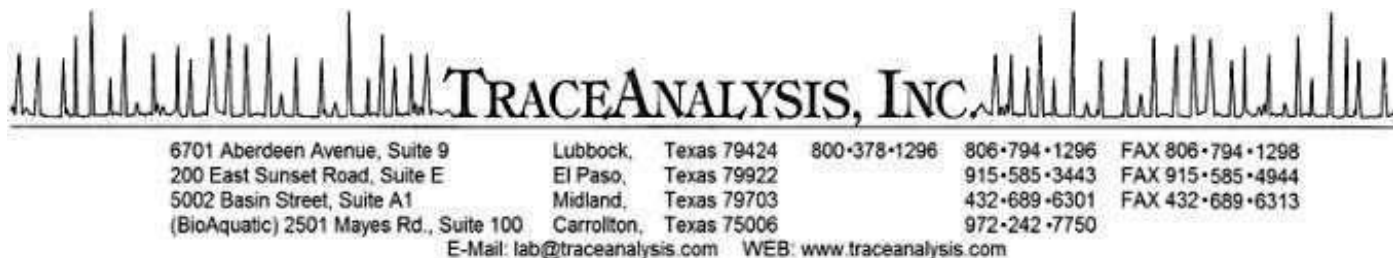
---

**Sample: 407096 - BW-4 Buckeye Brine**

Param	Flag	Result	Units	RL
Chloride		<b>176000</b>	mg/L	2.5
Density		<b>1.18</b>	g/ml	
Dissolved Sodium		<b>108000</b>	mg/L	1
pH		<b>6.76</b>	s.u.	2
Total Dissolved Solids		<b>310000</b>	mg/L	2.5

---





## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: November 12, 2015

Work Order: 15102712



Project Location: Buckeye & Tatum NM  
Project Name: Brine Well 3rd QT. Sample  
Project Number: BW-4 & BW-22

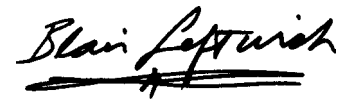
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
407093	BW-22 Tatum Fresh	water	2015-10-23	13:15	2015-10-26
407094	BW-22 Tatum Brine	water	2015-10-23	13:20	2015-10-26
407095	BW-4 Buckeye Fresh	water	2015-10-23	17:55	2015-10-26
407096	BW-4 Buckeye Brine	water	2015-10-23	18:00	2015-10-26

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style and is underlined with a thick, dark line.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well 3rd QT. Sample were received by TraceAnalysis, Inc. on 2015-10-26 and assigned to work order 15102712. Samples for work order 15102712 were received intact at a temperature of 3.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	106703	2015-11-04 at 13:00	126115	2015-11-04 at 13:45
Density	ASTM D854-92	106620	2015-11-02 at 13:10	126018	2015-11-02 at 13:15
Na, Dissolved	S 6010C	106726	2015-11-06 at 12:43	126288	2015-11-12 at 10:10
pH	SM 4500-H+	106519	2015-10-27 at 17:30	125907	2015-10-27 at 17:31
TDS	SM 2540C	106564	2015-10-29 at 12:04	126012	2015-10-29 at 12:00
TDS	SM 2540C	106671	2015-11-03 at 16:30	126079	2015-11-03 at 16:31

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 15102712 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

# Analytical Report

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2015-11-04	Analyzed By:	RL
QC Batch:	126115	Sample Preparation:		Prepared By:	RL
Prep Batch:	106703				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	76.6	mg/L	5	2.50

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	ASTM D854-92	Prep Method:	N/A
Analysis:	Density	Date Analyzed:	2015-11-02	Analyzed By:	CF
QC Batch:	126018	Sample Preparation:		Prepared By:	CF
Prep Batch:	106620				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.978	g/ml	1	0.00

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2015-10-27	Analyzed By:	LQ
QC Batch:	125907	Sample Preparation:		Prepared By:	LQ
Prep Batch:	106519				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	7.79	s.u.	1	2.00

## Sample: 407093 - BW-22 Tatum Fresh

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2015-10-29	Analyzed By:	LQ
QC Batch:	126012	Sample Preparation:		Prepared By:	LQ
Prep Batch:	106564				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>659</b>	mg/L	10	2.50

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 126115      Date Analyzed: 2015-11-04      Analyzed By: RL  
Prep Batch: 106703      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>18000</b>	mg/L	500	2.50

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 126018      Date Analyzed: 2015-11-02      Analyzed By: CF  
Prep Batch: 106620      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.02</b>	g/ml	1	0.00

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 126288      Date Analyzed: 2015-11-12      Analyzed By: RR  
Prep Batch: 106726      Sample Preparation: 2015-11-06      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>12500</b>	mg/L	100	1.00

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	125907	Date Analyzed:	2015-10-27
Prep Batch:	106519	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>6.99</b>	s.u.	1	2.00

**Sample: 407094 - BW-22 Tatum Brine**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	126012	Date Analyzed:	2015-10-29
Prep Batch:	106564	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>37000</b>	mg/L	1000	2.50

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	126115	Date Analyzed:	2015-11-04
Prep Batch:	106703	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>280</b>	mg/L	10	2.50

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock		
Analysis:	Density	Analytical Method:	ASTM D854-92
QC Batch:	126018	Date Analyzed:	2015-11-02
Prep Batch:	106620	Sample Preparation:	
		Prep Method:	N/A
		Analyzed By:	CF
		Prepared By:	CF

*continued ...*

Report Date: November 12, 2015  
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Brine Well 3rd QT. Sample

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*sample 407095 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.997</b>	g/ml	1	0.00

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	125907	Date Analyzed:	2015-10-27	Analyzed By:	LQ
Prep Batch:	106519	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.61</b>	s.u.	1	2.00

**Sample: 407095 - BW-4 Buckeye Fresh**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	126012	Date Analyzed:	2015-10-29	Analyzed By:	LQ
Prep Batch:	106564	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>868</b>	mg/L	20	2.50

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	126115	Date Analyzed:	2015-11-04	Analyzed By:	RL
Prep Batch:	106703	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>176000</b>	mg/L	5000	2.50



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BW-4 & BW-22

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**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Density	Analytical Method:	ASTM D854-92	Prep Method:	N/A
QC Batch:	126018	Date Analyzed:	2015-11-02	Analyzed By:	CF
Prep Batch:	106620	Sample Preparation:		Prepared By:	CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			1.18	g/ml	1	0.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	Na, Dissolved	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	126288	Date Analyzed:	2015-11-12	Analyzed By:	RR
Prep Batch:	106726	Sample Preparation:	2015-11-06	Prepared By:	RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	108000	mg/L	1000	1.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	125907	Date Analyzed:	2015-10-27	Analyzed By:	LQ
Prep Batch:	106519	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	6.76	s.u.	1	2.00

**Sample: 407096 - BW-4 Buckeye Brine**

Laboratory:	Lubbock				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	126079	Date Analyzed:	2015-11-03	Analyzed By:	LQ
Prep Batch:	106671	Sample Preparation:		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	310000	mg/L	2000	2.50

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## Method Blanks

### Method Blank (1)      QC Batch: 126012

QC Batch:	126012	Date Analyzed:	2015-10-29	Analyzed By:	LQ
Prep Batch:	106564	QC Preparation:	2015-10-29	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 126018

QC Batch:	126018	Date Analyzed:	2015-11-02	Analyzed By:	CF
Prep Batch:	106620	QC Preparation:	2015-11-02	Prepared By:	CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 126079

QC Batch:	126079	Date Analyzed:	2015-11-03	Analyzed By:	LQ
Prep Batch:	106671	QC Preparation:	2015-11-03	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 126115

QC Batch:	126115	Date Analyzed:	2015-11-04	Analyzed By:	RL
Prep Batch:	106703	QC Preparation:	2015-11-04	Prepared By:	RL

Report Date: November 12, 2015  
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Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.323	mg/L	2.5

Method Blank (1)      QC Batch: 126288

QC Batch: 126288	Date Analyzed: 2015-11-12	Analyzed By: RR
Prep Batch: 106726	QC Preparation: 2015-11-06	Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

## Duplicates

### Duplicates (1) Duplicated Sample: 406966

QC Batch: 125907 Date Analyzed: 2015-10-27 Analyzed By: LQ  
Prep Batch: 106519 QC Preparation: 2015-10-27 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	6.95	6.79	s.u.	1	2	20

### Duplicates (1) Duplicated Sample: 407191

QC Batch: 126012 Date Analyzed: 2015-10-29 Analyzed By: LQ  
Prep Batch: 106564 QC Preparation: 2015-10-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	3320	3180	mg/L	50	4	10

### Duplicates (1) Duplicated Sample: 407096

QC Batch: 126018 Date Analyzed: 2015-11-02 Analyzed By: CF  
Prep Batch: 106620 QC Preparation: 2015-11-02 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		1.19	1.18	g/ml	1	1	20

### Duplicates (1) Duplicated Sample: 407287

QC Batch: 126079 Date Analyzed: 2015-11-03 Analyzed By: LQ  
Prep Batch: 106671 QC Preparation: 2015-11-03 Prepared By: LQ

Report Date: November 12, 2015  
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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1190	1180	mg/L	20	1	10

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 126012  
Prep Batch: 106564

Date Analyzed: 2015-10-29  
QC Preparation: 2015-10-29

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	1000	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	1000	mg/L	10	1000	<25.0	100	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 126079  
Prep Batch: 106671

Date Analyzed: 2015-11-03  
QC Preparation: 2015-11-03

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	992	mg/L	10	1000	<25.0	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	992	mg/L	10	1000	<25.0	99	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 126115  
Prep Batch: 106703

Date Analyzed: 2015-11-04  
QC Preparation: 2015-11-04

Analyzed By: RL  
Prepared By: RL

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

Page Number: 15 of 20  
Buckeye & Tatum NM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	24.7	mg/L	1	25.0	<0.323	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	24.9	mg/L	1	25.0	<0.323	100	90 - 110	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 126288  
Prep Batch: 106726

Date Analyzed: 2015-11-12  
QC Preparation: 2015-11-06

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	53.0	mg/L	1	52.5	<0.0197	101	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	53.2	mg/L	1	52.5	<0.0197	101	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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Buckeye & Tatum NM

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 407240

QC Batch: 126115  
Prep Batch: 106703

Date Analyzed: 2015-11-04  
QC Preparation: 2015-11-04

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	153	mg/L	5	125	26.2	101	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	153	mg/L	5	125	26.2	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 407349

QC Batch: 126288  
Prep Batch: 106726

Date Analyzed: 2015-11-12  
QC Preparation: 2015-11-06

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	874	mg/L	1	525	377	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	852	mg/L	1	525	377	90	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



## Calibration Standards

### Standard (CCV-1)

QC Batch: 125907

Date Analyzed: 2015-10-27

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	s.u.	7.00	7.01	100	98.6 - 101.4	2015-10-27

### Standard (CCV-1)

QC Batch: 126115

Date Analyzed: 2015-11-04

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.1	100	90 - 110	2015-11-04

### Standard (CCV-2)

QC Batch: 126115

Date Analyzed: 2015-11-04

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	24.6	98	90 - 110	2015-11-04

### Standard (ICV-1)

QC Batch: 126288

Date Analyzed: 2015-11-12

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	27.5	26.8	97	90 - 110	2015-11-12

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	27.5	27.8	101	90 - 110	2015-11-12

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

---

F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

---

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



# Summary Report

## (Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

### Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		1820	mg/L	2.5
Density		0.980	g/ml	
pH		7.81	s.u.	2
Total Dissolved Solids		3240	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Chloride	H	149000	mg/L	2.5
Density	1	1.16	g/ml	
Dissolved Sodium		106000	mg/L	1
pH		6.91	s.u.	2

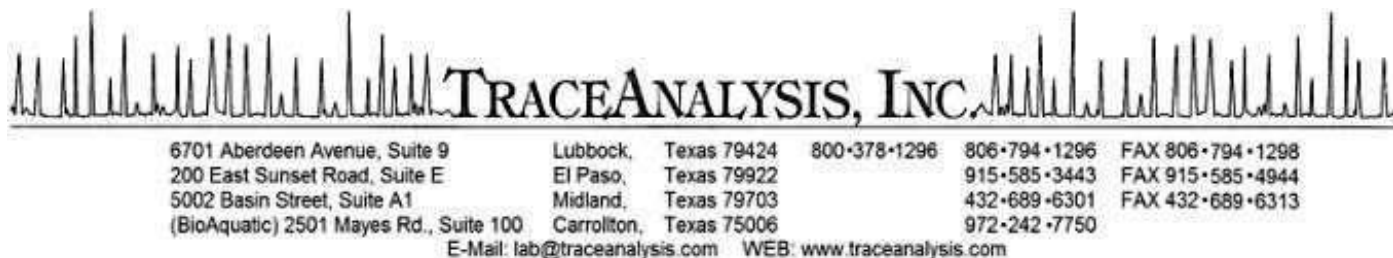
*continued ...*

<sup>1</sup>Analyzed out of hold time.

---

*sample 414779 continued ...*

Param	Flag	Result	Units	RL
Total Dissolved Solids		<b>263000</b>	mg/L	2.5



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

(Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Report Corrections (Work Order 16022210)

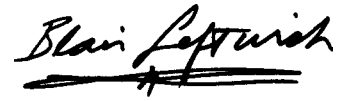
- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.



A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal stroke at the end.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Chloride (IC)	E 300.0	109290	2016-03-23 at 14:00	129049	2016-03-23 at 15:09
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Density	ASTM D854-92	109263	2016-03-23 at 11:10	129013	2016-03-23 at 11:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
pH	SM 4500-H+	109282	2016-03-23 at 12:30	129028	2016-03-23 at 12:30
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30
TDS	SM 2540C	109281	2016-03-23 at 16:30	129044	2016-03-23 at 16:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2016-02-23	Analyzed By:	RL
QC Batch:	128419	Sample Preparation:		Prepared By:	RL
Prep Batch:	108743				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	1820	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	ASTM D854-92	Prep Method:	N/A
Analysis:	Density	Date Analyzed:	2016-02-23	Analyzed By:	CF
QC Batch:	128394	Sample Preparation:		Prepared By:	CF
Prep Batch:	108721				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.980	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2016-02-22	Analyzed By:	LQ
QC Batch:	128366	Sample Preparation:		Prepared By:	LQ
Prep Batch:	108694				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	7.81	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2016-02-23	Analyzed By:	LQ
QC Batch:	128463	Sample Preparation:		Prepared By:	LQ
Prep Batch:	108734				

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      Sample Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>149000</b>	mg/L	5000	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density		1	<b>1.16</b>	g/ml	1	0.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      Sample Preparation: 2016-02-22      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>106000</b>	mg/L	1000	1.00

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: pH

QC Batch: 129028

Prep Batch: 109282

Analytical Method: SM 4500-H+

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>6.91</b>	s.u.	1	2.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 129044

Prep Batch: 109281

Analytical Method: SM 2540C

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>263000</b>	mg/L	2000	2.50

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch:	128362	Date Analyzed:	2016-02-22	Analyzed By:	RR
Prep Batch:	108686	QC Preparation:	2016-02-22	Prepared By:	PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch:	128394	Date Analyzed:	2016-02-23	Analyzed By:	CF
Prep Batch:	108721	QC Preparation:	2016-02-23	Prepared By:	CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch:	128419	Date Analyzed:	2016-02-23	Analyzed By:	RL
Prep Batch:	108743	QC Preparation:	2016-02-23	Prepared By:	RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch:	128463	Date Analyzed:	2016-02-23	Analyzed By:	LQ
Prep Batch:	108734	QC Preparation:	2016-02-23	Prepared By:	LQ



Report Date: March 24, 2016  
Brine Well

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Brine Well

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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129013

QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      QC Preparation: 2016-03-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.979	g/ml	

**Method Blank (1)**      QC Batch: 129044

QC Batch: 129044      Date Analyzed: 2016-03-23      Analyzed By: LQ  
Prep Batch: 109281      QC Preparation: 2016-03-23      Prepared By: LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129049

QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      QC Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1090	1120	mg/L	20	3	10

### Duplicates (1) Duplicated Sample: 414781

QC Batch: 129013 Date Analyzed: 2016-03-23 Analyzed By: CF  
Prep Batch: 109263 QC Preparation: 2016-03-23 Prepared By: CF

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density	2	0.978	0.996	g/ml	1	2	20

**Duplicates (1)**    Duplicated Sample: 416191

QC Batch: 129028                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109282                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.18	7.18	s.u.	1	4	20

**Duplicates (1)**    Duplicated Sample: 416188

QC Batch: 129044                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109281                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	4630	4670	mg/L	50	1	10

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

Page Number: 14 of 20  
Buckeye New Mexico

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129044  
Prep Batch: 109281

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	995	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1020	mg/L	10	1000	<25.0	102	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.3	mg/L	1	25.0	<0.323	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	24.2	mg/L	1	25.0	<0.323	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 416184

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3570	mg/L	100	2500	1100	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3540	mg/L	100	2500	1100	98	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.7	103	90 - 110	2016-02-23



Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

### Standard (CCV-2)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.9	104	90 - 110	2016-02-23

### Standard (CCV-1)

QC Batch: 129028

Date Analyzed: 2016-03-23

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.03	100	98.6 - 101.4	2016-03-23

### Standard (CCV-1)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

### Standard (CCV-2)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

## Appendix

### Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

### Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2015-066	Lubbock

### Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.

F	Description
U	The analyte is not detected above the SDL

---

**Result Comments**

- 1 Analyzed out of hold time.
- 2 Analyzed out of hold time.

**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 16022210

# TraceAnalysis, Inc.

email: lab@traceanalysis.com

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

Branch:  
3403 Industrial  
Hobbs, NM 87401  
Tel (575) 392-7500  
Fax (575) 392-4506

Company Name: PRICE LLC Phone #: 832 657 4873

Address: (Street, City, Zip) 310 ENCANTADO RIDGE CT NE 87124 Fax #: 505 892 6643

Contact Person: LESTER WAYNE PRICE JR E-mail: wprice23@hotmail.com

Invoice to: (If different from above) RANDY CORPORATION

Project #: NA Project Name: BRINE WELL

Project Location (including state): ROCKEYE NM Sampler Signature: LUPAK

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD					SAMPLING	
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE	DATE	TIME
44778	FRESH WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM
779	BRINE WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM

## ANALYSIS REQUEST (Circle or Specify Method No.)

MTBE 8021 / 602 / 8260 / 624	BTEX 8021 / 602 / 8260 / 624	TPH 418.1 / TX1005 / TX1005 Ext(C35)	TPH 8015 GRO / DRO / TVHC	PAH 8270 / 625	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260 / 624	GC/MS Semi. Vol. 8270 / 625	PCBs 8082 / 608	Pesticides 8081 / 608	BOD, TSS, pH	Moisture Content	Cl, F, SO <sub>4</sub> , NO <sub>3</sub> -N, NO <sub>2</sub> -N, PO <sub>4</sub> -P, Alkalinity	Na, Ca, Mg, K, TDS, EC	X Chloride Density Pl, TDS	X Dissolved Sodium	Turn Around Time if different from standard	Hold
------------------------------	------------------------------	--------------------------------------	---------------------------	----------------	---	-------------------------------------	----------------	---------------------	-----------------	-----	-----------------------	-----------------------------	-----------------	-----------------------	--------------	------------------	---	------------------------	----------------------------	--------------------	---	------

REPORT INV. & COC e-mail FAX: 2-25-16 FAX: 2-25-16

REMARKS: COC # 1

LAB USE ONLY

Received by: KLS Date: 2-18-16 1:03 PM INST 1-7 OBS 1-7 COR 1-7

Received by: Murrell Date: 2-20-16 10:00 INST 1-7 OBS 1-7 COR 1-7

Received by: Company: Date: INST OBS COR

Relinquished by: Lester Wayne Price Jr Company: PRICE LLC Date: 2/17/16 12:30 PM

Relinquished by: Company: Date: INST OBS COR

Relinquished by: Company: Date: INST OBS COR

Log-in-Review

Headspace Y/N

Inject Y/N

Dry Weight Basis Required

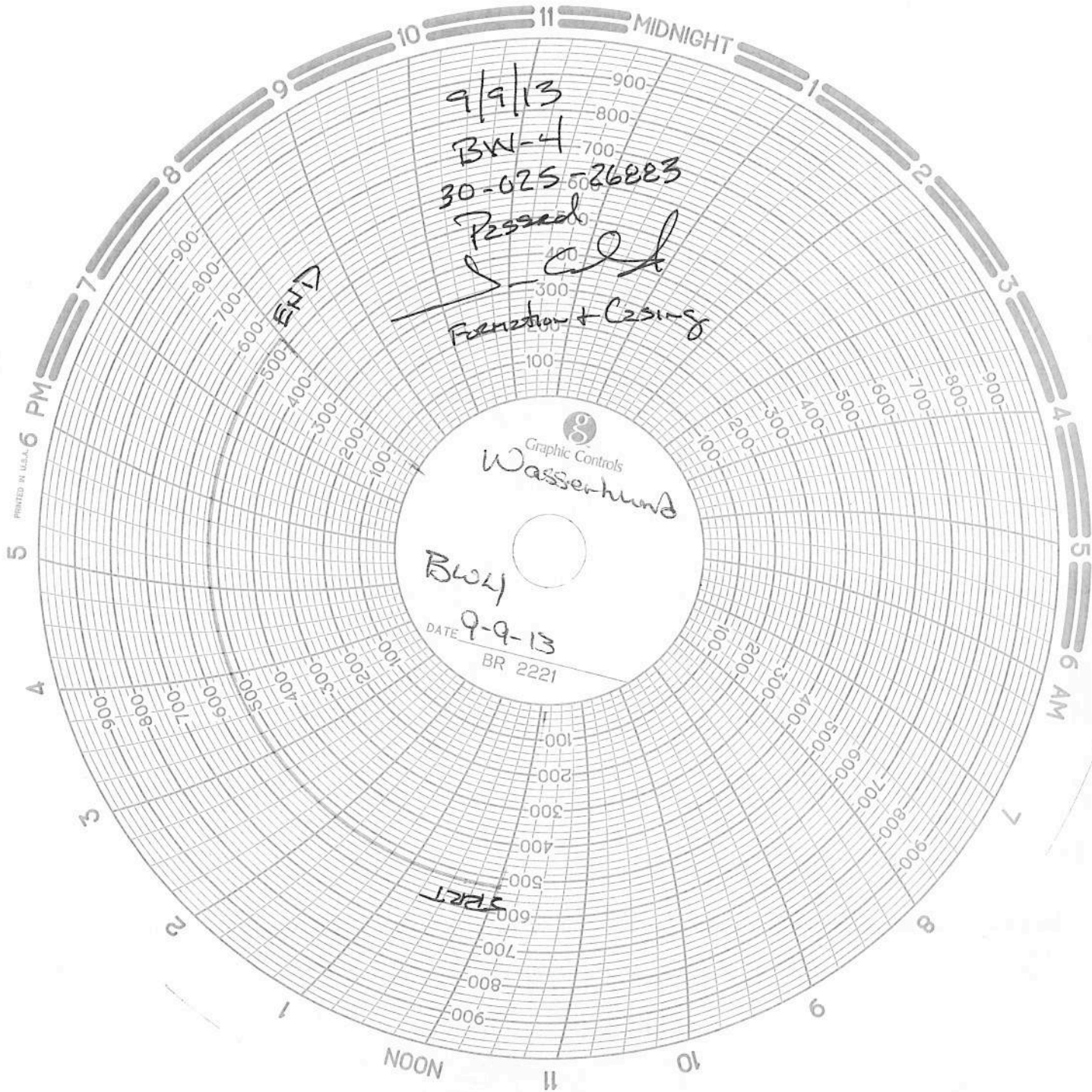
TRRP Report Required

Check If Special Reporting Limits Are Needed

## Appendix “D”

- 2013 MIT Chart





9/9/13

BW-4

30-025-26883

Passed

*[Signature]*

Friction + Casing

END

BW4

DATE 9-9-13

BR 2221

START

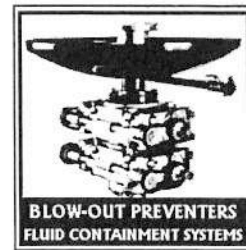
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



Friday, September 06, 2013

Invoice # 100177

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

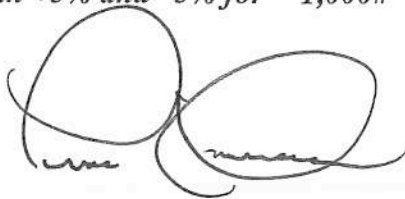
**Unit:** 2

**Model:** 8" Chart recorder

**Pressure Rating:** 1,000#

**Serial #:**

*This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.*



\_\_\_\_\_  
Issac Luna

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan



2015 BW-04 AOR Review- Well Status List

up-dated Apr 03, 2016

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR	Casing Program	Cased/Cemented	Corrective Action
								* within 660 ft or Critical AOR	Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	No Action Required no

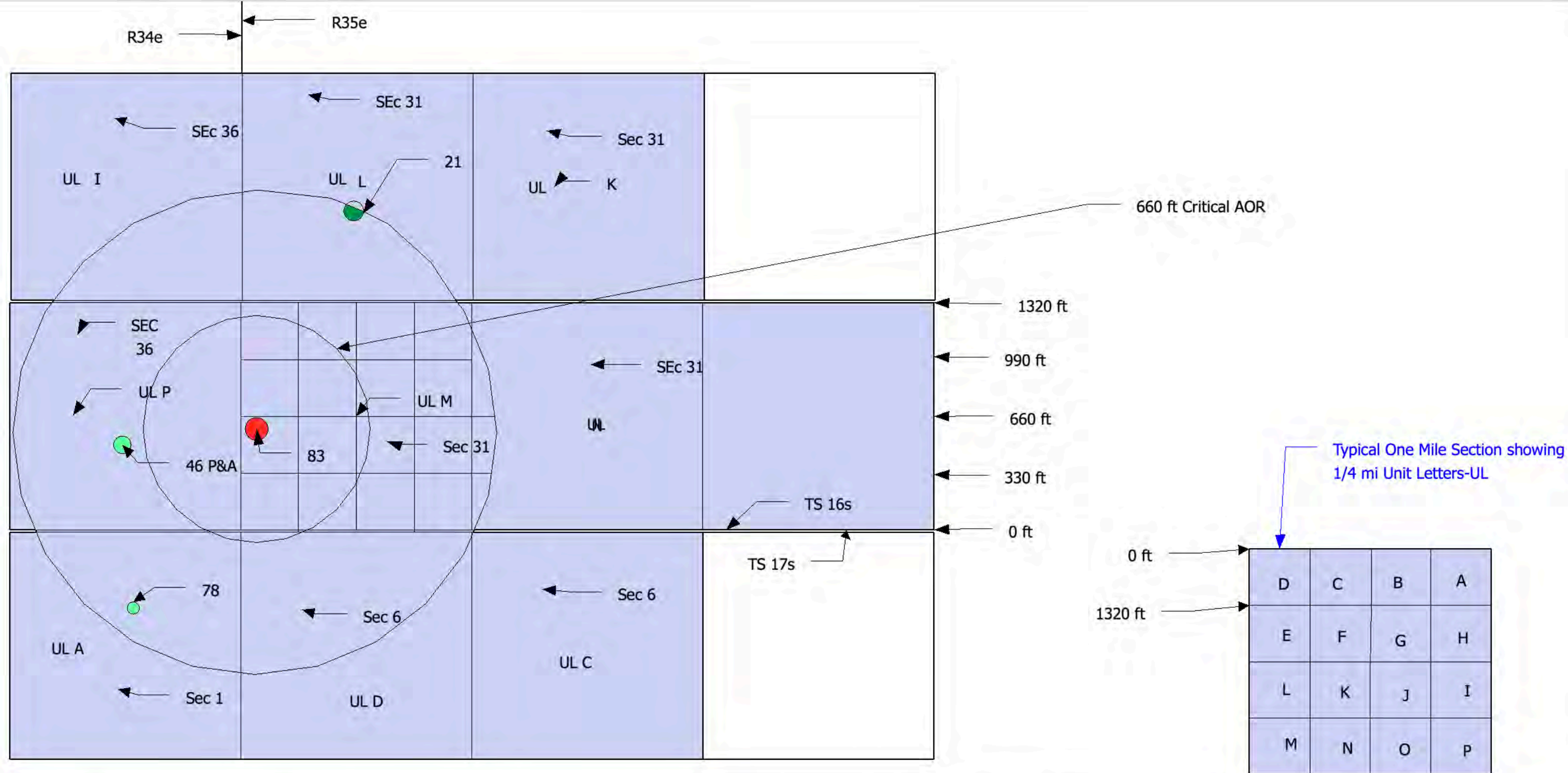
3 Total # of wells in adjacent quarter-sections

3 Total # of wells in 1/4 mile AOR

3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

Notes:

\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.



Brine Well Area of Review (AOR) UL Plot Plan	Well API#: 30-025-26883	Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.
Operator Name: Wasserhund INC	Permit # BW-04	
AOR Year: 2015	Location: UL M-Sec 31-Ts16s-R35e	



Submit 1 Copy To Appropriate District Office  
District I – (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II – (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III – (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV – (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
Revised July 18, 2013

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

WELL API NO. 30-025-35678
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 28798
7. Lease Name or Unit Agreement Name North Vacuum Abo North Unit (form. State VII, 7)
8. Well Number 62
9. OGRID Number
10. Pool name or Wildcat North Vacuum (Abo) (61760)

SUNDRY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)  
1. Type of Well: Oil Well ☐ Gas Well ☒ Other **HOBBS OCD**

2. Name of Operator  
Lime Rock Resources II-A, LP **MAR 18 2016**

3. Address of Operator  
1111 Bagby St., Ste. 4600; Houston, TX 77002 **RECEIVED**

4. Well Location  
Unit Letter A : 660 feet from the N line and 660 feet from the E line  
Section 1 Township 17S Range 34E NMPM County Lea

11. Elevation (Show whether DR, RKB, RT, GR, etc.)  
4051' KB 4033' GL

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐  
CLOSED-LOOP SYSTEM ☐  
OTHER: Recompletion ☒

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☐  
OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Our plan is to recomplate the well, into the North Vacuum (Abo) formation, utilizing the following procedure:

- 1) Dump bail 35' cmt on pkr @ 12406'
- 2) Set CIBP @ +12000'
- 3) Spot 20' cmt on top of CIBP
- 4) Shoot sqz perfs @ 9600' & sqz across Abo formation up to +/-8700'
- 5) Perforate Abo formation from +8820'-8950'
- 6) Return well to production

Spud Date:

4/15/16

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Carla Martin TITLE Carla Martin/Regulatory Tech DATE 3/17/16

Type or print name \_\_\_\_\_ E-mail address: \_\_\_\_\_ PHONE: \_\_\_\_\_  
**For State Use Only**

APPROVED BY: [Signature] TITLE Petroleum Engineer DATE 03/22/16  
Conditions of Approval (if any): \_\_\_\_\_

MAR 22 2016



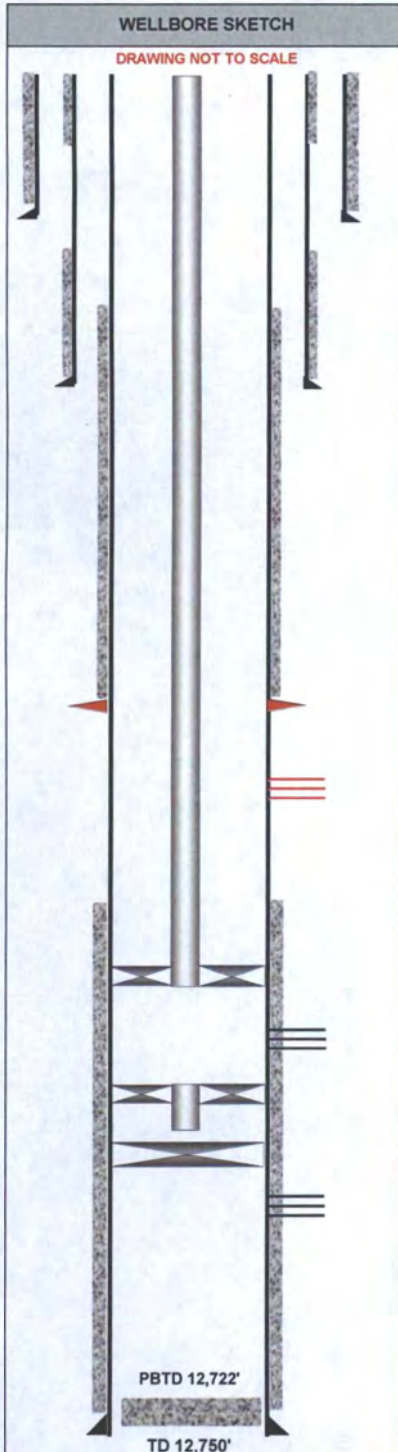
OPERATOR: <b>LRR II-A, LP</b>	LEASE / WELL: <b>State VII, 7 (became NVANU 62)</b>	SURVEY: <b>Sec 1, T17S, R34E</b>	Property No.
COMPLETION RIG:	COUNTY / STATE: <b>Lea County, NM</b>	SURFACE LOCATION: <b>660' FNL &amp; 660' FEL</b>	FIELD: <b>North Vacuum</b>

DIRECTIONAL DATA		
KOP:	STRAIGHT HOLE	
MAX DEV:	deg @	MD
DEV @ PERFS:	deg @	MD
DEV @ PERFS:	deg @	MD
DEV @ PERFS:	deg @	MD

DRILLING / COMPLETION FLUID		
DRILLING FLUID:	ppg -	
DRILLING FLUID:	ppg -	
DRILLING FLUID:	ppg -	
COMPLETION FLUID:	ppg -	
PACKER FLUID:	ppg -	

TUBULAR DATA							
Tubulars	Size	Weight	Grade	Thread	Top	MD	SKS
DRIVE PIPE							
CONDUCTOR	20"				0'	92'	
SURFACE	11-3/4"	42#	H-40	STC	0'	1610'	790
INTERMEDIATE	8-5/8"	32#	K-55	LTC	0'	5020'	1,190
PRODUCTION	4-1/2"	11.6#	P-110	LTC	0'	12,732'	1,380
PROD TIEBACK							
PROD LINER							
PROD LINER							
TUBING	2-3/8"	4.7#	N-80	8rd	0'	12400'	
COILED TUBING							

WELLHEAD DATA	
TYPE	
WP	
T	FLANGE:
R	
E	THREAD:
E	
TUBING HANGER:	
BTM FLANGE:	
BPV PROFILE:	
ELEVATIONS:	GROUND ELEVATION
RKB-DF:	
RKB-ELEV:	<b>4033'</b>



EQUIPMENT DESCRIPTION	ID	OD	DEPTH TVD	DEPTH MD
<b>TA'd Well</b>				
hole in 8-5/8" csg @ 700' - pumped 300 sxs down 4-1/2" x 8-5/8" annulus, circ to surface				
11-3/4" surface csg @ 1610' - cmt'd w/790 sxs to surface				
TOC @ 1740' (TS)				
TOC @ 2000'				
8-5/8" intermediate csg @ 5020' - cmt'd w/1190 sxs				
Tubing Detail (Sept-02):				
386 jts 2-3/8" 4.7# N-80 8rd tubing				
PX plug				
4-1/2" AS1-X retrievable packer @ 12,185' w/1.875" profile nipple w/ PX plug				
6' 2-3/8" sub				
1.875" SN				
4' 2-3/8" sub				
DV tool @ 8498'				
Proposed perfs ~8820'-8950'				
TOC @ 11,475'				
Atoka perfs @ 12,280'-98'				
Permanent packer @ 12,406' w/1 jt 2-3/8" tubing, & 4' sub				
CIBP @ 12,469'				
Morrow perfs @ 12,551'-57', 12,604'-08', 12,612'-18', & 12,621'-27' (6 spf)				
20 bbls 15% HCl, 10 bbls Morrow blend 10% HCl, 70/30 Methanol, 3600 gal				
50Q CO2 Morrow blend				
4-1/2" production csg @ 12,732' - cmt'd w/1380 sxs				
COMMENTS:	Working Interest:	PLUG BACK DEPTH:		
API # 30-025-35678	Net Revenue Interest:	TOTAL WELL DEPTH:		
Property#		PREPARED OR	DATE:	
Spud Date:		REVISED BY:		
Completed in		cml		9/2/2015

**CURRENT**

DIRECTIONS TO LOCATION: Directions to well needed.



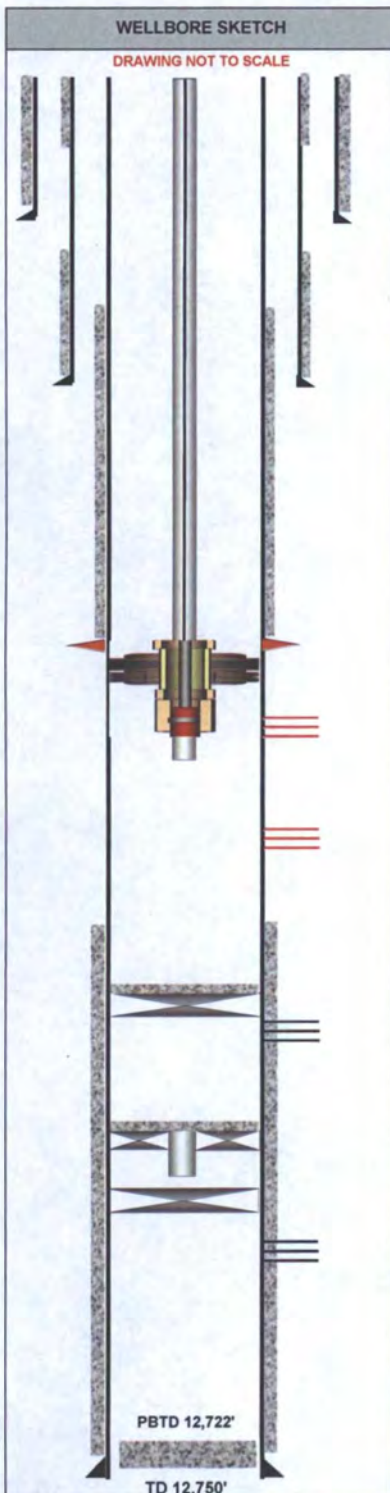
OPERATOR: <b>LRR II-A, LP</b>	LEASE / WELL: <b>NVANU 62 (was State VII, 7)</b>	SURVEY: <b>Sec 1, T17S, R34E</b>	Property No.
COMPLETION RIG:	COUNTY / STATE: <b>Lea County, NM</b>	SURFACE LOCATION: <b>660' FNL &amp; 660' FEL</b>	FIELD: <b>North Vacuum</b>

DIRECTIONAL DATA			
KOP:	STRAIGHT HOLE		
MAX DEV:	deg @	MD	
DEV @ PERFS:	deg @	MD	
DEV @ PERFS:	deg @	MD	
DEV @ PERFS:	deg @	MD	

DRILLING / COMPLETION FLUID			
DRILLING FLUID:	ppg -		
DRILLING FLUID:	ppg -		
DRILLING FLUID:	ppg -		
COMPLETION FLUID:	ppg -		
PACKER FLUID:	ppg -		

TUBULAR DATA							
Tubulars	Size	Weight	Grade	Thread	Top	MD	SKS
DRIVE PIPE							
CONDUCTOR	20"				0'	92'	
SURFACE	11-3/4"	42#	H-40	STC	0'	1610'	790
INTERMEDIATE	8-5/8"	32#	K-55	LTC	0'	5020'	1,190
PRODUCTION	4-1/2"	11.6#	P-110	LTC	0'	12,732'	1,380
PROD TIEBACK							
PROD LINER							
PROD LINER							
TUBING	2-3/8"	4.7#	N-80	8rd	0'	12400'	
COILED TUBING							

WELLHEAD DATA			
TYPE			
WP			
T	FLANGE:		
R	THREAD:		
E			
A			
P			
TUBING HANGER:			
BTM FLANGE:			
BPV PROFILE:			
ELEVATIONS:			
RKB-DF:			
RKB-ELEV:			
			GROUND ELEVATION 4033'



EQUIPMENT DESCRIPTION	ID	OD	DEPTH TVD	DEPTH MD
<b>PROPOSED WELL</b>				
hole in 8-5/8" csg @ 700' - pumped 300 sxs down 4-1/2" x 8-5/8" annulus, circ to surface				
11-3/4" surface csg @ 1610' - cmt'd w/790 sxs to surface				
TOC @ 1740' (TS)				
TOC @ 2000'				
8-5/8" intermediate csg @ 5020' - cmt'd w/1190 sxs				
Proposed Tubular Installation:				
Rod pump, TA @ ~8450', SN@ ~8975', & EOT @ ~9150'				
DV tool @ 8498'				
Proposed perfs ~8920'-8950'				
sqz perfs @ 9600' - circ cmt to above Abo				
TOC @ 11,475'				
Proposed CIBP @ 12,230' + 20' cmt				
Atoka perfs @ 12,280'-98'				
dump ball 35' cmt on pkr				
Permanent packer @ 12,406' w/1 jt 2-3/8" tubing, & 4' sub				
CIBP @ 12,469'				
Morrow perfs @ 12,551'-57', 12,604'-08', 12,612'-18', & 12,621'-27' (6 spf)				
20 bbls 15% HCl, 10 bbls Morrow blend 10% HCl, 70/30 Methanol, 3600 gal				
50Q CO2 Morrow blend				
4-1/2" production csg @ 12,732' - cmt'd w/1380 sxs				
COMMENTS:	Working Interest:	PLUG BACK DEPTH:		
API # 30-025-35678	Net Revenue Interest:	TOTAL WELL DEPTH:		
Property#		PREPARED OR	DATE:	
Spud Date:		REVISED BY:		
Completed in		cml		3/17/2016

**PROPOSED**

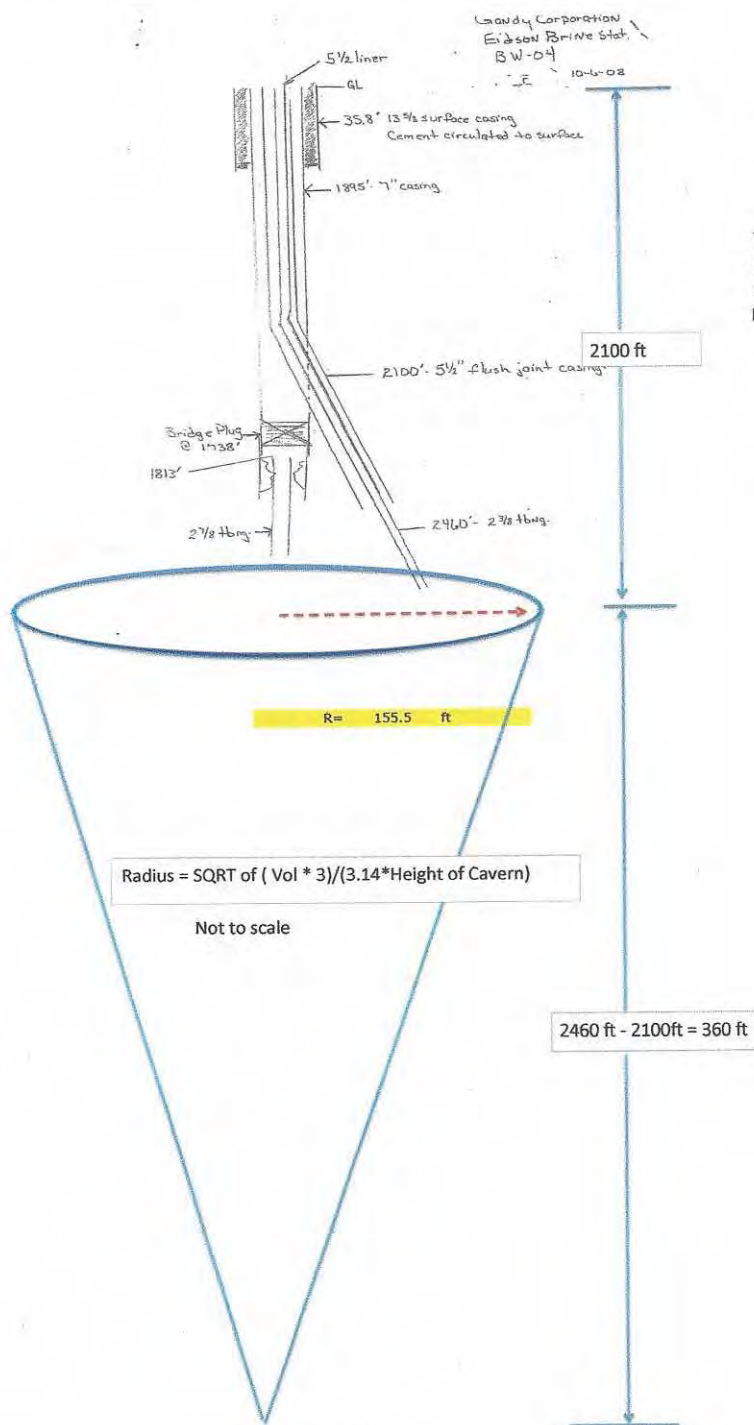
DIRECTIONS TO LOCATION: Directions to well needed.

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan
- Lime Rock API # 30-025-35678 Proposed Re-Completion

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2015 Radius and D/H calculations.
- Aerial View showing Cavern Radius



# 2015 Calculations

$$r = \sqrt[3]{\frac{V}{\pi \cdot D}}$$

V	Volume	=	9,111,275 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft3 salt/bbl	155.5	1 est

$$r = \frac{155.5 \text{ ft}}{Diameter} = 311.00 \text{ ft}$$

$$D/H = 0.148$$





## Appendix “G”

- Solution Cavern Monitoring Plan Program

# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e

Wasserhund Inc. hereby proposes to install a minimum of three National Geodetic Survey (NGS) survey control stations, i.e. survey monuments, around the brine well in a manner that will adequately provide vertical geodetic data to determine if any subsidence is occurring at the aforementioned well site.

A Berntsen Monument Installation Detail is included for reference. An approved Surveying/Contracting company will install the complete system.

A certified surveyed plat will be provided showing the location of the monuments and all significant features of the site.

The monuments will be laid out in a triangulation configuration around the wellhead, and located so as to pick-up any movement related to up-lift or subsidence of the anticipated areas of greatest concern.

The wellhead will also be included in the measurements, along with a known geodetic reference point outside of the possible influence of the well. While the system will focus on vertical movements, lateral movements will be visually noted and will actually impact the vertical readings.

The surveys will be performed semi-annually, evaluated and reported to the agency.  
All survey readings will be adjusted for and conform to the New Mexico Coordinate System.

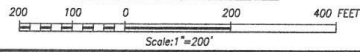
Price LLC will conduct surveys in-house using approved level measuring instruments with a set number of readings collected by a licensed surveyor for quality control.

The data will be tabulated and a graph be maintained for each point over the life of the system.

Attached: Examples Only:  
Topographic Map-  
Vicinity Map shows Local Benchmarks-Example only  
USGS Map-Example only  
Susidence Monument Location Map- Example only.  
Berntsen Monument Installation Detail-Actual  
Data Sheets-Example Only  
Graphs-Example Only

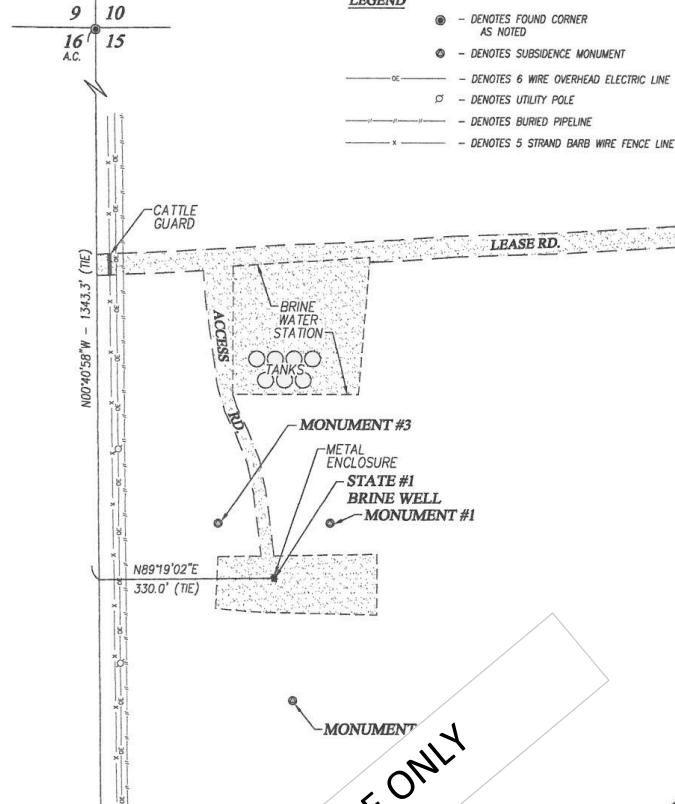
# TOPOGRAPHIC MAP

Figure 4



## LEGEND

- - DENOTES FOUND CORNER AS NOTED
- - DENOTES SUBSIDENCE MONUMENT
- - DENOTES 6 WIRE OVERHEAD ELECTRIC LINE
- - DENOTES UTILITY POLE
- |—|—|— - DENOTES BURIED PIPELINE
- x— - DENOTES 5 STRAND BARB WIRE FENCE LINE



## NOTE

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.



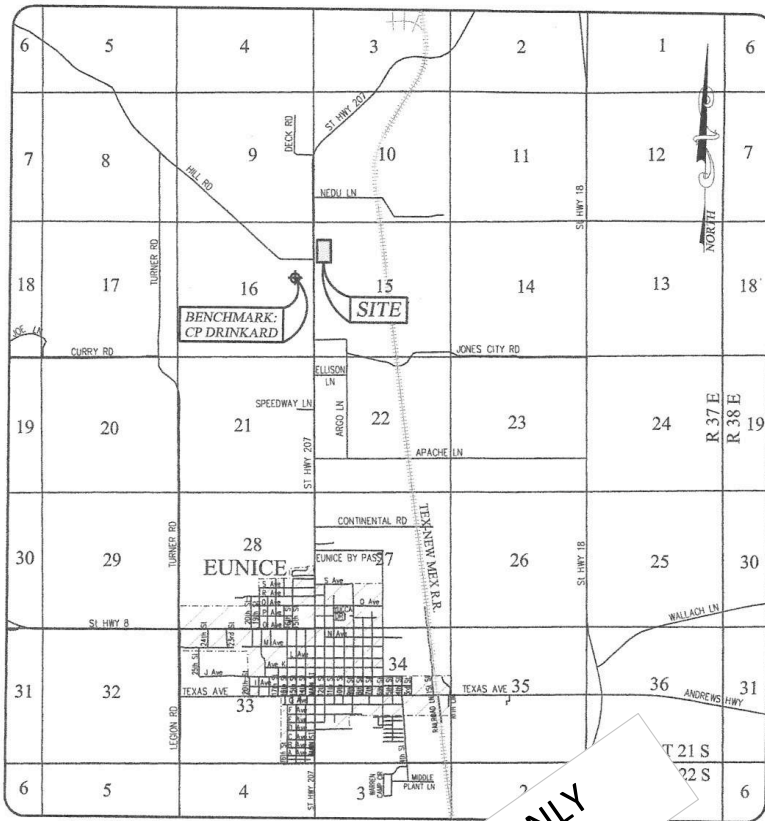
PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mex5\Tracts\Subsidence Monitoring\Key Energy Services, LLC\State #1 Brine Well Enclosure Lea County NM\12111721

VICINITY MAP  
NOT TO SCALE

Figure 1



EUNICE, NEW MEXICO AND SURROUNDING AREAS



PROVIDING SURVEYING SERVICES  
SINCE 1946  
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(575) 393-3117

TOWNSHIP

EXAMPLE ONLY

SURVEYING SERVICES, LLC

MONITORING FOR THE  
#1 BRINE WELL IN SECTION 15,  
37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO



Figure 2

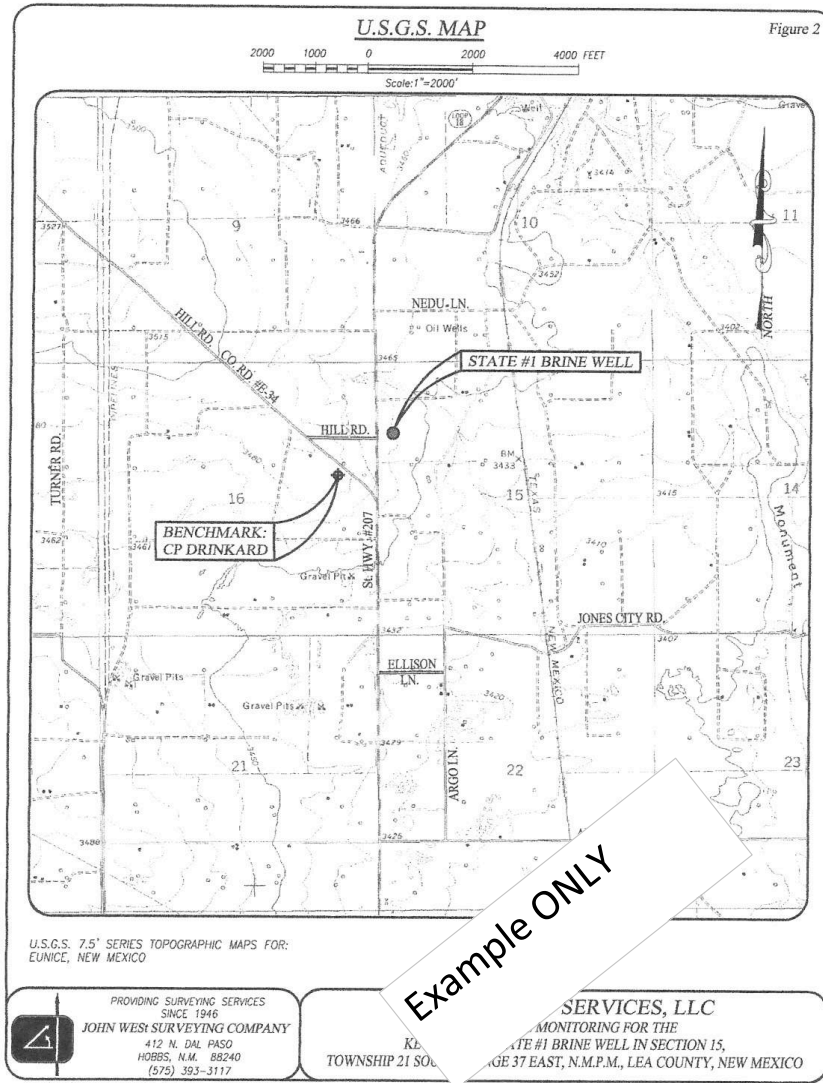
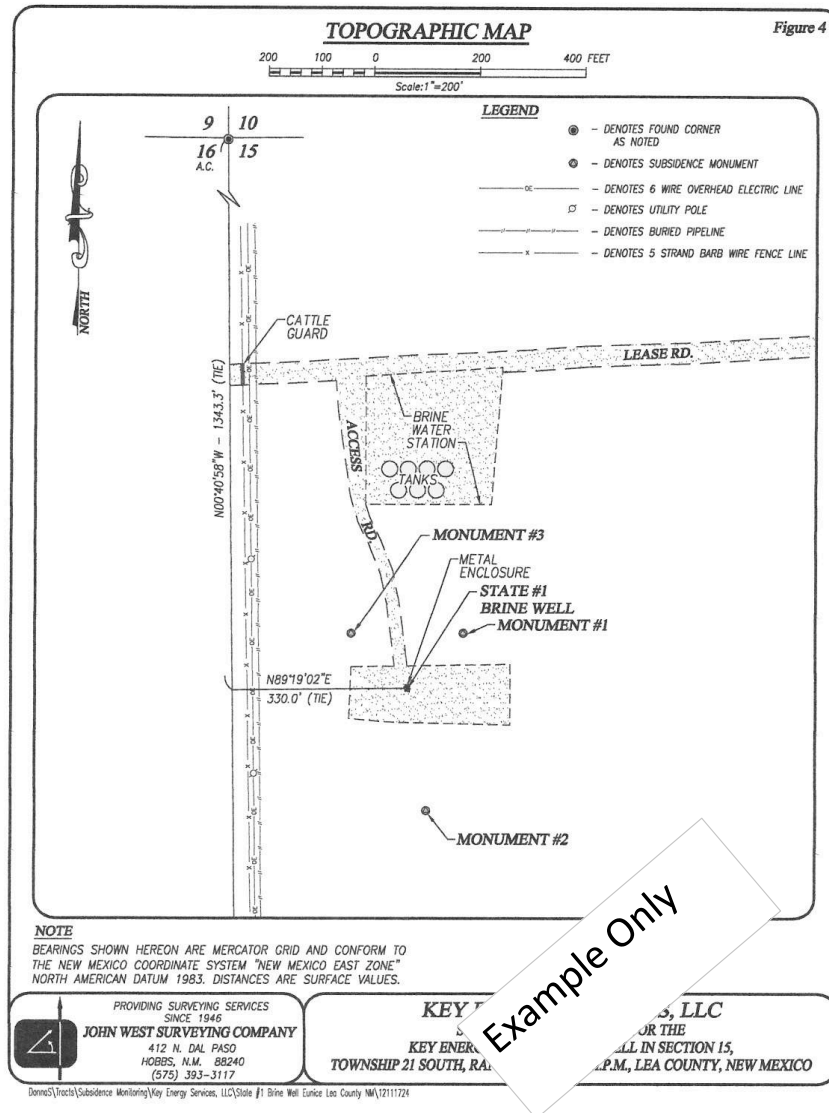
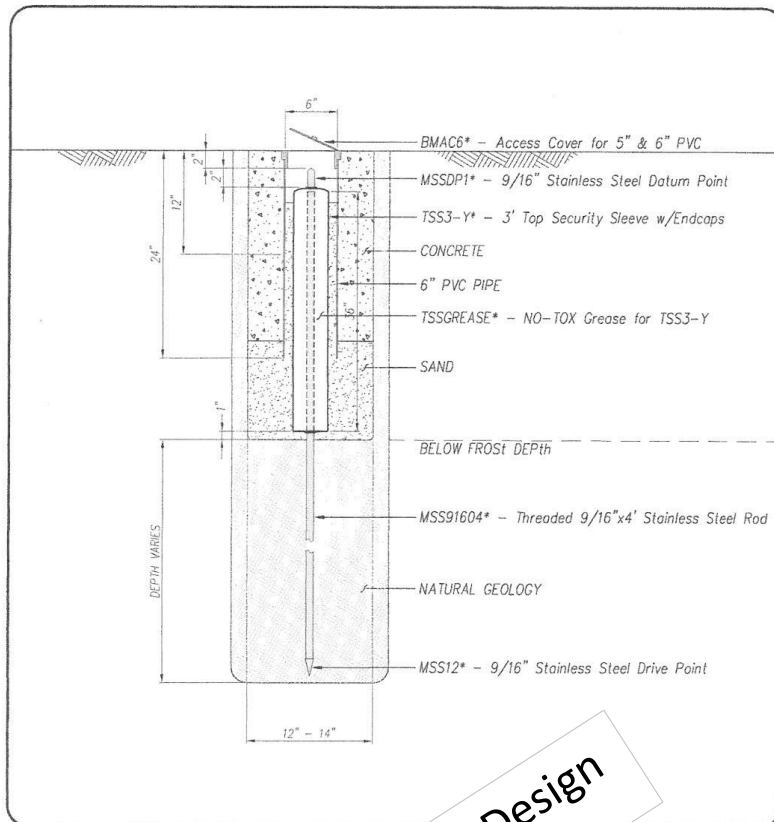


Figure 4



**BERNTSEN MONUMENT INSTALLATION DETAIL**  
NOT TO SCALE

Figure 6



\*REFERENCE:  
www.berntsen.com  
9/16" STAINLESS STEEL TOP SECURITY SLEEVE MONUMENT

**Actual Design**

PROVIDING SURVEYING SERVICES  
SINCE 1946  
**JOHN WESI SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBBS, N.M. 88240  
(505) 393-3117

**ENERGY SERVICES, LLC**  
RESIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

D:\mon\Berntsen\Monitoring\Key Energy Services, LLC\10110027 State #1\10110022.dwg 01/09/11



11	14	-1.5010	427.9000
11	15	-2.6820	222.6000
11	16	-6.0820	384.5400
16	17	-4.3450	464.4600
17	18	-5.5910	384.1600
18	19	-2.5440	424.7600
19	20	-2.6950	398.0200
20	21	-2.8570	385.9600
21	22	-2.1030	267.9000

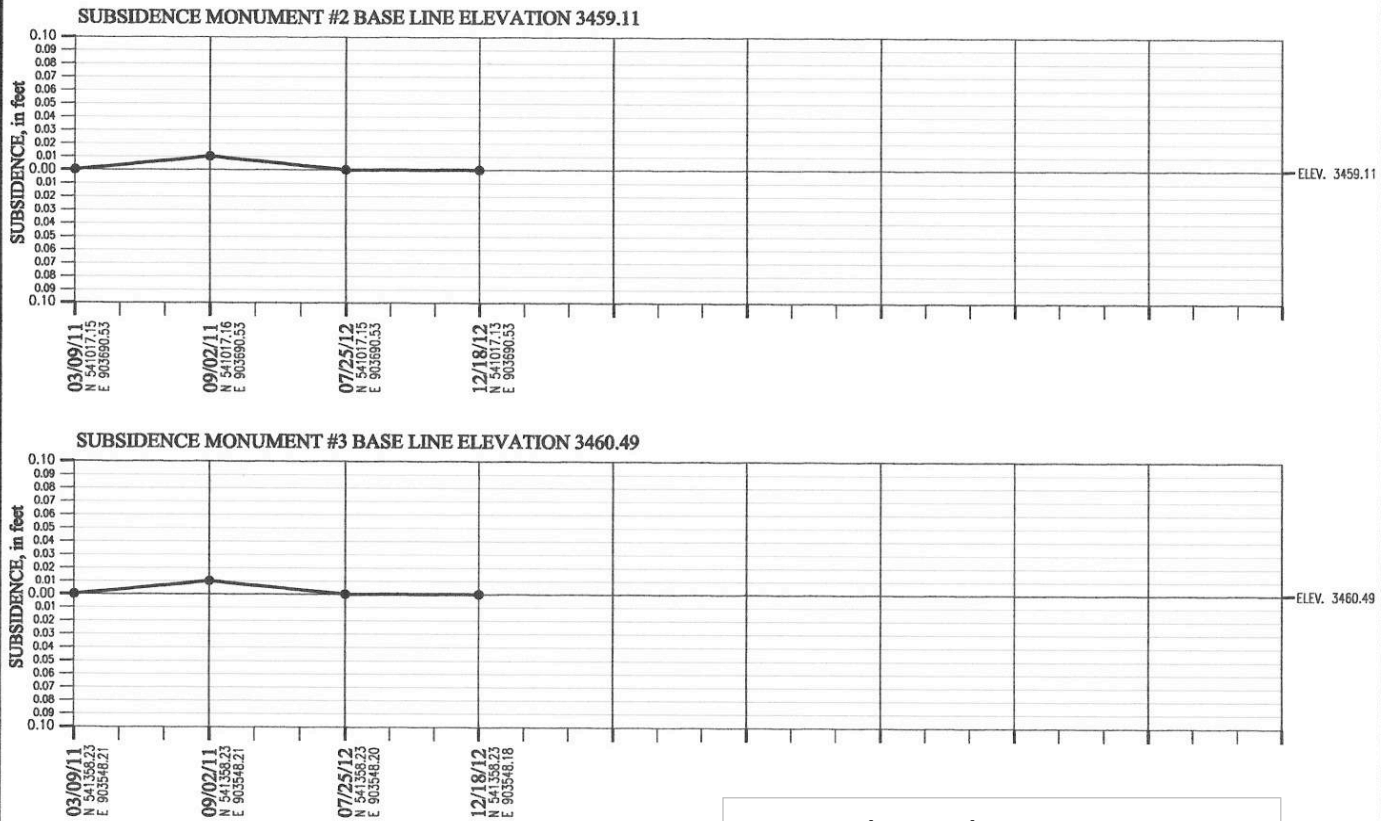
# ADJUSTED ELEVATIONS

Station	Adjusted Elev	Standard Dev.	
L98	<b>3434.3700</b>	0.00000	NGS MONUMENT L98
22	3434.3700	0.00000	
1	3436.9801	0.01150	
2	3439.3987	0.01639	
3	3442.4091	0.01964	
4	3444.7482	0.02205	
5	3450.5778	0.02338	
6	3455.7212	0.02422	
7	<b>3457.9332</b>	0.02724	MONUMENT #1
8	<b>3459.1092</b>	0.02888	MONUMENT #2
9	<b>3460.4962</b>	0.02863	MONUMENT #3
10	<b>3461.9212</b>	0.02775	STATE #1 WELL
11	3460.6115	0.02450	(AVERAGE)
12	<b>3461.9215</b>	0.02694	STATE #1 WELL 3461.921
13	<b>3460.4925</b>	0.02785	MONUMENT #3 3460.494
14	<b>3459.1105</b>	0.02810	MONUMENT #2 3459.110
15	<b>3457.9295</b>	0.02643	MONUMENT #1 3457.931
16	3454.5260	0.02425	
17	3450.1768	0.02326	
18	3444.5823	0.02181	
19	3442.0345	0.01937	
20	3439.3359	0.01595	
21	3436.4754	0.01061	

From	To	ROUTE SUMMARY Elev. Diff. (adjusted)	Residuals
L98	1	2.6101	-0.0029
1	2	2.4186	-0.0034
2	3	3.0104	-0.0036
3	4	2.3390	-0.0040
4	5	5.8297	-0.0033
5	6	5.1434	-0.0036
6	7	2.2120	-0.0000
6	8	3.3880	-0.0000
6	9	4.7750	-0.0000
6	10	6.2000	-0.0000
6	11	4.8903	-0.0037
11	12	1.3100	-0.0000
11	13	-0.1190	-0.0000
11	14	-1.5010	-0.0000
11	15	-2.6820	0.0000

Example  
Only

### VERTICAL SUBSIDENCE TABLE



## Example Only

**Figure 7B**



PROVIDING SURVEYING SERVICES  
SINCE 1946

**JOHN WEST SURVEYING COMPANY**  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(575) 393-3117

**NOTE:**

HORIZONTAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.02$  FT.  
VERTICAL ACCURACY OF EQUIPMENT PER  
MANUFACTURER  $\pm 0.01$  FT.

KEY ENERGY BW-19 CARLSBAD No. 1 WELL IN SECTION 36,  
TOWNSHIP 22 SOUTH, RANGE 26 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO

## Appendix “H”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2015 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

		CPI	
Pulling Unit Rig	\$25,000	1.03	\$25,750
Halliburton Cement Job	\$8,000.00	1.03	\$8,240
Post Subsidence Monitoring 5 years	\$15,000.00	1.03	\$15,450
Tank Removal, Pad Clean-Up	\$30,000.00	1.03	\$30,900
Consulting fees	\$10,000.00	1.03	\$10,300
Total Estimate	\$88,000	1.03	\$90,640

**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2016**

Wasserhund Inc.

Buckeye Brine Station

OCD Permit BW-04

*Expiration Date: November 08, 2018*

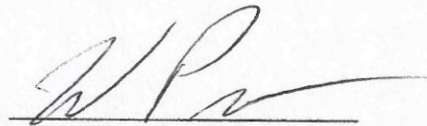
API No. 30-025-26883 Eidson #1

Unit Letter M-Section 31-Ts 16s – R35e

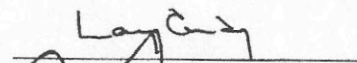
April 30, 2017

Submitted By: Price LLC on behalf of Wasserhund Inc Principals Mr. Larry and Jon Gandy.

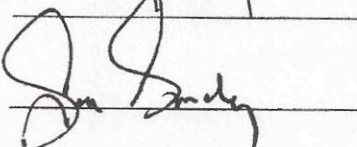
Wayne Price-LLC



Larry Gandy



Jon Gandy



**Bullet Point 2- Summary of Operations:**

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103.") Permit Expires November 08, 2018.

During the 2016 year there was no major remedial work on the brine well. General housekeeping was routinely performed and inspections were conducted for awareness of the BW-04 permit conditions. (A copy of the most recent OCD approved Discharge Plan permit BW-04 is included for reference in **Appendix "A"**).

In 2013, Wasserhund Inc. installed an automated brine dispensing system, which included remote automated billing and tracking. The equipment was supplied by Flowpoint systems and Price LLC provided start-up consulting services.

The OCD held a Brine Well Operator's meeting, in Hobbs on September 05, 2012 to discuss permit changes. The most notable change by OCD was the removing of the annual pressure test requirement, and went to a 5-year requirement allowing the "Open-to-Formation" test, and a successful test was performed in September of 2013 (Copy attached in **Appendix "D"**). The next scheduled 5-year test was scheduled for 2018.

The OCD sent out an E-Mail in July of 2016 indicating a test for this well was being scheduled for 2016. (See Bullet Point 6).

The brine well was drilled in 1980 and has been in operation for approximately 36 years and is sited on State Highway 08, approximately 12 miles southwest of Lovington, NM. The well is producing out of the Salado "Salt Formation" at a depth of approximately 1900-2460 feet below surface.

The brine well has been producing for a number of years and may possibly be considered approaching an "end of life" scenario due to its age. This scenario is not due to a safety aspect, i.e. collapse, since the well has produced only about one-half of normal volume compared to similar wells of age. Bullet point 10 (Brine Cavity/Subsidence Information) below discusses the safety aspects of this well in more detail.

As with most brine wells of this age, repeated required annual testing which flexes the cavern support, thus causing flexure stress cracking and the past required reverse flow issue, has caused these older wells to have pre-mature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive. This well had to be whip-stocked in 2008 in order to reenter after a severe down-hole problem.

To ensure the safety of the well a Pro-active well "Area of Review" has been conducted annually and will continue including yearly cavern size calculations.

Evaluation of the last sonar test conducted determines cavern stability and is discussed further in Bullet Point 10 below.

While this is an older well, it still has not reached its productive end of life and is deemed safe and is an extremely valuable asset for the oil and gas industry.

### **Bullet Point 3- Production Volumes:**

(Permit condition 2.J.3 “Monthly fluid injection and brine production volume, including the cumulative total carried over each year”

Wasserhund Inc. installed a new sales metering system in 2014 and installed new flow meters to monitor both water injected and brine produced.

Monthly, Yearly and Lifetime Injection and Production Volumes:

The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review. The total 2016 brine production volume was 265,462 bbls and the lifetime production volume is 9,227,911 bbls.

Enclosed in **Appendix “B”** is the injection and production and a comparison chart of injected water to produced water with comments.

### **Bullet Point 4- “Injection Pressure Data.”**

(Permit condition 2.J.4 “Injection Pressure Data”

Maximum and Average Injection Pressure:

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 280 psig. This reading is taken from a pressure gauge mounted on the pump outlet.

The maximum pressure (Injection) is set to 340 psig, which is well below the frac pressure for this well at the casing shoe. The casing shoe depth frac pressure is calculated to be 420 psig using a .70 psi/ft gradient.

Antidotal evidence may suggest older brine wells have a tendency to have a lower frac gradient over time. For this reason Wasserhund will not exceed 315 psig when testing the formation.

**Special Note:** This is a change from previous years and a special Brine Well Maximum Test Pressure Calculator is included in Appendix “D” for reference. The new frac gradient for this well is set at .65 psi/ft.

### **Bullet Point 5- Chemical Analysis:**

(Permit condition 2.J.5 "A copy of the quarterly chemical analysis shall be included with data summary and all QA/QC information.")

Please find attached in **Appendix "C"** the latest chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected during the 2016 year and analyzed by Trace Analysis in Lubbock, Texas and Hall Environmental, Albuquerque NM. The sampling process and laboratory used common approved EPA methods to collect, analyze and reporting.

The injection water was collected from the fresh water tank load line that is connected directly to the fresh water storage tanks. The fresh water is supplied by a fresh-water well located just west of the site.

The brine water was collected from the brine water tank load line that is connected directly to the brine water storage tanks. This sample point is representative of the brine water at the station.

The analysis revealed the brine water is predominately sodium chloride with a high density of 1.208 specific gravity. This analysis is very representative of Salado "Salt" formation waters found in the area. Pursuant to the 2016 chemical analysis, the Density of the brine ranged from 1.171 SG to 1.208 SG for an average of 1.189, which equates to 9.90 lbs./gal.

Wasserhund routinely performs field-testing to ensure brine well quality. This testing generally shows close to 10 lb brine using the field method.

The Sodium-Chloride ratios for the year averaged .681, which is very close to the theoretical value of .648 ratio for sodium chloride. This is a fair indication that the well is producing predominantly from the salt section.

### **Bullet Point 6- Mechanical Integrity:**

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.")

A 4-hour Cavern Mechanical Integrity Test (MIT) was successfully ran and passed on November 28, 2016 and subsequently approved by OCD.

Pursuant to the permit conditions this test was not due until 2018. Therefore, the next five-year test will be scheduled for November of 2021, unless otherwise required by OCD for good cause shown or permit condition requirement.

Please find in **Appendix "D"** a copy of the approved C-103, test chart with meter calibration notes.



**Bullet Point 7- Deviations from Normal Production Methods:**

(Permit condition 2.J.7 “Brief explanation describing deviations from normal operations.”)

In 2008 two OCD permitted brine wells collapsed. As a result of those incidents, the OCD issued a temporary moratorium on new brine well permits. During the moratorium OCD facilitated a work group to determine a proper path forward for current and new brine well operations.

As a result of those proceedings, OCD issued instructions to operators to change OCD’s previous requirement of injecting fresh water down the annulars and producing brine up the tubing (i.e reverse-flow); to injecting fresh water down the tubing and producing brine up the annulars, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, and is making quality 10# brine, with occasional reverse flow for maintenance.

**Bullet Point 8- Leak and Spill Reports:**

(Permit condition 2.J.8 “Results of any leaks and spill reports;”)

There were no reportable leaks and spills in 2016.

The loading areas are concrete with spill containers under the hose connections that are designed to catch de-minimus drips from hose connections. Drivers routinely suck out the spill containers, for re-cycling.

The entire facility is bermed to prevent run-on or run-off and all reportable or non-reportable spills are cleaned up pursuant to OCD rules and guidance.

**Bullet Point 9- Area of Review Update Summary:**

(Permit condition 2.J.9 “An Area of Review (AOR) update summary;”)

An extensive AOR review was conducted for the Eidson #1 brine well, OCD permit # BW-04, located in UL M of Section 31-Ts16S-R35e. Wasserhund Inc. used OCD records and actual field verification (see **Appendix “E”**) to confirm wells in the AOR.

Using OCD on-line files, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-04 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft (i.e. critical zone) and ¼ mile, casing program status, casing/cementing status, and corrective action required status.

This method was formulated to provide a baseline for future AOR studies. Since brine wells are limited in size, a critical AOR of 660 feet was initially established and all wells within that radius was researched in detail.

Using the current estimated diameter of the brine well @ 313 feet (R = 156.5 ft) updated for 2016, a 10:1 safety factor is applied that equates to about 1565 ft. As the brine well grows, this newly calculated critical AOR will be expanded and new wells will be added and all existing wells restudied.

The rationale behind this approach is the fact that brine wells are non-static in terms of size and configuration, and the fact that the brine well operator has only indirect control on wells drilled in close proximity.

Initially focusing on the current wells in the ¼ mile AOR, and assuming the status of these wells remain the same, may be a mistake. Therefore, a more dynamic approach is being undertaken, and each well in the critical Area of Review (AOR) will be looked at on an annual basis, or whenever any planned activity or new wells are noticed in the AOR.

In the 2016 review, there were no wells added to the list. **Appendix "E"** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-04 brine well.

There currently are three wells located within the critical 1565 ft, and ¼ miles radius of review. The critical zone wells were investigated by checking the OCD on-line well records.

The three wells located in the new critical zone, i.e. within 1565 feet, were reinvestigated by checking the OCD on-line well records. The last recorded file records for the three wells located in the critical AOR are identified as API# 30-025-25146, 30-025-35678 and 30-025-31621 and the following provides the most recent results found in the OCD public records.

The Findings are as follows:

**API # 30-025-25146:** In 2010, a C-103 was submitted to the OCD to P&A the well by setting plugs at the top, top of salt, bottom of salt, and place a cement plug in tubing at 5700 feet. This work was completed and C-103 filed with the OCD District I office in Hobbs and subsequently approved.

This well was properly plugged and abandoned in September of 2012 and approved by OCD. This well has been transferred to Lime Rock Resources.

Conclusions: The OCD records show that a subsequent P&A report was filed and approved by OCD.

Corrective Actions: Well has been P&A.

**API # 30-025-35678:** The Chesapeake St. VII #7, (Now Chevron USA) according to OCD records, is located 660 FNL & 660 FEL of UL A Section 1-Ts17s-R34e. It is shown to be located approximately 1600 ft to the SW of the BW-04 well.

In November of 2013, OCD sent Chevron USA Inc. a Letter of Violation and Shut-In Directive due to an observation of a Bradenhead issue, and required corrective actions and a Mechanical Integrity Test. In the 2014 year another Bradenhead test was conducted and witnessed by OCD.

This well has since been transferred to Lime Rock Resources and has been approved by OCD for recompletion, which would appear to have the salt zone "Salado" casing cemented. See Copy of proposed recompletion diagram in **Appendix "E"**.

Conclusions: OCD has approved the proposed re-completion.

Corrective Actions and Recommendation: If completed as proposed, this well appears to have adequate cemented casing coverage across the salt section and no corrective actions are required.

In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

**API # 30-025-31621:** The BTA Oil Producers Vacuum 9205 JV-P Com was drilled and completed in 1992 as a gas well. The Casing strings are as follows: 13-3/8" surface casing set at 423 feet cemented with 480 sacks, circulated to the surface. 8 5/8" Intermediate casing set at 4795 cemented with 2500 sacks, circulated to the surface.

A 5-1/2" production string was set at 12,900 ft and cemented with 2100 sacks, circulated to the surface.

Conclusions: This well is properly cemented from top to bottom, and the salt section is adequately covered. In 2016 this well passed an OCD Braden-head survey witnessed by OCD.

Corrective Actions: No Corrective actions required.

## **Bullet Point 10- Subsidence/Cavern Volumes/Geometric Measurements**

*(Permit condition 2.J.10. "A summary with interpretations of MIT's, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s);")*

Since the use of sonar tests in other wells has not provided adequate information, the continued use of sonar may be in question until the validity of using sonar test is resolved.

The last cavern survey (2008) for this well did not provide any useful information pertaining to the size and shape of this particular cavern. An alternate method has been

discussed with Jim Griswold-OCD and it was mutually decided that an estimated worst-case diameter is to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the WIPP site, has concluded that failures, such as “catastrophic collapses”, have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern.

This number is typically called D/H where “D” is the diameter of the cavity and “H” is the depth from surface to the casing shoe. Various reports seem to conclude that when a ratio of D/H reaches or exceeds .66 then the probability of collapse increases to a point that the well may be considered un-safe, thus closing procedures such as proper plugging and abandonment, and possible long term subsidence monitoring should be instituted.

The alternate method mentioned above involves calculating the maximum diameter of the cavern by using a worst-case scenario of an “**upright cone**”. The volume of the cavern is calculated using the lifetime brine production volumes and using a “*rule of thumb*” conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report and equates that every barrel of brine produced will create approximately one cubic foot of cavity.

Please find attached in **Appendix “F”**, a wellbore sketch, and the calculations for the brine well, and the lifetime brine production tally of approximately 9.22 million barrels of brine produced as of December 2016. The maximum diameter was calculated to be approximately 313 feet with a corresponding D/H ratio of .149 updated for the 2016 year.

Comparing the current D/H ratio of .149 to the .66 value mentioned above, it can be concluded that the current brine well status meets and exceeds the recommended safety value by approximately five times.

## **Permit Condition 2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

*The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence-monitoring program. The Permittee shall submit the results of all subsidence surveys to*

*OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.*

*Wasserhund Inc did submit a plan in last year's reports to meet the requirement of the rule.*

**Special Request: This facility currently does not have subsidence monitors installed and Wasserhund Inc. respectfully request waiver of this requirement until further evaluation can be completed or closure of the site commences.**

This request is based on the fact the well continues to exhibit good Cavern Mechanical Integrity, very low D/H ratio, and the fact the radius of the Cavern does not encroach upon any buildings, wells, or public ROW's. Currently there have been no subsidence issues noted or experienced.

**2. Solution Cavern Characterization Program:** *The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.*

**Solution Cavern Characterization Plan:** Wasserhund Inc. hereby proposes to use a combination of calculated results as determined above, and will experiment with various geophysical methods, including actually performing an "Induced Current Method" and report these results in the next annual report.

The "Induced Current" Method has not been totally successful, primarily to bad connections; low DC voltage used, capacitance effect, and ground interference. Wasserhund Inc. will investigate other methods and consult with OCD on this issue. The old fashion cavern calculation continues to be the best economic method available.

### **Bullet Point #11- Ratio of Injected/Produced Fluids**

*(Permit condition 2.J.11 "A summary of the ratio of the volume of injected fluids to the volume of produced brine;")*

*See Bullet Point #3 and Appendix "B" for comparison chart numbers.*

Special Note: **Wasserhund Inc. requests a minor modification of the permit**

**requirement 3.K** *“The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.”*

**Dear Jim Griswold-NMOCD Environmental Bureau Chief and Carl Chavez Environmental Engineer.**

As you know, this topic has been discussed and kicked around for a long time. The current permit requirement does not take into account many factors that can cause the variance to be under or over the requirement of 110%-120%. Every year we report this number in the annual report and while the average monthly injection for the year is normally within range, the actual monthly numbers can and are sometimes under and over. There are many reasons for this as we have discussed, and thus the requirement to suspend operations is not based on any real parameter or trend that may be an immediate threat to the well, groundwater or the environment. The current requirement put operators in a continuous violation and interruption of operations.

Of course notwithstanding, if you have a well that takes water without producing, or starts to pressure up, then you know you may have lost circulation or communicated to a pressure zone, then immediate action should be taken and notification to the agency.

The point to be made here is that this parameter is a trailing indicator not a leading indicator. Of course a continued pattern for a few months would be beneficial.

Currently the permit reads as follows:

*The Permittee shall immediately suspend injection and notify the agency within 72 hours, if the Fresh Water Injection does not cause a normal immediate return of Brine Water to the surface, or if the well flows excessively for an unusual amount of time without fresh water injection after the cavern pressure has been stabilized to it's normal operating pressure, or if permittee has become aware of any out of zone injection or communication. The Permittee shall include in each annual report a summary showing the monthly variance, the average monthly variance for the year and the total accumulative variance over the life of the well. The operator shall certify and explain that any yearly variance that falls outside of the range of 20%, (Difference between the Fresh Water input and Brine Water output) will not cause harm to Fresh Water, Public Health or the Environment.*

**Bullet Point #12- Summary of Activities**

*(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;")*

See Bullet Point #2 for summary.

**5.B. BONDING OR FINANCIAL ASSURANCE:** *The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.*

Appendix "G" contains a third party closure estimate for the Wasserhund Inc. BW-04 brine well.

**Bullet Point #13- Annual Certification**

*(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. "2.B.3. Annual Certification: The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")*

**Operator Response:** Based on all current information and actual on-site observance, the operator of record hereby certifies that the current operations pose no threat to public health and the environment at the submission of this report. If any substantial event that, has or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet of Bullet Point 1 of permit condition 2.J.1, the operator hereby certifies this condition of the permit.

**Bullet Point 14- Groundwater Monitoring:**

*(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken;")*

The BW-04 Wasserhund Inc. Buckeye facility currently does not have groundwater monitoring at this site.

**Bullet Point 15- Annual Reporting**

(Permit condition 2.J.15 “The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD’s Environmental Bureau.”)

The operator hereby submits a PDF file on flash drive and one hard copy.



## Appendix “A”

- Discharge Plan BW-04

**BW-4**

**Wasserhund/Buckeye  
Eidson State #1**

**Permit Renewal  
11/8/13**

State of New Mexico  
Energy, Minerals and Natural Resources Department

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**Susana Martinez**  
Governor

**David Martin**  
Cabinet Secretary

**Brett F. Woods, Ph.D.**  
Deputy Cabinet Secretary

**Jami Bailey**  
Division Director  
Oil Conservation Division



November 8, 2013

Larry Gandy  
Wasserhund, Inc.  
PO Box 827  
Tatum, New Mexico 88267

**RE: Renewal of Discharge Permit BW-4 for the Eidson State #1 Brine Well in Unit M of Section 31, Township 16 South, Range 35 East NMPM; Lea County, New Mexico**

Dear Mr. Gandy,

Pursuant to all applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC and more specifically 20.6.2.3104 thru.3999 discharge permit, and 20.6.2.5000 thru .5299 Underground Injection Control, the Oil Conservation Division hereby renews the discharge permit and authorizes operation and injection for the Wasserhund, Inc. (owner/operator) brine well BW-4 (API# 30-025-26883) at the location described above and under the conditions specified in the attached Discharge Permit Approval Conditions.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules or regulations.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at [jim.griswold@state.nm.us](mailto:jim.griswold@state.nm.us). On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation and patience during this renewal application review.

Respectfully,

**Jami Bailey**  
Director

JB/JG/jg  
Attachment – Discharge Permit Approval Conditions

cc: Michael Mariano, State Land Office

## DISCHARGE PERMIT BW-4

### 1. GENERAL PROVISIONS:

**1.A. PERMITTEE AND PERMITTED FACILITY:** The Director of the Oil Conservation Division (OCD) of the Energy, Minerals and Natural Resources Department renews Discharge Permit BW-4 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Eidson State #1 Brine Well - API No. 30-025-26883) located 567 feet FSL and 162 feet FWL (SW/4 SW/4, Unit Letter M) in Section 31, Township 16 South, Range 35 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located approximately 5 miles north of Buckeye, New Mexico along the west side of NM 238.

The Permittee is permitted to inject water into the subsurface salt layers and produce brine for use in the oil and gas industry. Ground water that may be affected by a spill, leak, or accidental discharge occurs at a depth of approximately 75 feet below ground surface and has a total dissolved solids concentration of approximately 500 mg/L.

**1.B. SCOPE OF PERMIT:** OCD has been granted the authority by statute and by delegation from the Water Quality Control Commission (WQCC) to administer the Water Quality Act (Chapter 74, Article 6 NMSA 1978) as it applies to Class III wells associated with the oil and gas industry (See Section 74-6-4, 74-6-5 NMSA 1978).

The Water Quality Act and the rules promulgated pursuant to the Act protect ground water and surface water of the State of New Mexico by providing that, unless otherwise allowed by 20.6.2 NMAC, no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water unless such discharge is pursuant to an approved discharge plan (See 20.6.2.3104 NMAC, 20.6.2.3106 NMAC, and 20.6.2.5000 through 20.6.2.5299 NMAC).

This Discharge Permit for a Class III well is issued pursuant to the Water Quality Act and WQCC rules, 20.6.2 NMAC. This Discharge Permit does not authorize any treatment of, or on-site disposal of, any materials, product, by-product, or oil-field waste.

Pursuant to 20.6.2.5004A NMAC, the following underground injection activities are prohibited:

1. The injection of fluids into a motor vehicle waste disposal well is prohibited.
2. The injection of fluids into a large capacity cesspool is prohibited.
3. The injection of any hazardous or radioactive waste into a well is prohibited except as provided by 20.6.2.5004A(3) NMAC.
4. Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action.

**5.** Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited.

This Discharge Permit does not convey any property rights of any sort nor any exclusive privilege, and does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state, federal, or local laws, rules or regulations.

The Permittee shall operate in accordance with the terms and conditions specified in this Discharge Permit to comply with the Water Quality Act and the rules issued pursuant to that Act, so that neither a hazard to public health nor undue risk to property will result (see 20.6.2.3109C NMAC); so that no discharge will cause or may cause any stream standard to be violated (see 20.6.2.3109H(2) NMAC); so that no discharge of any water contaminant will result in a hazard to public health, (see 20.6.2.3109H(3) NMAC); so that the numerical standards specified of 20.6.2.3103 NMAC are not exceeded; and, so that the technical criteria and performance standards (see 20.6.2.5000 through 20.6.2.5299 NMAC) for Class III wells are met. Pursuant to 20.6.2.5003B NMAC, the Permittee shall comply with 20.6.2.1 through 20.6.2.5299 NMAC.

The Permittee shall not allow or cause water pollution, discharge, or release of any water contaminant that exceeds the Water Quality Control Commission (WQCC) standards specified at 20.6.2.3101 NMAC and 20.6.2.3103 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams). Pursuant to 20.6.2.5101A NMAC, the Permittee shall not inject non-hazardous fluids into ground water having 10,000 mg/l or less total dissolved solids (TDS).

The issuance of this permit does not relieve the Permittee from the responsibility of complying with the provisions of the Water Quality Act, any applicable regulations or water quality standards of the WQCC, or any applicable federal laws, regulations or standards (See Section 74-6-5 NMSA 1978).

**1.C. DISCHARGE PERMIT RENEWAL:** This Discharge Permit is a permit renewal that replaces the permit being renewed. Replacement of a prior permit does not relieve the Permittee of its responsibility to comply with the terms of that prior permit while that permit was in effect.

**1.D. DEFINITIONS:** Terms not specifically defined in this Discharge Permit shall have the same meanings as those in the Water Quality Act or the rules adopted pursuant to the Act, as the context requires.

**1.E. FILING FEES AND PERMIT FEES:** Pursuant to 20.6.2.3114 NMAC, every facility that submits a Discharge Permit application for initial approval or renewal shall pay the permit fees specified in Table 1 and the filing fee specified in Table 2 of 20.6.2.3114 NMAC. OCD has already received the required \$100.00 filing fee. The Permittee is now required to submit the \$1,700.00 permit fee for a Class III well. Please remit payment made payable to the Water Quality Management Fund in care of OCD at 1220 South St. Francis Drive in Santa Fe, New Mexico 87505.

**1.F. EFFECTIVE DATE, EXPIRATION, RENEWAL CONDITIONS, AND PENALTIES FOR OPERATING WITHOUT A DISCHARGE PERMIT:** This Discharge Permit becomes effective 30 days from the date that the Permittee receives this discharge permit or until the permit is terminated or expires. This Discharge Permit will expire on **November 8, 2018**. The Permittee shall submit an application for renewal no later than 120 days before that expiration date, pursuant to 20.6.2.5101F NMAC. If a Permittee submits a renewal application at least 120 days before the Discharge Permit expires and is in compliance with the approved Discharge Permit, then the existing Discharge Permit will not expire until OCD has approved or disapproved the renewal application. A discharge permit continued under this provision remains fully effective and enforceable. Operating with an expired Discharge Permit may subject the Permittee to civil and/or criminal penalties (See Section 74-6-10.1 NMSA 1978 and Section 74-6-10.2 NMSA 1978).

**1.G. MODIFICATIONS AND TERMINATIONS:** The Permittee shall notify the OCD Director and OCD's Environmental Bureau of any Facility expansion or process modification (See 20.6.2.3107C NMAC). The OCD Director may require the Permittee to submit a Discharge Permit modification application pursuant to 20.6.2.3109E NMAC and may modify or terminate a Discharge Permit pursuant to Sections 74-6-5(M) through (N) NMSA 1978.

**1.** If data submitted pursuant to any monitoring requirements specified in this Discharge Permit or other information available to the OCD Director indicate that 20.6.2 NMAC is being or may be violated, then the OCD Director may require modification or, if it is determined by the OCD Director that the modification may not be adequate, may terminate this Discharge Permit for a Class III well that was approved pursuant to the requirements of 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

**a.** Noncompliance by Permittee with any condition of this Discharge Permit;  
or,

**b.** The Permittee's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or Permittee's misrepresentation of any relevant facts at any time; or,

**c.** A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination (See Section 75-6-6 NMSA 1978; 20.6.2.5101I NMAC; and, 20.6.2.3109E NMAC).

**2.** This Discharge Permit may also be modified or terminated for any of the following causes:

**a.** Violation of any provisions of the Water Quality Act or any applicable regulations, standard of performance or water quality standards;

**b.** Violation of any applicable state or federal effluent regulations or limitations; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge (See Section 75-6-5M NMSA 1978).

**1.H. TRANSFER OF CLASS III WELL DISCHARGE PERMIT:**

1. The transfer provisions of 20.6.2.3111 NMAC do not apply to a discharge permit for a Class III well.

2. Pursuant to 20.6.2.5101H NMAC, the Permittee may request to transfer its Class III well discharge permit if:

a. The OCD Director receives written notice 30 days prior to the transfer date; and,

b. The OCD Director does not object prior to the proposed transfer date. OCD may require modifications to the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

3. The written notice required in accordance with Permit Condition 1.H.2.a shall:

a. Have been signed by the Permittee and the succeeding Permittee, and shall include an acknowledgement that the succeeding Permittee shall be responsible for compliance with the Class III well discharge permit upon taking possession of the facility; and

b. Set a specific date for transfer of the discharge permit responsibility, coverage and liability; and

c. Include information relating to the succeeding Permittee's financial responsibility required by 20.6.2.5210B(17) NMAC.

**1.I. COMPLIANCE AND ENFORCEMENT:** If the Permittee violates or is violating a condition of this Discharge Permit, OCD may issue a compliance order that requires compliance immediately or within a specified time period, or assess a civil penalty, or both (See Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (See Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (See Section 74-6-10.2 NMSA 1978).

## **2. GENERAL FACILITY OPERATIONS:**

**2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS III WELLS:** The Permittee may use either or both fresh water or water from otherwise non-potable sources. Pursuant to 20.6.2.5207C, the Permittee shall provide analysis of the injected fluids at least quarterly to yield data representative of their characteristics. The Permittee shall analyze the injected fluids for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids; and,
- chloride concentration.

The Permittee shall also provide analysis of the produced brine on a quarterly basis. The Permittee shall analyze the produced brine for the following characteristics:

- pH;
- density;
- concentration of total dissolved solids;
- chloride concentration; and,
- sodium concentration.

## **2.B. SOLUTION CAVERN MONITORING PROGRAM:**

**1. Surface Subsidence Monitoring Plan:** The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective date of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually.

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.

**2. Solution Cavern Characterization Program:** The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical method approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.



a. The Permittee shall provide an estimate of the size and shape of the solution cavern at least annually, based on fluid injection and brine production data.

b. The Permit shall compare the ratio of the volume of injected fluids to the volume of produced brine monthly. If the average ratio of injected fluid to produced brine varies is less than 90% or greater than 110%, the Permittee shall report this to OCD and cease injection and production operations of its Class III well within 24 hours. The Permittee shall begin an investigation to determine the cause of this abnormal ratio within 72 hours. The Permittee shall submit to OCD a report of its investigation within 15 days of cessation of injection and production operations of its Class III well.

**3. Annual Certification:** The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.

If the solution cavern is determined by either OCD or the Permittee to be potentially unstable by either direct or indirect means, then the Permittee shall cease all fluid injection and brine production within 24 hours. If the Permittee ceases operations because it or OCD has determined that the solution cavern is unstable, then it shall submit a plan to stabilize the solution cavern within 30 days. OCD may require the Permittee to implement additional subsidence monitoring and to conduct additional corrective action.

**2.C. CONTINGENCY PLANS:** The Permittee shall implement its proposed contingency plan(s) included in its Permit Renewal Application to cope with failure of a system(s) in the Discharge Permit.

**2.D. CLOSURE:** Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the Class III well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

**1. Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of its Class III well. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before Permittee may implement its proposed closure plan.

**2. Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);
- Address of Permittee (and owner or operator, if appropriate);
- Contact person;
- Phone number;
- Number and type of well(s);

- Year of well construction;
- Well construction details;
- Type of discharge;
- Average flow (gallons per day);
- Proposed well closure activities (*e.g.*, sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type of well, ground water and vadose zone investigation, other);
- Proposed date of well closure;
- Name of Preparer; and,
- Date.

**2.E. PLUGGING AND ABANDONMENT PLAN:** Pursuant to 20.6.2.5209A NMAC, when the Permittee proposes to plug and abandon its Class III well, it shall submit to OCD a plugging and abandonment plan that meets the requirements of 20.6.2.3109C NMAC, 20.6.2.5101C NMAC, and 20.6.2.5005 NMAC for protection of ground water. If requested by OCD, Permittee shall submit for approval prior to closure, a revised or updated plugging and abandonment plan. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of this Discharge Permit. The Permittee shall comply with 20.6.2.5209 NMAC.

**2.F RECORD KEEPING:** The Permittee shall maintain records of all inspections, surveys, investigations, *etc.*, required by this Discharge Permit at its Facility office for a minimum of five years and shall make those records available for inspection by OCD.

**2.G. RELEASE REPORTING:** The Permittee shall comply with the following permit conditions, pursuant to 20.6.2.1203 NMAC, if it determines that a release of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, has occurred. The Permittee shall report unauthorized releases of water contaminants in accordance with any additional commitments made in its approved Contingency Plan. If the Permittee determines that any constituent exceeds the standards specified at 20.6.2.3103 NMAC, then it shall report a release to OCD's Environmental Bureau.

**1. Oral Notification:** As soon as possible after learning of such a discharge, but in no event more than twenty-four (24) hours thereafter, the Permittee shall notify OCD's Environmental Bureau. The Permittee shall provide the following:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility;
- The name and location of the facility;
- The date, time, location, and duration of the discharge;
- The source and cause of discharge;
- A description of the discharge, including its chemical composition;
- The estimated volume of the discharge; and,

- Any corrective or abatement actions taken to mitigate immediate damage from the discharge.

**2. Written Notification:** Within one week after the Permittee has discovered a discharge, the Permittee shall send written notification (may use form C-141 with attachments) to OCD's Environmental Bureau verifying the prior oral notification as to each of the foregoing items and providing any appropriate additions or corrections to the information contained in the prior oral notification.

The Permittee shall provide subsequent written reports as required by OCD's Environmental Bureau.

## **2.H. OTHER REQUIREMENTS:**

**1. Inspection and Entry:** Pursuant to Section 74-6-9 NMSA 1978 and 20.6.2.3107A NMAC, the Permittee shall allow any authorized representative of the OCD Director, to:

- Upon the presentation of proper credentials, enter the premises at reasonable times;
- Inspect and copy records required by this Discharge Permit;
- Inspect any treatment works, monitoring, and analytical equipment;
- Sample any injection fluid or produced brine; and,
- Use the Permittee's monitoring systems and wells in order to collect samples.

**2. Advance Notice:** The Permittee shall provide OCD's Environmental Bureau and Hobbs District Office with at least five (5) working days advance notice of any environmental sampling to be performed pursuant to this Discharge Permit, or any well plugging, abandonment or decommissioning of any equipment associated with its Class III well.

**3. Environmental Monitoring:** The Permittee shall ensure that any environmental sampling and analytical laboratory data collected meets the standards specified in 20.6.2.3107B NMAC. The Permittee shall ensure that all environmental samples are analyzed by an accredited "National Environmental Laboratory Accreditation Conference" (NELAC) Laboratory. The Permittee shall submit data summary tables, all raw analytical data, and laboratory QA/QC.

**2.I. BONDING OR FINANCIAL ASSURANCE:** Pursuant to 20.6.2.5210B(17) NMAC, the Permittee shall maintain at a minimum, a single well plugging bond in the amount that it shall determine, in accordance with Permit Condition 5.B, to cover potential costs associated with plugging and abandonment of the Class III well, surface restoration, and post-operational monitoring, as may be needed. OCD may require additional financial assurance to ensure adequate funding is available to plug and abandon the well and/or for any required corrective actions.

Methods by which the Permittee shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the OCD Director, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a

non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. If an adequate bond is posted by the Permittee to a federal or another state agency, and this bond covers all of the measures specified above, the OCD Director shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the Permittee will fully perform the measures required hereinabove.

**2.J. ANNUAL REPORT:** The Permittee shall submit its annual report pursuant to 20.6.2.3107 NMAC to OCD's Environmental Bureau by **June 1<sup>st</sup>** of the following year. The annual report shall include the following:

- Cover sheet marked as "Annual Class III Well Report, Name of Permittee, Discharge Permit Number, API number of well(s), date of report, and person submitting report;
- Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of form C-103;
- Monthly fluid injection and brine production volume, including the cumulative total carried over each year;
- Injection pressure data;
- A copy of the quarterly chemical analyses shall be included with data summary and all QA/QC information;
- Copy of any mechanical integrity test chart, including the type of test, *i.e.*, duration, gauge pressure, etc.;
- Brief explanation describing deviations from the normal operations;
- Results of any leaks and spill reports;
- An Area of Review (AOR) update summary;
- A summary with interpretation of MITs, surface subsidence surveys, cavern volume and geometry measurements with conclusion(s) and recommendation(s);
- A summary of the ratio of the volume of injected fluids to the volume of produced brine;
- A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations;
- Annual Certification in accordance with Permit Condition 2.B.3.
- A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken; and,
- The Permittee shall file its Annual Report in an electronic format with a hard copy submittal to OCD's Environmental Bureau.

**3. CLASS III WELL OPERATIONS:**

**3.A. OPERATING REQUIREMENTS:** The Permittee shall comply with the operating requirements specified in 20.6.2.5206A NMAC and 20.6.2.5206A NMAC to ensure that:

1. Injection will occur through the innermost tubing string and brine production through the annulus between the casing and tubing string to promote cavern development at depth. Injection and production flow can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

2. Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone. If the Permittee determines that its Class III well is discharging or suspects that it is discharging fluids into a zone or zones other than the permitted injection zone specified in Permit Condition 3.B.1., then the Permittee shall within 24 hours notify OCD's Environmental Bureau and Hobbs District Office of the circumstances and action(s) taken. The Permittee shall cease operations until proper repairs are made and it has received approval from OCD to re-start injection operations.

**3.B. INJECTION OPERATIONS:**

1. **Well Injection Pressure Limit:** The Permittee shall ensure that the maximum wellhead or surface injection pressure on its Class III well shall not exceed the fracture pressure of the injection salt formation and will not cause new fractures or propagate any existing fractures or cause damage to the system.

2. **Pressure Limiting Device:** The Permittee shall equip and operate its Class III well or system with a pressure limiting device which shall, at all times, limit surface injection pressure to the maximum allowable pressure for its Class III well. The Permittee shall monitor the pressure-limiting device daily and shall report all pressure exceedances within 24 hours of detecting an exceedance to OCD's Environmental Bureau.

The Permittee shall take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface. The Permittee shall report to OCD's Environmental Bureau within 24 hours of discovery any indication that new fractures or existing fractures have been propagated, or that damage to the well, the injection zone, or formation has occurred.

**3.C. CONTINUOUS MONITORING DEVICES:** The Permittee shall use continuous monitoring devices to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

**3.D. MECHANICAL INTEGRITY FOR CLASS III WELLS:**

1. Pursuant to 20.6.2.5204 NMAC, the Permittee shall demonstrate mechanical integrity for its Class III well at least once every five years or more frequently as the OCD

Director may require for good cause during the life of the well. The Permittee shall demonstrate mechanical integrity for its Class III well every time it performs a well workover, including when it pulls the tubing. A Class III well has mechanical integrity if there is no detectable leak in the casing or tubing which OCD considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the OCD Director considers to be significant. The Permittee shall conduct a casing Mechanical Integrity Test (MIT) from the surface to the approved injection depth to assess casing integrity. The MIT shall consist of a 30-minute test at a minimum pressure of 300 psig measured at the surface.

The Permittee shall notify OCD's Environmental Bureau 5 days prior to conducting any MIT to allow OCD the opportunity to witness the MIT.

2. The following criteria will determine if the Class III well has passed the MIT:
  - a. Passes MIT if zero bleed-off during the test;
  - b. Passes MIT if final test pressure is within  $\pm 10\%$  of starting pressure, if approved by OCD;
  - c. When the MIT is not witnessed by OCD and fails, the Permittee shall notify OCD within 24 hours of the failure of the MIT.

3. Pursuant to 20.6.2.5204C NMAC, the OCD Director may consider the use by the Permittee of equivalent alternative test methods to determine mechanical integrity. The Permittee shall submit information on the proposed test and all technical data supporting its use. The OCD Director may approve the Permittee's request if it will reliably demonstrate the mechanical integrity of the well for which its use is proposed.

4. Pursuant to 20.6.2.5204D NMAC, when conducting and evaluating the MIT(s), the Permittee shall apply methods and standards generally accepted in the oil and gas industry. When the Permittee reports the results of all MIT(s) to the OCD Director, it shall include a description of the test(s), the method(s) used, and the test results.

**3.E. WELL WORKOVER OPERATIONS:** Pursuant to 20.6.2.5205A(5) NMAC, the Permittee shall provide notice to and shall obtain approval from OCD's District Office in Hobbs and the Environmental Bureau in Santa Fe prior to commencement of any remedial work or any other workover operations to allow OCD the opportunity to witness the operation. The Permittee shall request approval using form C-103 (Sundry Notices and Reports on Wells) with copies sent to OCD's Environmental Bureau and Hobbs District Office. Properly completed Forms C-103 and/or C-105 must be filed with OCD upon completion of workover activities and copies included in that year's Annual Report.

**3.K. FLUIDS INJECTION AND BRINE PRODUCTION VOLUMES AND PRESSURES:** The Permittee shall continuously monitor the volumes of water injected and brine production. The Permittee shall submit monthly reports of its injection and production volumes on or before the 10<sup>th</sup> day of the following month. The Permittee shall suspend injection if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the Permittee shall notify OCD within 24 hours.

**3.L. AREA OF REVIEW (AOR):** The Permittee shall report within 72 hours of discovery any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within a 1-mile radius from its Class III well.

**4. CLASS V WELLS:** Pursuant to 20.6.2.5002B NMAC, leach fields and other waste fluids disposal systems that inject non-hazardous fluid into or above an underground source of drinking water are UIC Class V injection wells. This Discharge Permit does not authorize the use of a Class V injection well for the disposal of industrial waste. Pursuant to 20.6.2.5005 NMAC, the Permittee shall close any Class V industrial waste injection well that injects non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes (*e.g.*, septic systems, leach fields, dry wells, *etc.*) within 90 calendar days of the issuance of this Discharge Permit. The Permittee shall document the closure of any Class V wells used for the disposal of non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes other than contaminated ground water in its Annual Report. Other Class V wells, including wells used only for the injection of domestic wastes, shall be permitted by the New Mexico Environment Department.

**5. SCHEDULE OF COMPLIANCE:**

**5.A. ANNUAL REPORT:** The Permittee shall submit its annual report to OCD by June 1st of each year.

**5.B. BONDING OR FINANCIAL ASSURANCE:** The Permittee shall submit an estimate of the minimum cost to properly close, plug and abandon its Class III well, conduct ground water restoration if applicable, and any post-operational monitoring as may be needed (see 20.6.2.5210B(17) NMAC) within 90 days of permit issuance (See 20.6.2.5210B(17) NMAC). The Permittee's cost estimate shall be based on third person estimates. After review, OCD will require the Permittee to submit a single well plugging bond based on the third person cost estimate.

**5.C. SURFACE SUBSIDENCE MONITORING PLAN:** The Permittee shall submit the Surface Subsidence Monitoring Plan required in accordance with Permit Condition 2.B.1 within 180 days of permit issuance.

**5.D. SOLUTION CAVERN CHARACTERIZATION PLAN:** The Permittee shall submit the Solution Cavern Characterization Plan required in accordance with Permit Condition 2.B.2 within 180 days of permit issuance.

## Appendix “B”

- Injection and Production Volumes/Comparison Charts



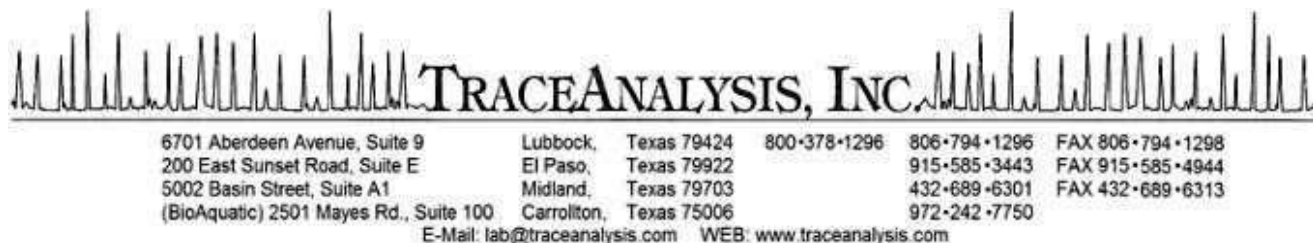
2016 Wasserhund Inc OCD BW-04 Annual Production Data											
								Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.			
				Brine-BBLS		Fresh-BBLS		% diff			
Jan				40524		40659		0.33%			
Feb				24732		24845		0.46%			
Mar				15914		16011		0.61%			
Apr				15003		15124		0.81%			
May				19261		19292		0.16%			
Jun				20440		20655		1.05%			
Jul				23497		23612		0.49%			
Aug				22449		22572		0.55%			
Sept				22730		22955		0.99%			
Oct				14084		14179		0.67%			
Nov				21508		21723		1.00%			
Dec				25320		25425		0.41%			
Total				265,462		267,052		0.60%			
Total Brine Water Production Carry Over from Years Past BBLs				8,962,449							
Total Production year ending 2016				9,227,911	bbls						

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water

## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Waynce Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: February 25, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 16 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager

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## Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: February 25, 2016  
Brine Well

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Buckeye New Mexico

# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      Sample Preparation:      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	1820	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			0.980	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 128366      Date Analyzed: 2016-02-22      Analyzed By: LQ  
Prep Batch: 108694      Sample Preparation:      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	7.81	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      Sample Preparation:      Prepared By: LQ



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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: Na, Dissolved

QC Batch: 128362

Prep Batch: 108686

Analytical Method: S 6010C

Date Analyzed: 2016-02-22

Sample Preparation: 2016-02-22

Prep Method: S 3005A

Analyzed By: RR

Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>106000</b>	mg/L	1000	1.00

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## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      QC Preparation: 2016-02-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      QC Preparation: 2016-02-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      QC Preparation: 2016-02-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      QC Preparation: 2016-02-23      Prepared By: LQ

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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 6	<25.0	mg/L	2.5

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## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1090	1120	mg/L	20	3	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	S.U.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.7	103	90 - 110	2016-02-23



Report Date: February 25, 2016  
Brine Well

Work Order: 16022210  
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---

**Standard (CCV-2)**

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.9	104	90 - 110	2016-02-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

---

## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 25, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

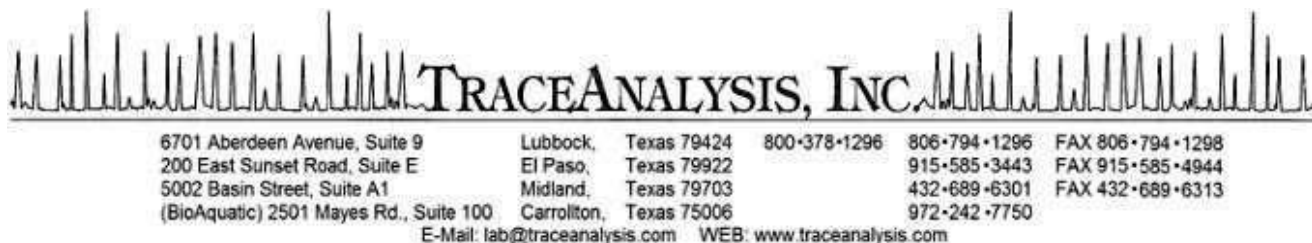
Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		<b>1820</b>	mg/L	2.5
Density		<b>0.980</b>	g/ml	
pH		<b>7.81</b>	s.u.	2
Total Dissolved Solids		<b>3240</b>	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Dissolved Sodium		<b>106000</b>	mg/L	1



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

(Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well  
Project Number: Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

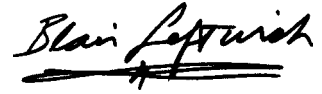
### Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 20 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

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# Case Narrative

Samples for project Brine Well were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022210. Samples for work order 16022210 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	108743	2016-02-23 at 10:00	128419	2016-02-23 at 10:08
Chloride (IC)	E 300.0	109290	2016-03-23 at 14:00	129049	2016-03-23 at 15:09
Density	ASTM D854-92	108721	2016-02-23 at 13:10	128394	2016-02-23 at 13:15
Density	ASTM D854-92	109263	2016-03-23 at 11:10	129013	2016-03-23 at 11:15
Na, Dissolved	S 6010C	108686	2016-02-22 at 12:23	128362	2016-02-22 at 15:23
pH	SM 4500-H+	108694	2016-02-22 at 15:00	128366	2016-02-22 at 15:00
pH	SM 4500-H+	109282	2016-03-23 at 12:30	129028	2016-03-23 at 12:30
TDS	SM 2540C	108734	2016-02-23 at 15:30	128463	2016-02-23 at 15:30
TDS	SM 2540C	109281	2016-03-23 at 16:30	129044	2016-03-23 at 16:30

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16022210 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Report Date: March 24, 2016  
Brine Well

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# Analytical Report

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Chloride (IC) Analytical Method: E 300.0 Prep Method: N/A  
QC Batch: 128419 Date Analyzed: 2016-02-23 Analyzed By: RL  
Prep Batch: 108743 Sample Preparation: Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,5	<b>1820</b>	mg/L	100	2.50

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: Density Analytical Method: ASTM D854-92 Prep Method: N/A  
QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 Sample Preparation: Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>0.980</b>	g/ml	1	0.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: pH Analytical Method: SM 4500-H+ Prep Method: N/A  
QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 Sample Preparation: Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>7.81</b>	s.u.	1	2.00

## Sample: 414778 - Fresh Water

Laboratory: Lubbock  
Analysis: TDS Analytical Method: SM 2540C Prep Method: N/A  
QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 Sample Preparation: Prepared By: LQ

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>3240</b>	mg/L	50	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      Sample Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1,2,3,4,5	<b>149000</b>	mg/L	5000	2.50

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Density      Analytical Method: ASTM D854-92      Prep Method: N/A  
QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      Sample Preparation:      Prepared By: CF

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Density			<b>1.16</b>	g/ml	1	0.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      Sample Preparation: 2016-02-22      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,5	<b>106000</b>	mg/L	1000	1.00

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**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: pH

QC Batch: 129028

Prep Batch: 109282

Analytical Method: SM 4500-H+

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,5	<b>6.91</b>	s.u.	1	2.00

**Sample: 414779 - Brine Water**

Laboratory: Lubbock

Analysis: TDS

QC Batch: 129044

Prep Batch: 109281

Analytical Method: SM 2540C

Date Analyzed: 2016-03-23

Sample Preparation: 2016-03-23

Prep Method: N/A

Analyzed By: LQ

Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,5	<b>263000</b>	mg/L	2000	2.50

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## Method Blanks

### Method Blank (1)      QC Batch: 128362

QC Batch: 128362      Date Analyzed: 2016-02-22      Analyzed By: RR  
Prep Batch: 108686      QC Preparation: 2016-02-22      Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,5	<0.0197	mg/L	1

### Method Blank (1)      QC Batch: 128394

QC Batch: 128394      Date Analyzed: 2016-02-23      Analyzed By: CF  
Prep Batch: 108721      QC Preparation: 2016-02-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.988	g/ml	

### Method Blank (1)      QC Batch: 128419

QC Batch: 128419      Date Analyzed: 2016-02-23      Analyzed By: RL  
Prep Batch: 108743      QC Preparation: 2016-02-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,5	<0.323	mg/L	2.5

### Method Blank (1)      QC Batch: 128463

QC Batch: 128463      Date Analyzed: 2016-02-23      Analyzed By: LQ  
Prep Batch: 108734      QC Preparation: 2016-02-23      Prepared By: LQ

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Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129013

QC Batch: 129013      Date Analyzed: 2016-03-23      Analyzed By: CF  
Prep Batch: 109263      QC Preparation: 2016-03-23      Prepared By: CF

Parameter	Flag	Cert	MDL Result	Units	RL
Density			0.979	g/ml	

**Method Blank (1)**      QC Batch: 129044

QC Batch: 129044      Date Analyzed: 2016-03-23      Analyzed By: LQ  
Prep Batch: 109281      QC Preparation: 2016-03-23      Prepared By: LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1, 2, 3, 4, 5	<25.0	mg/L	2.5

**Method Blank (1)**      QC Batch: 129049

QC Batch: 129049      Date Analyzed: 2016-03-23      Analyzed By: RL  
Prep Batch: 109290      QC Preparation: 2016-03-23      Prepared By: RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1, 2, 3, 4, 5	<0.323	mg/L	2.5

Report Date: March 24, 2016  
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## Duplicates

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128366 Date Analyzed: 2016-02-22 Analyzed By: LQ  
Prep Batch: 108694 QC Preparation: 2016-02-22 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,5	7.91	7.93	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 414780

QC Batch: 128394 Date Analyzed: 2016-02-23 Analyzed By: CF  
Prep Batch: 108721 QC Preparation: 2016-02-23 Prepared By: CF

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density		0.968	0.985	g/ml	1	2	20

### Duplicates (1) Duplicated Sample: 414786

QC Batch: 128463 Date Analyzed: 2016-02-23 Analyzed By: LQ  
Prep Batch: 108734 QC Preparation: 2016-02-23 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,5	1090	1120	mg/L	20	3	10

### Duplicates (1) Duplicated Sample: 414781

QC Batch: 129013 Date Analyzed: 2016-03-23 Analyzed By: CF  
Prep Batch: 109263 QC Preparation: 2016-03-23 Prepared By: CF



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Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Density	<sup>2</sup>	0.978	0.996	g/ml	1	2	20

**Duplicates (1)**    Duplicated Sample: 416191

QC Batch: 129028                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109282                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	<sup>1,2,4,5</sup>	7.18	7.18	s.u.	1	4	20

**Duplicates (1)**    Duplicated Sample: 416188

QC Batch: 129044                      Date Analyzed: 2016-03-23                      Analyzed By: LQ  
Prep Batch: 109281                      QC Preparation: 2016-03-23                      Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	<sup>1,2,3,4,5</sup>	4630	4670	mg/L	50	1	10

## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	55.1	mg/L	1	52.5	<0.0197	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	52.7	mg/L	1	52.5	<0.0197	100	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	25.8	mg/L	1	25.0	<0.323	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	25.7	mg/L	1	25.0	<0.323	103	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 128463  
Prep Batch: 108734

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: LQ  
Prepared By: LQ

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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1010	mg/L	10	1000	<25.0	101	90 - 110	0	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129044  
Prep Batch: 109281

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,5	995	mg/L	10	1000	<25.0	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,5	1020	mg/L	10	1000	<25.0	102	90 - 110	2	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

#### Laboratory Control Spike (LCS-1)

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	24.3	mg/L	1	25.0	<0.323	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	24.2	mg/L	1	25.0	<0.323	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 414212

QC Batch: 128362  
Prep Batch: 108686

Date Analyzed: 2016-02-22  
QC Preparation: 2016-02-22

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,5	491	mg/L	1	500	2.44	98	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,5	500	mg/L	1	500	2.44	100	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 414780

QC Batch: 128419  
Prep Batch: 108743

Date Analyzed: 2016-02-23  
QC Preparation: 2016-02-23

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	340	mg/L	10	250	76.6	105	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	333	mg/L	10	250	76.6	102	80 - 120	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 416184

QC Batch: 129049  
Prep Batch: 109290

Date Analyzed: 2016-03-23  
QC Preparation: 2016-03-23

Analyzed By: RL  
Prepared By: RL

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

Page Number: 16 of 20  
Buckeye New Mexico

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,5	3570	mg/L	100	2500	1100	99	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,5	3540	mg/L	100	2500	1100	98	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	24.9	96	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,5	mg/L	26.0	25.3	97	90 - 110	2016-02-22

### Standard (CCV-1)

QC Batch: 128366

Date Analyzed: 2016-02-22

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	S.U.	7.00	7.00	100	98.6 - 101.4	2016-02-22

### Standard (CCV-1)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.7	103	90 - 110	2016-02-23

Report Date: March 24, 2016  
Brine Well

Work Order: 16022210  
Brine Well

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Buckeye New Mexico

### Standard (CCV-2)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	25.9	104	90 - 110	2016-02-23

### Standard (CCV-1)

QC Batch: 129028

Date Analyzed: 2016-03-23

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,5	s.u.	7.00	7.03	100	98.6 - 101.4	2016-03-23

### Standard (CCV-1)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

### Standard (CCV-2)

QC Batch: 129049

Date Analyzed: 2016-03-23

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,5	mg/L	25.0	24.4	98	90 - 110	2016-03-23

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.



F	Description
U	The analyte is not detected above the SDL

---

## Result Comments

- 1 Analyzed out of hold time.
- 2 Analyzed out of hold time.

## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.

LAB Order ID # 16022210

# TraceAnalysis, Inc.

email: lab@traceanalysis.com

6701 Aberdeen Avenue, Suite 9  
Lubbock, Texas 79424  
Tel (806) 794-1296  
Fax (806) 794-1298  
1 (800) 378-1296

5002 Basin Street, Suite A1  
Midland, Texas 79703  
Tel (432) 689-6301  
Fax (432) 689-6313

200 East Sunset Rd., Suite E  
El Paso, Texas 79922  
Tel (915) 585-3443  
Fax (915) 585-4944  
1 (888) 588-3443

Branch:  
3403 Industrial  
Hobbs, NM 87401  
Tel (575) 392-7500  
Fax (575) 392-4506

Company Name: PRICE LLC Phone #: 832 657 4873

Address: (Street, City, Zip) 310 ENCANTADO RIDGE CT NE 87124 Fax #: 505 892 6643

Contact Person: LESTER WAYNE PRICE JR E-mail: wprice23@hotmail.com

Invoice to: (If different from above) RANDY CORPORATION

Project #: NA Project Name: BRINE WELL

Project Location (including state): ROCKEYE NM Sampler Signature: LUPAK

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume / Amount	MATRIX			PRESERVATIVE METHOD					SAMPLING	
				WATER	AIR	SLUDGE	HCl	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaOH	ICE	DATE	TIME
44778	FRESH WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM
779	BRINE WATER	1	1 PLASTIC	X							X	2/17/16	2:30PM

## ANALYSIS REQUEST (Circle or Specify Method No.)

MTBE 8021 / 602 / 8260 / 624	BTEX 8021 / 602 / 8260 / 624	TPH 418.1 / TX1005 / TX1005 Ext(C35)	TPH 8015 GRO / DRO / TVHC	PAH 8270 / 625	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260 / 624	GC/MS Semi. Vol. 8270 / 625	PCBs 8082 / 608	Pesticides 8081 / 608	BOD, TSS, pH	Moisture Content	Cl, F, SO <sub>4</sub> , NO <sub>3</sub> -N, NO <sub>2</sub> -N, PO <sub>4</sub> -P, Alkalinity	Na, Ca, Mg, K, TDS, EC	X Chloride Density Pl, TDS	X Dissolved Sodium	Turn Around Time if different from standard	Hold
------------------------------	------------------------------	--------------------------------------	---------------------------	----------------	---	-------------------------------------	----------------	---------------------	-----------------	-----	-----------------------	-----------------------------	-----------------	-----------------------	--------------	------------------	---	------------------------	----------------------------	--------------------	---	------

Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: KLS	Company: BTK	Date: 2-18-16	Time: 1:03	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7
Relinquished by: Lester W Price Jr	Company: PRICE LLC	Date: 2/17/16	Time: 12:30 PM	Received by: Lester W Price Jr	Company: TA	Date: 2-20-16	Time: 10:00	INST 1-7	OBS 1-7	COR 1-7

LAB USE ONLY	Inject Y/N	Headspace Y/N	Log-in-Review
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REMARKS:

COC # 1

Dry Weight Basis Required  
TRRP Report Required  
Check If Special Reporting Limits Are Needed

REPORT INV. & COC e-mail FAX: 2-25-16 FAX: 2-25-16

# Summary Report

(Corrected Report)

Lester Waynce Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: March 24, 2016

Work Order: 16022210



Project Location: Buckeye New Mexico  
Project Name: Brine Well

## Report Corrections (Work Order 16022210)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414779.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
414778	Fresh Water	water	2016-02-17	14:25	2016-02-18
414779	Brine Water	water	2016-02-17	14:30	2016-02-18

### Sample: 414778 - Fresh Water

Param	Flag	Result	Units	RL
Chloride		<b>1820</b>	mg/L	2.5
Density		<b>0.980</b>	g/ml	
pH		<b>7.81</b>	s.u.	2
Total Dissolved Solids		<b>3240</b>	mg/L	2.5

### Sample: 414779 - Brine Water

Param	Flag	Result	Units	RL
Chloride	<sup>H</sup>	<b>149000</b>	mg/L	2.5
Density	<sup>1</sup>	<b>1.16</b>	g/ml	
Dissolved Sodium		<b>106000</b>	mg/L	1
pH		<b>6.91</b>	s.u.	2

*continued ...*

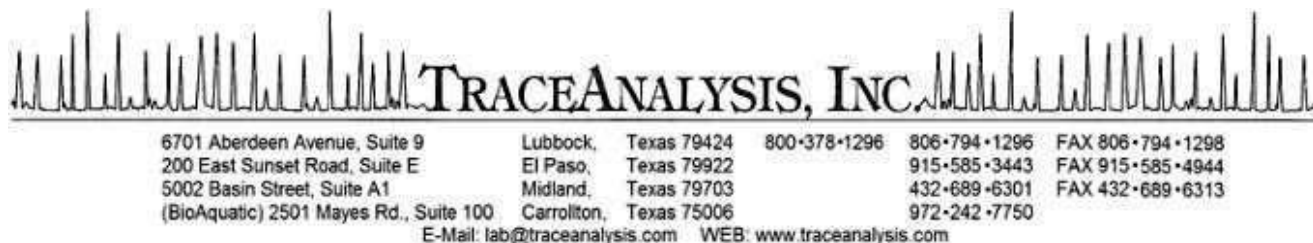
<sup>1</sup>Analyzed out of hold time.

---

*sample 414779 continued ...*

Param	Flag	Result	Units	RL
Total Dissolved Solids		<b>263000</b>	mg/L	2.5

---



## Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

# Analytical and Quality Control Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: May 17, 2016

Work Order: 16042902



Project Location: Buckeye NM & Tatum  
Project Name: Gandy Brine/Fresh Well  
Project Number: BW-4 & BW-22

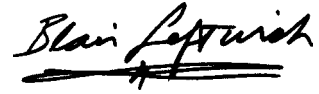
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
418340	BW-4 Fresh Water-B	water	2016-04-28	13:10	2016-04-28
418341	BW-4 Brine Water-B	water	2016-04-28	13:20	2016-04-28
418342	BW-22 Fresh Water-T	water	2016-04-28	12:30	2016-04-28
418343	BW-22 Brine Water-T	water	2016-04-28	12:20	2016-04-28

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TraceAnalysis, Inc. uses the attached chain of custody (COC) as the laboratory check-in documentation which includes sample receipt, temperature, sample preservation method and condition, collection date and time, testing requested, company, sampler, contacts and any special remarks.

This report consists of a total of 17 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

A handwritten signature in black ink, reading "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Johnny Grindstaff, Operations Manager

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## Case Narrative

Samples for project Gandy Brine/Fresh Well were received by TraceAnalysis, Inc. on 2016-04-28 and assigned to work order 16042902. Samples for work order 16042902 were received intact at a temperature of 3.0 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Chloride (IC)	E 300.0	110129	2016-05-06 at 10:00	129998	2016-05-06 at 10:30
Na, Dissolved	S 6010C	110161	2016-05-11 at 14:09	130128	2016-05-17 at 11:53
pH	SM 4500-H+	109974	2016-04-29 at 15:30	129815	2016-04-29 at 15:30
TDS	SM 2540C	109973	2016-04-29 at 15:16	129873	2016-04-29 at 16:15

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 16042902 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.



Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

# Analytical Report

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory:	Lubbock	Analytical Method:	E 300.0	Prep Method:	N/A
Analysis:	Chloride (IC)	Date Analyzed:	2016-05-06	Analyzed By:	RL
QC Batch:	129998	Sample Preparation:	2016-05-06	Prepared By:	RL
Prep Batch:	110129				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>250</b>	mg/L	10	2.50

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory:	Lubbock	Analytical Method:	SM 4500-H+	Prep Method:	N/A
Analysis:	pH	Date Analyzed:	2016-04-29	Analyzed By:	LQ
QC Batch:	129815	Sample Preparation:	2016-04-29	Prepared By:	LQ
Prep Batch:	109974				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.76</b>	s.u.	1	2.00

## Sample: 418340 - BW-4 Fresh Water-B

Laboratory:	Lubbock	Analytical Method:	SM 2540C	Prep Method:	N/A
Analysis:	TDS	Date Analyzed:	2016-04-29	Analyzed By:	LQ
QC Batch:	129873	Sample Preparation:	2016-04-29	Prepared By:	LQ
Prep Batch:	109973				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>678</b>	mg/L	20	2.50

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>149000</b>	mg/L	5000	2.50

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	Na, Dissolved	Analytical Method:	S 6010C
QC Batch:	130128	Date Analyzed:	2016-05-17
Prep Batch:	110161	Sample Preparation:	2016-05-11
		Prep Method:	S 3005A
		Analyzed By:	RR
		Prepared By:	RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>91000</b>	mg/L	1100	1.00

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	129815	Date Analyzed:	2016-04-29
Prep Batch:	109974	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>6.92</b>	s.u.	1	2.00

**Sample: 418341 - BW-4 Brine Water-B**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	129873	Date Analyzed:	2016-04-29
Prep Batch:	109973	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>240000</b>	mg/L	2000	2.50

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>79.4</b>	mg/L	10	2.50

**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	pH	Analytical Method:	SM 4500-H+
QC Batch:	129815	Date Analyzed:	2016-04-29
Prep Batch:	109974	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.85</b>	s.u.	1	2.00

**Sample: 418342 - BW-22 Fresh Water-T**

Laboratory:	Lubbock		
Analysis:	TDS	Analytical Method:	SM 2540C
QC Batch:	129873	Date Analyzed:	2016-04-29
Prep Batch:	109973	Sample Preparation:	2016-04-29
		Prep Method:	N/A
		Analyzed By:	LQ
		Prepared By:	LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>670</b>	mg/L	20	2.50

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory:	Lubbock		
Analysis:	Chloride (IC)	Analytical Method:	E 300.0
QC Batch:	129998	Date Analyzed:	2016-05-06
Prep Batch:	110129	Sample Preparation:	2016-05-06
		Prep Method:	N/A
		Analyzed By:	RL
		Prepared By:	RL

*continued ...*

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

*sample 418343 continued ...*

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3,4,6	<b>11500</b>	mg/L	1000	2.50

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 130128      Date Analyzed: 2016-05-17      Analyzed By: RR  
Prep Batch: 110161      Sample Preparation: 2016-05-11      Prepared By: RR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2,3,4,6	<b>5960</b>	mg/L	1	1.00

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 129815      Date Analyzed: 2016-04-29      Analyzed By: LQ  
Prep Batch: 109974      Sample Preparation: 2016-04-29      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		1,2,4,6	<b>7.44</b>	s.u.	1	2.00

**Sample: 418343 - BW-22 Brine Water-T**

Laboratory: Lubbock  
Analysis: TDS      Analytical Method: SM 2540C      Prep Method: N/A  
QC Batch: 129873      Date Analyzed: 2016-04-29      Analyzed By: LQ  
Prep Batch: 109973      Sample Preparation: 2016-04-29      Prepared By: LQ

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		1,2,3,4,6	<b>20700</b>	mg/L	1000	2.50

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

## Method Blanks

### Method Blank (1)      QC Batch: 129873

QC Batch:	129873	Date Analyzed:	2016-04-29	Analyzed By:	LQ
Prep Batch:	109973	QC Preparation:	2016-04-29	Prepared By:	LQ

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		1,2,3,4,6	<25.0	mg/L	2.5

### Method Blank (1)      QC Batch: 129998

QC Batch:	129998	Date Analyzed:	2016-05-06	Analyzed By:	RL
Prep Batch:	110129	QC Preparation:	2016-05-06	Prepared By:	RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	<0.297	mg/L	2.5

### Method Blank (1)      QC Batch: 130128

QC Batch:	130128	Date Analyzed:	2016-05-17	Analyzed By:	RR
Prep Batch:	110161	QC Preparation:	2016-05-11	Prepared By:	PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Sodium		2,3,4,6	<0.0197	mg/L	1

Report Date: May 17, 2016  
BW-4 & BW-22

Work Order: 16042902  
Gandy Brine/Fresh Well

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Buckeye NM & Tatum

## Duplicates

### Duplicates (1) Duplicated Sample: 418343

QC Batch: 129815 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109974 QC Preparation: 2016-04-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	1,2,4,6	7.41	7.44	s.u.	1	0	20

### Duplicates (1) Duplicated Sample: 418110

QC Batch: 129873 Date Analyzed: 2016-04-29 Analyzed By: LQ  
Prep Batch: 109973 QC Preparation: 2016-04-29 Prepared By: LQ

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	1,2,3,4,6	1660	1670	mg/L	20	1	10

Report Date: May 17, 2016  
BW-4 & BW-22

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## Laboratory Control Spikes

### Laboratory Control Spike (LCS-1)

QC Batch: 129873  
Prep Batch: 109973

Date Analyzed: 2016-04-29  
QC Preparation: 2016-04-29

Analyzed By: LQ  
Prepared By: LQ

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		1,2,3,4,6	922	mg/L	10	1000	<25.0	92	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		1,2,3,4,6	983	mg/L	10	1000	<25.0	98	90 - 110	6	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 129998  
Prep Batch: 110129

Date Analyzed: 2016-05-06  
QC Preparation: 2016-05-06

Analyzed By: RL  
Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	26.8	mg/L	1	25.0	<0.297	107	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	25.3	mg/L	1	25.0	<0.297	101	90 - 110	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Laboratory Control Spike (LCS-1)

QC Batch: 130128  
Prep Batch: 110161

Date Analyzed: 2016-05-17  
QC Preparation: 2016-05-11

Analyzed By: RR  
Prepared By: PM

Report Date: May 17, 2016  
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Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	53.4	mg/L	1	52.5	<0.0197	102	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	54.7	mg/L	1	52.5	<0.0197	104	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.



Report Date: May 17, 2016  
BW-4 & BW-22

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## Matrix Spikes

### Matrix Spike (MS-1) Spiked Sample: 418342

QC Batch: 129998  
Prep Batch: 110129

Date Analyzed: 2016-05-06  
QC Preparation: 2016-05-06

Analyzed By: RL  
Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	334	mg/L	10	250	79.4	102	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1,2,3,4,6	333	mg/L	10	250	79.4	101	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

### Matrix Spike (MS-1) Spiked Sample: 418341

QC Batch: 130128  
Prep Batch: 110161

Date Analyzed: 2016-05-17  
QC Preparation: 2016-05-11

Analyzed By: RR  
Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2,3,4,6	91500	mg/L	1	525	91000	95	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Sodium		2,3,4,6	91500	mg/L	1	525	91000	95	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

## Calibration Standards

### Standard (CCV-1)

QC Batch: 129815

Date Analyzed: 2016-04-29

Analyzed By: LQ

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		1,2,4,6	s.u.	7.00	7.02	100	98.6 - 101.4	2016-04-29

### Standard (CCV-1)

QC Batch: 129998

Date Analyzed: 2016-05-06

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.4	102	90 - 110	2016-05-06

### Standard (CCV-2)

QC Batch: 129998

Date Analyzed: 2016-05-06

Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	25.5	102	90 - 110	2016-05-06

### Standard (ICV-1)

QC Batch: 130128

Date Analyzed: 2016-05-17

Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	25.1	96	90 - 110	2016-05-17

Report Date: May 17, 2016  
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**Standard (CCV-1)**

QC Batch: 130128

Date Analyzed: 2016-05-17

Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Sodium		2,3,4,6	mg/L	26.0	27.0	104	90 - 110	2016-05-17

# Appendix

## Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

## Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	L-A-B	L2418	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-16-12	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2015-066	Lubbock

## Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less than ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.

Report Date: May 17, 2016  
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F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

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## Attachments

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: May 17, 2016

Work Order: 16042902



Project Location: Buckeye NM & Tatum  
Project Name: Gandy Brine/Fresh Well  
Project Number: BW-4 & BW-22

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
418340	BW-4 Fresh Water-B	water	2016-04-28	13:10	2016-04-28
418341	BW-4 Brine Water-B	water	2016-04-28	13:20	2016-04-28
418342	BW-22 Fresh Water-T	water	2016-04-28	12:30	2016-04-28
418343	BW-22 Brine Water-T	water	2016-04-28	12:20	2016-04-28

### Sample: 418340 - BW-4 Fresh Water-B

Param	Flag	Result	Units	RL
Chloride		<b>250</b>	mg/L	2.5
pH		<b>7.76</b>	s.u.	2
Total Dissolved Solids		<b>678</b>	mg/L	2.5

### Sample: 418341 - BW-4 Brine Water-B

Param	Flag	Result	Units	RL
Chloride		<b>149000</b>	mg/L	2.5
Dissolved Sodium		<b>91000</b>	mg/L	1
pH		<b>6.92</b>	s.u.	2
Total Dissolved Solids		<b>240000</b>	mg/L	2.5

### Sample: 418342 - BW-22 Fresh Water-T

*continued ...*

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*sample 418342 continued ...*

Param	Flag	Result	Units	RL
Param	Flag	Result	Units	RL
Chloride		<b>79.4</b>	mg/L	2.5
pH		<b>7.85</b>	s.u.	2
Total Dissolved Solids		<b>670</b>	mg/L	2.5

**Sample: 418343 - BW-22 Brine Water-T**

Param	Flag	Result	Units	RL
Chloride		<b>11500</b>	mg/L	2.5
Dissolved Sodium		<b>5960</b>	mg/L	1
pH		<b>7.44</b>	s.u.	2
Total Dissolved Solids		<b>20700</b>	mg/L	2.5





Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

August 17, 2016

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: Brine Wells

OrderNo.: 1608238

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 8/2/2016 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608238

Date Reported: 8/17/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** Brine Wells

**Collection Date:** 7/30/2016 2:30:00 PM

**Lab ID:** 1608238-001

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9968		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	240	10		mg/L	20	8/4/2016 9:39:15 PM	A36247
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	676	20.0	*	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.81	1.68	H	pH units	1	8/4/2016 5:40:31 PM	R36251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 1 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608238

Date Reported: 8/17/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** Brine Wells

**Collection Date:** 7/30/2016 2:40:00 PM

**Lab ID:** 1608238-002

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.208		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	190000	5000	*	mg/L	1E	8/5/2016 11:38:44 PM	R36295
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	353000	2000	*D	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.83	1.68	H	pH units	1	8/4/2016 5:44:48 PM	R36251
<b>EPA METHOD 200.7: DISSOLVED METALS</b>							Analyst: <b>MED</b>
Sodium	120000	5000		mg/L	5E	8/6/2016 1:34:14 PM	A36279

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608238

Date Reported: 8/17/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** Brine Wells

**Collection Date:** 7/30/2016 3:30:00 PM

**Lab ID:** 1608238-003

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9979		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	65	10		mg/L	20	8/4/2016 10:28:53 PM	A36247
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	657	20.0	*	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.98	1.68	H	pH units	1	8/4/2016 5:49:03 PM	R36251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1608238**

Date Reported: **8/17/2016**

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** Brine Wells

**Collection Date:** 7/30/2016 3:40:00 PM

**Lab ID:** 1608238-004

**Matrix:** AQUEOUS

**Received Date:** 8/2/2016 10:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.025		0		1	8/8/2016 2:53:00 PM	R36304
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	19000	500	*	mg/L	1E	8/8/2016 8:52:15 PM	R36324
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	39200	2000	*D	mg/L	1	8/9/2016 8:31:00 AM	26813
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	6.92	1.68	H	pH units	1	8/4/2016 5:53:12 PM	R36251
<b>EPA METHOD 200.7: DISSOLVED METALS</b>							Analyst: <b>MED</b>
Sodium	11000	500		mg/L	500	8/6/2016 1:32:30 PM	A36279

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 4 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB-A		SampType: MBLK		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	PBW		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123618		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LCS-A		SampType: LCS		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	LCSW		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123619		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	49	1.0	50.00	0	98.8	85	115			

Sample ID	LLLCS-A		SampType:	LCSLL		TestCode:	EPA Method 200.7: Dissolved Metals				
Client ID:	BatchQC		Batch ID:	A36279		RunNo:	36279				
Prep Date:			Analysis Date:	8/6/2016		SeqNo:	1123620		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	ND	1.0	0.5000	0	110	50	150				

Sample ID	1608238-002BMS		SampType: MS		TestCode: EPA Method 200.7: Dissolved Metals					
Client ID:	Buckeye-Brine		Batch ID: A36279		RunNo: 36279					
Prep Date:			Analysis Date: 8/6/2016		SeqNo: 1123666		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	360000	5000	250000	116100	98.2	70	130			

Sample ID	1608238-002BMSD		SampType:	MSD		TestCode:	EPA Method 200.7: Dissolved Metals				
Client ID:	Buckeye-Brine		Batch ID:	A36279		RunNo:	36279				
Prep Date:			Analysis Date:	8/6/2016		SeqNo:	1123667	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Sodium	370000	5000	250000	116100	100	70	130	1.37	20		

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	A36247	RunNo:	36247					
Prep Date:		Analysis Date:	8/4/2016	SeqNo:	1122810	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	A36247	RunNo:	36247					
Prep Date:		Analysis Date:	8/4/2016	SeqNo:	1122811	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.4	90	110			

Sample ID	MB	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36295	RunNo:	36295					
Prep Date:		Analysis Date:	8/5/2016	SeqNo:	1124287	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36295	RunNo:	36295					
Prep Date:		Analysis Date:	8/5/2016	SeqNo:	1124288	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	97.7	90	110			

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36324	RunNo:	36324					
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1125092	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36324	RunNo:	36324					
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1125093	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	94.9	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	1608238-003ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	Tatum-Fresh	Batch ID:	R36304	RunNo:	36304					
Prep Date:		Analysis Date:	8/8/2016	SeqNo:	1124614	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9963	0						0.160	20	

### Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608238

17-Aug-16

Client: Wasserhund Inc

Project: Brine Wells

Sample ID	MB-26813		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	26813		RunNo:	36311				
Prep Date:	8/5/2016		Analysis Date:	8/9/2016		SeqNo:	1124795		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	ND	20.0									

Sample ID	LCS-26813		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 26813		RunNo: 36311					
Prep Date:	8/5/2016		Analysis Date: 8/9/2016		SeqNo: 1124796		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	997	20.0	1000	0	99.7	80	120			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1608238

RcptNo: 1

Received by/date:

AS

08/02/16

Logged By: Ashley Gallegos

8/2/2016 10:00:00 AM

AS

Completed By: Ashley Gallegos

8/4/2016 11:33:03 AM

AS

Reviewed By:

08/04/16

## Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

## Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? AS Yes Yes ☒ No ☒
9. Was preservative added to bottles? Yes ☒ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

 # of preserved  
bottles checked  
for pH:

2

(&lt;2 or &gt;12 unless noted)

Adjusted?

NO Yes

Checked by:

AS

## Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:

Date:

By Whom:

 Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

17. Additional remarks:

 For metals analysis: added 0.4 mL  $\text{HNO}_3$  to -002B, -004B  
for acceptable pH.

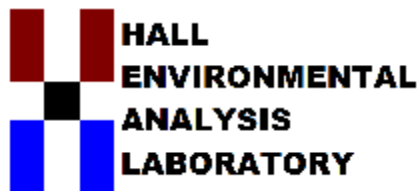
18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.2	Good	Yes			

8/4@1245

AS





Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

November 29, 2016

Wayne Price  
Wasserhund Inc  
PO Box 2140  
Lovington, NM 88260  
TEL: (505) 715-2809  
FAX

RE: BW-04 Buckeye BW-22 Tatum

OrderNo.: 1610E77

Dear Wayne Price:

Hall Environmental Analysis Laboratory received 4 sample(s) on 10/28/2016 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Fresh

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 2:50:00 PM

**Lab ID:** 1610E77-001

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9933		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	200	50		mg/L	100	10/31/2016 6:58:15 PM	R38358
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	662	20.0	*	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.11	1.68	H	pH units	1	11/2/2016 5:28:48 PM	R38415

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Buckeye-Brine

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 3:00:00 PM

**Lab ID:** 1610E77-002

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.171	0			1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	120000	10000	*	mg/L	2E	11/3/2016 3:54:43 AM	A38417
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	276000	2000	*D	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.05	1.68	H	pH units	1	11/2/2016 5:32:50 PM	R38415
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>MED</b>
Sodium	97000	2000		mg/L	2E	11/8/2016 1:43:33 PM	B38512

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Fresh

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 4:00:00 PM

**Lab ID:** 1610E77-003

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	0.9934		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	150	5.0		mg/L	10	10/31/2016 8:00:19 PM	R38358
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	784	20.0	*	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	8.06	1.68	H	pH units	1	11/2/2016 5:37:16 PM	R38415

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 3 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1610E77

Date Reported: 11/29/2016

**CLIENT:** Wasserhund Inc

**Client Sample ID:** Tatum-Brine

**Project:** BW-04 Buckeye BW-22 Tatum

**Collection Date:** 10/27/2016 4:10:00 PM

**Lab ID:** 1610E77-004

**Matrix:** AQUEOUS

**Received Date:** 10/28/2016 3:04:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SPECIFIC GRAVITY</b>							Analyst: <b>LGT</b>
Specific Gravity	1.026		0		1	11/2/2016 2:24:00 PM	R38398
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>LGT</b>
Chloride	17000	1000	*	mg/L	2E	11/3/2016 4:07:08 AM	A38417
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>							Analyst: <b>KS</b>
Total Dissolved Solids	39300	2000	*D	mg/L	1	11/7/2016 10:42:00 AM	28453
<b>SM4500-H+B: PH</b>							Analyst: <b>JRR</b>
pH	7.45	1.68	H	pH units	1	11/2/2016 5:41:30 PM	R38415
<b>EPA METHOD 200.7: METALS</b>							Analyst: <b>MED</b>
Sodium	12000	200		mg/L	200	11/8/2016 1:45:23 PM	B38512

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 4 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	MB-B		SampType: MBLK		TestCode: EPA Method 200.7: Metals					
Client ID:	PBW		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203671		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID	LCS-B		SampType: LCS		TestCode: EPA Method 200.7: Metals					
Client ID:	LCSW		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203675		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	50	1.0	50.00	0	101	85	115			

Sample ID	LLLCS-B		SampType: LCSLL		TestCode: EPA Method 200.7: Metals					
Client ID:	BatchQC		Batch ID: B38512		RunNo: 38512					
Prep Date:			Analysis Date: 11/8/2016		SeqNo: 1203676		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0	0.5000	0	95.0	50	150			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	MB	SampType: MBLK			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: R38358			RunNo: 38358						
Prep Date:		Analysis Date: 10/31/2016			SeqNo: 1197702		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID:	R38358	RunNo:	38358						
Prep Date:		Analysis Date:	10/31/2016	SeqNo:	1197703	Units:	mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		5.1	0.50	5.000	0	101	90	110			

Sample ID	MB	SampType:	MBLK		TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	A38417		RunNo:	38417					
Prep Date:		Analysis Date:	11/3/2016		SeqNo:	1199971	Units:	mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID:	A38417	RunNo:	38417						
Prep Date:		Analysis Date:	11/3/2016	SeqNo:	1199972	Units:	mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		4.6	0.50	5.000	0	91.1	90	110			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	1610E77-001ADUP	SampType:	DUP	TestCode:	Specific Gravity						
Client ID:	Buckeye-Fresh	Batch ID:	R38398	RunNo:	38398						
Prep Date:		Analysis Date:	11/2/2016	SeqNo:	1199193	Units:					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Specific Gravity	0.9922	0						0.111	20		

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1610E77

29-Nov-16

Client: Wasserhund Inc

Project: BW-04 Buckeye BW-22 Tatum

Sample ID	MB-28453		SampType: MBLK		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	PBW		Batch ID: 28453		RunNo: 38482					
Prep Date:	11/3/2016		Analysis Date: 11/7/2016		SeqNo: 1201925		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	LCS-28453		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 28453		RunNo: 38482					
Prep Date:	11/3/2016		Analysis Date: 11/7/2016		SeqNo: 1201926		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1020	20.0	1000	0	102	80	120			

### Qualifiers:

\* Value exceeds Maximum Contaminant Level.  
D Sample Diluted Due to Matrix  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1610E77

RcptNo: 1

Received by/date:

AG

10/28/16

Logged By: Ashley Gallegos

10/28/2016 3:04:00 PM

AG

Completed By: Ashley Gallegos

10/31/2016 11:48:33 AM

AG

Reviewed By:

MJ

10/31/16

## Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Client

## Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved  
bottles checked  
for pH:

2

(2 or >12 unless noted)

Adjusted?

yes

Checked by:

AS

## Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:

Date

By Whom:

Via:

☐ eMail

☐ Phone

☐ Fax

☐ In Person

Regarding:

Client Instructions:

17. Additional remarks: For metals analysis: added 1mL HNO3 to -002B, -004B
18. Cooler Information For acceptable pH.

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.3	Good	Not Present			

10/31 @ 1330  
AS



## Appendix “D”

- C-103
- 2016 MIT Chart
- Recorder Calibration
- Brine Well Maximum Test Pressure Calculator

Submit 1 Copy To Appropriate District Office  
District I - (575) 393-6161  
1625 N. French Dr., Hobbs, NM 88240  
District II - (575) 748-1283  
811 S. First St., Artesia, NM 88210  
District III - (505) 334-6178  
1000 Rio Brazos Rd., Aztec, NM 87410  
District IV - (505) 476-3460  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-103  
Revised July 18, 2013

WELL API NO. 30-025-26883
5. Indicate Type of Lease STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>
6. State Oil & Gas Lease No. 25-26883
7. Lease Name or Unit Agreement Name Eidson Brine Station, BW-004
8. Well Number 1
9. OGRID Number 130851
10. Pool name or Wildcat
11. Elevation (Show whether DR, RKB, RT, GR, etc.)

SUNDRY NOTICES AND REPORTS ON WELLS  
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well: Oil Well ☐ Gas Well ☐ Other Brine Well

2. Name of Operator  
Wasserhund, Inc.

3. Address of Operator  
P.O. Box 2140, Lovington, NM 88260

4. Well Location  
Unit Letter M : 567.4 feet from the South line and 161.7 feet from the West line  
Section 31 Township 16S Range 35E NMPM County Lea

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐  
CLOSED-LOOP SYSTEM ☐  
OTHER: Integrity Test ☐

SUBSEQUENT REPORT OF:

REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☐  
OTHER: ☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

See Attached Chart

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

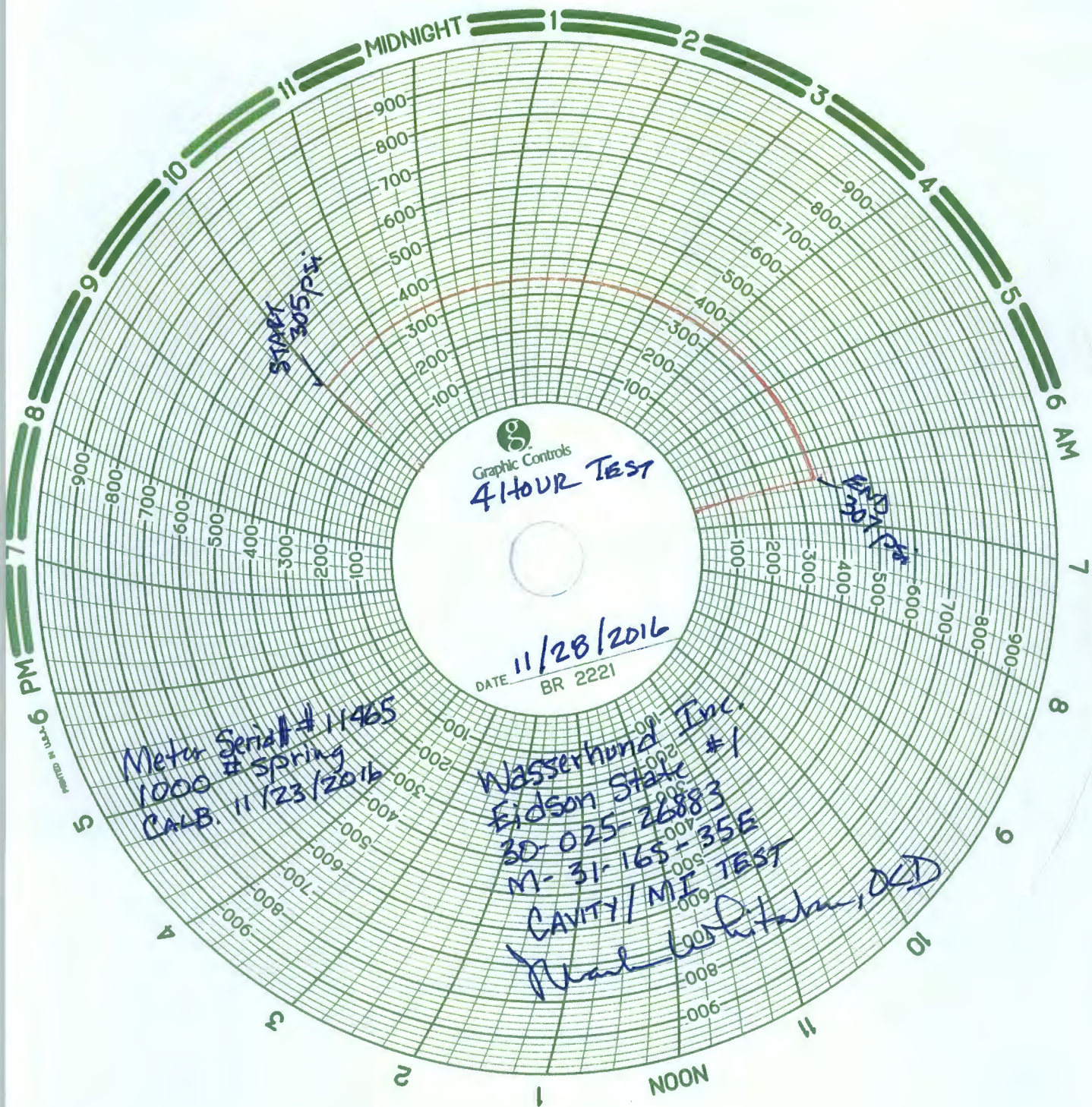
SIGNATURE Jon Gandy TITLE Secretary/Treasurer DATE 11/29/16

Type or print name Jon Gandy E-mail address: jonrgandy@aol.com PHONE: 575-396-0522

For State Use Only

APPROVED BY: Carl J. Chavez TITLE Secretary/Treasurer DATE 12/6/16  
Conditions of Approval (if any):





Graphic Controls  
4 HOUR TEST

DATE 11/28/2016  
BR 2221

Meter Serial # 11465  
1000 # Spring  
CALB. 11/23/2016

Wasserkund Inc.  
Edson State #1  
30-025-26883  
M-31-165-35E  
CAVITY/MT TEST

Paul W. [Signature] OED

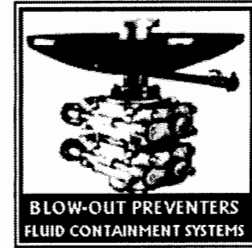
## ***D & L Meters & Instrument Service, Inc.***

Lovington, NM 88260

P.O. Box 1621

Office: (575) 396-3715

Fax: (575) 396-5812



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**Date:**      **Wednesday, November 23, 2016**

**Invoice #** \_\_\_\_\_

### **Certification of Pressure Recorder Test:**

**Company:** Gandy

**Unit:** Gandy #4

**Model:** 8" PMC

**Pressure Rating:** 1,000#

**Serial #:** 11218

***This Pressure Recorder was tested at midrange for accuracy and verified within +5% and -5% for 1,000# pressure element.***

A handwritten signature in black ink, appearing to read "Issac Luna", is written over a horizontal line. The signature is stylized with large loops and a long horizontal stroke at the end.

Issac Luna, Technician

### Brine Well Maximum Test Pressure Calculator

Provides an approximate estimate for Maximum Test pressures allowed to prevent possible fracturing of formation.

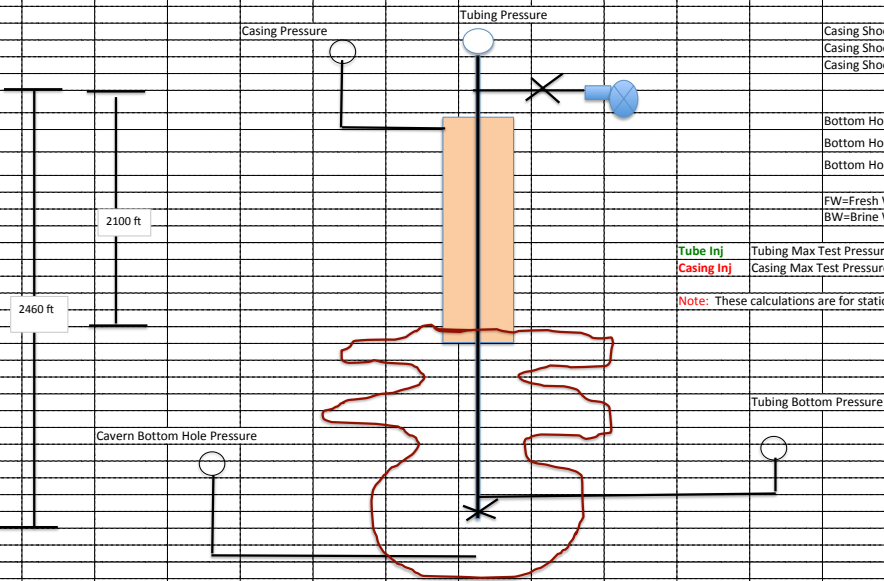
Inputs are for casing shoe depth, bottom hole depth, and frac gradient.

Answers are given when pressure testing using Fresh water or Brine water.

Major assumptions: Frac Gradient of .65 is used, casing is filled with brine or fresh water

**Note: When brine well has been operating in normal flow, then assume that casing is filled with Brine Water.**

BW-04 Wasserhund Buckeye



Input Depth to Casing Shoe 2100 ft  
Input Depth to Bottom Hole 2460 ft  
Input Frac/Gradient 0.65 psi/ft

Inputs are in Green

		Depth ft	Gradient-psi/ft	psig
Casing Shoe	FW	2100	0.433	909
Casing Shoe	BW	2100	0.5	1050
Casing Shoe	Frac	2100	0.65	1365
Bottom Hole	FW	2460	0.433	1065
Bottom Hole	BW	2460	0.5	1230
Bottom Hole	Frac	2460	0.65	1599

FW=Fresh Water  
BW=Brine Water

Answers in Yellow

Tube Inj	Tubing Max Test Pressure	Max Surface Pressure = Depth to Bottom * (Frac Gradient -Water Head Gradient)
Casing Inj	Casing Max Test Pressure	Max Surface Pressure = Depth to Casing Shoe * (Frac Gradient -Water Head Gradient)

	Using BW	Using FW
Tube Inj	369 psig	534 psig
Casing Inj	315 psig	456 psig

**Note:** These calculations are for static test only and does not take into account dynamic pressure drops in Tubing or Casing.

**Do Not Exceed Tubing or Casing Surface Pressures while Pumping or Testing**

## Appendix “E”

- AOR Well Status List
- AOR Plot Plan

## 2016 BW-04 AOR Review- Well Status List

up-dated Feb 26, 2017

	API#	Well Name	UL	Sector	Ts	Rg	Footage	Within 1/4 mi AOR * within 660 ft or Critical AOR	Casing Program	Cased/Cemented	Corrective Action
									Checked	across salt section	Required
0	<u>30-025-26883</u>	<u>Wasserhund Eidson #1</u>	<u>M</u>	<u>31</u>	<u>16s</u>	<u>35e</u>	<u>567 FSL &amp; 162 FWL</u>	NA	NA	NA	NA
1	30-025-25146	LimeRock-N Vacumm ABO #1	P	36	16s	34e	460 FSL & 660 FEL	yes*	yes	yes	NO-P&A
1	30-025-35678	LimeRock St.VII #7	A	1	17s	34e	660 FNL & 660 FEL	yes*	yes	no	Re-Completion OCD Approved No Action Required
1	30-025-31621	BTA Oil Producers	L	31	16s	35e	1980 FSL & 660 FWL	Yes*	yes	yes	

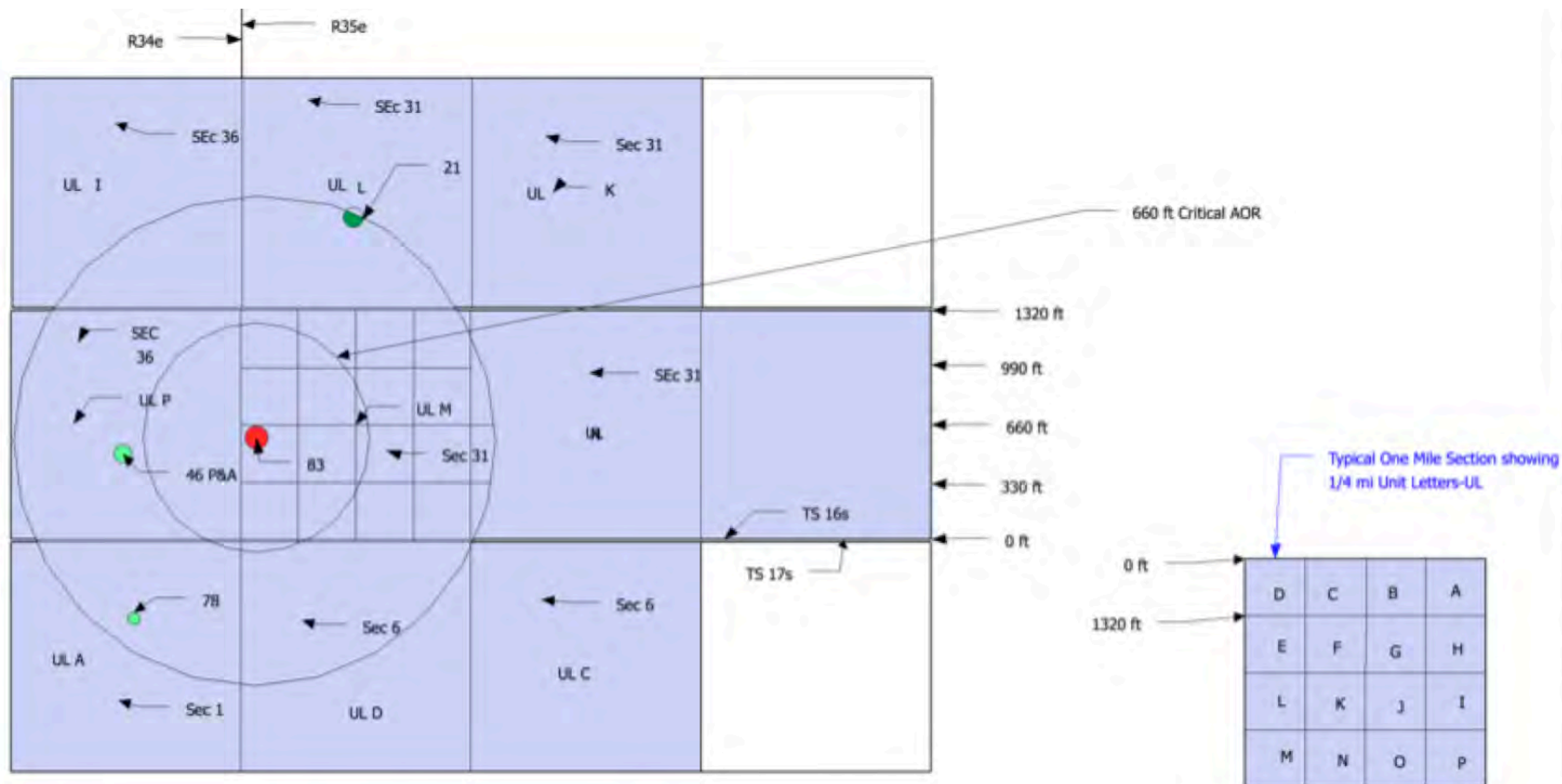
2 2

3 Total # of wells in adjacent quarter-sections  
 3 Total # of wells in 1/4 mile AOR  
 3 Total # of wells that are within 660 ft or have become within the Critical AOR of the outside radius of the brine well and casing program will be checked Annually.

### Notes:

\* Means the well is within 660 ft or Critical AOR (1500-1600 ft) of the outside radius of the brine well and casing program will be checked annually.





Brine Well Area of Review (AOR) UL Plot Plan

Well API#: 30-025-26883

Operator Name: Wasserhund INC

Permit # BW-04

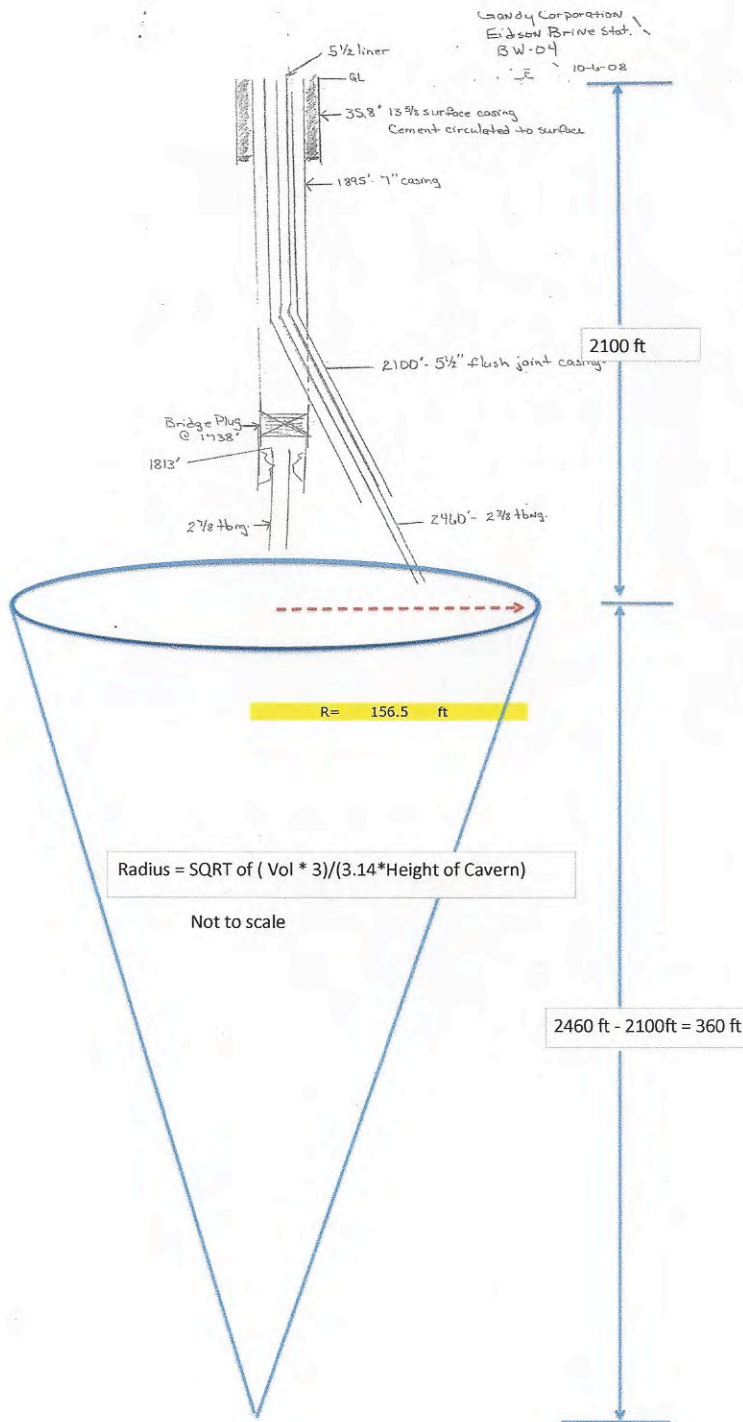
AOR Year: 2016

Location: UL M-Sec 31-Ts16s-R35e

Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list.

## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2016 Radius and D/H calculations.



#### 2016 Calculations

$$r = \sqrt[3]{\frac{V}{\pi \cdot D}}$$

V	Volume	=	9,227,911 bbls
D	Depth	=	360 ft
H	Height	=	2100 ft
Kf	ft <sup>3</sup> salt/bbl	156.5	1 est

r	=	156.5 ft
Diameter	=	312.99 ft

$$D/H = 0.149$$



## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.

## Appendix “G”

BW-04 Wasserhund Inc. Closure Cost Estimate.

2016 Annual Report  
BW-04 Wasserhund Inc. Closure Cost

		CPI	
Pulling Unit Rig	\$25,000	1.03	\$25,750
Halliburton Cement Job	\$8,000.00	1.03	\$8,240
Post Subsidence Monitoring 5 years	\$15,000.00	1.03	\$15,450
Tank Removal, Pad Clean-Up	\$30,000.00	1.03	\$30,900
Consulting fees	\$10,000.00	1.03	\$10,300
Total Estimate	\$88,000	1.03	\$90,640