

**BW - \_\_\_\_\_022\_\_\_\_\_**

# **ANNUAL REPORTS**



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**ANNUAL CLASS III WELL REPORT FOR 2017**

**Wasserhund Inc.**

**Tatum Brine Station**

**OCD Permit BW-22**

*Expiration Date: Nov 08, 2018*

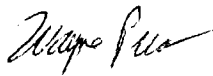
**API No. 30-025-28162 Watson #1**

**Unit Letter M-Section 20-Ts 12s – R 35e**

**May 01, 2018**

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

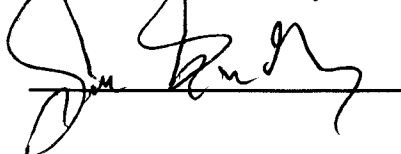
Wayne Price-LLC



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 Expiration Date November 08, 2018.

During the 2017 year, there was no major or remedial work performed on the brine well. Due to brine quality issues experienced during the past years, Wasserhund Inc. is not currently producing 10 lb Brine.

Even though the oilfield is slow in this area, there still is some demand for cut-brine, and Wassehund Inc. continues to operate the well on a limited basis.

The brine well was drilled in 1983 and has been in operation for approximately 34 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado “Salt Formation” at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small compared to similar wells of age. **Bullet Point 10** (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.

As will be discussed in **Bullet Point 5** (Chemical Analysis) ever since the last open-hole formation-test, the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.

General housekeeping was routinely performed and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions unless unusual operating conditions warrant such.



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 **Bullet Point 10** below.

Depending upon OCD requirements and local economics, Wasserhund Inc. will have to evaluate whether future operations of this well is warranted as a concentrated-brine producing well.

### **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”

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 2017 fresh water injected was 3425 barrels and brine production volume was 3360 barrels.

The lifetime fresh water volumes are reported at 2,764,646 barrels and the life time brine production volume is 2,724,847 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: Maximum and Average Injection Pressure:

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 260 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 325 psig on the casing when operating or testing the formation. The tubing pressure should not exceed 428 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 325 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 chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected and analyzed by Hall Environmental in Albuquerque NM for the 2017 year. The sampling process and laboratory used common approved EPA methods to collect, analyze and report.

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 north 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, and often from the wellhead. This sample point is representative of the brine water at the station.

As reported in the production volumes, the Tatum Brine Station saw very little action and the specific gravity (Density) was reported to fall between .9964 to 1.035. As previously reported, from time to time, an off red color of the produced brine has been noted, possibly caused by injected fresh water interacting with the upper Salado/Rustler formation where the salt has been dissolved.



Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn't recover, then some remedial action may be taken, including the possibility of running a tubing plug with wire-line to determine integrity, reversing the flow, deepening the well or plugging the well

The brine water density continues to be well below the normal 10 lb brine and the average density (SG) for the year was 1.006 or 8.38 #/gal.

While very low, this water still has good value in today's market sold as cut-brine.

#### **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 December 02, 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 December 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, (i.e. conventional-flow).

Wasserhund Inc. has been successful in changing the flow pattern to conventional flow, but due to some down-hole geological-physical characteristics, is only able to make a cut-brine.



### **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 have spill containers under the hose connections, which are designed to catch de-minimums 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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files and actual on-site field verification, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

Currently there re no wells located within the AOR.

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. 123.22 ft ( $r = 61.6$  ft) up-dated for 2017, a 10:1 safety factor is applied that equates to about 616 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 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.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

## **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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.72 million barrels



of brine produced as of December 2017. The maximum diameter was calculated to be approximately 123.22 feet with a corresponding D/H ratio of .057 updated for the 2017 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in **Appendix "F"** is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .057 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 11.5 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, except in a few cases. With BW-22 being one of them.

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

The best method still appears to be the “Worst Case” Cone Calculation method. However, the last geophysical tool used (i.e. Sonar) actually provided a good picture of the top of this cavern.

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 geophysical method is utilized such as a well log. OCD provided examples (see Appendix F).

Since the BW-22 well never had any logs run, Wasserhund Inc. has chosen to utilize the last sonar results as a geophysical method to characterize the well. In addition a mass balance has been calculated and the results are included in Appendix ‘F’.

The mass balance compares the calculated salt removed versus the measured salt removed. The comparison was within -6% (minus reflecting that the calculated value was actually higher than the measured salt removed), 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 Inc. 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 cone 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-22 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-22 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-22 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-22 facility 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 can supply a hard copy upon request.



## Appendix “A”

- Discharge Plan BW-22 Expires November 08, 2018



BW-22

Wasserhund/Tatum  
Watson #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-22 for the Watson #1 Brine Well in Unit M of Section 20, Township 12 South, Range 36 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-22 (API# 30-025-28162) 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



**DISCHARGE PERMIT BW-22**

**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-22 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Watson #1 - API No. 30-025-28162) located 593 feet FSL and 639 feet FWL (SW/4 SW/4, Unit Letter M) in Section 20, Township 12 South, Range 36 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located within Tatum, New Mexico to the north of US 380.

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 30 feet below ground surface and has a total dissolved solids concentration of approximately 700 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                                    |
|                    | 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#: 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:

\* 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#: 1704039

17-Apr-17

Client: Wasserhund Inc

Project: Buckeye Tatum 1st qtr 2017

|            |     |                         |      |           |                                    |      |             |           |      |          |      |
|------------|-----|-------------------------|------|-----------|------------------------------------|------|-------------|-----------|------|----------|------|
| Sample ID  | MB  | SampType: mblk          |      |           | TestCode: EPA Method 300.0: Anions |      |             |           |      |          |      |
| Client ID: | PBW | Batch ID: R41868        |      |           | RunNo: 41868                       |      |             |           |      |          |      |
| Prep Date: |     | Analysis Date: 4/4/2017 |      |           | SeqNo: 1315703                     |      | 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:      | R41868   | RunNo:    | 41868                    |        |          |           |      |          |      |
| Prep Date: |      | Analysis Date: | 4/4/2017 | SeqNo:    | 1315704                  | 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                        | 95.4   | 90       | 110       |      |          |      |

|            |     |                |          |           |             |                          |          |           |      |          |      |
|------------|-----|----------------|----------|-----------|-------------|--------------------------|----------|-----------|------|----------|------|
| Sample ID  | MB  | SampType:      | mblk     |           | TestCode:   | EPA Method 300.0: Anions |          |           |      |          |      |
| Client ID: | PBW | Batch ID:      | A41955   |           | RunNo:      | 41955                    |          |           |      |          |      |
| Prep Date: |     | Analysis Date: | 4/6/2017 |           | SeqNo:      | 1317699                  | 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:      | A41955   | RunNo:    | 41955                    |        |          |           |      |          |      |
| Prep Date: |      | Analysis Date: | 4/6/2017 | SeqNo:    | 1317700                  | 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                        | 98.9   | 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#: 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:

\* 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: **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  
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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              |

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 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           |
|                    | 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 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           |
|                    | 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 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.

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     | 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.              | 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 |



## Sample Log-In Check List

Client Name: WASSERHUND INC

Work Order Number: 1707799

RcptNo: 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  
( $\leq 2$  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 1450 Re

### 18. Cooler Information

| Cooler No | Temp °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 PM           | 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

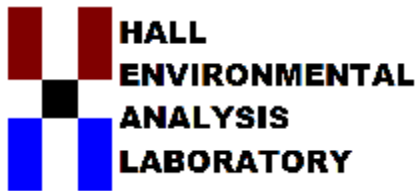
[illegible]

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*

*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: *MW*

### 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  $\text{HNO}_3$  to 002B and 004B*  
*held for 24 hrs prior to analysis*

*@ 1520 on 2/19/18*

### 17. Cooler Information

| Cooler No | Temp $^{\circ}\text{C}$ | Condition | Seal Intact | Seal No | Seal Date | Signed By |
|-----------|-------------------------|-----------|-------------|---------|-----------|-----------|
| 1         | 3.1                     | Good      | Not Present |         |           |           |



# THE UNIVERSITY OF CHICAGO

|  |   |
|--|---|
| <input checked="" type="checkbox"/> Standard | <input type="checkbox"/> Rush                                       |
| Project Name                                 |   |
| Buckeye-Tatum 4 <sup>th</sup> QTR-2017       |   |
| Project #                                    |   |
| 4 -2017                                      |   |
| Project Manager                              |   |
| Wayne Price-Price LLC                        |   |
| Sampler: Wayne Price. Sr                     |   |
| On Ice:                                      | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Sample Temperature: 3.                       |   |

| Container Type and # | Preservative Type | HEAL No. |
|----------------------|-------------------|----------|
| 11-P                 | ICE               | 1802994  |
| -                    | -                 | -001     |
| -                    | -                 | -002     |
| -                    | -                 | -003     |
| -                    | -                 | -004     |

[illegible]

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

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

## Analysis Request

|   |
|---|
| BTEX + MTBE + TMB's (B021)  |
| BTEX + MTBE + TPH (Gas only)  |
| TPH Method 8015B (Gas/Diesel)   |
| TPH (Method 418.1)  |
| EDB (Method 504.1)  |
| 8310 (PNA or PAH)   |
| RCRA 8 Metals   |
| Anions (F <sup>-</sup> Cl <sup>-</sup> NO <sub>3</sub> <sup>-</sup> PO <sub>4</sub> <sup>3-</sup> SO <sub>4</sub> <sup>2-</sup> ) |
| 8081 Pesticides / 8082 PCB's  |
| 8260B (VOA)   |
| 8270 (Semi-VOA)   |
| 1   |
| TDS, SG, Chlorides, PH  |
| TDS, 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 MIT Approval
- 2016 MIT Chart
- Brine Well Maximum Pressure Test 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. 30-025-28162  |  |
| 5. Indicate Type of Lease<br>STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/>  |  |
| 6. State Oil & Gas Lease No. 25-28162  |  |
| 7. Lease Name or Unit Agreement Name<br>Quality Brine  |  |
| 8. Well Number 1   |  |
| 9. OGRID Number 130851   |  |
| 10. Pool name or Wildcat   |  |
| SUNDRY NOTICES AND REPORTS ON WELLS<br>(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 <input type="checkbox"/> Brine Well   |  |
| 2. Name of Operator<br>Wasserhund, Inc.  |  |
| 3. Address of Operator<br>P.O. Box 2140, Lovington, NM 88260   |  |
| 4. Well Location<br>Unit Letter M : 593 feet from the South line and 639 feet from the West line<br>Section 20 Township 12S Range 36E 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 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"/> | 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: Integritiy 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.

Please see attached Chart

Spud Date:

Rig Release Date:

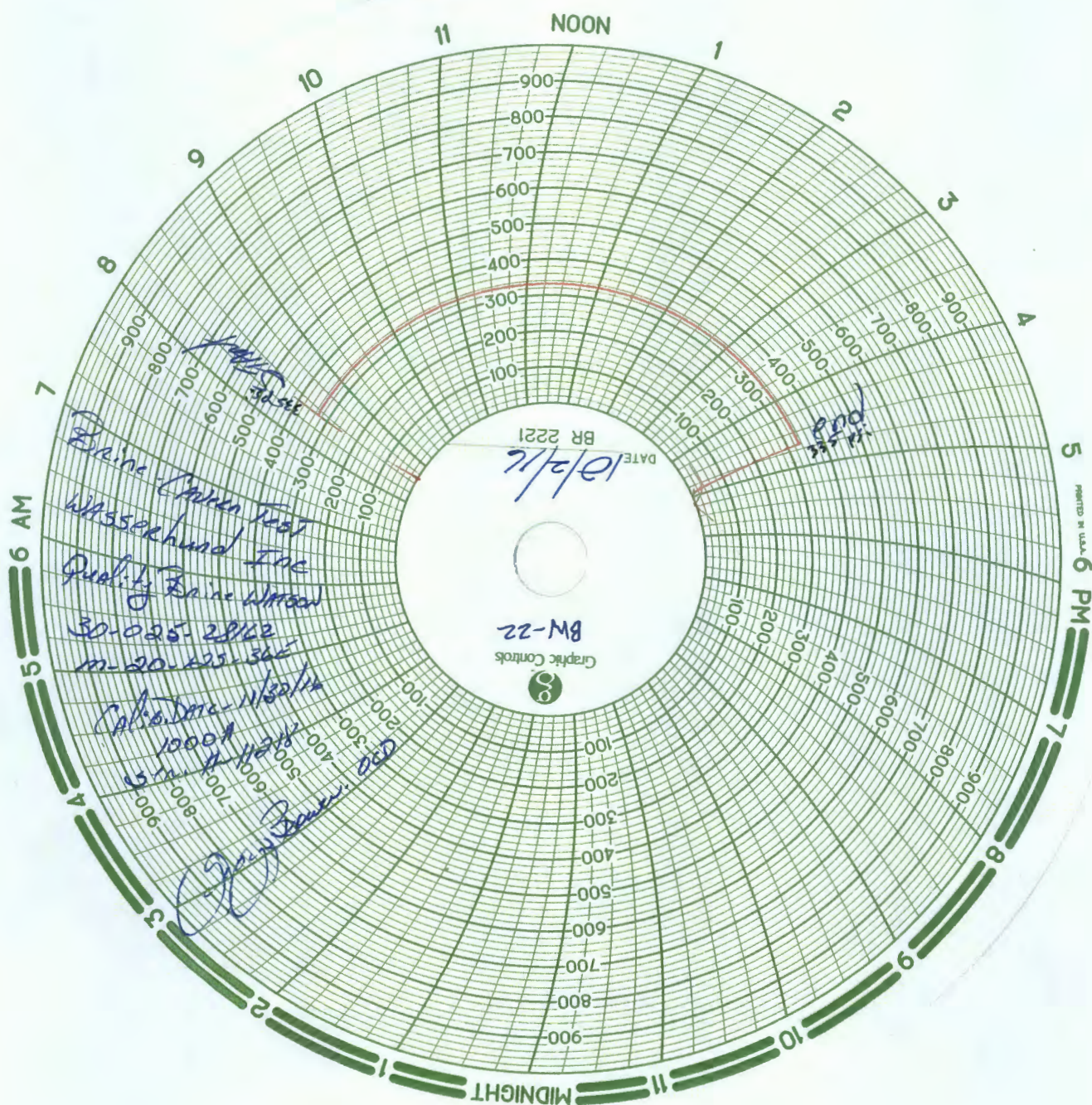
I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Larry Gandy TITLE President DATE 12/05/16

Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522  
**For State Use Only**

APPROVED BY: Carl J. Whiting TITLE Senior Engineer DATE 12/8/16  
Conditions of Approval (if any):







|   |  |  |  |  |
|---|--|--|--|--|
| Provides an approximate estimate for Maximum Test pressures allowed to prevent possible fracking 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                         |  |  |  |  |
| <b>Note: When brine well has been operating in normal flow, then assume that casing is filled with Brine Water.</b> |  |  |  |  |

The diagram illustrates a wellbore with the following components and labels:

- Casing Pressure:** Indicated by a pressure sensor symbol at the top left.
- Tubing Pressure:** Indicated by a pressure sensor symbol at the top center.
- 2165 ft:** A vertical dimension line indicating a depth from the top.
- 2850 ft:** A vertical dimension line indicating a depth from the top.
- Cavern Bottom Hole Pressure:** Indicated by a pressure sensor symbol at the bottom left.
- Wellbore Profile:** A red outline representing the irregular shape of the wellbore.
- Valves:** Two valve symbols (X marks) are shown on the tubing line.
- Pressure Indicators:** Blue circles with 'X' marks are shown on the tubing line.
- Text Labels:**
  - Tube Inj** (green)
  - Casing Inj** (red)
  - Note:** These calcul
  - Tubin** (partially visible)
  - Casin** (partially visible)
  - Tubin** (partially visible)

Inputs are in Green

|          |
|----------|
| Using BW |
|----------|

|     |      |     |      |
|-----|------|-----|------|
| 428 | psig | 618 | psig |
| 325 | psig | 470 | psig |

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



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan



2017 BW-22 AOR Review-- Well Status List  
up-dated April 2, 2018

|   | API#                | Well Name                           | UL       | ectio     | Ts         | Rg         | Footage                      | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR | Casing Progra<br>Checked | Cased/Cemented<br>across salt section | Corrective Action<br>Required |
|---|---------------------|-------------------------------------|----------|-----------|------------|------------|------------------------------|---|--------------------------|---------------------------------------|-------------------------------|
| 1 | <u>30-025-28162</u> | <u>Wasserhund Quality Watson #1</u> | <u>M</u> | <u>20</u> | <u>12s</u> | <u>36e</u> | <u>593 FSL &amp; 639 FWL</u> | NA  | NA                       | Na                                    | NA                            |

0 0

1 Total # of wells in adjacent quarter-sections

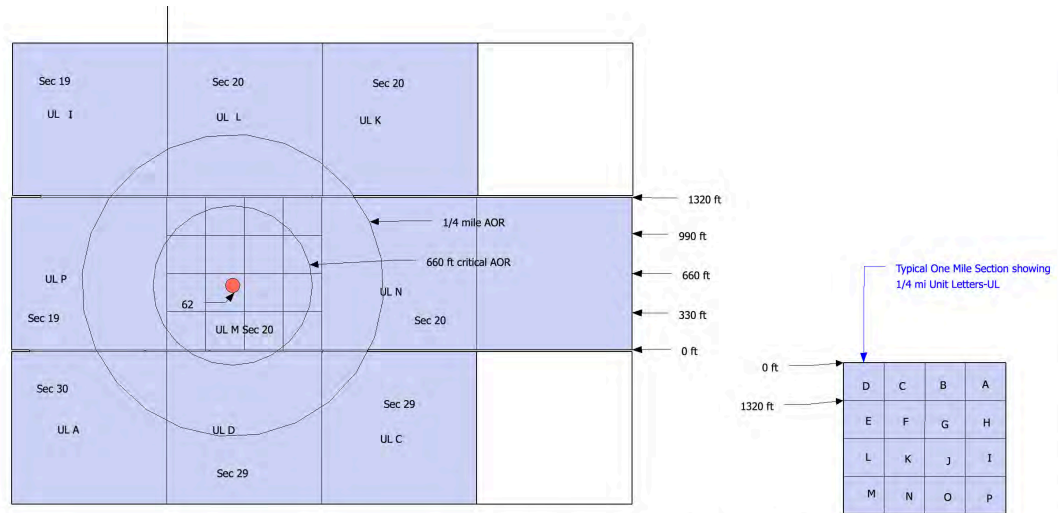
0 Total # of wells in 1/4 mile AOR

0 Total # of wells that within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked and reported annually.

Notes:

\* Means the well is within 660 ft or the 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#: 30-025-28162          | 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-22                   |   |
| AOR Year: 2017                               | Location: UL M-Sec 20-Ts12s-R36e |   |



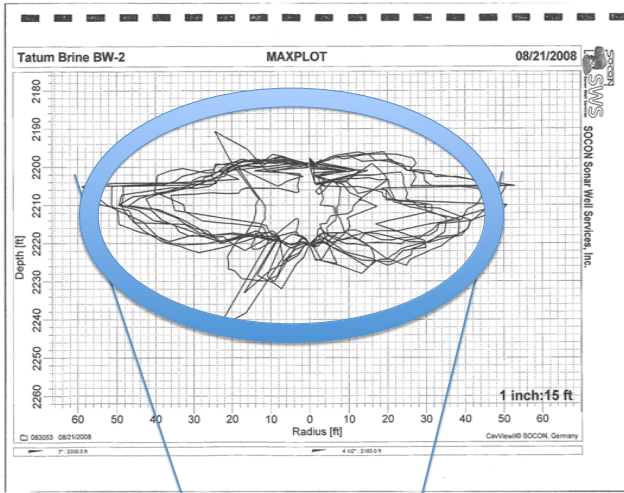
## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2017 Radius and D/H calculations.    **Geophysical (Sonar) for Cavern Top.**

### **Cavern Characterization**

- \* **OCD Email**
- \* **Example of OCD Well Log + Cavern Layout (not used on BW-22)**
- \* **Mass Balance**





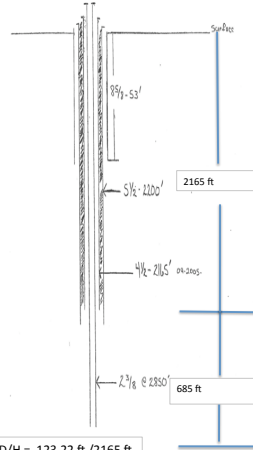
$$R = \text{SQRT of } V \cdot 3 / 3.14 \cdot H$$

Vol = 2.72 million cuft  
Height = 685 ft from casing  
shoe to bottom

Radius = 61.6 ft  
Dia = 123.22 123.220693 ft  
2017 year

H = 685 formulas  
V = 2,721,487 formulas  
H1 = 2165 formulas  
R = 61.6 formulas  
D/H = 0.05691487 formulas  
D = 123.220693 formulas

Wasserkund Inc.  
Quality Brine  
Wetmore Vt.  
# 20-124-304  
10-015-20142



D/H = 123.22 ft / 2165 ft

D/H = .057



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:

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



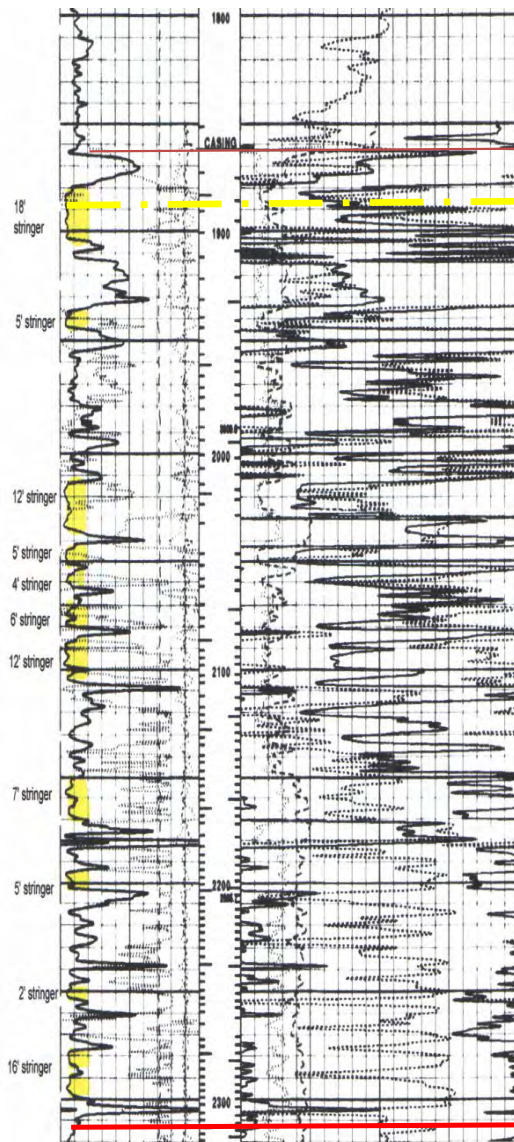
# EXAMPLE SALT CAVERN CHARACTERIZATION

John Doe Well No6

API 30-015-#####

SEC36 T18S R38E

LAT: 32.##### LONG:-103.#####



PPG 9.97 brine

PPG 8.34 fresh

SG 1.1951

2006 to 2017 Total Brine bbl. 3,538,154

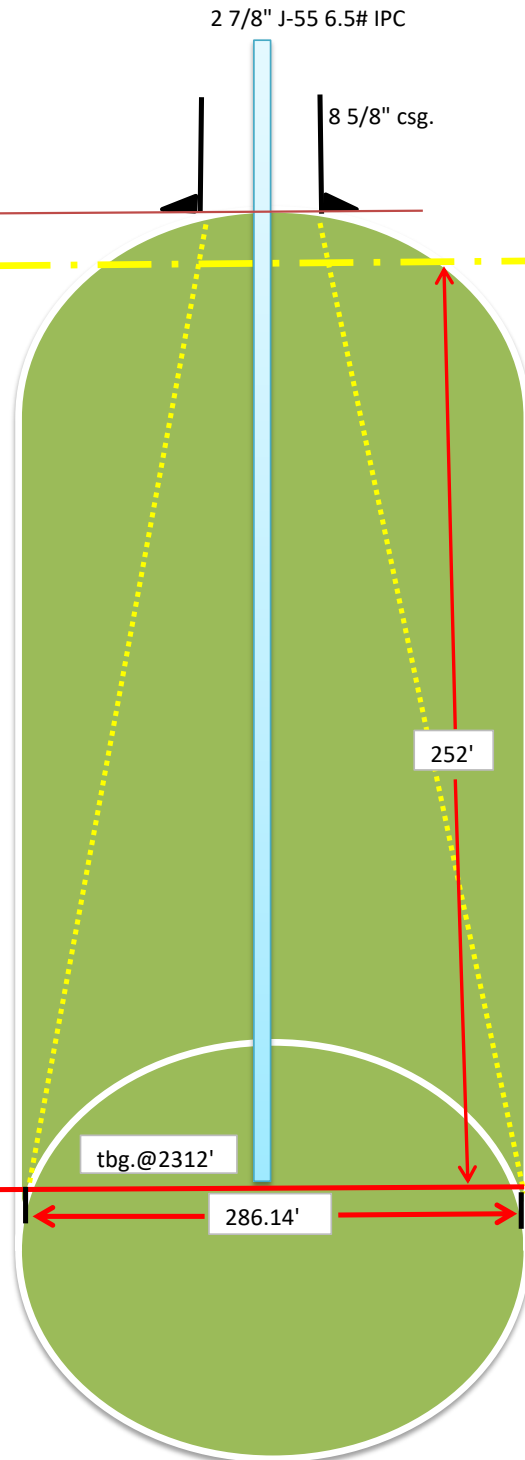
122.136 LBS / BBL = 432,135,977 LBS HALITE

(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'



|   |  |  |                 |  |                                  |
|---|--|--|-----------------|--|----------------------------------|
| BW-22 Mass Balance  |  |  |                 | Independent Inputs                                       |                                  |
| Measured Salt Removed vs Calculated Salt Removed                      |  |  |                 | Formulas   | Dependent Variables              |
| 2017 year End total Production Volume                                 |  |  | 2,724,847 Bbls  | Independent variable                                     |                                  |
| Average Density #/gal produced water measured                         |  |  | 9.7 lbs/gal     | Independent variable                                     | Average over like of well        |
| 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   |  |  | 1.366 Lbs/gal   | Dependent Variable                                       |                                  |
| LBs of Salt per BBL   |  |  | 75.13 Lbs/bbl   | Dependent Variable                                       |                                  |
| Total LBs of Salt Removed   |  |  | 204,717,755 LBS | Dependent Variable                                       |                                  |
| Ft3 of salt removed   |  |  | 2,558,972 Ft3   | Estimated Cavern Size calculated from Production Numbers |                                  |
| Geo-Physical Worst Case Cone Calculation<br>V= $\frac{4}{3}\pi R^2 h$ |  |  |                 |  |                                  |
| Radius  |  |  | 61.6 ft         | Dependent Variable                                       |                                  |
| Height from Log   |  |  | 685 ft          | Independent Variable                                     |                                  |
| Volume of Worst Case Cone   |  |  | 2,720,573 Ft3   | Calculated using "Worst Case Cone"                       |                                  |
|   |  |  | -6%             | Within 10 % Passes                                       |                                  |



## Appendix “G”

Wasserhund Inc. Closure Cost Estimate.



2017  
 BW-22 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.

Tatum Brine Station

OCD Permit BW-22

*Expiration Date: Nov 08, 2018*

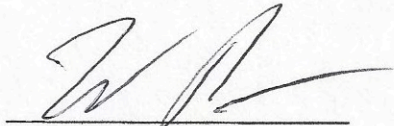
API No. 30-025-28162 Watson #1

Unit Letter M-Section 20-Ts 12s – R 35e

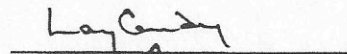
May 01, 2017

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

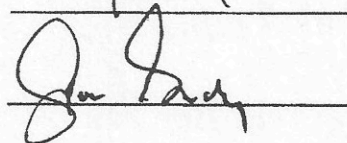
Wayne Price-LLC

A handwritten signature in black ink, appearing to be 'W Price', written over a horizontal line.

Larry Gandy

A handwritten signature in black ink, appearing to be 'Larry Gandy', written over a horizontal line.

Jon Gandy

A handwritten signature in black ink, appearing to be 'Jon Gandy', written over a horizontal line.



## **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 Expiration Date November 08, 2018.*

During the 2016 year, there was no major or remedial work performed on the brine well. Due to brine quality issues experienced during the past years, Wasserhund Inc. submitted a C-103 to OCD in late December of 2012 to investigate why the well is not producing high quality brine water. (C-103 included in **Appendix “A”**)

Even though the oilfield has slowed down, there still is some demand for cut-brine, Wasserhund Inc. decided to forego any well work during the 2016 calendar year.

The brine well was drilled in 1983 and has been in operation for approximately 33 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado “Salt Formation” at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small compared to similar wells of age. **Bullet Point 10** (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.

As will be discussed in **Bullet Point 5** (Chemical Analysis) ever since the last open-hole formation-test, the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.

General housekeeping was routinely performed and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions unless unusual operating conditions warrant such.



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 **Bullet Point 10** below.

Depending upon OCD requirements and local economics, Wasserhund Inc. will have to evaluate whether future operations of this well is warranted as a concentrated-brine producing well.

### **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”

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 2016 brine production volume was 4,670 bbls and the lifetime production volume is 2,721,487 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: Maximum and Average Injection Pressure:

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

The maximum pressure (Injection) is set to 380 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 433 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 325 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 chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected and analyzed by Trace Analysis in Lubbock, Texas, and Hall Environmental in Albuquerque NM for the 2016 year. The sampling process and laboratory used common approved EPA methods to collect, analyze and report.

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 north 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, and often from the wellhead. This sample point is representative of the brine water at the station.

As reported in the production volumes, the Tatum Brine Station saw very little action and the specific gravity (Density) was reported to fall between .996 to 1.026. As previously reported, from time to time, an off red color of the produced brine has been noted, possibly caused by injected fresh water interacting with the upper Salado/Rustler formation where the salt has been dissolved.

Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn’t recover, then some remedial action may be taken, including the possibility of running a tubing plug with wire-line to determine integrity, reversing the flow, deepening the well or plugging the well

The sodium-chloride average ratio for 2015 was .632, and varied from a low of .60 to a high of .71, where the theoretical stoichiometric average for any sodium chloride salt is .648. These ratios were compared to production volumes and density, but no correlation was apparent at that time.

The sodium-chloride average ratio for 2016 was .58, and varied from a low of .52 to a high of .70, with an overall decrease in salt production.

This year’s production was 25% less than last years. The sodium-chloride ratio was noted to be higher after the well had been idle for some time, probably indicating the in-situ water had more time to dissolve sodium salt, versus calcium, magnesium, and other salts found in the formation layers of salt, anhydrite and dolomites.



However, the brine water density continues to be well below the normal 10 lb brine and the average density (SG) for the year was 1.0156 or 8.46 #/gal.

While very low, this water still has good value in today's market sold as cut-brine.

**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 December 02, 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 December 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, but due to some down-hole geological-physical characteristics, is only able to make a cut-brine ranging in specific gravity of .996 to 1.026 .

**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 have spill containers under the hose connections, which are designed to catch de-minimums 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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files and actual on-site field verification, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

In the 2016 review, there were no new wells added to the list. **Appendix “E”** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-22 brine well.

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. 123.0 ft (r= 61.5 ft) up-dated for 2016, a 10:1 safety factor is applied that equates to about 615 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 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.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.



## **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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.72 million barrels of brine produced as of December 2016. The maximum diameter was calculated to be approximately 123.2 feet with a corresponding D/H ratio of .057 updated for the 2016 year.



While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in **Appendix "F"** is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .057 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 11.5 times.

Included in **Appendix "F"** is an aerial view showing the 61.5-foot radius superimposed around the brine well and station.

## **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.**

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-22 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-22 facility 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”

- C-103
- Aerial Photo
- Discharge Plan BW-22



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

**HOBBS OGD** Energy, Minerals and Natural Resources

DEC 14 2012 CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

RECEIVED

Form C-103

Revised August 1, 2011

|  |  |
|--|--|
| WELL API NO.<br>30-025-26883 <b>28162</b>  |  |
| 5. Indicate Type of Lease<br>STATE <input type="checkbox"/> FEE <input type="checkbox"/> |  |
| 6. State Oil & Gas Lease No.   |  |
| 7. Lease Name or Unit Agreement Name<br>Quality Brine                                    |  |
| 8. Well Number <b>1</b>  |  |
| 9. OGRID Number<br>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** : **593** feet from the **South** line and **639** feet from the **West** line  
Section **20** Township **12s** Range **36e** 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: ☐

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.

1. Pull tubing because of light brine weight.
2. Run packer, test casing.
3. Drill to approximately 2850'.
4. Return to making brine.

Begin work as soon as we have OCD approval.

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 President DATE 12/05/12

Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

For State Use Only

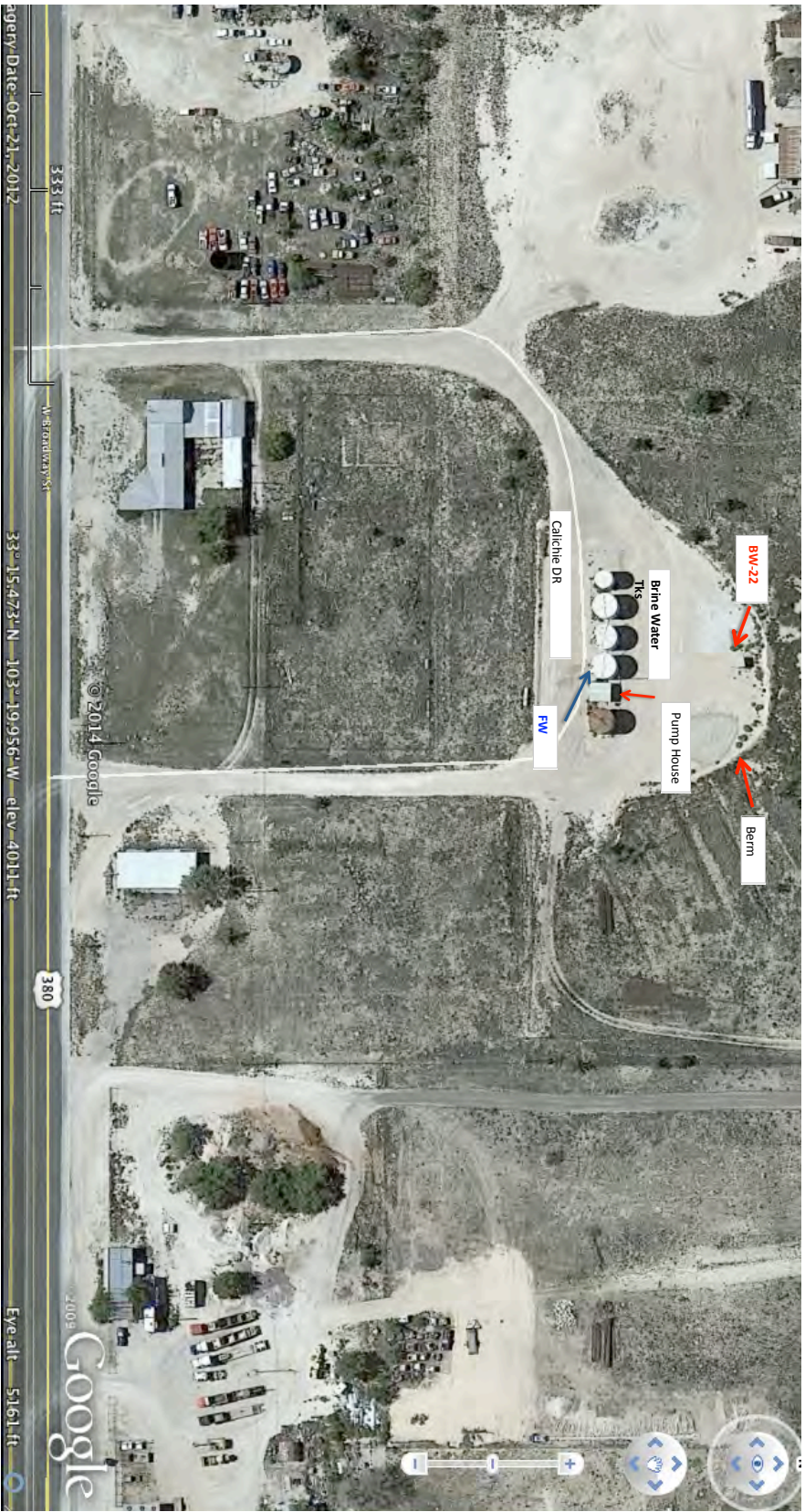
APPROVED BY: Maal Whitaker TITLE Compliance Officer DATE 12-21-2012

Conditions of Approval (if any):

JAN 8 2013

dm







BW-22

Wasserhund/Tatum  
Watson #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-22 for the Watson #1 Brine Well in Unit M of Section 20, Township 12 South, Range 36 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-22 (API# 30-025-28162) 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



## DISCHARGE PERMIT BW-22

### 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-22 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Watson #1 - API No. 30-025-28162) located 593 feet FSL and 639 feet FWL (SW/4 SW/4, Unit Letter M) in Section 20, Township 12 South, Range 36 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located within Tatum, New Mexico to the north of US 380.

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 30 feet below ground surface and has a total dissolved solids concentration of approximately 700 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



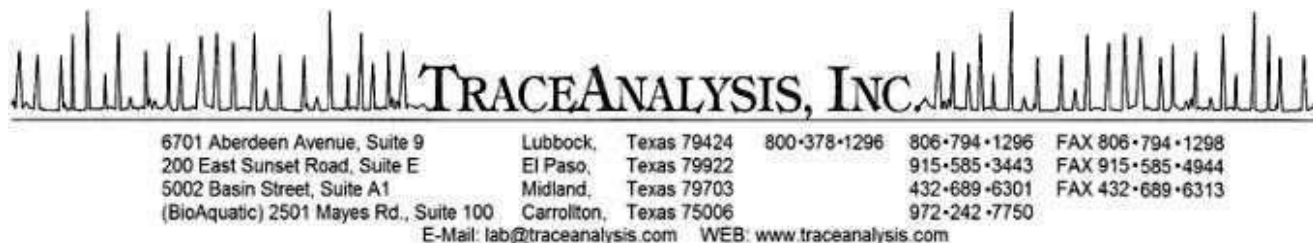
[illegible]



## Appendix “C”

- Chemical Analysis Fresh Water
- Chemical Analysis Brine Water





## 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 25, 2016

Work Order: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 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 that reads "Blair Leftwich". The signature is written in a cursive style with a prominent horizontal line underneath the name.

---

Dr. Blair Leftwich, Director  
James Taylor, Assistant Director  
Brian Pellam, Operations Manager



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| QC Batch 128394 - Method Blank (1) . . . . . | 7         |
| QC Batch 128419 - Method Blank (1) . . . . . | 7         |
| QC Batch 128463 - Method Blank (1) . . . . . | 7         |
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## Case Narrative

Samples for project Brine Well-Tatum were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022211. Samples for work order 16022211 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

| Test          | Method       | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 16022211 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-Tatum

Work Order: 16022211  
Brine Well-Tatum

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# Analytical Report

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | <b>76.6</b>  | mg/L  | 10       | 2.50 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      |      | <b>0.985</b> | g/ml  | 1        | 0.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>7.93</b>  | s.u.  | 1        | 2.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>662</b>   | mg/L  | 10       | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>6760</b>  | mg/L  | 1000     | 1.00 |



## 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<br>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<br>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<br>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<br>Result | Units | RL  |
|------------------------|------|-----------|---------------|-------|-----|
| Total Dissolved Solids |      | 1,2,3,4,5 | <25.0         | 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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



## Calibration Standards

### Standard (ICV-1)

QC Batch: 128362

Date Analyzed: 2016-02-22

Analyzed By: RR

| Param            | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 25.7                   | 103                         | 90 - 110                      | 2016-02-23       |



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Brine Well-Tatum

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**Standard (CCV-2)**

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | 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 |                      | 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.  |



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Brine Well-Tatum

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| 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: February 25, 2016

Work Order: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

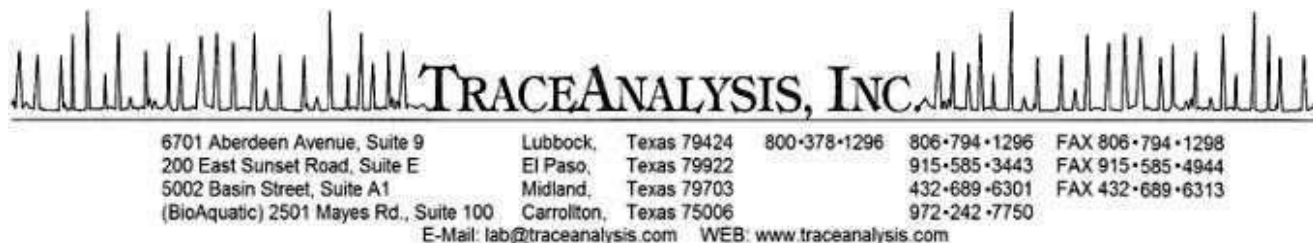
### Sample: 414780 - Fresh Water

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>76.6</b>  | mg/L  | 2.5 |
| Density                |      | <b>0.985</b> | g/ml  |     |
| pH                     |      | <b>7.93</b>  | s.u.  | 2   |
| Total Dissolved Solids |      | <b>662</b>   | mg/L  | 2.5 |

### Sample: 414781 - Brine Water

| Param            | Flag | Result      | Units | RL |
|------------------|------|-------------|-------|----|
| Dissolved Sodium |      | <b>6760</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: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Report Corrections (Work Order 16022211)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

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-Tatum were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022211. Samples for work order 16022211 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

| Test          | Method       | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 16022211 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: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | <b>76.6</b>  | mg/L  | 10       | 2.50 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      |      | <b>0.985</b> | g/ml  | 1        | 0.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>7.93</b>  | s.u.  | 1        | 2.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>662</b>   | mg/L  | 10       | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | H    | 1,2,3,4,5 | <b>12600</b> | mg/L  | 500      | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   | I    |      | <b>0.996</b> | g/ml  | 1        | 0.00 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>6760</b>  | mg/L  | 1000     | 1.00 |



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**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>7.29</b>  | s.u.  | 1        | 2.00 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>26700</b> | mg/L  | 1000     | 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|----------------------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | <sup>1,2,3,4,5</sup> | 4630                | 4670             | mg/L  | 50       | 1   | 10           |



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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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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| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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-Tatum

Work Order: 16022211  
Brine Well-Tatum

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**Standard (CCV-2)**

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.  |



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Brine Well-Tatum

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---

| 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.







# 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: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum

## Report Corrections (Work Order 16022211)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Sample: 414780 - Fresh Water

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>76.6</b>  | mg/L  | 2.5 |
| Density                |      | <b>0.985</b> | g/ml  |     |
| pH                     |      | <b>7.93</b>  | s.u.  | 2   |
| Total Dissolved Solids |      | <b>662</b>   | mg/L  | 2.5 |

### Sample: 414781 - Brine Water

| Param            | Flag         | Result       | Units | RL  |
|------------------|--------------|--------------|-------|-----|
| Chloride         | <sup>H</sup> | <b>12600</b> | mg/L  | 2.5 |
| Density          | 1            | <b>0.996</b> | g/ml  |     |
| Dissolved Sodium |              | <b>6760</b>  | mg/L  | 1   |
| pH               |              | <b>7.29</b>  | s.u.  | 2   |

*continued ...*

<sup>1</sup>Analyzed out of hold time.



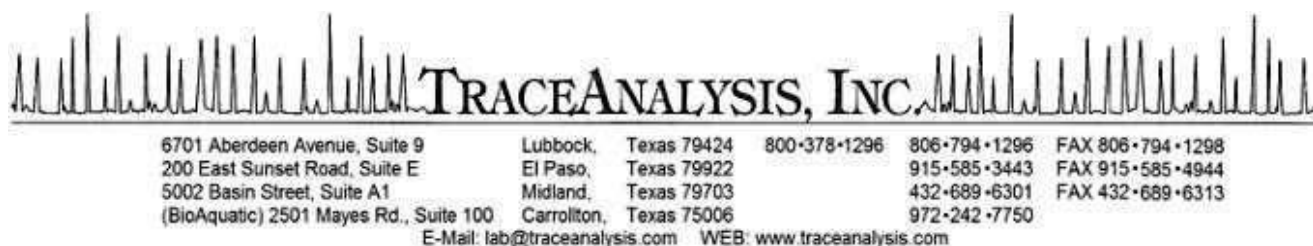
---

*sample 414781 continued ...*

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Total Dissolved Solids |      | <b>26700</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.

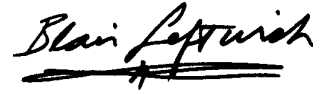
| Sample | Description         | Matrix | Date Taken | Time Taken | Date Received |
|--------|---------------------|--------|------------|------------|---------------|
| 418340 | BW-4 Fresh Water-B  | water  | 2016-04-28 | 13:10      | 2016-04-28    |
| 418341 | BW-4 Brine Water-B  | water  | 2016-04-28 | 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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| <b>Duplicates</b>                             | <b>10</b> |
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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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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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# 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<br>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<br>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<br>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

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**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<br>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<br>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<br>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<br>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  
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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<br>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<br>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<br>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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*sample 418343 continued ...*

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Parameter | Flag | Cert      | RL<br>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<br>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<br>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<br>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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## 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<br>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<br>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<br>Result | Units | RL |
|------------------|------|---------|---------------|-------|----|
| Dissolved Sodium |      | 2,3,4,6 | <0.0197       | mg/L  | 1  |



Report Date: May 17, 2016  
BW-4 & BW-22

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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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|------------------|------|---------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Dissolved Sodium |      | 2,3,4,6 | mg/L  | 26.0                  | 25.1                   | 96                          | 90 - 110                      | 2016-05-17       |



Report Date: May 17, 2016  
BW-4 & BW-22

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**Standard (CCV-1)**

QC Batch: 130128

Date Analyzed: 2016-05-17

Analyzed By: RR

| Param            | Flag | Cert    | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.  |



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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           | 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                                    |             |
|                    | 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           | 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.  
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  | 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 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







## Appendix “D”

- C-103 MIT Approval
- 2016 MIT Chart
- Brine Well Maximum Pressure Test 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

|   |  |   |
|---|--|---|
| <b>SUNDRY NOTICES AND REPORTS ON WELLS</b><br>(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. 30-025-28162   |
| 1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other Brine Well   |  | 5. Indicate Type of Lease<br>STATE <input checked="" type="checkbox"/> FEE <input type="checkbox"/> |
| 2. Name of Operator<br>Wasserhund, Inc.   |  | 6. State Oil & Gas Lease No.<br>25-28162  |
| 3. Address of Operator<br>P.O. Box 2140, Lovington, NM 88260  |  | 7. Lease Name or Unit Agreement Name<br>Quality Brine   |
| 4. Well Location<br>Unit Letter M : 593 feet from the South line and 639 feet from the West line<br>Section 20 Township 12S Range 36E NMPM County Lea   |  | 8. Well Number 1  |
| 11. Elevation (Show whether DR, RKB, RT, GR, etc.)  |  | 9. OGRID Number 130851  |
|   |  | 10. Pool name or Wildcat  |

12. 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"/> | 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: Integritiy 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.

Please see attached Chart

Spud Date:

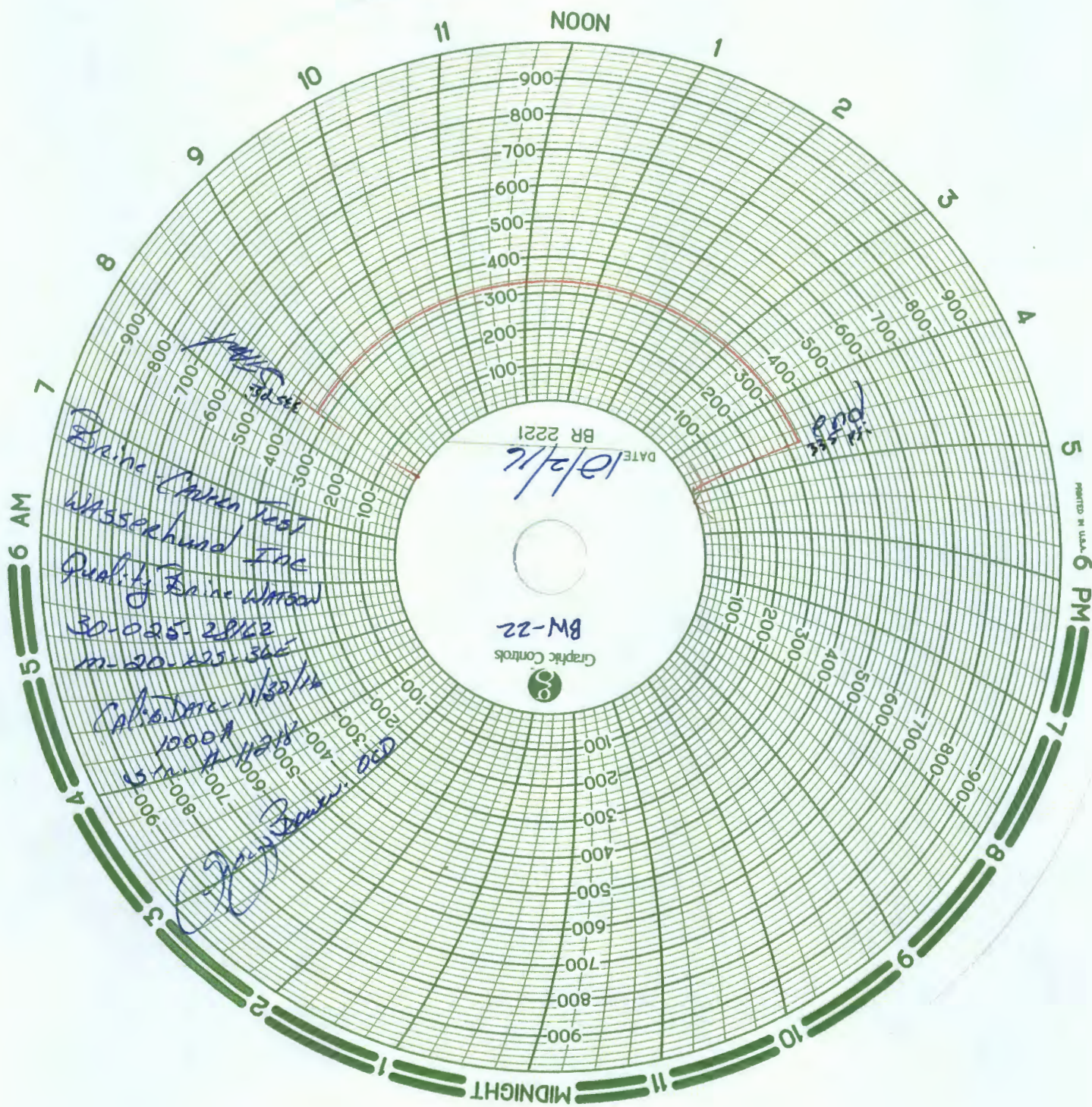
Rig Release Date:

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

SIGNATURE Larry Gandy TITLE President DATE 12/05/16  
Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522  
**For State Use Only**

APPROVED BY: Carl J. Whiting TITLE Senior Engineer DATE 12/8/16  
Conditions of Approval (if any):





PRINTED IN U.S.A. 6 PM



### Brine Well Maximum Test Pressure Calculator

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

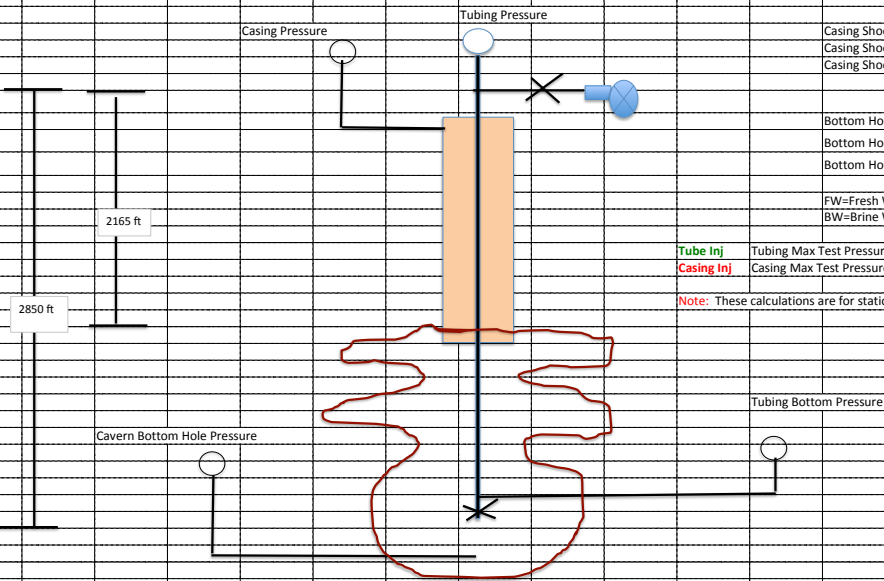
Inputs are for casing shoe depth, bottom hole depth, and frac gradient.

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-22 Wasserhund Tatum



Input Depth to Casing Shoe 2165 ft  
Input Depth to Bottom Hole 2850 ft  
Input Frac/Gradient 0.65 psi/ft

Inputs are in Green

|             |      | Depth ft | Gradient-psi/ft | psig |
|-------------|------|----------|-----------------|------|
| Casing Shoe | FW   | 2165     | 0.433           | 937  |
| Casing Shoe | BW   | 2165     | 0.5             | 1083 |
| Casing Shoe | Frac | 2165     | 0.65            | 1407 |
| Bottom Hole | FW   | 2850     | 0.433           | 1234 |
| Bottom Hole | BW   | 2850     | 0.5             | 1425 |
| Bottom Hole | Frac | 2850     | 0.65            | 1853 |

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 |
| 428 psig | 618 psig |
| 325 psig | 470 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-22 AOR Review-- Well Status List  
up-dated Feb 25, 2016

|   | API#                | Well Name                           | UL       | ectio     | Ts         | Rg         | Footage                      | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR | Casing Progra<br>Checked | Cased/Cemented<br>across salt section | Corrective Action<br>Required |
|---|---------------------|-------------------------------------|----------|-----------|------------|------------|------------------------------|---|--------------------------|---------------------------------------|-------------------------------|
| 1 | <u>30-025-28162</u> | <u>Wasserhund Quality Watson #1</u> | <u>M</u> | <u>20</u> | <u>12s</u> | <u>36e</u> | <u>593 FSL &amp; 639 FWL</u> | NA  | NA                       | Na                                    | NA                            |

0 0

1 Total # of wells in adjacent quarter-sections

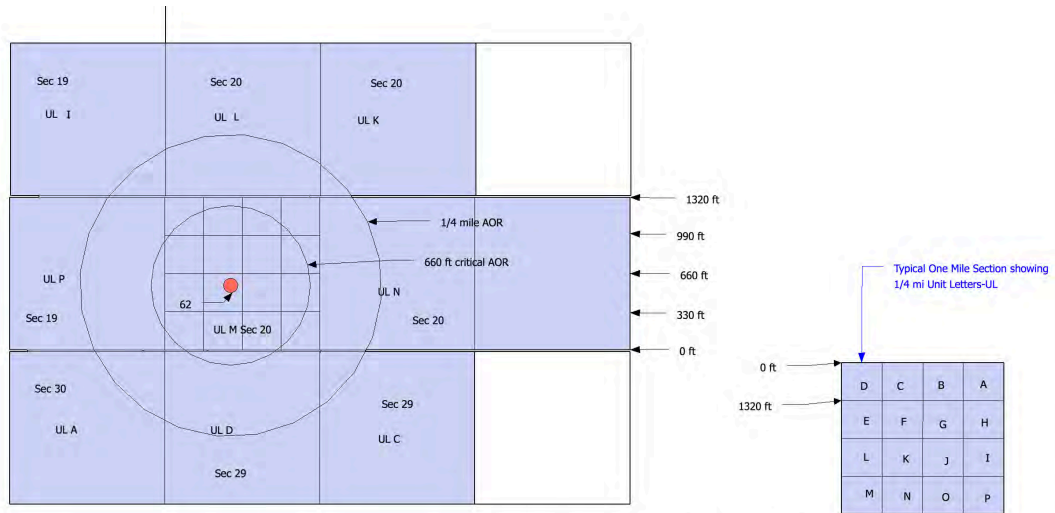
0 Total # of wells in 1/4 mile AOR

0 Total # of wells that within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked and reported annually.

Notes:

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





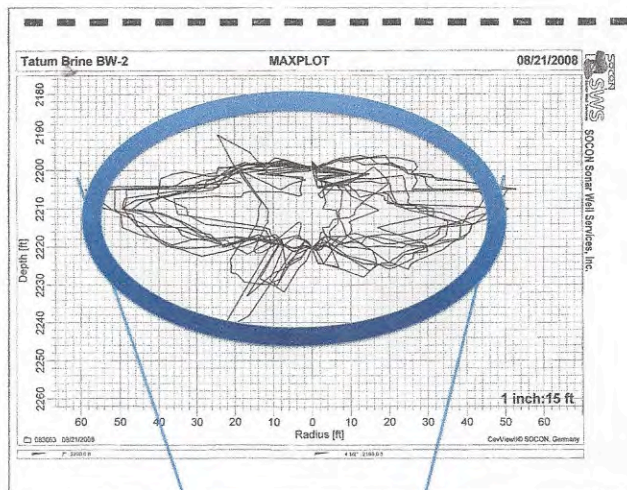
|  |                                  |   |
|--|----------------------------------|---|
| Brine Well Area of Review (AOR) UL Plot Plan | Well API#: 30-025-28162          | Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list. |
| Operator Name: Wasserhund INC                | Permit # BW-22                   |   |
| AOR Year: 2016                               | Location: UL M-Sec 20-Ts12s-R36e |   |



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2016 Radius and D/H calculations.
- Aerial View showing Cavern Radius





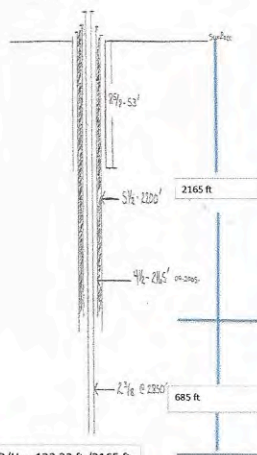
$$R = \text{SQRT of } V \cdot 3 / 3.14 \cdot H$$

Vol = 2.72 million cuft  
Height = 685 ft from casing  
shoe to bottom

Radius = 61.6 ft  
Dia = 123.22 123.220693 ft  
2016 year

H = 685 formulas  
V = 2,721,487 formulas  
H1 = 2165 formulas  
R = 61.6 formulas  
D/H = 0.05691487 formulas  
D = 123.220693 formulas

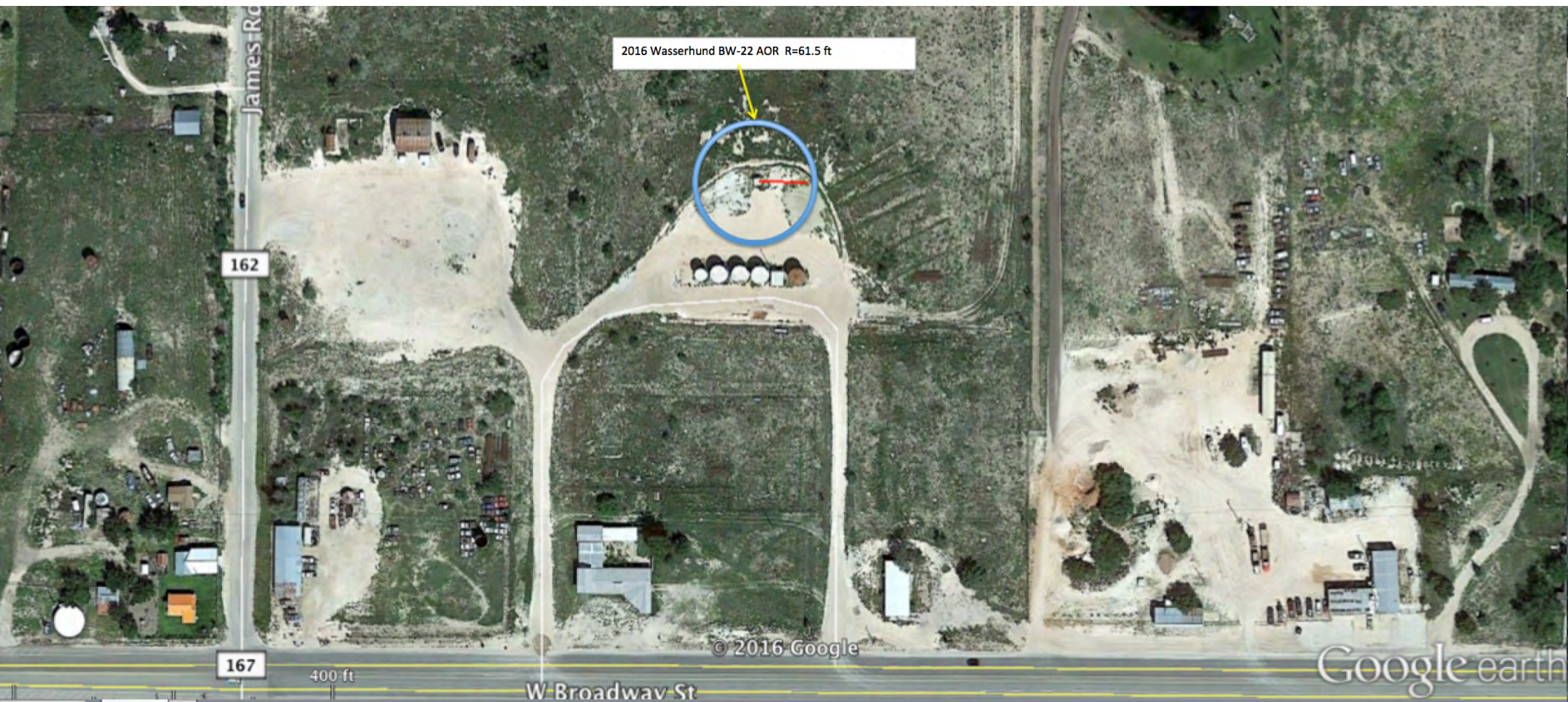
Wasserschutz Inc.  
Geology Section  
Watson 11  
P 21-22-30e  
30-425-2151



D/H = 123.22 ft / 2165 ft

D/H = .057







## Appendix “G”

Wasserhund Inc. Closure Cost Estimate.



2016 Annual Report  
BW-22 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.**

**Tatum Brine Station**

**OCD Permit BW-22**

***Expiration Date: Nov 08, 2018***

**API No. 30-025-28162 Watson #1**

**Unit Letter M-Section 20-Ts 12s – R 35e**

**April 30, 2016**

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

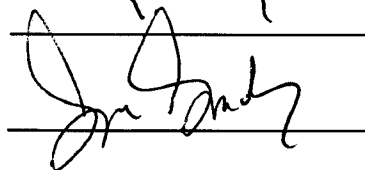
**Wayne Price-LLC**



**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 Expiration Date November 08, 2018.

During the 2015 year, there was no major or remedial work performed on the brine well. Due to brine quality issues experienced during the past years, Wasserhund Inc. submitted a C-103 to OCD in late December of 2012 to investigate why the well is not producing high quality brine water. (C-103 included in **Appendix “A”**)

Even though the oilfield has slowed down, there still is some demand for cut-brine, Wasserhund Inc. decided to forego any well work during the 2015 calendar year.

The brine well was drilled in 1983 and has been in operation for approximately 32 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado “Salt Formation” at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22, aerial photo and recent site inspection report 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 been a relative low producer and the size of the cavity is quite small compared to similar wells of age. **Bullet Point 10** (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.

As will be discussed in **Bullet Point 5** (Chemical Analysis) ever since the last open-hole formation-test, the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.

General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions unless unusual operating conditions warrant such.



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 **Bullet Point 10** below.

Depending upon OCD requirements and local economics, Wasserhund Inc. will have to evaluate whether future operations of this well is warranted as a concentrated brine producing well.

### **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”

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 2015 brine production volume was 6,225 bbls and the lifetime production volume is 2,718,372 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: Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 380 psig, which is approximately 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 260 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 chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected and analyzed by Trace Analysis in Lubbock, Texas, for the 2015 year. 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 north 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.

As reported in the production volumes, the Tatum Brine Station saw very little action and the specific gravity (Density) was reported to fall between .996 to 1.027. As previously reported, from time to time, an off red color of the produced brine has been noted, possibly caused by injected fresh water interacting with the upper Salado/Rustler formation where the salt has been dissolved.

Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn’t recover, then some remedial action may be taken, including the possibility of running a tubing plug with wire-line to determine integrity, reversing the flow, deepening the well or plugging the well.

The sodium-chloride average ratio was .632, and varied from a low of .60 to a high of .71, where the theoretical average for Sodium Chloride salt is .648. These ratios were compared to production volumes, but no correlation was apparent at this time.

### **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, but due to some down-hole geological-physical characteristics, is only able to make a cut-brine ranging in specific gravity of .996 to 1.027 .

**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 have 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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files and actual on-site field verification, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.



In the 2015 review, there were no new wells added to the list. **Appendix “E”** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-22 brine well.

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. 123.0 ft ( $r = 61.5$  ft) up-dated for 2015, a 10:1 safety factor is applied that equates to about 615 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.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

#### **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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.71 million barrels of brine produced as of December 2015. The maximum diameter was calculated to be approximately 123.0 feet with a corresponding D/H ratio of .057 updated for the 2015 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in **Appendix “F”** is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .057 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 11.5 times.

Included in **Appendix “F”** is an aerial view showing the 61.5-foot radius superimposed around the brine well and station.

## **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.*

**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.**

However, in order to meet the new permit requirements, 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 Request: 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-22 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-22 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.



**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”

- C-103
- Aerial Photo
- Discharge Plan BW-22
- Inspection Sheet & Photos



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

HOBBS OGD

State of New Mexico

Energy, Minerals and Natural Resources

Form C-103

Revised August 1, 2011

DEC 14 2012

CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

RECEIVED

|  |
|--|
| WELL API NO.<br>30-025-26883 <b>28162</b>  |
| 5. Indicate Type of Lease<br>STATE <input type="checkbox"/> FEE <input type="checkbox"/> |
| 6. State Oil & Gas Lease No.   |
| 7. Lease Name or Unit Agreement Name<br>Quality Brine                                    |
| 8. Well Number <b>1</b>  |
| 9. OGRID Number<br>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 : 593 feet from the South line and 639 feet from the West line  
Section 20 Township 12s Range 36e 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: ☐

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.

1. Pull tubing because of light brine weight.
2. Run packer, test casing.
3. Drill to approximately 2850'.
4. Return to making brine.

Begin work as soon as we have OCD approval.

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 President DATE 12/05/12

Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

For State Use Only

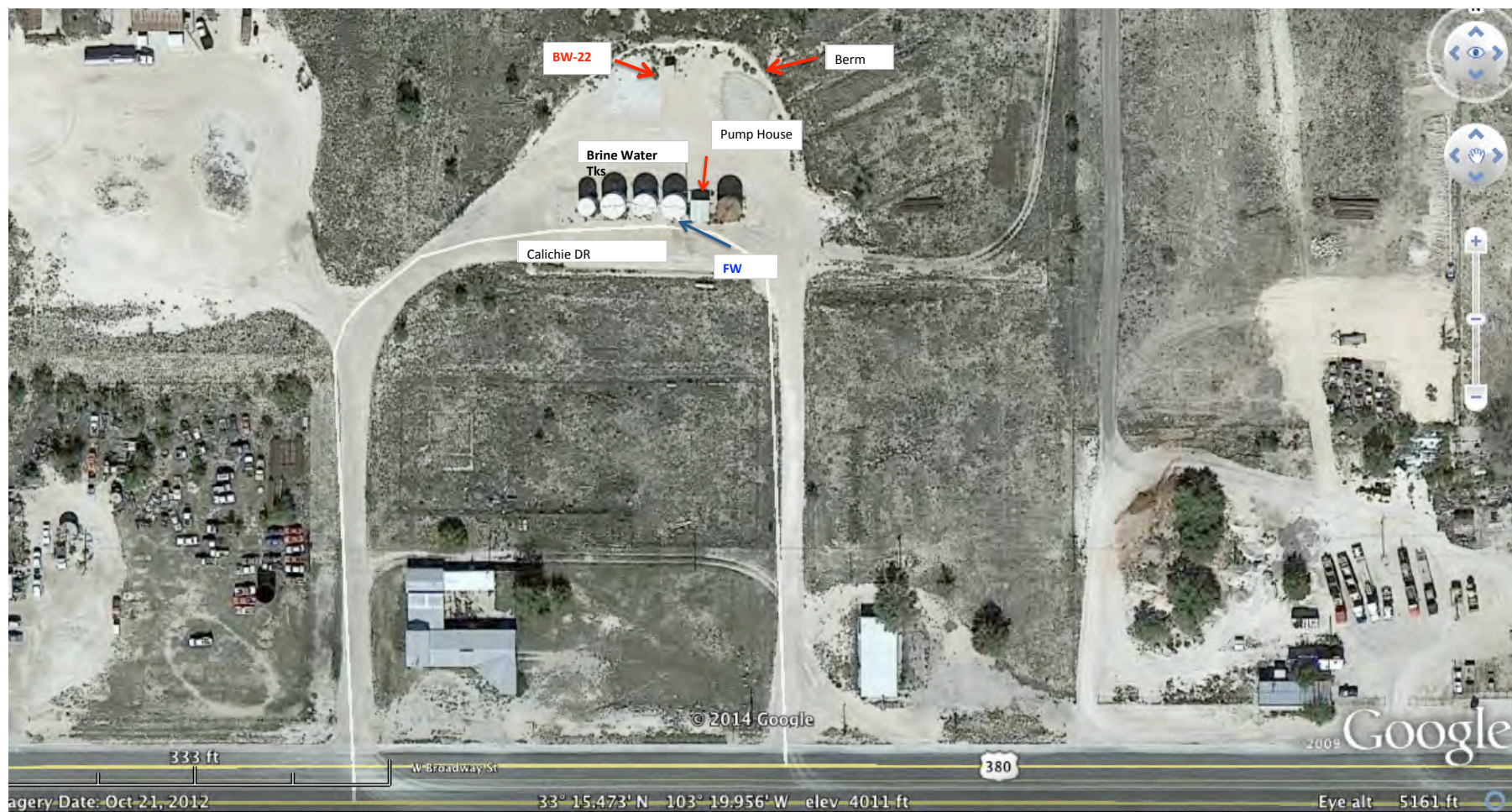
APPROVED BY: Maal Whitaker TITLE Compliance Officer DATE 12-21-2012

Conditions of Approval (if any):

JAN 10 2013

chm







BW-22

Wasserhund/Tatum  
Watson #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-22 for the Watson #1 Brine Well in Unit M of Section 20, Township 12 South, Range 36 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-22 (API# 30-025-28162) 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



## **DISCHARGE PERMIT BW-22**

### **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-22 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Watson #1 - API No. 30-025-28162) located 593 feet FSL and 639 feet FWL (SW/4 SW/4, Unit Letter M) in Section 20, Township 12 South, Range 36 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located within Tatum, New Mexico to the north of US 380.

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 30 feet below ground surface and has a total dissolved solids concentration of approximately 700 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.



Brine Well Inspection Sheet:

Permit # BW-22  
API# 30-025-28162 Watson #1  
Operator: Wasserhund Inc.  
Location: Unit Letter M-Section 20-Ts 12s - R 35e

|   | 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              | 120 psig                         |
| 6 Is operator experiencing any downhole issues?               | X              | Difficult to Produce 10 lb brine |
| 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?   | NA             |                                  |
| 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:

WR





Wasserhund BW-22 Brine Station  
Feb 17, 2016-Photo by Price LLC  
Looking NW



Wasserhund BW-22 Well Head Pressure Gage  
Feb 17, 2016-Photo by Price LLC





## Appendix “B”

- Injection and Production Volumes/Comparison Charts



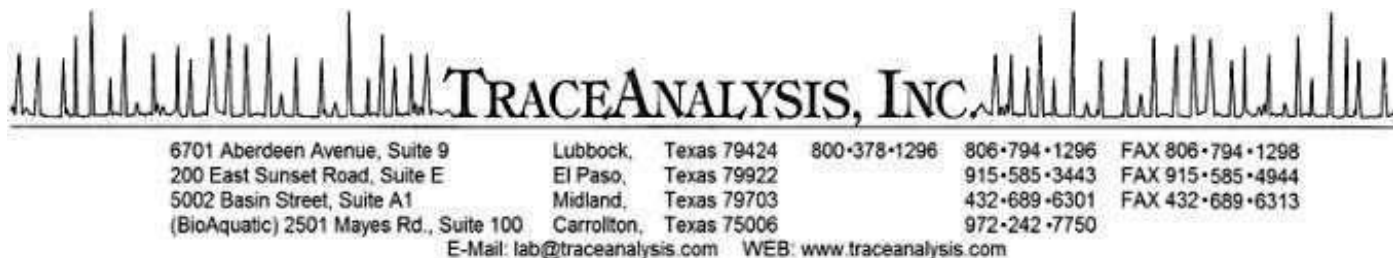
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## Appendix “C”

- 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 Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
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Report Date: February 17, 2015

Work Order: 15012304



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 385127 | Fresh       | water  | 2015-01-16 | 06:17      | 2015-01-21    |
| 385128 | Brine       | water  | 2015-01-16 | 06:25      | 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 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-Tatum were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012304. Samples for work order 15012304 were received intact at a temperature of 2.0 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>Date    |
|------------------|---------------|---------------|---------------------|-------------|---------------------|
| Chloride (IC)    | E 300.0       | 100958        | 2015-02-13 at 15:00 | 119384      | 2015-02-13 at 18:06 |
| 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 15012304 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: 385127 - Fresh

Laboratory: Lubbock  
Analysis: Chloride (IC)  
QC Batch: 119384  
Prep Batch: 100958

Analytical Method: E 300.0  
Date Analyzed: 2015-02-13  
Sample Preparation:

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | B    | 1,2,3,4,5 | 71.6         | mg/L  | 10       | 2.50 |

Sample: 385127 - Fresh

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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium | Qs   | 2,3,4,5 | 75.9         | mg/L  | 1        | 1.00 |

Sample: 385127 - Fresh

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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 8.20         | s.u.  | 1        | 2.00 |

Sample: 385127 - Fresh

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



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| Parameter        | Flag | Cert | RL<br>Result  | Units | Dilution | RL    |
|------------------|------|------|---------------|-------|----------|-------|
| Specific Gravity |      |      | <b>0.9861</b> | g/ml  | 1        | 0.000 |

**Sample: 385127 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>642</b>   | mg/L  | 20       | 2.50 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | H    | 1,2,3,4,5 | <b>16000</b> | mg/L  | 1000     | 2.50 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium | Qs   | 2,3,4,5 | <b>11400</b> | mg/L  | 100      | 1.00 |



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**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>6.16</b>  | s.u.  | 1        | 2.00 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.027</b> | g/ml  | 1        | 0.000 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>31000</b> | mg/L  | 1000     | 2.50 |



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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<br>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<br>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<br>Result | Units | RL |
|------------------|------|---------|---------------|-------|----|
| Dissolved Sodium |      | 2,3,4,5 | <0.0184       | mg/L  | 1  |

### Method Blank (1)      QC Batch: 119384

QC Batch: 119384      Date Analyzed: 2015-02-13      Analyzed By: RL  
Prep Batch: 100958      QC Preparation: 2015-02-13      Prepared By: RL



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| Parameter | Flag | Cert      | MDL<br>Result | Units | RL  |
|-----------|------|-----------|---------------|-------|-----|
| Chloride  |      | 1,2,3,4,5 | 0.826         | mg/L  | 2.5 |

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 |

| Parameter | Flag | Cert      | MDL<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 850                 | 806              | mg/L  | 20       | 5   | 10           |



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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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: 119384  
Prep Batch: 100958

Date Analyzed: 2015-02-13  
QC Preparation: 2015-02-13

Analyzed By: RL  
Prepared By: RL



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| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|----------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|
| Chloride |   | 1,2,3,4,5 | 24.1          | mg/L  | 1    | 25.0            | 0.826            | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|----------|---|-----------|----------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Chloride |   | 1,2,3,4,5 | 24.3           | mg/L  | 1    | 25.0            | 0.826            | 94   | 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: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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     |       | Dil. | Spike  | Matrix | Rec. |       | RPD      |   |    |
|------------------|----|----|---------|-------|------|--------|--------|------|-------|----------|---|----|
|                  | F  | C  | Result  | Units |      | Amount | Result | Rec. | Limit | RPD      |   |    |
| Dissolved Sodium | Qs | Qs | 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: 385127

QC Batch: 119384  
Prep Batch: 100958

Date Analyzed: 2015-02-13  
QC Preparation: 2015-02-13

Analyzed By: RL  
Prepared By: RL

| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|----------|---|-----------|--------------|-------|------|-----------------|------------------|------|---------------|
| Chloride |   | 1,2,3,4,5 | 319          | mg/L  | 10   | 250             | 71.6             | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|----------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Chloride |   | 1,2,3,4,5 | 312           | mg/L  | 10   | 250             | 71.6             | 96   | 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: 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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-Tatum

Work Order: 15012304  
Brine Well-Tatum

Page Number: 15 of 17  
Tatum, NM

#### Standard (CCV-1)

QC Batch: 119384

Date Analyzed: 2015-02-13

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 23.6                   | 94                          | 90 - 110                      | 2015-02-13       |

#### Standard (CCV-2)

QC Batch: 119384

Date Analyzed: 2015-02-13

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 23.8                   | 95                          | 90 - 110                      | 2015-02-13       |

#### Standard (CCV-1)

QC Batch: 119410

Date Analyzed: 2015-02-16

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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: 15050506



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 392449 | Fresh       | water  | 2015-04-27 | 14:10      | 2015-05-01    |
| 392450 | Brine       | water  | 2015-04-27 | 14:20      | 2015-05-01    |

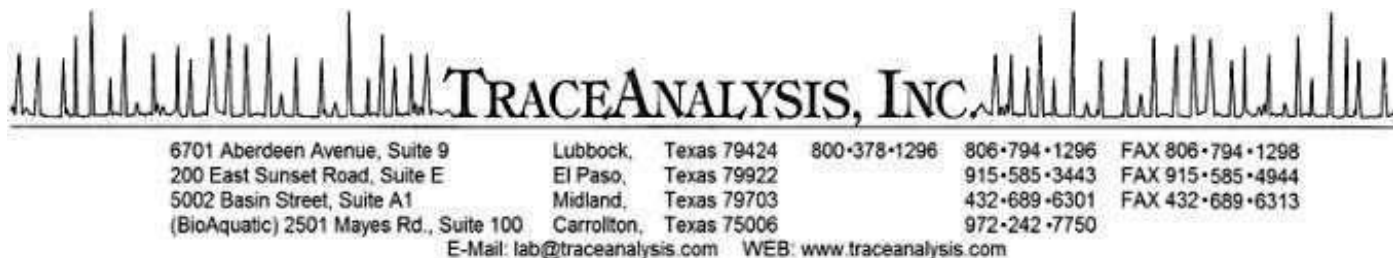
### Sample: 392449 - Fresh

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               |      | 82.8   | mg/L  | 2.5 |
| pH                     |      | 8.32   | s.u.  | 2   |
| Specific Gravity       |      | 0.9923 | g/ml  |     |
| Total Dissolved Solids |      | 633    | mg/L  | 2.5 |

### Sample: 392450 - Brine

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               |      | 20500  | mg/L  | 2.5 |
| Dissolved Sodium       |      | 12500  | mg/L  | 1   |
| pH                     |      | 6.05   | s.u.  | 2   |
| Specific Gravity       |      | 1.018  | g/ml  |     |
| Total Dissolved Solids |      | 34100  | 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: 15050506



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well  
Project Number: Tatum Fresh & Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

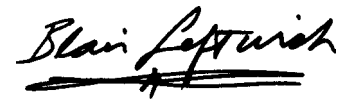
| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 392449 | Fresh       | water  | 2015-04-27 | 14:10      | 2015-05-01    |
| 392450 | Brine       | water  | 2015-04-27 | 14:20      | 2015-05-01    |

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.

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 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". 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



# Report Contents

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## Case Narrative

Samples for project Tatum Fresh & Brine Well were received by TraceAnalysis, Inc. on 2015-05-01 and assigned to work order 15050506. Samples for work order 15050506 were received intact at a temperature of 1.4 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 |
| TDS              | SM 2540C      | 102742        | 2015-05-11 at 19:20 | 121420      | 2015-05-11 at 19:21 |

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 15050506 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  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

Page Number: 5 of 18  
Tatum NM

# Analytical Report

## Sample: 392449 - Fresh

|             |               |                     |            |              |     |
|-------------|---------------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock       | Analytical Method:  | E 300.0    | Prep Method: | N/A |
| Analysis:   | Chloride (IC) | Date Analyzed:      | 2015-05-14 | Analyzed By: | RL  |
| QC Batch:   | 121554        | Sample Preparation: |            | Prepared By: | RL  |
| Prep Batch: | 102846        |                     |            |              |     |

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | 82.8         | mg/L  | 5        | 2.50 |

## Sample: 392449 - Fresh

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 4500-H+ | Prep Method: | N/A |
| Analysis:   | pH      | Date Analyzed:      | 2015-05-06 | Analyzed By: | HJ  |
| QC Batch:   | 121318  | Sample Preparation: |            | Prepared By: | HJ  |
| Prep Batch: | 102649  |                     |            |              |     |

| Parameter | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 8.32         | s.u.  | 1        | 2.00 |

## Sample: 392449 - Fresh

|             |                  |                     |               |              |     |
|-------------|------------------|---------------------|---------------|--------------|-----|
| Laboratory: | Lubbock          | Analytical Method:  | ASTM D1429-95 | Prep Method: | N/A |
| Analysis:   | Specific Gravity | Date Analyzed:      | 2015-05-07    | Analyzed By: | CF  |
| QC Batch:   | 121329           | Sample Preparation: | 2015-05-07    | Prepared By: | CF  |
| Prep Batch: | 102660           |                     |               |              |     |

| Parameter        | Flag | Cert | RL<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | 0.9923       | g/ml  | 1        | 0.000 |

## Sample: 392449 - Fresh

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 2540C   | Prep Method: | N/A |
| Analysis:   | TDS     | Date Analyzed:      | 2015-05-11 | Analyzed By: | HJ  |
| QC Batch:   | 121420  | Sample Preparation: |            | Prepared By: | HJ  |
| Prep Batch: | 102742  |                     |            |              |     |



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>633</b>   | mg/L  | 10       | 2.50 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | <b>20500</b> | mg/L  | 500      | 2.50 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>12500</b> | mg/L  | 100      | 1.00 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>6.05</b>  | s.u.  | 1        | 2.00 |



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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**Sample: 392450 - Brine**

Laboratory: Lubbock  
Analysis: Specific Gravity  
QC Batch: 121329  
Prep Batch: 102660

Analytical Method: ASTM D1429-95  
Date Analyzed: 2015-05-07  
Sample Preparation: 2015-05-07

Prep Method: N/A  
Analyzed By: CF  
Prepared By: CF

| Parameter        | Flag | Cert | RL<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.018</b> | g/ml  | 1        | 0.000 |

**Sample: 392450 - Brine**

Laboratory: Lubbock  
Analysis: TDS  
QC Batch: 121355  
Prep Batch: 102686

Analytical Method: SM 2540C  
Date Analyzed: 2015-05-07  
Sample Preparation:

Prep Method: N/A  
Analyzed By: HJ  
Prepared By: HJ

| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>34100</b> | mg/L  | 1000     | 2.50 |



# Method Blanks

Method Blank (1)      QC Batch: 121329

QC Batch: 121329  
Prep Batch: 102660

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: CF  
Prepared By: CF

| Parameter        | Flag | Cert | MDL<br>Result | Units | RL |
|------------------|------|------|---------------|-------|----|
| Specific Gravity |      |      | 0.9884        | g/ml  |    |

Method Blank (1)      QC Batch: 121355

QC Batch: 121355  
Prep Batch: 102686

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: HJ  
Prepared By: HJ

| Parameter              | Flag | Cert      | MDL<br>Result | Units | RL  |
|------------------------|------|-----------|---------------|-------|-----|
| Total Dissolved Solids |      | 1,2,3,4,5 | <25.0         | mg/L  | 2.5 |

Method Blank (1)      QC Batch: 121420

QC Batch: 121420  
Prep Batch: 102742

Date Analyzed: 2015-05-11  
QC Preparation: 2015-05-11

Analyzed By: HJ  
Prepared By: HJ

| Parameter              | Flag | Cert      | MDL<br>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  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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| Parameter | Flag | Cert      | MDL<br>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 |

| Parameter        | Flag | Cert    | MDL<br>Result | Units | RL |
|------------------|------|---------|---------------|-------|----|
| Dissolved Sodium |      | 2,3,4,5 | <0.0197       | mg/L  | 1  |



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

Page Number: 10 of 18  
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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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 32400               | 34100            | mg/L  | 1000     | 5   | 10           |

### Duplicates (1) Duplicated Sample: 392783

QC Batch: 121420 Date Analyzed: 2015-05-11 Analyzed By: HJ  
Prep Batch: 102742 QC Preparation: 2015-05-11 Prepared By: HJ



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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Tatum NM

| Param                  |           | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 38.0                | 39.0             | mg/L  | 10       | 3   | 10           |



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

Page Number: 12 of 18  
Tatum NM

## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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: 121420  
Prep Batch: 102742

Date Analyzed: 2015-05-11  
QC Preparation: 2015-05-11

Analyzed By: HJ  
Prepared By: HJ

| Param                  | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|------------------------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|
| Total Dissolved Solids |   | 1,2,3,4,5 | 993           | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|------------------------|---|-----------|----------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Total Dissolved Solids |   | 1,2,3,4,5 | 975            | mg/L  | 10   | 1000            | <25.0            | 98   | 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: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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Tatum NM

| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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

| Param            | F | C       | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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## Calibration Standards

### Standard (ICV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

| Param | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 24.9                   | 100                         | 90 - 110                      | 2015-05-14       |



Report Date: June 5, 2015  
Tatum Fresh & Brine Well

Work Order: 15050506  
Tatum Fresh & Brine Well

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Tatum NM

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**Standard (ICV-1)**

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

| Param            | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.  |



| F | Description                               |
|---|---|
| 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

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: August 19, 2015

Work Order: 15081114



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 401722 | Fresh       | water  | 2015-07-08 | 17:30      | 2015-08-09    |
| 401723 | Brine       | water  | 2015-07-08 | 17:40      | 2015-08-09    |

### Sample: 401722 - Fresh

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               | B,H  | 73.5   | mg/L  | 2.5 |
| Dissolved Sodium       |      | 120    | mg/L  | 1   |
| pH                     |      | 8.04   | s.u.  | 2   |
| Specific Gravity       |      | 1.000  | g/ml  |     |
| Total Dissolved Solids |      | 669    | mg/L  | 2.5 |

### Sample: 401723 - Brine

| Param            | Flag | Result | Units | RL |
|------------------|------|--------|-------|----|
| Dissolved Sodium |      | 9700   | mg/L  | 1  |



## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: August 19, 2015

Work Order: 15081114



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 401722 | Fresh       | water  | 2015-07-08 | 17:30      | 2015-08-09    |
| 401723 | Brine       | water  | 2015-07-08 | 17:40      | 2015-08-09    |

### Sample: 401722 - Fresh

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               | B,H  | 73.5   | mg/L  | 2.5 |
| Dissolved Sodium       |      | 120    | mg/L  | 1   |
| pH                     |      | 8.04   | s.u.  | 2   |
| Specific Gravity       |      | 1.000  | g/ml  |     |
| Total Dissolved Solids |      | 669    | mg/L  | 2.5 |

### Sample: 401723 - Brine

| Param            | Flag | Result | Units | RL |
|------------------|------|--------|-------|----|
| Dissolved Sodium |      | 9700   | mg/L  | 1  |



## 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 |

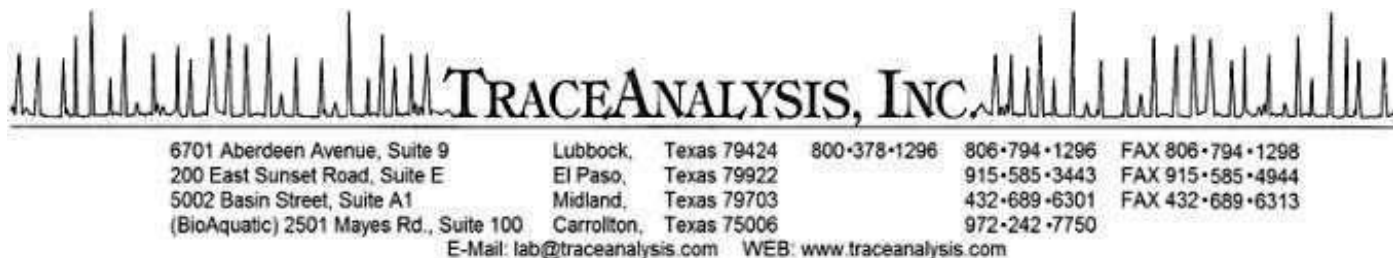
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**Sample: 407096 - BW-4 Buckeye Brine**

| 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.

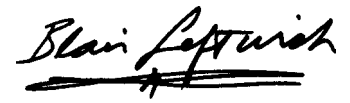
| Sample | Description        | Matrix | Date Taken | Time Taken | Date Received |
|--------|--------------------|--------|------------|------------|---------------|
| 407093 | BW-22 Tatum Fresh  | water  | 2015-10-23 | 13:15      | 2015-10-26    |
| 407094 | BW-22 Tatum Brine  | water  | 2015-10-23 | 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



# Report Contents

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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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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

Page Number: 5 of 20  
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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,6 | <b>12500</b> | mg/L  | 100      | 1.00 |



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**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<br>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<br>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<br>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 . . .*



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*sample 407095 continued ...*

| Parameter | Flag | Cert | RL<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Parameter | Flag | Cert | RL<br>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<br>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<br>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<br>Result  | Units | Dilution | RL   |
|-----------|------|-----------|---------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,6 | <b>176000</b> | mg/L  | 5000     | 2.50 |



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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<br>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<br>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<br>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<br>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<br>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<br>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<br>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 |



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| Parameter | Flag | Cert      | MDL<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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



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| Param                  |           | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,6 | 1190                | 1180             | mg/L  | 20       | 1   | 10           |



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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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



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| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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 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        |

---

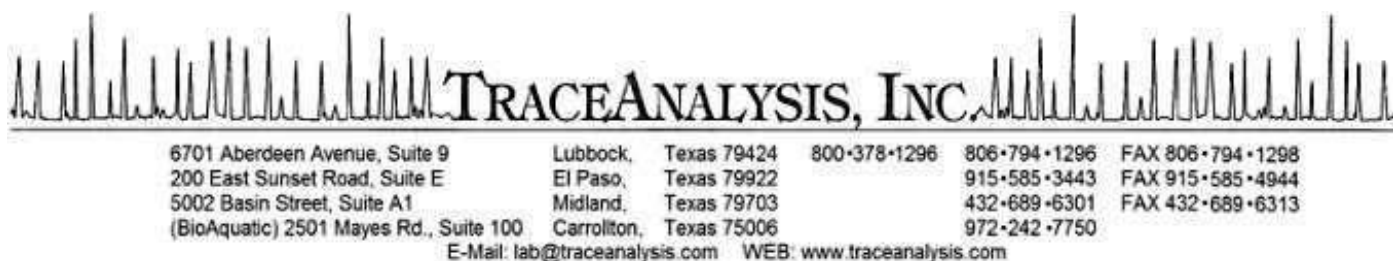
**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.









## 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: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Report Corrections (Work Order 16022211)

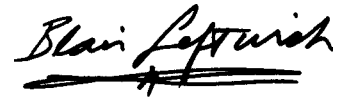
- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

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



# Report Contents

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## Case Narrative

Samples for project Brine Well-Tatum were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022211. Samples for work order 16022211 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

| Test          | Method       | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 16022211 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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Brine Well-Tatum

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# Analytical Report

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | 76.6         | mg/L  | 10       | 2.50 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      |      | 0.985        | g/ml  | 1        | 0.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 7.93         | s.u.  | 1        | 2.00 |

## Sample: 414780 - 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  |                     |            |              |     |



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| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>662</b>   | mg/L  | 10       | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | H    | 1,2,3,4,5 | <b>12600</b> | mg/L  | 500      | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      | 1    | <b>0.996</b> | g/ml  | 1        | 0.00 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>6760</b>  | mg/L  | 1000     | 1.00 |



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**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>7.29</b>  | s.u.  | 1        | 2.00 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>26700</b> | mg/L  | 1000     | 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 4630                | 4670             | mg/L  | 50       | 1   | 10           |



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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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-Tatum

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Brine Well-Tatum

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| Param                  | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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-Tatum

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| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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-Tatum

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### Standard (CCV-2)

QC Batch: 128419

Date Analyzed: 2016-02-23

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.







# 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: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum

### Report Corrections (Work Order 16022211)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Sample: 414780 - Fresh Water

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>76.6</b>  | mg/L  | 2.5 |
| Density                |      | <b>0.985</b> | g/ml  |     |
| pH                     |      | <b>7.93</b>  | s.u.  | 2   |
| Total Dissolved Solids |      | <b>662</b>   | mg/L  | 2.5 |

### Sample: 414781 - Brine Water

| Param            | Flag | Result       | Units | RL  |
|------------------|------|--------------|-------|-----|
| Chloride         | H    | <b>12600</b> | mg/L  | 2.5 |
| Density          | 1    | <b>0.996</b> | g/ml  |     |
| Dissolved Sodium |      | <b>6760</b>  | mg/L  | 1   |
| pH               |      | <b>7.29</b>  | s.u.  | 2   |

*continued ...*

<sup>1</sup>Analyzed out of hold time.



---

*sample 414781 continued ...*

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Total Dissolved Solids |      | <b>26700</b> | mg/L  | 2.5 |



## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: June 5, 2015

Work Order: 15050506



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 392449 | Fresh       | water  | 2015-04-27 | 14:10      | 2015-05-01    |
| 392450 | Brine       | water  | 2015-04-27 | 14:20      | 2015-05-01    |

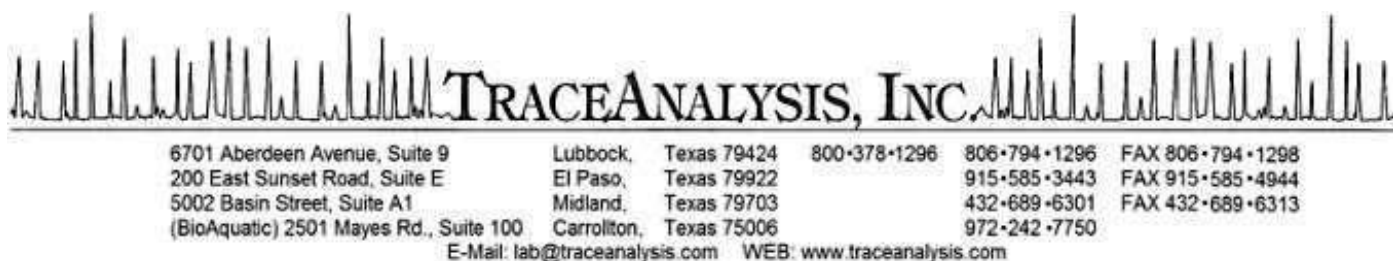
### Sample: 392449 - Fresh

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               |      | 82.8   | mg/L  | 2.5 |
| pH                     |      | 8.32   | s.u.  | 2   |
| Specific Gravity       |      | 0.9923 | g/ml  |     |
| Total Dissolved Solids |      | 633    | mg/L  | 2.5 |

### Sample: 392450 - Brine

| Param                  | Flag | Result | Units | RL  |
|------------------------|------|--------|-------|-----|
| Chloride               |      | 20500  | mg/L  | 2.5 |
| Dissolved Sodium       |      | 12500  | mg/L  | 1   |
| pH                     |      | 6.05   | s.u.  | 2   |
| Specific Gravity       |      | 1.018  | g/ml  |     |
| Total Dissolved Solids |      | 34100  | 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: 15050506



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well  
Project Number: Tatum Fresh & Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

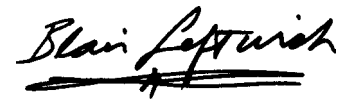
| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 392449 | Fresh       | water  | 2015-04-27 | 14:10      | 2015-05-01    |
| 392450 | Brine       | water  | 2015-04-27 | 14:20      | 2015-05-01    |

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.

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 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". 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



# Report Contents

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## Case Narrative

Samples for project Tatum Fresh & Brine Well were received by TraceAnalysis, Inc. on 2015-05-01 and assigned to work order 15050506. Samples for work order 15050506 were received intact at a temperature of 1.4 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 |
| TDS              | SM 2540C      | 102742        | 2015-05-11 at 19:20 | 121420      | 2015-05-11 at 19:21 |

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 15050506 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: 392449 - Fresh

|             |               |                     |            |              |     |
|-------------|---------------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock       | Analytical Method:  | E 300.0    | Prep Method: | N/A |
| Analysis:   | Chloride (IC) | Date Analyzed:      | 2015-05-14 | Analyzed By: | RL  |
| QC Batch:   | 121554        | Sample Preparation: |            | Prepared By: | RL  |
| Prep Batch: | 102846        |                     |            |              |     |

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | 82.8         | mg/L  | 5        | 2.50 |

## Sample: 392449 - Fresh

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 4500-H+ | Prep Method: | N/A |
| Analysis:   | pH      | Date Analyzed:      | 2015-05-06 | Analyzed By: | HJ  |
| QC Batch:   | 121318  | Sample Preparation: |            | Prepared By: | HJ  |
| Prep Batch: | 102649  |                     |            |              |     |

| Parameter | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 8.32         | s.u.  | 1        | 2.00 |

## Sample: 392449 - Fresh

|             |                  |                     |               |              |     |
|-------------|------------------|---------------------|---------------|--------------|-----|
| Laboratory: | Lubbock          | Analytical Method:  | ASTM D1429-95 | Prep Method: | N/A |
| Analysis:   | Specific Gravity | Date Analyzed:      | 2015-05-07    | Analyzed By: | CF  |
| QC Batch:   | 121329           | Sample Preparation: | 2015-05-07    | Prepared By: | CF  |
| Prep Batch: | 102660           |                     |               |              |     |

| Parameter        | Flag | Cert | RL<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | 0.9923       | g/ml  | 1        | 0.000 |

## Sample: 392449 - Fresh

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 2540C   | Prep Method: | N/A |
| Analysis:   | TDS     | Date Analyzed:      | 2015-05-11 | Analyzed By: | HJ  |
| QC Batch:   | 121420  | Sample Preparation: |            | Prepared By: | HJ  |
| Prep Batch: | 102742  |                     |            |              |     |



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| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>633</b>   | mg/L  | 10       | 2.50 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | <b>20500</b> | mg/L  | 500      | 2.50 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>12500</b> | mg/L  | 100      | 1.00 |

**Sample: 392450 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>6.05</b>  | s.u.  | 1        | 2.00 |



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**Sample: 392450 - Brine**

|             |                  |                     |               |              |     |
|-------------|------------------|---------------------|---------------|--------------|-----|
| Laboratory: | Lubbock          | Analytical Method:  | ASTM D1429-95 | Prep Method: | N/A |
| Analysis:   | Specific Gravity | Date Analyzed:      | 2015-05-07    | Analyzed By: | CF  |
| QC Batch:   | 121329           | Sample Preparation: | 2015-05-07    | Prepared By: | CF  |
| Prep Batch: | 102660           |                     |               |              |     |

| Parameter        | Flag | Cert | RL<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.018</b> | g/ml  | 1        | 0.000 |

**Sample: 392450 - Brine**

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 2540C   | Prep Method: | N/A |
| Analysis:   | TDS     | Date Analyzed:      | 2015-05-07 | Analyzed By: | HJ  |
| QC Batch:   | 121355  | Sample Preparation: |            | Prepared By: | HJ  |
| Prep Batch: | 102686  |                     |            |              |     |

| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>34100</b> | mg/L  | 1000     | 2.50 |



# Method Blanks

Method Blank (1)      QC Batch: 121329

QC Batch: 121329  
Prep Batch: 102660

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: CF  
Prepared By: CF

| Parameter        | Flag | Cert | MDL<br>Result | Units | RL |
|------------------|------|------|---------------|-------|----|
| Specific Gravity |      |      | 0.9884        | g/ml  |    |

Method Blank (1)      QC Batch: 121355

QC Batch: 121355  
Prep Batch: 102686

Date Analyzed: 2015-05-07  
QC Preparation: 2015-05-07

Analyzed By: HJ  
Prepared By: HJ

| Parameter              | Flag | Cert      | MDL<br>Result | Units | RL  |
|------------------------|------|-----------|---------------|-------|-----|
| Total Dissolved Solids |      | 1,2,3,4,5 | <25.0         | mg/L  | 2.5 |

Method Blank (1)      QC Batch: 121420

QC Batch: 121420  
Prep Batch: 102742

Date Analyzed: 2015-05-11  
QC Preparation: 2015-05-11

Analyzed By: HJ  
Prepared By: HJ

| Parameter              | Flag | Cert      | MDL<br>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  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL



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| Parameter | Flag | Cert      | MDL<br>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 |

| Parameter        | Flag | Cert    | MDL<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 32400               | 34100            | mg/L  | 1000     | 5   | 10           |

### Duplicates (1) Duplicated Sample: 392783

QC Batch: 121420 Date Analyzed: 2015-05-11 Analyzed By: HJ  
Prep Batch: 102742 QC Preparation: 2015-05-11 Prepared By: HJ



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| Param                  |           | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 38.0                | 39.0             | mg/L  | 10       | 3   | 10           |

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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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: 121420  
Prep Batch: 102742

Date Analyzed: 2015-05-11  
QC Preparation: 2015-05-11

Analyzed By: HJ  
Prepared By: HJ

| Param                  | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|------------------------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|
| Total Dissolved Solids |   | 1,2,3,4,5 | 993           | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|------------------------|---|-----------|----------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Total Dissolved Solids |   | 1,2,3,4,5 | 975            | mg/L  | 10   | 1000            | <25.0            | 98   | 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: 121554  
Prep Batch: 102846

Date Analyzed: 2015-05-14  
QC Preparation: 2015-05-14

Analyzed By: RL  
Prepared By: RL



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| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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

| Param            | F | C       | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



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## Calibration Standards

### Standard (ICV-1)

QC Batch: 121318

Date Analyzed: 2015-05-06

Analyzed By: HJ

| Param | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 24.9                   | 100                         | 90 - 110                      | 2015-05-14       |



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### Standard (ICV-1)

QC Batch: 122047

Date Analyzed: 2015-06-05

Analyzed By: RR

| Param            | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.  |



| F | Description                               |
|---|---|
| U | The analyte is not detected above the SDL |

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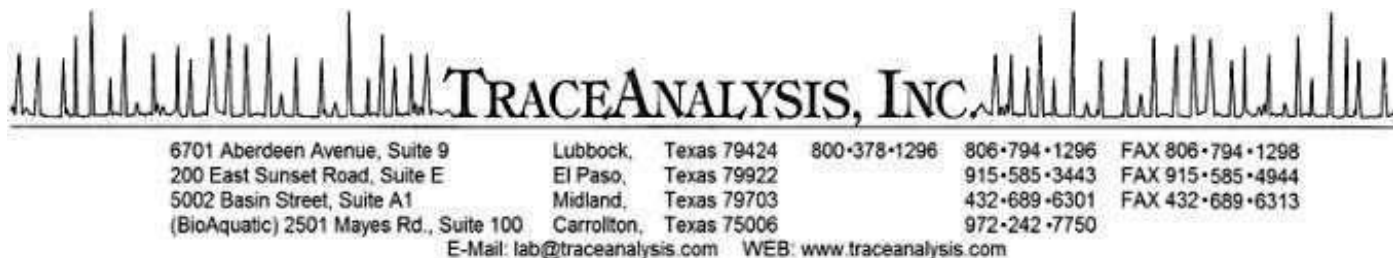
**Attachments**

The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.









## 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: 15081114



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well  
Project Number: Tatum Fresh & Brine Well

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

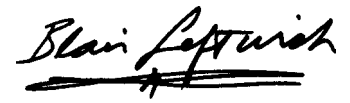
| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 401722 | Fresh       | water  | 2015-07-08 | 17:30      | 2015-08-09    |
| 401723 | Brine       | water  | 2015-07-08 | 17:40      | 2015-08-09    |

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 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 Tatum Fresh & Brine Well were received by TraceAnalysis, Inc. on 2015-08-09 and assigned to work order 15081114. Samples for work order 15081114 were received intact at a temperature of 30.0 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 15081114 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: 401722 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | B,H  | 1,2,3,4,5 | <b>73.5</b>  | mg/L  | 5        | 2.50 |

## Sample: 401722 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>120</b>   | mg/L  | 1        | 1.00 |

## Sample: 401722 - Fresh

| Parameter | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>8.04</b>  | s.u.  | 1        | 2.00 |

## Sample: 401722 - 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<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.000</b> | g/ml  | 1        | 0.000 |



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**Sample: 401722 - Fresh**

| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>669</b>   | mg/L  | 10       | 2.50 |

**Sample: 401723 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>9700</b>  | mg/L  | 1        | 1.00 |



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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<br>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<br>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<br>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



| Parameter |   | Flag | Cert      | MDL<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 804                 | 804              | mg/L  | 20       | 0   | 10           |



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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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



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| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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  
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## Calibration Standards

### Standard (CCV-1)

QC Batch: 123931

Date Analyzed:

Analyzed By:

| Param | Flag | Cert    | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 24.5                   | 98                          | 90 - 110                      | 2015-08-17       |



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| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.







## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: August 19, 2015

Work Order: 15081114



Project Location: Tatum NM  
Project Name: Tatum Fresh & Brine Well

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 401722 | Fresh       | water  | 2015-07-08 | 17:30      | 2015-08-09    |
| 401723 | Brine       | water  | 2015-07-08 | 17:40      | 2015-08-09    |

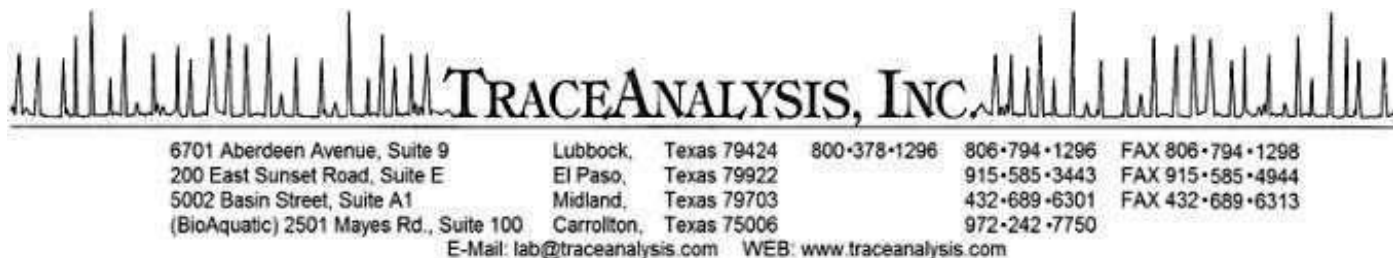
### Sample: 401722 - Fresh

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               | B,H  | <b>73.5</b>  | mg/L  | 2.5 |
| Dissolved Sodium       |      | <b>120</b>   | mg/L  | 1   |
| pH                     |      | <b>8.04</b>  | s.u.  | 2   |
| Specific Gravity       |      | <b>1.000</b> | g/ml  |     |
| Total Dissolved Solids |      | <b>669</b>   | mg/L  | 2.5 |

### Sample: 401723 - Brine

| Param            | Flag | Result      | Units | RL |
|------------------|------|-------------|-------|----|
| Dissolved Sodium |      | <b>9700</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: 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.

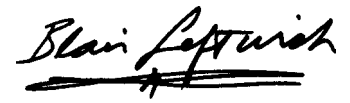
| Sample | Description        | Matrix | Date Taken | Time Taken | Date Received |
|--------|--------------------|--------|------------|------------|---------------|
| 407093 | BW-22 Tatum Fresh  | water  | 2015-10-23 | 13:15      | 2015-10-26    |
| 407094 | BW-22 Tatum Brine  | water  | 2015-10-23 | 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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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.



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# 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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,6 | <b>12500</b> | mg/L  | 100      | 1.00 |



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**Sample: 407094 - BW-22 Tatum 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<br>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   | 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<br>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    | 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<br>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 | Prep Method: | N/A |
| QC Batch:   | 126018  | Date Analyzed:      | 2015-11-02   | Analyzed By: | CF  |
| Prep Batch: | 106620  | Sample Preparation: |              | Prepared By: | CF  |

*continued ...*



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*sample 407095 continued ...*

| Parameter | Flag | Cert | RL<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Parameter | Flag | Cert | RL<br>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<br>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<br>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<br>Result  | Units | Dilution | RL   |
|-----------|------|-----------|---------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,6 | <b>176000</b> | mg/L  | 5000     | 2.50 |



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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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      |      | <b>1.18</b>  | 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<br>Result  | Units | Dilution | RL   |
|------------------|------|---------|---------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,6 | <b>108000</b> | 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,6 | <b>6.76</b>  | 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<br>Result  | Units | Dilution | RL   |
|------------------------|------|-----------|---------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,6 | <b>310000</b> | 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<br>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<br>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<br>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 |



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| Parameter | Flag | Cert      | MDL<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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



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| Param                  |           | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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

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Brine Well 3rd QT. Sample

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| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



Report Date: November 12, 2015  
BW-4 & BW-22

Work Order: 15102712  
Brine Well 3rd QT. Sample

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## Calibration Standards

### Standard (CCV-1)

QC Batch: 125907

Date Analyzed: 2015-10-27

Analyzed By: LQ

| Param | Flag | Cert    | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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

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 |

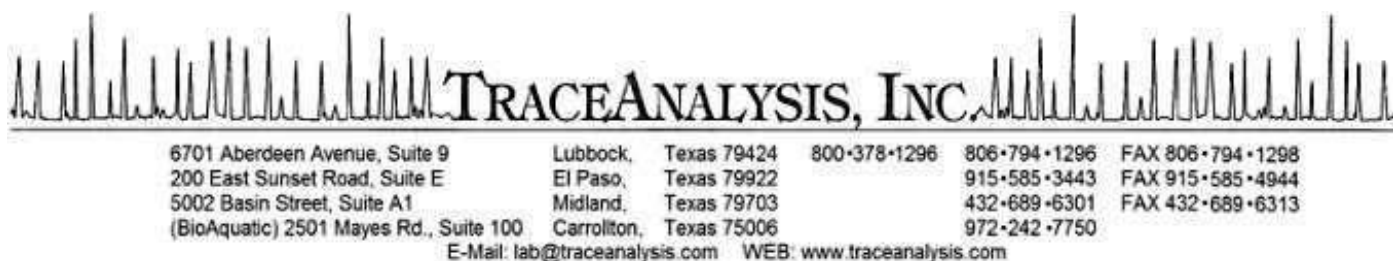
---

**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

(Corrected Report)

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM, 87124

Report Date: March 24, 2016

Work Order: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Report Corrections (Work Order 16022211)

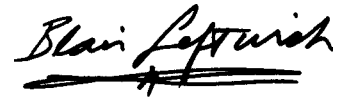
- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

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-Tatum were received by TraceAnalysis, Inc. on 2016-02-18 and assigned to work order 16022211. Samples for work order 16022211 were received intact at a temperature of -0.1 C.

Samples were analyzed for the following tests using their respective methods.

| Test          | Method       | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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 16022211 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-Tatum

Work Order: 16022211  
Brine Well-Tatum

Page Number: 6 of 20  
Tatum, NM

# Analytical Report

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | 76.6         | mg/L  | 10       | 2.50 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      |      | 0.985        | g/ml  | 1        | 0.00 |

## Sample: 414780 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 7.93         | s.u.  | 1        | 2.00 |

## Sample: 414780 - 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  |                     |            |              |     |



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| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>662</b>   | mg/L  | 10       | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | H    | 1,2,3,4,5 | <b>12600</b> | mg/L  | 500      | 2.50 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Density   |      | 1    | <b>0.996</b> | g/ml  | 1        | 0.00 |

**Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium |      | 2,3,4,5 | <b>6760</b>  | mg/L  | 1000     | 1.00 |



Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 7.29         | s.u.  | 1        | 2.00 |

Sample: 414781 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | 26700        | mg/L  | 1000     | 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 4630                | 4670             | mg/L  | 50       | 1   | 10           |



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## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



## 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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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| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | 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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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-Tatum

Work Order: 16022211  
Brine Well-Tatum

Page Number: 20 of 20  
Tatum, NM

---

| 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.







# 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: 16022211



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum

### Report Corrections (Work Order 16022211)

- 3/24/16: Added Chloride, pH, TDS and Density to sample 414781.

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 414780 | Fresh Water | water  | 2016-02-17 | 17:55      | 2016-02-18    |
| 414781 | Brine Water | water  | 2016-02-17 | 18:00      | 2016-02-18    |

### Sample: 414780 - Fresh Water

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>76.6</b>  | mg/L  | 2.5 |
| Density                |      | <b>0.985</b> | g/ml  |     |
| pH                     |      | <b>7.93</b>  | s.u.  | 2   |
| Total Dissolved Solids |      | <b>662</b>   | mg/L  | 2.5 |

### Sample: 414781 - Brine Water

| Param            | Flag | Result       | Units | RL  |
|------------------|------|--------------|-------|-----|
| Chloride         | H    | <b>12600</b> | mg/L  | 2.5 |
| Density          | 1    | <b>0.996</b> | g/ml  |     |
| Dissolved Sodium |      | <b>6760</b>  | mg/L  | 1   |
| pH               |      | <b>7.29</b>  | s.u.  | 2   |

*continued ...*

<sup>1</sup>Analyzed out of hold time.



---

*sample 414781 continued ...*

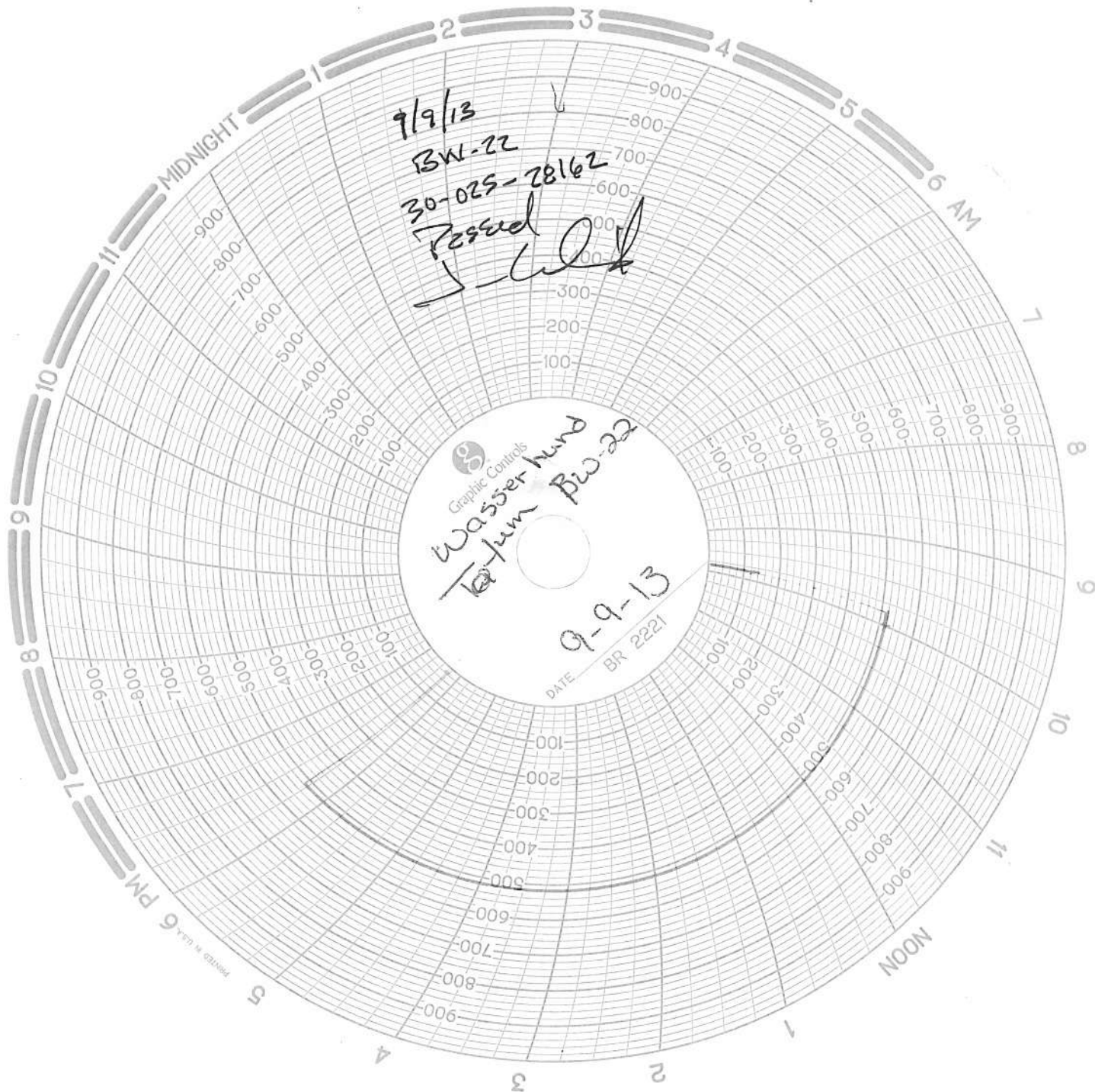
| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Total Dissolved Solids |      | <b>26700</b> | mg/L  | 2.5 |



## Appendix “D”

- 2013 MIT Chart

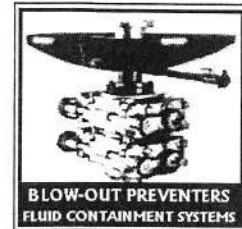






## **D & L Meters & Instrument Service, Inc.**

Lovington, NM 88260  
P.O. Box 1621  
Office: (575) 396-3715  
Fax: (575) 396-5812



Friday, June 28, 2013

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

**Company:** Celero Energy  
**Unit:** N/A  
**Model:** 8" Bristols  
**Pressure Rating:** 1,000#  
**Serial #:** 3914

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

  
Jesse Arenivas, Technician

BLOW-OUT PREVENTERS  
FLUID CONTAINMENT SYSTEMS



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan



2015 BW-22 AOR Review-- Well Status List  
up-dated Apr 5, 2016

|   | API#                | Well Name                           | UL       | ectio     | Ts         | Rg         | Footage                      | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR | Casing Progra<br>Checked | Cased/Cemented<br>across salt section | Corrective Action<br>Required |
|---|---------------------|-------------------------------------|----------|-----------|------------|------------|------------------------------|---|--------------------------|---------------------------------------|-------------------------------|
| 1 | <u>30-025-28162</u> | <u>Wasserhund Quality Watson #1</u> | <u>M</u> | <u>20</u> | <u>12s</u> | <u>36e</u> | <u>593 FSL &amp; 639 FWL</u> | NA  | NA                       | Na                                    | NA                            |

0 0

1 Total # of wells in adjacent quarter-sections

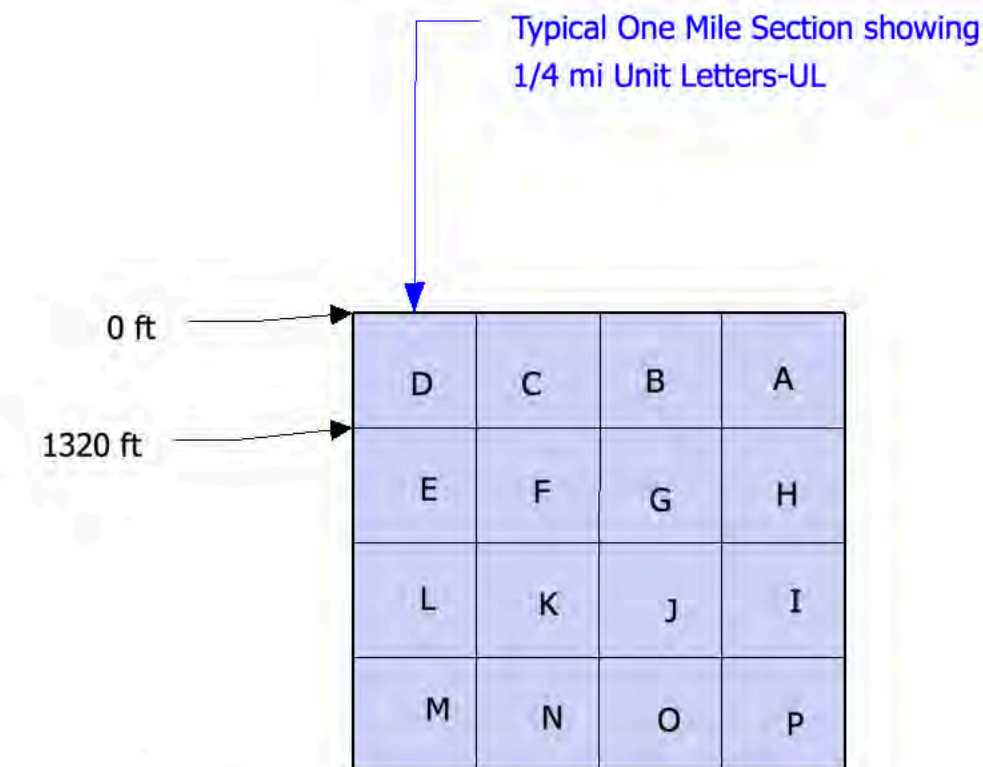
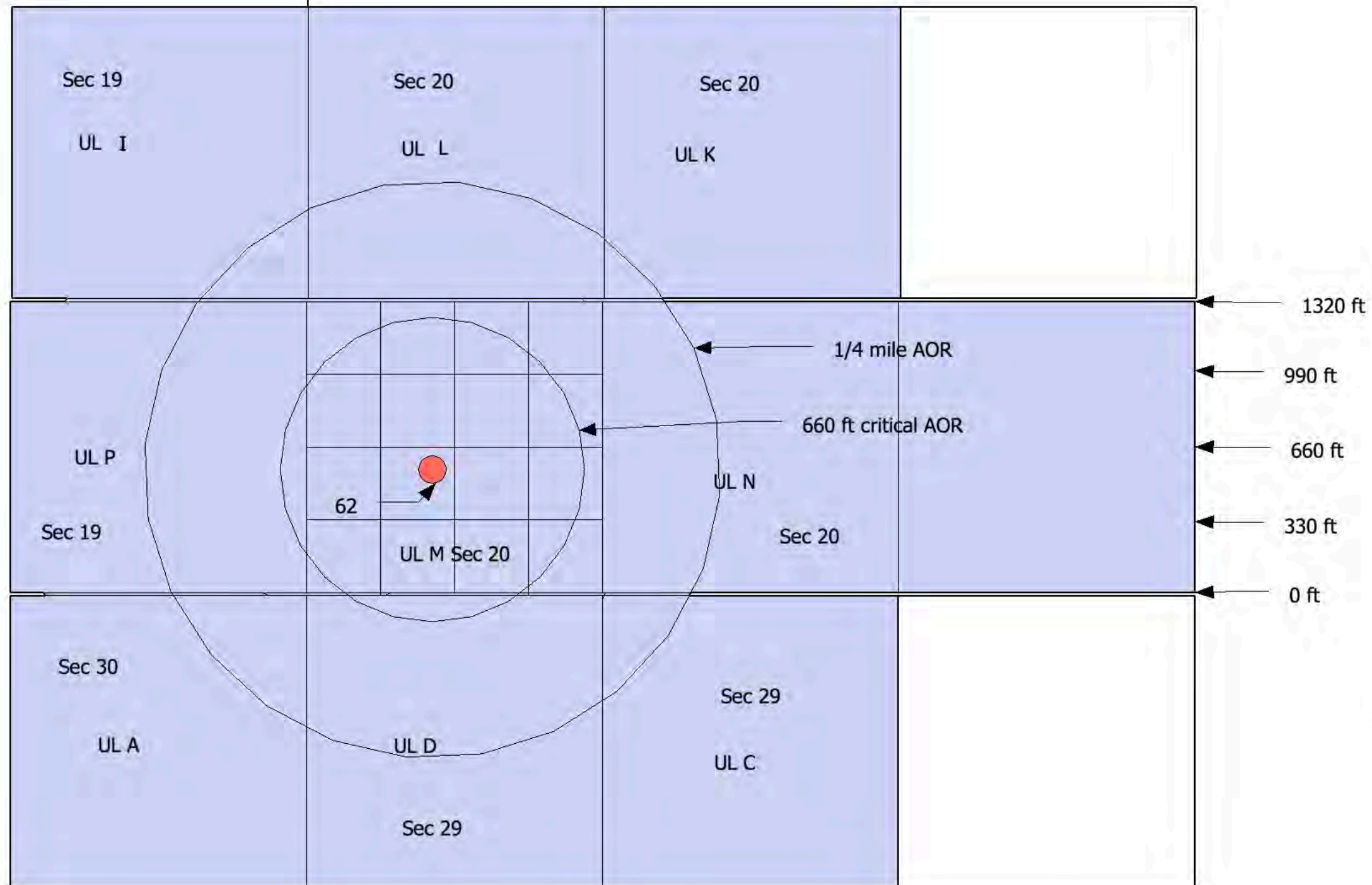
0 Total # of wells in 1/4 mile AOR

0 Total # of wells that within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked and reported annually.

Notes:

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





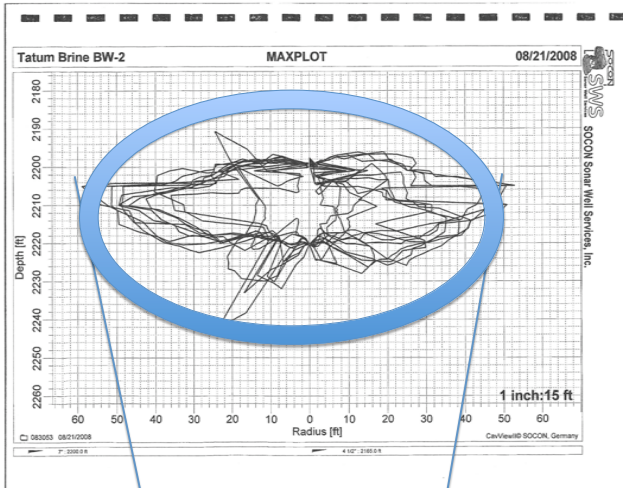
|  |                                  |   |
|--|----------------------------------|---|
| Brine Well Area of Review (AOR) UL Plot Plan | Well API#: 30-025-28162          | Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list. |
| Operator Name: Wasserhund INC                | Permit # BW-22                   |   |
| AOR Year: 2015                               | Location: UL M-Sec 20-Ts12s-R36e |   |



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2015 Radius and D/H calculations.
- Aerial View showing Cavern Radius





$$R = \sqrt[3]{V / 3.14 \cdot H}$$

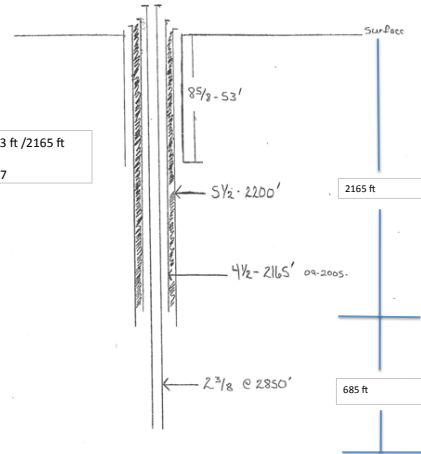
Vol = 2.71 million cuft  
Height = 685 ft from casing  
shoe to bottom

Radius = 61.5 feet  
Dia = 123.0 ft  
2015 year

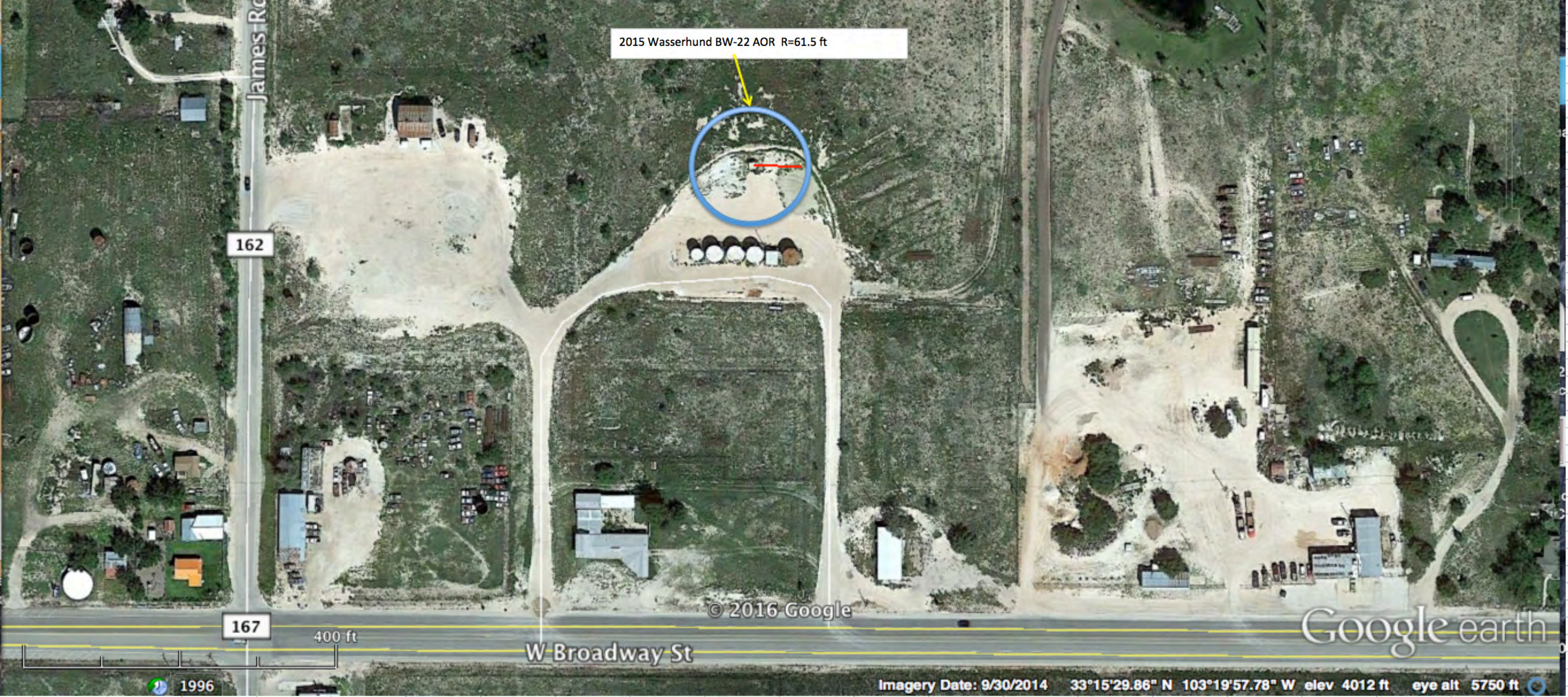
$$D/H = 123 \text{ ft} / 2165 \text{ ft}$$

$$D/H = .057$$

Wasserhund Inc.  
Quality Brine  
Watson #1  
H 20-128-36e  
30-025-28162







2015 Wasserhund BW-22 AOR R=61.5 ft

162

167

400 ft

W Broadway St

© 2016 Google

Google earth

1996

Imagery Date: 9/30/2014 33°15'29.86" N 103°19'57.78" W elev 4012 ft eye alt 5750 ft



## Appendix “G”

- Solution Cavern Monitoring Plan Program



# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc. Brine Station  
Tatum Brine Station  
OCD Permit BW-22  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e

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.

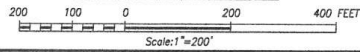
Attached: Examples Only:

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



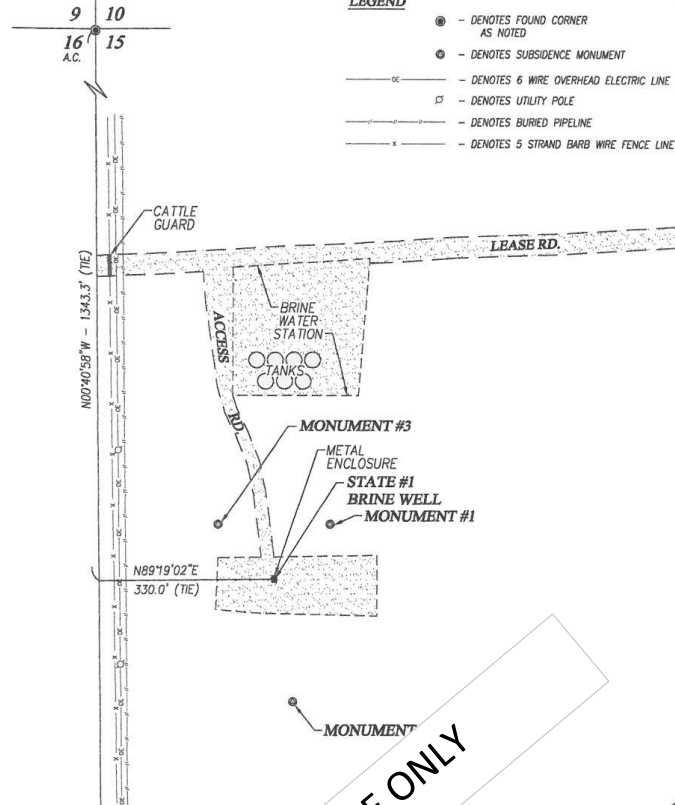
# TOPOGRAPHIC MAP

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



Figure 1



PROVIDING SURVEYING SERVICES  
SINCE 1946  
JOHN WESS SURVEYING COMPANY  
412 N. DAL PASO  
HOBBS, N.M. 88240  
(505) 393-3117



Figure 2

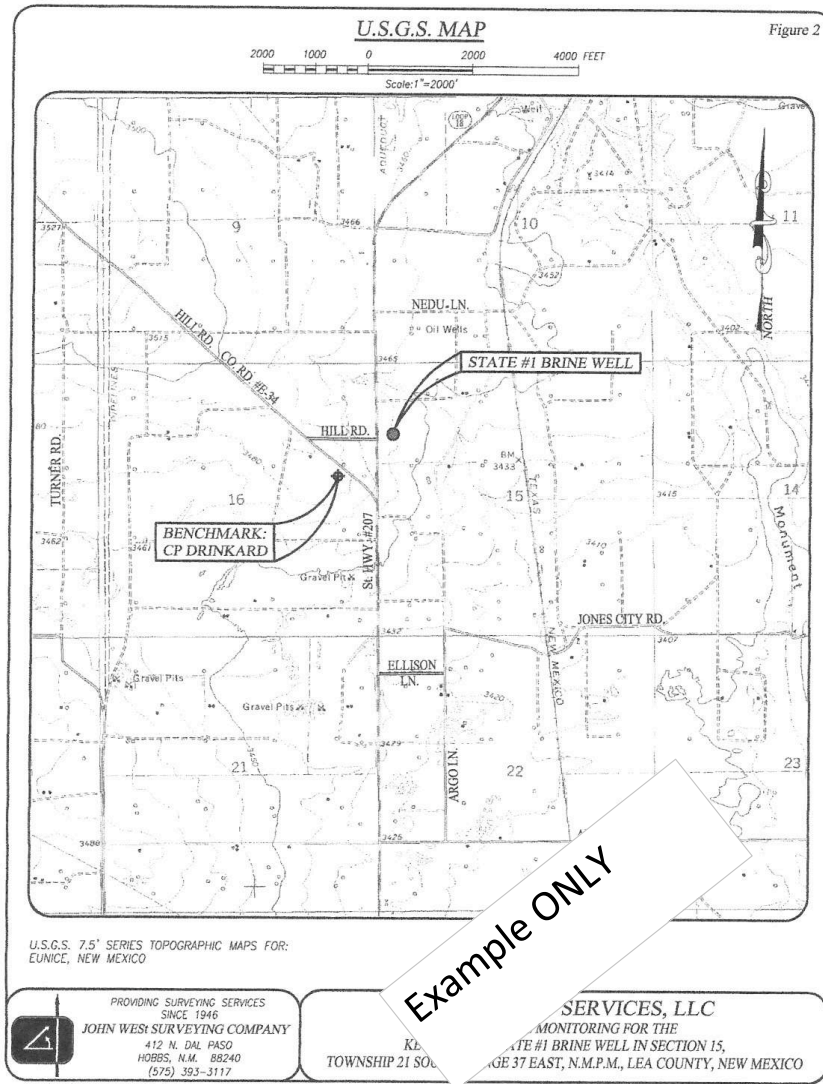
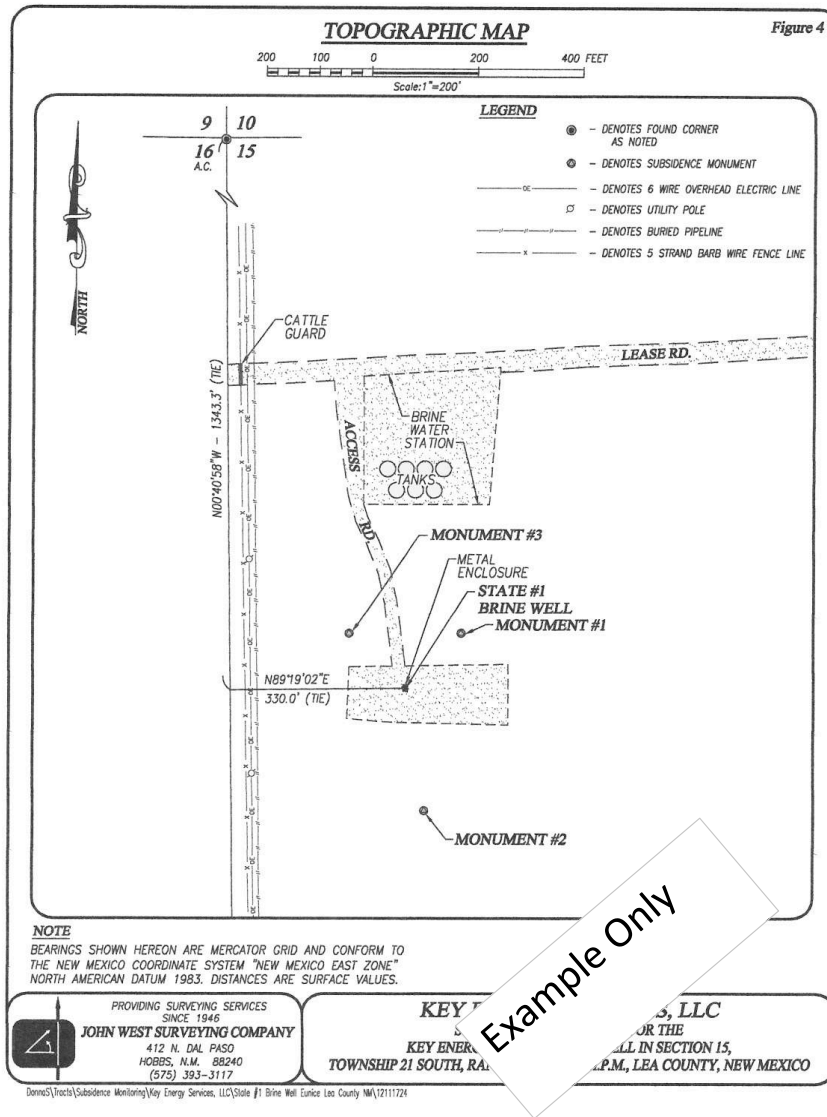




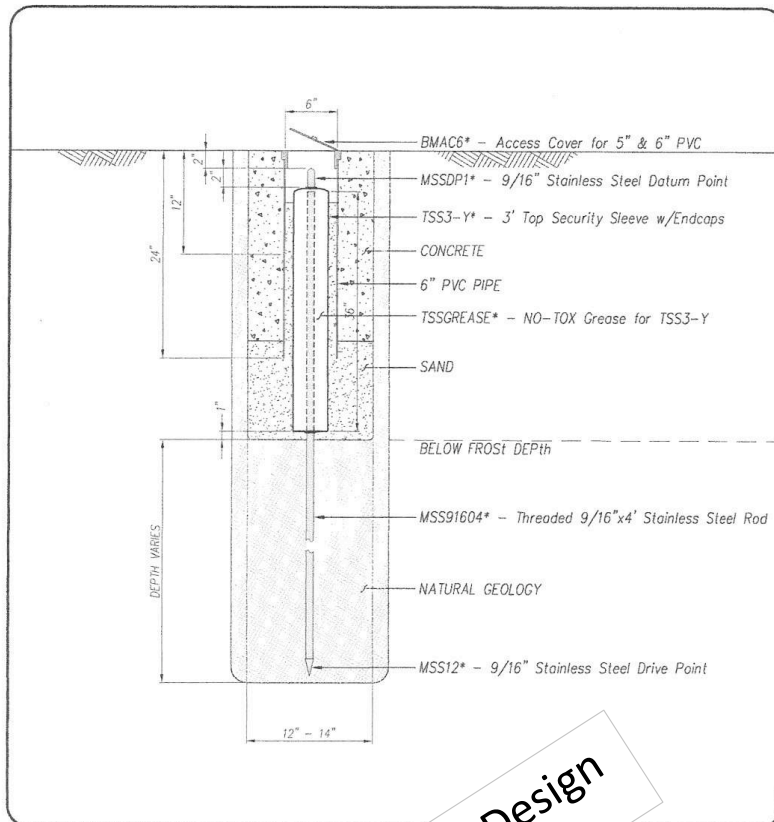
Figure 4





**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 WESLEY 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

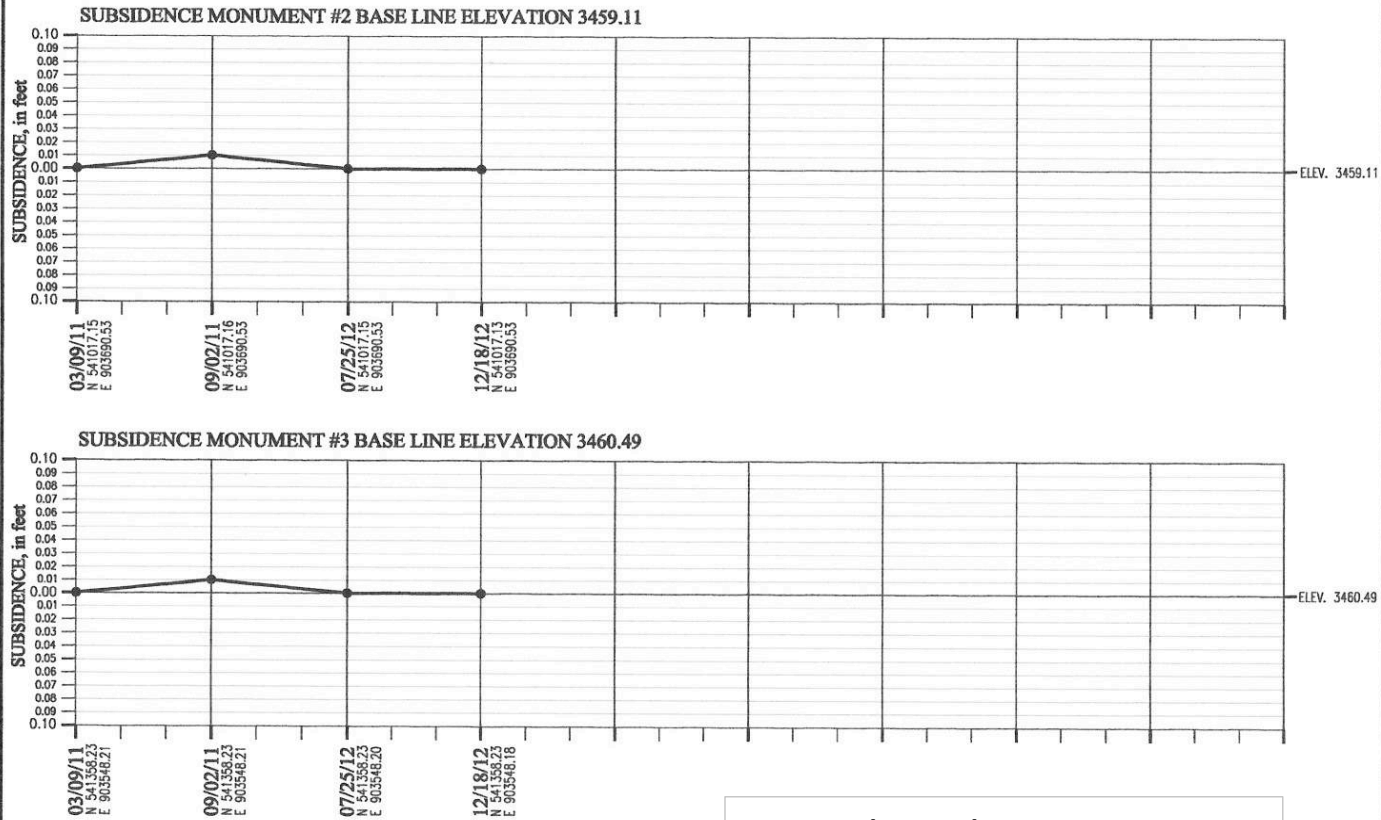
| Station | Adjusted Elev    | Standard Dev. |                        |
|---------|------------------|---------------|------------------------|
| L98     | <b>3434.3700</b> | 0.00000       | NGS MONUMENT L98       |
| 22      | 3434.3700        | 0.00000       |                        |
| 1       | 3436.9801        | 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<br>Elev. Diff.<br>(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”

Wasserhund Inc. Closure Cost Estimate.



|                                    |  |  |             |      |          |  |
|------------------------------------|--|--|-------------|------|----------|--|
|                                    |  |  |             |      |          |  |
|                                    |  |  |             |      |          |  |
|                                    |  |  |             |      |          |  |
| 2015 Annual Report                 |  |  |             |      |          |  |
| BW-22 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 |  |
|                                    |  |  |             |      |          |  |
|                                    |  |  |             |      |          |  |



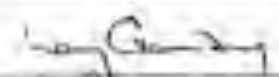
**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

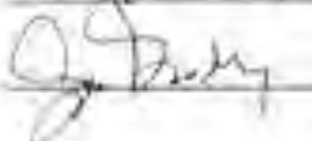
**ANNUAL CLASS III WELL REPORT FOR 2014**

Wasserhund Inc.  
Tatum Brine Station  
OCD Permit BW-22  
*Expiration Date: Nov 08, 2018*  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e  
May 30, 2015

Submitted by: Prita 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 Expiration Date November 08, 2018.

During the 2014 year, there was no major or remedial work performed on the brine well. Due to brine quality issues experienced during the past two years, Wasserhund Inc. submitted a C-103 to OCD in late December of 2012 to investigate why the well is not producing high quality brine water. (C-103 included in **Appendix “A”**)

Due to the demand for cut-brine, Wasserhund Inc. decided to forego any well work during the 2014 calendar year.

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 1983 and has been in operation for approximately 31 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado “Salt Formation” at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small compared to similar wells of age. **Bullet Point 10** (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.

As will be discussed in **Bullet Point 5** (Chemical Analysis) ever since the last open-hole formation-test, the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.



General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions unless unusual operating conditions warrant such.

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 **Bullet Point 10** below.

Depending upon OCD requirements and local economics, Wasserhund Inc. will have to evaluate whether future operations of this well is warranted as a concentrated brine producing well.

### **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")

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 2014 brine production volume was 11,042 bbls and the lifetime production volume is 2,712,147 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: Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 380 psig, which is approximately 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 260 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 chemical analysis and chain-of-custody of the brine and fresh water injection water samples collected and analyzed by Trace Analysis in Lubbock, Texas, for the 2014 year. 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 north 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 specific gravity of the brine water was noted to be a good 10# brine in the first half of the year. Production actually picked up in the second half of the year and the specific gravity (Density) fell back to a very low of 1.03 or 8.58 #/gal. As previously reported, from time to time, an off red color of the produced brine has been noted, possibly caused by injected fresh water interacting with the upper Salado/Rustler formation where the salt has been dissolved.

Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn't recover, then some remedial action may be taken, including the possibility of plugging the well, reversing the flow, or deepening the well.

#### **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, but due to some down-hole geological-physical characteristics, is only able to make a cut-brine ranging in density of 1.20 to 1.03 lb/gal.

### **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 have 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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files and actual on-site field verification, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.



In the 2014 review, there were no new wells added to the list. **Appendix “E”** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-22 brine well.

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. 123.0 ft ( $r = 61.5$  ft) up-dated for 2014, a 10:1 safety factor is applied that equates to about 615 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.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

#### **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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.712 million barrels of brine produced as of December 2014. The maximum diameter was calculated to be approximately 123.0 feet with a corresponding D/H ratio of .057 updated for the 2014 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in **Appendix “F”** is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .057 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 11.5 times.

Included in **Appendix “F”** is an aerial view showing the 61.5-foot radius superimposed around the brine well and station.

## **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.*

**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.**

However, in order to meet the new permit requirements, 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 Request: 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-22 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-22 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.



**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”

- C-103
- Aerial Photo
- Discharge Plan BW-22



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

**HOBBS OGD**

State of New Mexico

Energy, Minerals and Natural Resources

Form C-103

Revised August 1, 2011

DEC 14 2012

CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

**RECEIVED**

|  |
|--|
| WELL API NO.<br>30-025-26883 <b>28162</b>  |
| 5. Indicate Type of Lease<br>STATE <input type="checkbox"/> FEE <input type="checkbox"/> |
| 6. State Oil & Gas Lease No.   |
| 7. Lease Name or Unit Agreement Name<br>Quality Brine                                    |
| 8. Well Number 1   |
| 9. OGRID Number<br>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 : 593 feet from the South line and 639 feet from the West line  
Section 20 Township 12s Range 36e 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: ☐

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.

1. Pull tubing because of light brine weight.
2. Run packer, test casing.
3. Drill to approximately 2850'.
4. Return to making brine.

Begin work as soon as we have OCD approval.

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 President

DATE 12/05/12

Type or print name Larry Gandy

E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

**For State Use Only**

APPROVED BY:

Maal Whitaker

TITLE Compliance Officer

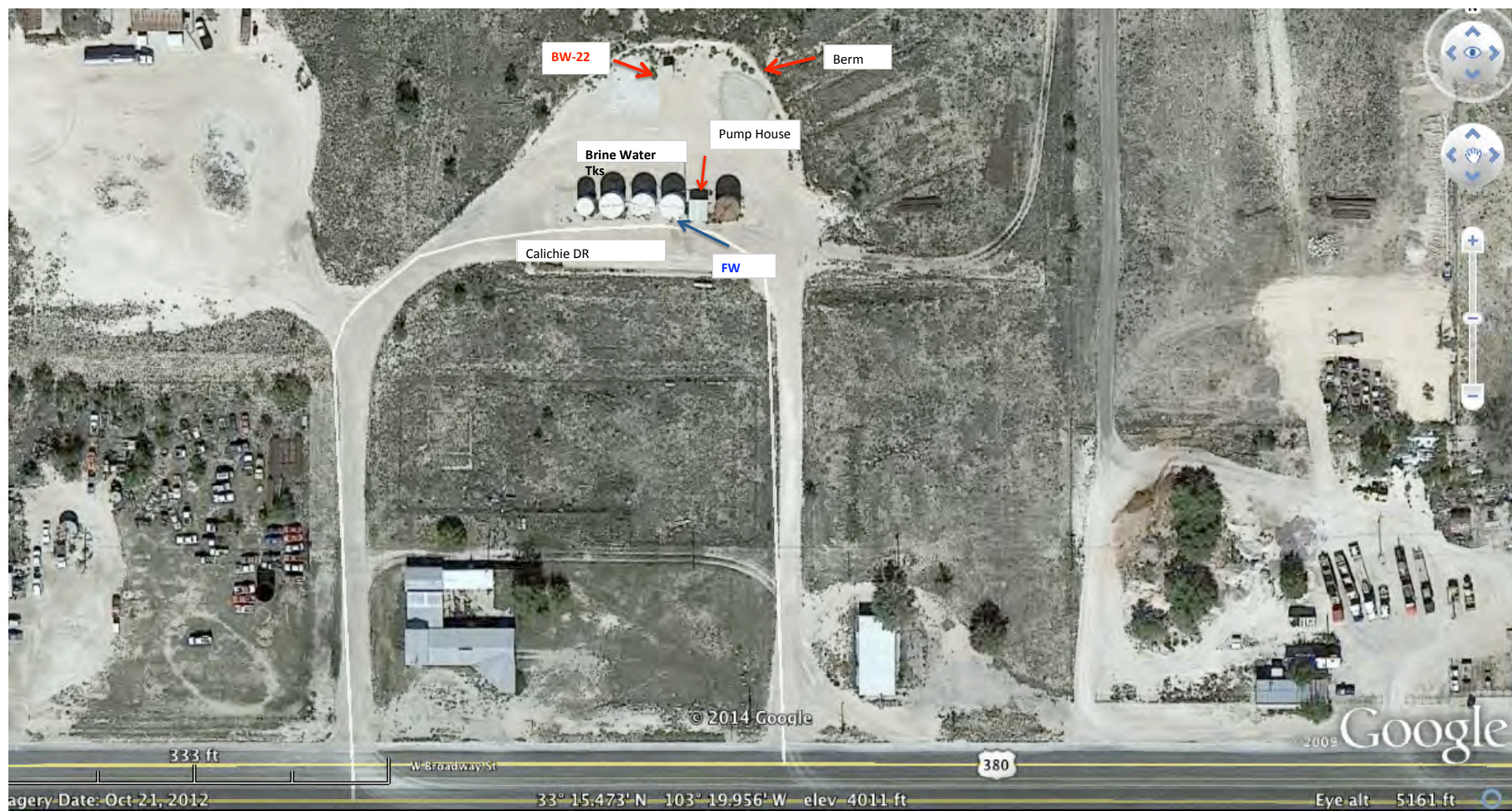
DATE 12-21-2012

Conditions of Approval (if any):

JAN 10 2013

chm







BW-22

Wasserhund/Tatum  
Watson #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-22 for the Watson #1 Brine Well in Unit M of Section 20, Township 12 South, Range 36 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-22 (API# 30-025-28162) 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



## **DISCHARGE PERMIT BW-22**

### **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-22 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Watson #1 - API No. 30-025-28162) located 593 feet FSL and 639 feet FWL (SW/4 SW/4, Unit Letter M) in Section 20, Township 12 South, Range 36 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located within Tatum, New Mexico to the north of US 380.

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 30 feet below ground surface and has a total dissolved solids concentration of approximately 700 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.



- 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.



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-22 Annual Production Data         |  |  |      |            |       |            |  |   |  |
|  |  |  |      |            |       |            |  | Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite. |  |
|  |  |  |      | Brine-BBLS |       | Fresh-BBLS |  | % diff  |  |
| Jan  |  |  |      | 100        |       | 110        |  | 10.00%  |  |
| Feb  |  |  |      | 160        |       | 175        |  | 9.38%   |  |
| Mar  |  |  |      | 916        |       | 937        |  | 2.29%   |  |
| Apr  |  |  |      | 1225       |       | 1275       |  | 4.08%   |  |
| May  |  |  |      | 763        |       | 776        |  | 1.70%   |  |
| Jun  |  |  |      | 1020       |       | 1055       |  | 3.43%   |  |
| Jul  |  |  |      | 1735       |       | 1755       |  | 1.15%   |  |
| Aug  |  |  |      | 960        |       | 995        |  | 3.65%   |  |
| Sep  |  |  |      | 2323       |       | 2350       |  | 1.16%   |  |
| Oct  |  |  |      | 810        |       | 830        |  | 2.47%   |  |
| Nov  |  |  |      | 320        |       | 335        |  | 4.69%   |  |
| Dec  |  |  |      | 710        |       | 725        |  | 2.11%   |  |
| 2014 Total   |  |  |      | 11042      |       | 11318      |  | 2.50%   |  |
|  |  |  |      |            |       |            |  |   |  |
|  |  |  |      | 2,701,105  |       |            |  |   |  |
| Total Brine Water Production Carry Over from Years Past BBLs |  |  |      |            |       |            |  |   |  |
| Total Production year ending                                 |  |  | 2014 | 2,712,147  | BBL's |            |  |   |  |



## 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 |

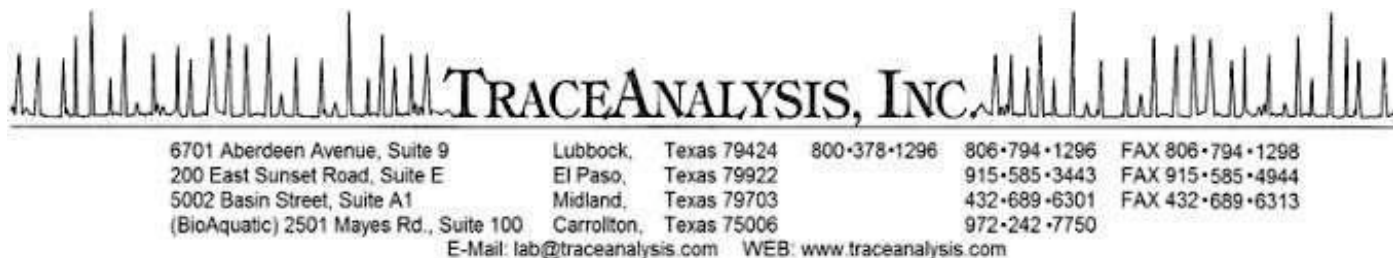
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**Sample: 359862 - BW-22 Brine**

| 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.

Dr. Blair Leftwich, Director  
Dr. Michael Abel, Project Manager



# Report Contents

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| QC Batch 110975 - Duplicate (1) . . . . .    | 10        |
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| QC Batch 111321 - CCV (2) . . . . .          | 15        |
| QC Batch 111322 - CCV (1) . . . . .          | 15        |
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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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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.



Report Date: April 23, 2014  
BW-4 & BW-22

Work Order: 14040811  
Annual Report

Page Number: 4 of 18  
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<br>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<br>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<br>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

Work Order: 14040811  
Annual Report

Page Number: 5 of 18  
Buckeye(BW-4) Tatum (BW-22)

| Parameter              | Flag | Cert | RL<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Parameter | Flag | Cert | RL<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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

Work Order: 14040811  
Annual Report

Page Number: 18 of 18  
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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[illegible]

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

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## Summary Report

Lester Wayne Price Jr.  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: February 17, 2015

Work Order: 15012304



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 385127 | Fresh       | water  | 2015-01-16 | 06:17      | 2015-01-21    |
| 385128 | Brine       | water  | 2015-01-16 | 06:25      | 2015-01-21    |


### Sample: 385127 - Fresh

| Param                  | Flag | Result        | Units | RL  |
|------------------------|------|---------------|-------|-----|
| Chloride               |      | <b>71.6</b>   | mg/L  | 2.5 |
| Dissolved Sodium       | Qs   | <b>75.9</b>   | mg/L  | 1   |
| pH                     |      | <b>8.20</b>   | s.u.  | 2   |
| Specific Gravity       |      | <b>0.9861</b> | g/ml  |     |
| Total Dissolved Solids |      | <b>642</b>    | mg/L  | 2.5 |

### Sample: 385128 - Brine

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               | H    | <b>16000</b> | mg/L  | 2.5 |
| Dissolved Sodium       | Qs   | <b>11400</b> | mg/L  | 1   |
| pH                     |      | <b>6.16</b>  | s.u.  | 2   |
| Specific Gravity       |      | <b>1.027</b> | g/ml  |     |
| Total Dissolved Solids |      | <b>31000</b> | mg/L  | 2.5 |





**TRACEANALYSIS, INC.**

|  |                         |              |              |                  |
|--|-------------------------|--------------|--------------|------------------|
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| (BioAquatic) 2501 Mayes Rd., Suite 100 | Carrollton, Texas 75006 |              | 972-242-7750 |                  |

E-Mail: [lab@traceanalysis.com](mailto:lab@traceanalysis.com) WEB: [www.traceanalysis.com](http://www.traceanalysis.com)

## 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: 15012304



Project Location: Tatum, NM  
Project Name: Brine Well-Tatum  
Project Number: Brine Well-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 385127 | Fresh       | water  | 2015-01-16 | 06:17      | 2015-01-21    |
| 385128 | Brine       | water  | 2015-01-16 | 06:25      | 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 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



# Report Contents

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## Case Narrative

Samples for project Brine Well-Tatum were received by TraceAnalysis, Inc. on 2015-01-21 and assigned to work order 15012304. Samples for work order 15012304 were received intact at a temperature of 2.0 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>Date    |
|------------------|---------------|---------------|---------------------|-------------|---------------------|
| Chloride (IC)    | E 300.0       | 100958        | 2015-02-13 at 15:00 | 119384      | 2015-02-13 at 18:06 |
| 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 15012304 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-Tatum

Work Order: 15012304  
Brine Well-Tatum

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# Analytical Report

## Sample: 385127 - Fresh

|             |               |                     |            |              |     |
|-------------|---------------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock       | Analytical Method:  | E 300.0    | Prep Method: | N/A |
| Analysis:   | Chloride (IC) | Date Analyzed:      | 2015-02-13 | Analyzed By: | RL  |
| QC Batch:   | 119384        | Sample Preparation: |            | Prepared By: | RL  |
| Prep Batch: | 100958        |                     |            |              |     |

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | B    | 1,2,3,4,5 | 71.6         | mg/L  | 10       | 2.50 |

## Sample: 385127 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium | Qs   | 2,3,4,5 | 75.9         | mg/L  | 1        | 1.00 |

## Sample: 385127 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 8.20         | s.u.  | 1        | 2.00 |

## Sample: 385127 - 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           |                     |               |              |     |



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Brine Well-Tatum

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| Parameter        | Flag | Cert | RL<br>Result  | Units | Dilution | RL    |
|------------------|------|------|---------------|-------|----------|-------|
| Specific Gravity |      |      | <b>0.9861</b> | g/ml  | 1        | 0.000 |

**Sample: 385127 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>642</b>   | mg/L  | 20       | 2.50 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | H    | 1,2,3,4,5 | <b>16000</b> | mg/L  | 1000     | 2.50 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium | Qs   | 2,3,4,5 | <b>11400</b> | mg/L  | 100      | 1.00 |



Report Date: February 17, 2015  
Brine Well-Tatum

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**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>6.16</b>  | s.u.  | 1        | 2.00 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.027</b> | g/ml  | 1        | 0.000 |

**Sample: 385128 - 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<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>31000</b> | mg/L  | 1000     | 2.50 |



Report Date: February 17, 2015  
Brine Well-Tatum

Work Order: 15012304  
Brine Well-Tatum

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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<br>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: 100533 QC Preparation: 2015-01-26 Prepared By: RL

| Parameter              | Flag | Cert      | MDL<br>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<br>Result | Units | RL |
|------------------|------|---------|---------------|-------|----|
| Dissolved Sodium |      | 2,3,4,5 | <0.0184       | mg/L  | 1  |

### Method Blank (1) QC Batch: 119384

QC Batch: 119384 Date Analyzed: 2015-02-13 Analyzed By: RL  
Prep Batch: 100958 QC Preparation: 2015-02-13 Prepared By: RL



Report Date: February 17, 2015  
Brine Well-Tatum

Work Order: 15012304  
Brine Well-Tatum

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| Parameter | Flag | Cert      | MDL<br>Result | Units | RL  |
|-----------|------|-----------|---------------|-------|-----|
| Chloride  |      | 1,2,3,4,5 | 0.826         | mg/L  | 2.5 |

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 |

| Parameter | Flag | Cert      | MDL<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 850                 | 806              | mg/L  | 20       | 5   | 10           |



Report Date: February 17, 2015  
Brine Well-Tatum

Work Order: 15012304  
Brine Well-Tatum

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Tatum, 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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: 119384  
Prep Batch: 100958

Date Analyzed: 2015-02-13  
QC Preparation: 2015-02-13

Analyzed By: RL  
Prepared By: RL



Report Date: February 17, 2015  
Brine Well-Tatum

Work Order: 15012304  
Brine Well-Tatum

Page Number: 11 of 17  
Tatum, NM

| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|----------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|
| Chloride |   | 1,2,3,4,5 | 24.1          | mg/L  | 1    | 25.0            | 0.826            | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|----------|---|-----------|----------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Chloride |   | 1,2,3,4,5 | 24.3           | mg/L  | 1    | 25.0            | 0.826            | 94   | 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: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL

| Param    | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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-Tatum

Work Order: 15012304  
Brine Well-Tatum

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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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: 385127

QC Batch: 119384  
Prep Batch: 100958

Date Analyzed: 2015-02-13  
QC Preparation: 2015-02-13

Analyzed By: RL  
Prepared By: RL

| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit |
|----------|---|-----------|--------------|-------|------|-----------------|------------------|------|---------------|
| Chloride |   | 1,2,3,4,5 | 319          | mg/L  | 10   | 250             | 71.6             | 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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>Limit |
|----------|---|-----------|---------------|-------|------|-----------------|------------------|------|---------------|-----|--------------|
| Chloride |   | 1,2,3,4,5 | 312           | mg/L  | 10   | 250             | 71.6             | 96   | 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: 386889

QC Batch: 119410  
Prep Batch: 100982

Date Analyzed: 2015-02-16  
QC Preparation: 2015-02-16

Analyzed By: RL  
Prepared By: RL



Report Date: February 17, 2015  
Brine Well-Tatum

Work Order: 15012304  
Brine Well-Tatum

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| Param    | F | C         | MS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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-Tatum

Work Order: 15012304  
Brine Well-Tatum

Page Number: 15 of 17  
Tatum, NM

#### Standard (CCV-1)

QC Batch: 119384

Date Analyzed: 2015-02-13

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 23.6                   | 94                          | 90 - 110                      | 2015-02-13       |

#### Standard (CCV-2)

QC Batch: 119384

Date Analyzed: 2015-02-13

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|----------|------|-----------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Chloride |      | 1,2,3,4,5 | mg/L  | 25.0                  | 23.8                   | 95                          | 90 - 110                      | 2015-02-13       |

#### Standard (CCV-1)

QC Batch: 119410

Date Analyzed: 2015-02-16

Analyzed By: RL

| Param    | Flag | Cert      | Units | CCVs<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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 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.  |
| 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: 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 |

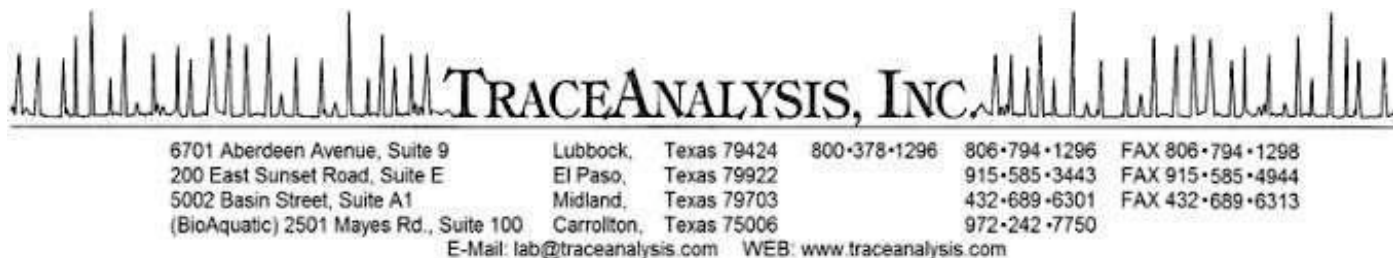
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**Sample: 368932 - TS BW**

| 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



# Report Contents

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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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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<br>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<br>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<br>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   |                     |            |              |     |



Report Date: July 31, 2014  
Buckeye Station-Tatum Station

Work Order: 14072110  
Quarterly Samples

Page Number: 5 of 19  
Buckeye, NM-Tatum, NM

| Parameter              | Flag | Cert      | RL<br>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<br>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<br>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<br>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 | 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<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 2,3,7,8 | <b>6.90</b>  | s.u.  | 1        | 2.00 |

**Sample: 368930 - BS BW**

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| Laboratory: | Lubbock | Analytical Method:  | SM 2540C   | Prep Method: | N/A |
| Analysis:   | TDS     | Date Analyzed:      | 2014-07-23 | Analyzed By: | CF  |
| QC Batch:   | 113960  | Sample Preparation: | 2014-07-23 | Prepared By: | CF  |
| Prep Batch: | 96388   |                     |            |              |     |

| Parameter              | Flag | Cert      | RL<br>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       | 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<br>Result | Units | Dilution | RL   |
|-----------|------|-------|--------------|-------|----------|------|
| Chloride  |      | 1,4,6 | <b>76.8</b>  | mg/L  | 10       | 2.50 |

**Sample: 368931 - TS 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   |                     |              |              |     |

*continued ...*



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*sample 368931 continued ...*

| Parameter | Flag | Cert | RL<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Parameter | Flag | Cert | RL<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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.







## Summary Report

Wayne Price  
Price LLC  
312 Encantado Ridge Ct. NE  
Rio Rancho, NM 87124

Report Date: October 29, 2014

Work Order: 14102108



Project Location: Tatum, NM  
Project Name: Wasserhund

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 377451 | Fresh       | water  | 2014-10-16 | 15:56      | 2014-10-21    |
| 377452 | Brine       | water  | 2014-10-16 | 15:43      | 2014-10-21    |

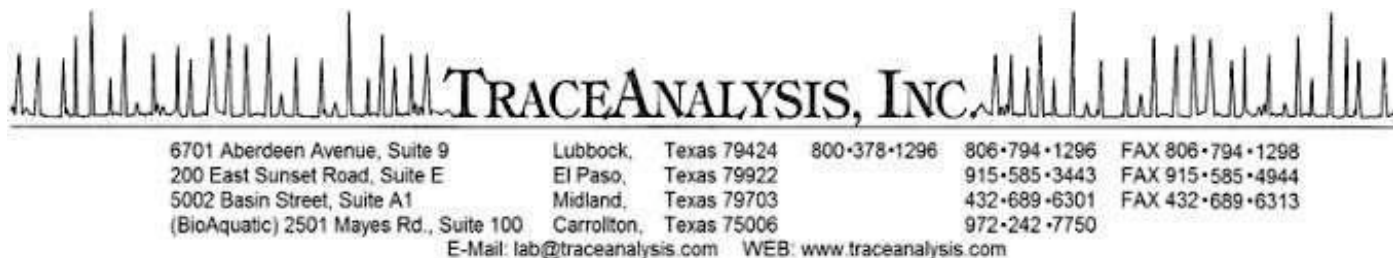
### Sample: 377451 - Fresh

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>75.5</b>  | mg/L  | 2.5 |
| pH                     |      | <b>8.02</b>  | s.u.  | 2   |
| Specific Gravity       |      | <b>1.004</b> | g/ml  |     |
| Total Dissolved Solids |      | <b>672</b>   | mg/L  | 2.5 |

### Sample: 377452 - Brine

| Param                  | Flag | Result       | Units | RL  |
|------------------------|------|--------------|-------|-----|
| Chloride               |      | <b>16800</b> | mg/L  | 2.5 |
| Dissolved Sodium       | Qs   | <b>14100</b> | mg/L  | 1   |
| pH                     |      | <b>6.34</b>  | s.u.  | 2   |
| Specific Gravity       |      | <b>1.035</b> | g/ml  |     |
| Total Dissolved Solids |      | <b>32400</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 29, 2014

Work Order: 14102108



Project Location: Tatum, NM  
Project Name: Wasserhund  
Project Number: Wasserhund-Tatum

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 |
|--------|-------------|--------|------------|------------|---------------|
| 377451 | Fresh       | water  | 2014-10-16 | 15:56      | 2014-10-21    |
| 377452 | Brine       | water  | 2014-10-16 | 15:43      | 2014-10-21    |

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 Wasserhund were received by TraceAnalysis, Inc. on 2014-10-21 and assigned to work order 14102108. Samples for work order 14102108 were received intact at a temperature of 1.9 C.

Samples were analyzed for the following tests using their respective methods.

| Test             | Method        | Prep<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>Date    |
|------------------|---------------|---------------|---------------------|-------------|---------------------|
| Chloride (IC)    | E 300.0       | 98705         | 2014-10-28 at 15:00 | 116735      | 2014-10-28 at 16:01 |
| 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 14102108 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: 377451 - Fresh

Laboratory: Lubbock  
Analysis: Chloride (IC)  
QC Batch: 116735  
Prep Batch: 98705

Analytical Method: E 300.0  
Date Analyzed: 2014-10-28  
Sample Preparation:

Prep Method: N/A  
Analyzed By: RL  
Prepared By: RL

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  | B    | 1,2,3,4,5 | 75.5         | mg/L  | 10       | 2.50 |

Sample: 377451 - Fresh

Laboratory: Lubbock  
Analysis: pH  
QC Batch: 116526  
Prep Batch: 98540

Analytical Method: SM 4500-H+  
Date Analyzed: 2014-10-21  
Sample Preparation:

Prep Method: N/A  
Analyzed By: JP  
Prepared By: JP

| Parameter | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | 8.02         | s.u.  | 1        | 2.00 |

Sample: 377451 - Fresh

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<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | 1.004        | g/ml  | 1        | 0.000 |

Sample: 377451 - Fresh

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



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| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>672</b>   | mg/L  | 20       | 2.50 |

**Sample: 377452 - Brine**

Laboratory: Lubbock  
Analysis: Chloride (IC)      Analytical Method: E 300.0      Prep Method: N/A  
QC Batch: 116735      Date Analyzed: 2014-10-28      Analyzed By: RL  
Prep Batch: 98705      Sample Preparation:      Prepared By: RL

| Parameter | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|-----------|------|-----------|--------------|-------|----------|------|
| Chloride  |      | 1,2,3,4,5 | <b>16800</b> | mg/L  | 500      | 2.50 |

**Sample: 377452 - Brine**

Laboratory: Lubbock  
Analysis: Na, Dissolved      Analytical Method: S 6010C      Prep Method: S 3005A  
QC Batch: 116734      Date Analyzed: 2014-10-29      Analyzed By: LM  
Prep Batch: 98605      Sample Preparation: 2014-10-23      Prepared By: LM

| Parameter        | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|------------------|------|---------|--------------|-------|----------|------|
| Dissolved Sodium | Qs   | 2,3,4,5 | <b>14100</b> | mg/L  | 100      | 1.00 |

**Sample: 377452 - Brine**

Laboratory: Lubbock  
Analysis: pH      Analytical Method: SM 4500-H+      Prep Method: N/A  
QC Batch: 116526      Date Analyzed: 2014-10-21      Analyzed By: JP  
Prep Batch: 98540      Sample Preparation:      Prepared By: JP

| Parameter | Flag | Cert    | RL<br>Result | Units | Dilution | RL   |
|-----------|------|---------|--------------|-------|----------|------|
| pH        |      | 1,2,4,5 | <b>6.34</b>  | s.u.  | 1        | 2.00 |



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**Sample: 377452 - Brine**

|             |                  |                     |               |              |     |
|-------------|------------------|---------------------|---------------|--------------|-----|
| 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<br>Result | Units | Dilution | RL    |
|------------------|------|------|--------------|-------|----------|-------|
| Specific Gravity |      |      | <b>1.035</b> | g/ml  | 1        | 0.000 |

**Sample: 377452 - Brine**

|             |         |                     |            |              |     |
|-------------|---------|---------------------|------------|--------------|-----|
| 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   |                     |            |              |     |

| Parameter              | Flag | Cert      | RL<br>Result | Units | Dilution | RL   |
|------------------------|------|-----------|--------------|-------|----------|------|
| Total Dissolved Solids |      | 1,2,3,4,5 | <b>32400</b> | mg/L  | 200      | 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<br>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<br>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<br>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



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| Parameter              | Flag | Cert      | MDL<br>Result | Units | RL  |
|------------------------|------|-----------|---------------|-------|-----|
| Total Dissolved Solids |      | 1,2,3,4,5 | <25.0         | mg/L  | 2.5 |

---



Duplicates

Duplicates (1)    Duplicated Sample: 377452

QC Batch: 116526  
Prep Batch: 98540

Date Analyzed: 2014-10-21  
QC Preparation: 2014-10-21

Analyzed By: JP  
Prepared By: JP

| Param |         | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|-------|---------|---------------------|------------------|-------|----------|-----|--------------|
| pH    | 1,2,4,5 | 6.33                | 6.34             | s.u.  | 1        | 0   | 20           |

Duplicates (1)    Duplicated Sample: 377452

QC Batch: 116586  
Prep Batch: 98592

Date Analyzed: 2014-10-23  
QC Preparation: 2014-10-23

Analyzed By: CF  
Prepared By: CF

| Param            |  | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------|--|---------------------|------------------|-------|----------|-----|--------------|
| Specific Gravity |  | 1.009               | 1.035            | g/ml  | 1        | 2   | 200          |

Duplicates (1)    Duplicated Sample: 377727

QC Batch: 116755  
Prep Batch: 98719

Date Analyzed: 2014-10-23  
QC Preparation: 2014-10-23

Analyzed By: RL  
Prepared By: RL

| Param                  |           | Duplicate<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>Limit |
|------------------------|-----------|---------------------|------------------|-------|----------|-----|--------------|
| Total Dissolved Solids | 1,2,3,4,5 | 1830                | 1830             | mg/L  | 20       | 0   | 10           |



Report Date: October 29, 2014  
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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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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



| Param                  | F | C         | LCS<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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.



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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit  |
|------------------|----|----|--------------|-------|------|-----------------|------------------|------|----------------|
| Dissolved Sodium | Qs | Qs | 2,3,4,5      | 5740  | mg/L | 100             | 525              | 5457 | 54<br>75 - 125 |

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

| Param            | F  | C  | MSD<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit  | RPD | RPD<br>Limit |
|------------------|----|----|---------------|-------|------|-----------------|------------------|------|----------------|-----|--------------|
| Dissolved Sodium | Qs | Qs | 2,3,4,5       | 5800  | mg/L | 100             | 525              | 5457 | 65<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit   |
|----------|---|---|--------------|-------|------|-----------------|------------------|------|-----------------|
| Chloride |   |   | 1,2,3,4,5    | 340   | mg/L | 10              | 250              | 75.5 | 106<br>80 - 120 |

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

| Param    | F | C | MSD<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit   | RPD | RPD<br>Limit |
|----------|---|---|---------------|-------|------|-----------------|------------------|------|-----------------|-----|--------------|
| Chloride |   |   | 1,2,3,4,5     | 339   | mg/L | 10              | 250              | 75.5 | 105<br>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: 116526

Date Analyzed: 2014-10-21

Analyzed By: JP

| Param | Flag | Cert    | Units | ICVs<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
|------------------|------|---------|-------|-----------------------|------------------------|-----------------------------|-------------------------------|------------------|
| Dissolved Sodium |      | 2,3,4,5 | mg/L  | 51.0                  | 52.5                   | 103                         | 90 - 110                      | 2014-10-29       |



Standard (CCV-1)

|                  |      |           |       |                           |                        |                             |                               |                  |
|------------------|------|-----------|-------|---------------------------|------------------------|-----------------------------|-------------------------------|------------------|
| QC Batch: 116735 |      |           |       | Date Analyzed: 2014-10-28 |                        |                             | Analyzed By: RL               |                  |
| Param            | Flag | Cert      | Units | CCVs<br>True<br>Conc.     | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc.     | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>Analyzed |
| Chloride         |      | 1,2,3,4,5 | mg/L  | 25.0                      | 25.4                   | 102                         | 90 - 110                      | 2014-10-28       |



## 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.  |



Report Date: October 29, 2014  
Wasserhund-Tatum

Work Order: 14102108  
Wasserhund

Page Number: 16 of 16  
Tatum, NM

---

| 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.



4102108

# 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

|  |  |                    |                        |
|--|--|--------------------|------------------------|
| Company Name:                            | PRICE LLC  | Phone #:           | 905-892-6643           |
| Address:                                 | (Street, City, Zip)<br>312 ENCANTADO RIDGE COURT NE NW 87124<br>Rio Rancho | Fax #:             | 905-892-6643           |
| Contact Person:                          | Lester Wayne Price Jr.   | E-mail:            | wayprice23@hotmail.com |
| Invoice to:<br>(If different from above) | WASSERHUND BANDY   |                    |                        |
| Project #:                               | NA   | Project Name:      | BRINE WELL             |
| Project Location (including state):      | TATUM NM   | Sampler Signature: | LWPR                   |

[illegible]

| Relinquished by:                    | Company: | Date:    | Time:   | Received by:    | Company: | Date:    | Time: | INST: | OBS: | COR: |
|-------------------------------------|----------|----------|---------|-----------------|----------|----------|-------|-------|------|------|
| LESTER WAYNE PRICE LLC<br>PRICE DTR |          | 10/17/14 | 4:00 PM | PVS             | BFC      | 10-17-14 | 4:13  |       |      |      |
| 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: |
|                                     |          |          |         | Brenda<br>H and | TA       | 10/21/14 | 8:00  |       |      |      |

[illegible]

|   |                               |   |
|---|-------------------------------|---|
| <p><b>LAB USE ONLY</b></p> <p>Inlaid <u>Y</u> <u>N</u></p> <p>Headspace <u>Y</u> <u>N</u> <u>NA</u></p> | <p>REMARKS:</p> <p>COC #2</p> | <p>Dry Weight Basis Required</p> <p>TRRP Report Required</p> <p>Check if Special Reporting Limits Are Needed</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Log-in-Review</p> |
|---|-------------------------------|---|

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

Carrier #

70 297511

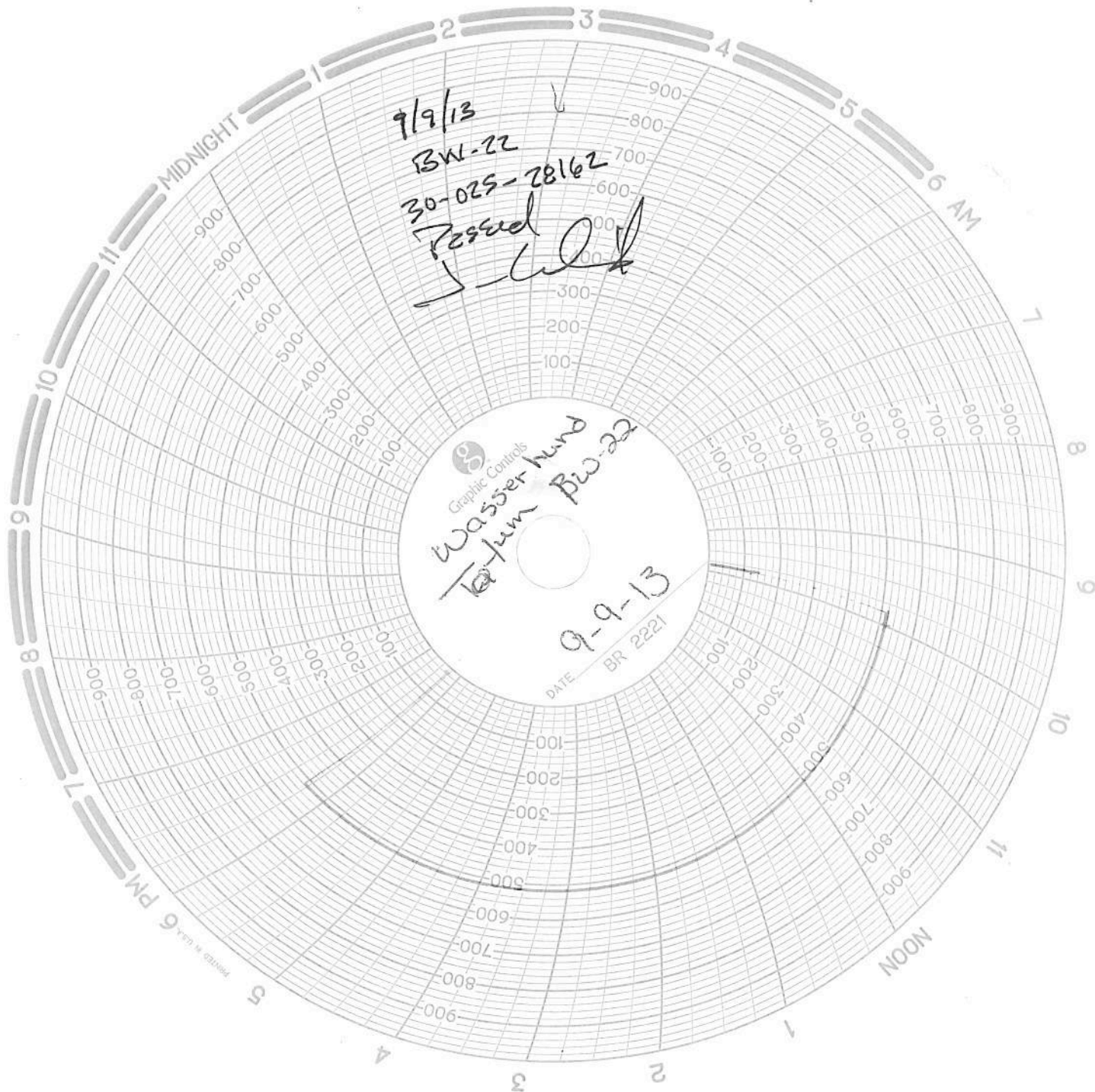
ORIGINAL COPY



## Appendix “D”

- 2013 MIT Chart

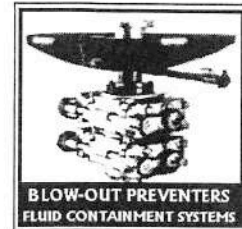






## **D & L Meters & Instrument Service, Inc.**

Lovington, NM 88260  
P.O. Box 1621  
Office: (575) 396-3715  
Fax: (575) 396-5812



Friday, June 28, 2013

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

**Company:** Celero Energy  
**Unit:** N/A  
**Model:** 8" Bristols  
**Pressure Rating:** 1,000#  
**Serial #:** 3914

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

  
Jesse Arenivas, Technician

BLOW-OUT PREVENTERS  
FLUID CONTAINMENT SYSTEMS



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan



2014 BW-22 AOR Review-- Well Status List  
up-dated Apr 28, 2015

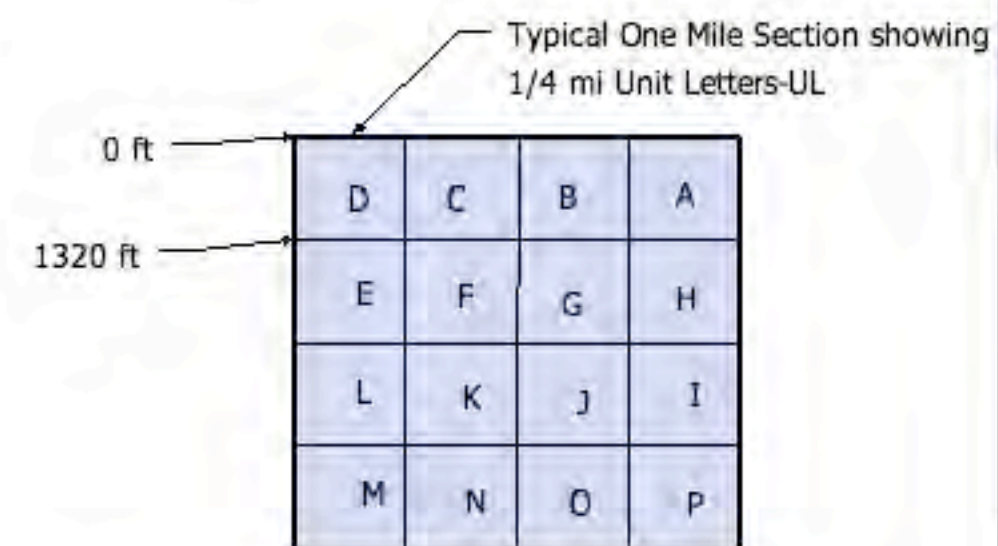
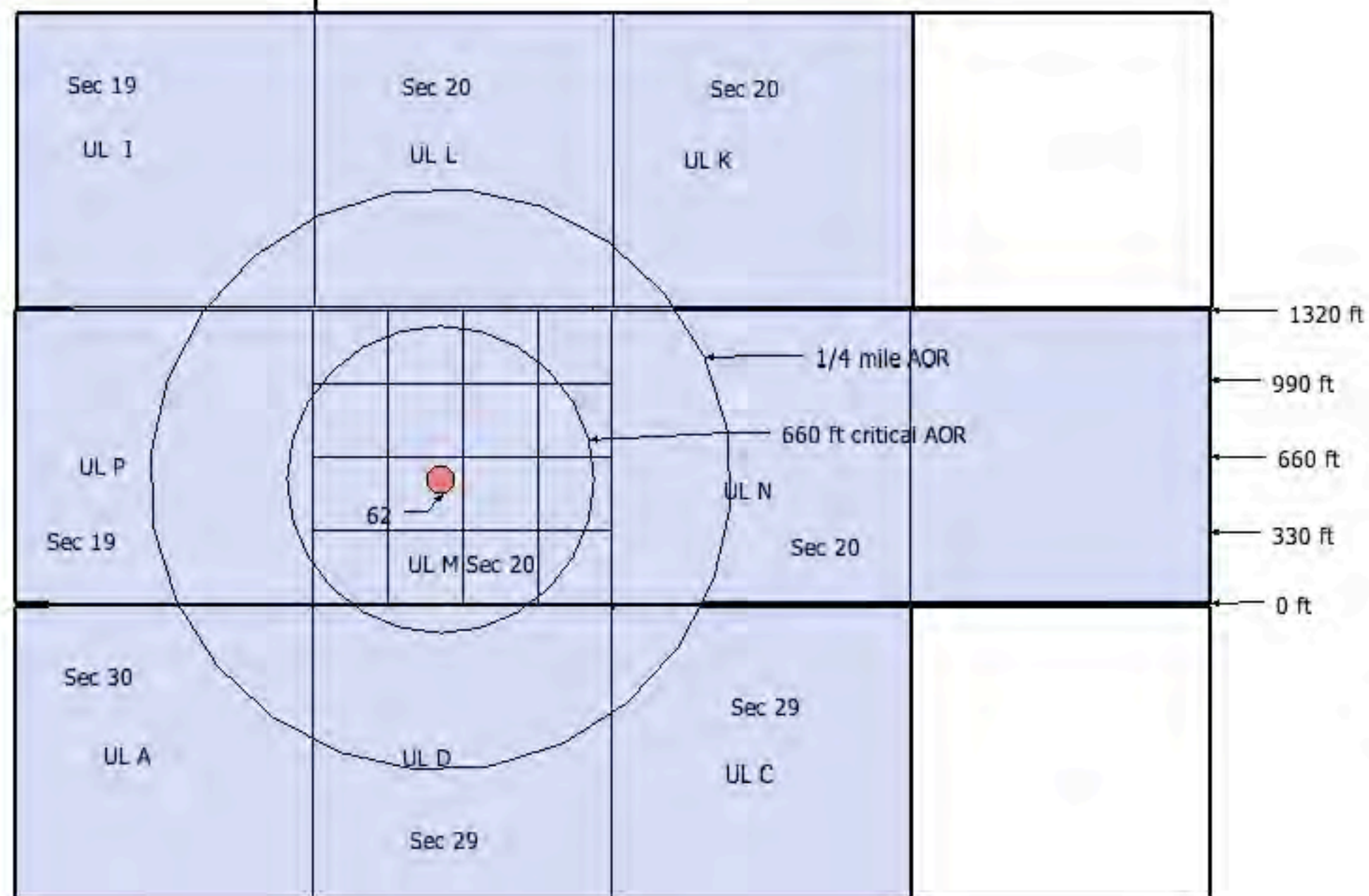
|   |  |                     |                                     |          |           | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR |            | Casing Progra                | Cased/Cemented | Corrective Action   |          |    |
|---|--|---------------------|-------------------------------------|----------|-----------|---|------------|------------------------------|----------------|---------------------|----------|----|
|   |  | API#                | Well Name                           | UL       | ectic     | Ts  | Rg         | Footage                      | Checked        | across salt section | Required |    |
| 1 |  | <u>30-025-28162</u> | <u>Wasserhund Quality Watson #1</u> | <u>M</u> | <u>20</u> | <u>12s</u>  | <u>36e</u> | <u>593 FSL &amp; 639 FWL</u> | NA             | NA                  | Na       | NA |

0 0

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

Notes:  
\* Means the well is within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked annually.





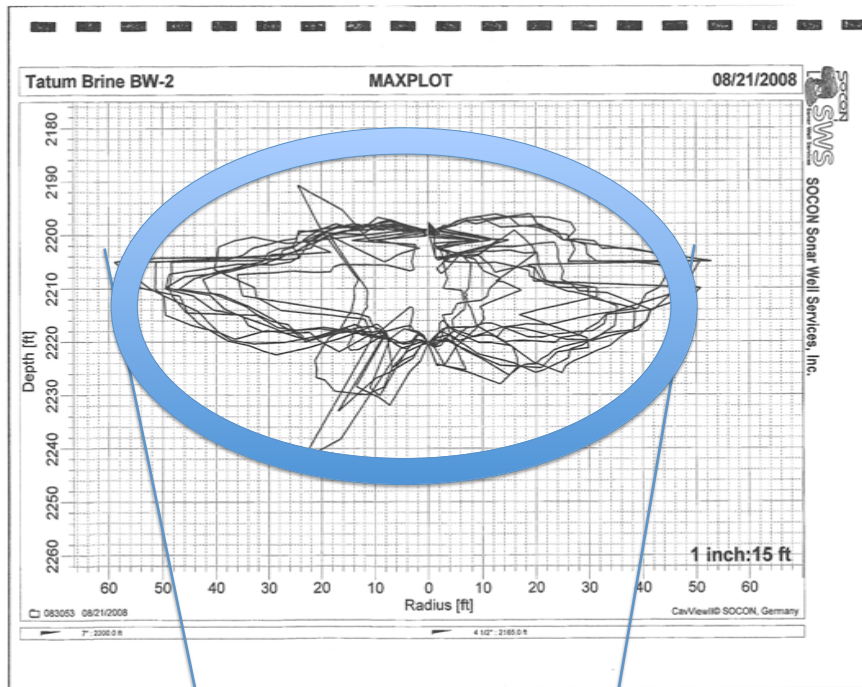
|                        |                                  |   |
|------------------------|----------------------------------|---|
| Wasserhund INC<br>2014 | Well API#: 30-025-28162          | Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list. |
|                        | Permit # BW-22                   |   |
|                        | Location: UL M-Sec 20-Ts12s-R36e |   |



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2014 Radius and D/H calculations.
- Aerial View showing Cavern Radius





$$R = \sqrt[3]{\frac{V}{3.14 \cdot H}}$$

Vol = 2.712 million cuft  
Height = 685 ft from casing shoe to bottom

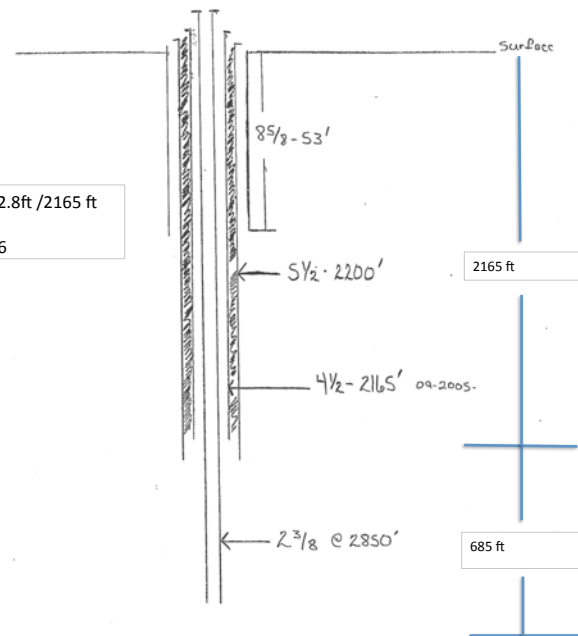
Radius = 61.5 feet  
Dia = 123.0 ft  
2014 year

2,701,105

Wasserhund Inc.  
Quality Brine  
Watson #1  
M 20-12e-36e  
30-025-28162

$$D/H = 122.8 \text{ ft} / 2165 \text{ ft}$$

$$D/H = .056$$





Wasserhund Brine Station Located on the west side of Tatum, NM. Aerial view shows 61.4 foot radius of calculated and measured cavern. May 14, 2014. For the 2013 annual report.





## Appendix “G”

- Solution Cavern Monitoring Plan Program



# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc. Brine Station  
Tatum Brine Station  
OCD Permit BW-22  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e

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.

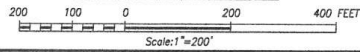
Attached: Examples Only:

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



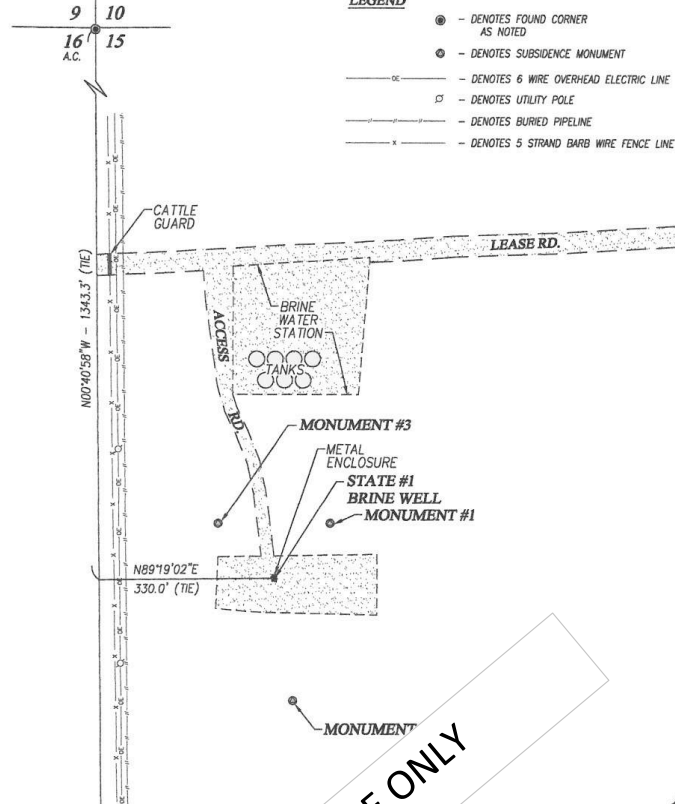
# TOPOGRAPHIC MAP

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

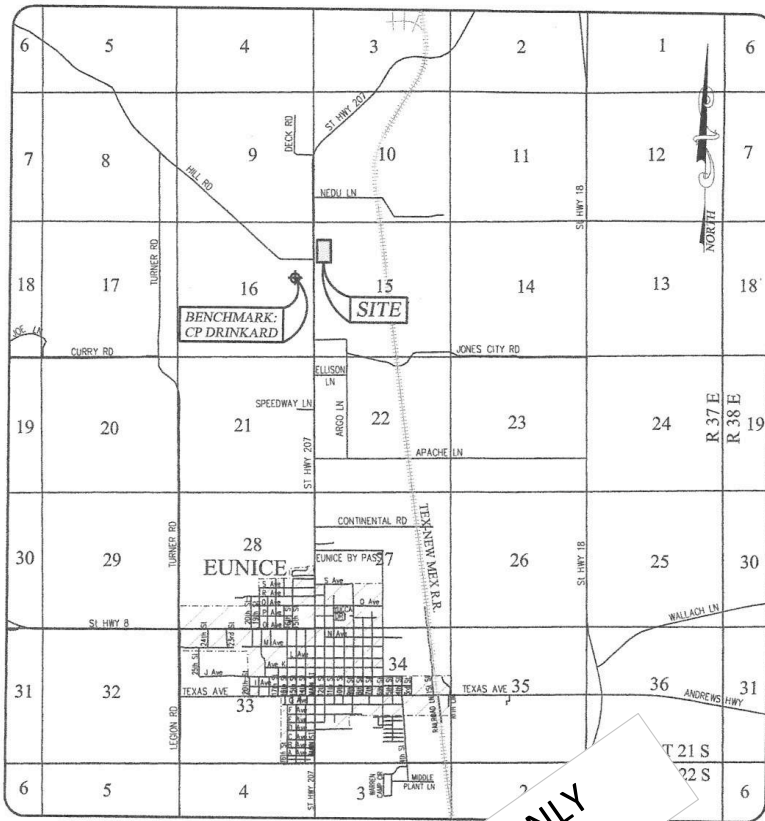
**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

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

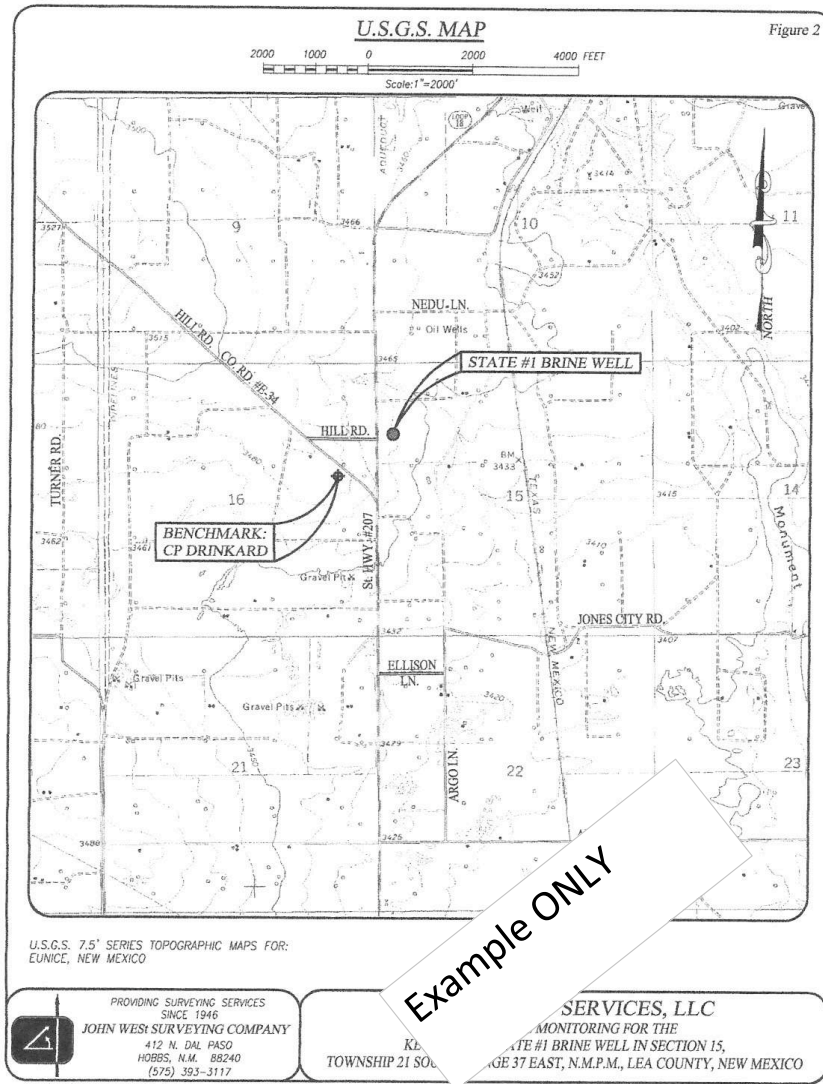
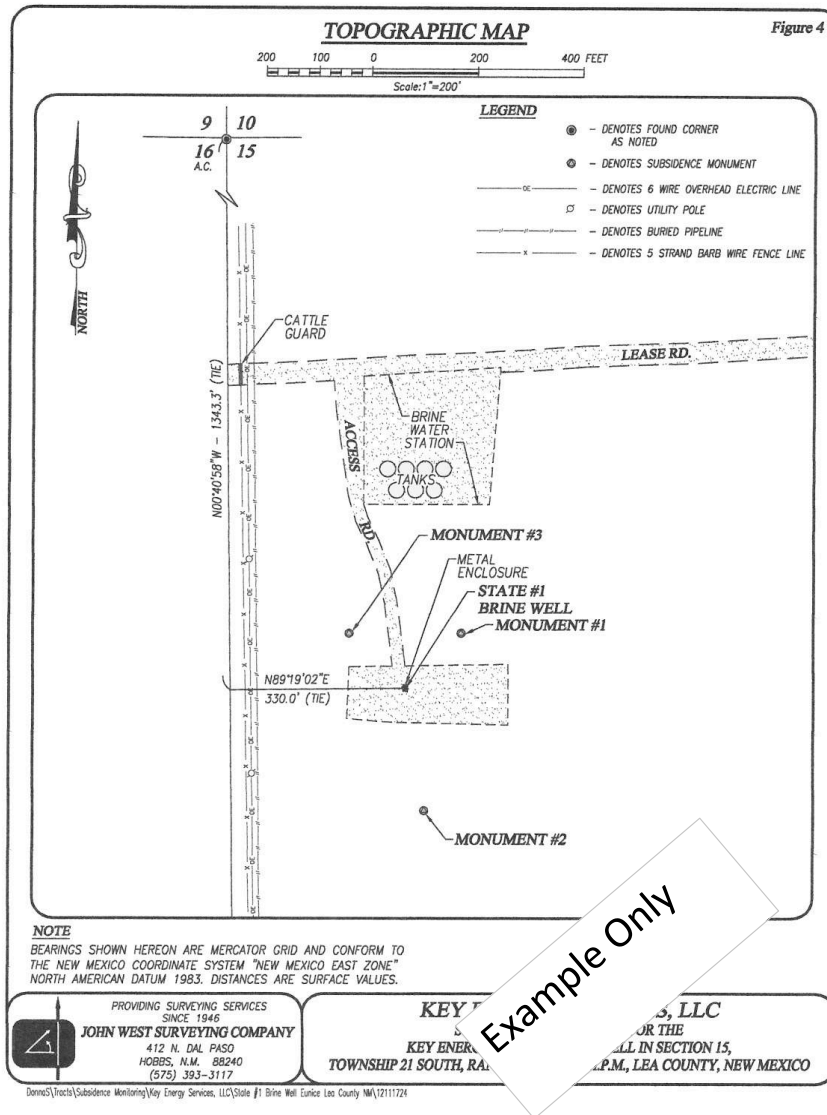




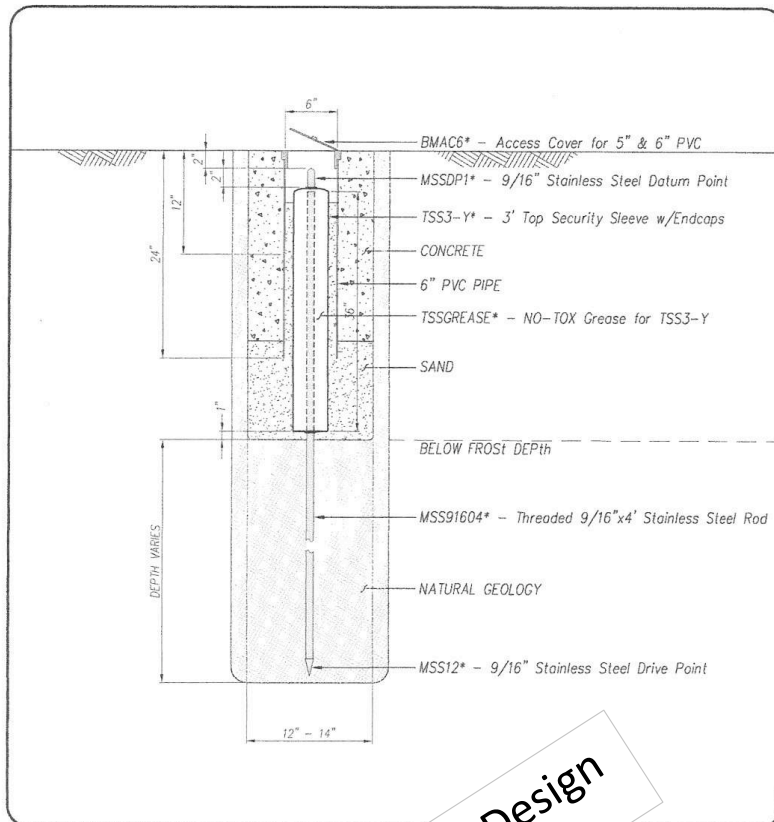
Figure 4





**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 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       |                        |

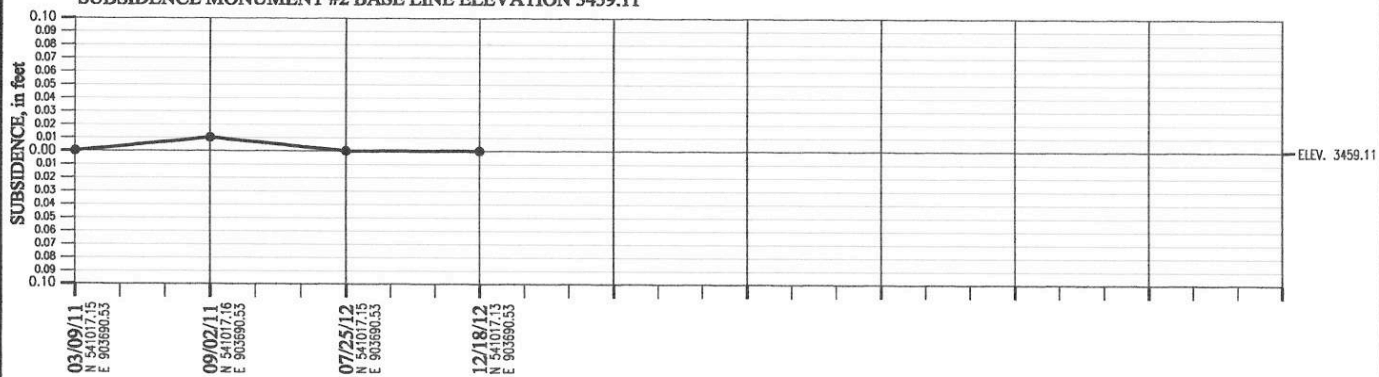
| From | To | ROUTE SUMMARY<br>Elev. Diff.<br>(adjusted) | Residuals |
|------|----|--|-----------|
| L98  | 1  | 2.6101                                     | -0.0029   |
| 1    | 2  | 2.4186                                     | -0.0034   |
| 2    | 3  | 3.0104                                     | -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

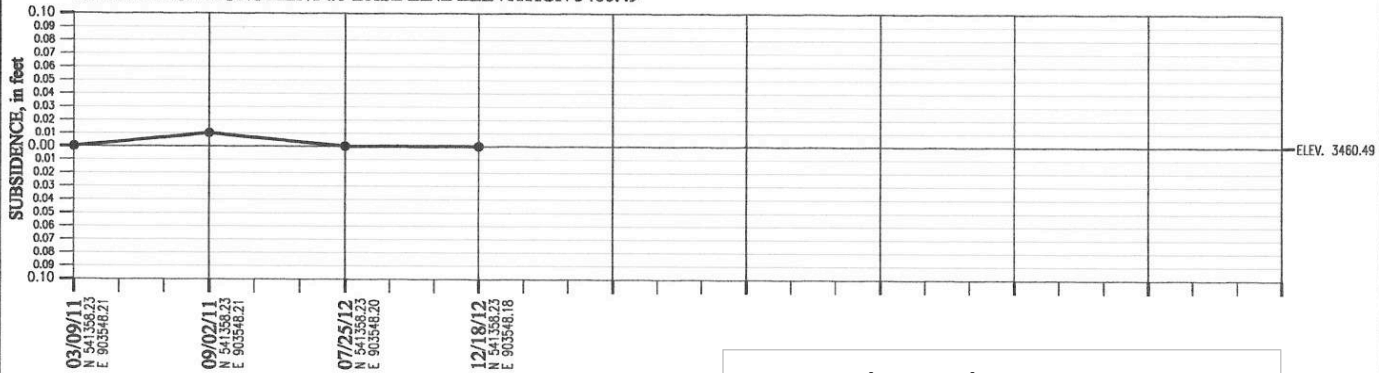


### VERTICAL SUBSIDENCE TABLE

**SUBSIDENCE MONUMENT #2 BASE LINE ELEVATION 3459.11**



**SUBSIDENCE MONUMENT #3 BASE LINE ELEVATION 3460.49**



## 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”

Wasserhund Inc. Closure Cost Estimate.



2014 Annual Report  
BW-22 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    |







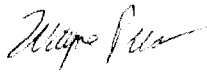
**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**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.

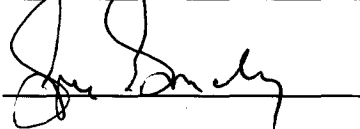
Wayne Price-LLC



Larry Gandy



Jon Gandy





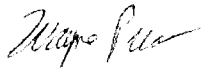
**Wasserhund Inc.**  
P.O. Box 2140  
575-396-0522  
FAX 575-396-0797  
Lovington, New Mexico 88260

**ANNUAL CLASS III WELL REPORT FOR 2013**


Wasserhund Inc.  
Buckeye Brine Station  
OCD Permit BW-04  
API No. 30-025-26883 Eidson #1  
Unit Letter M-Section 31-Ts 16s – R35e  
May 30, 2013

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

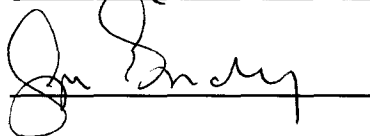
Wayne Price-LLC



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 or remedial work performed on the brine well. Due to brine quality issues experienced during the year, Wasserhund Inc. submitted a C-103 to OCD in late December of 2012 to investigate why the well is not producing high quality brine water. (C-103 included in **Appendix “A”**)

Due to the demand for cut-brine, Wasserhund Inc. decided to forego any well work during the 2013 calendar year.

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 1983 and has been in operation for approximately 31 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado “Salt Formation” at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small compared to similar wells of age. **Bullet Point 10** (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.

As will be discussed in **Bullet Point 5** (Chemical Analysis) ever since the last open-hole formation-test, the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.



General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions unless unusual operating conditions warrant such.

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 **Bullet Point 10** below.

Depending upon OCD requirements and local economics, Wasserhund Inc will have to evaluate whether future operations of this well is warranted as a concentrated brine producing well.

### **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")

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 2013 brine production volume was 14,300 bbls and the lifetime production volume is 2,701,105 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: Maximum and Average Injection Pressure:

The maximum operating injection pressure is approximately 380 psig, which is approximately 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 260 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 north 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 specific gravity of the brine water was 1.03, which equates to 8.77 lb/gal. This is lower than the usual 10 lb/gal produced in an normal operating brine well. In addition, from time to time, an off red color of the produced brine has been noted, possibly caused by injected fresh water interacting with the upper Salado/Rustler formation where the salt has been dissolved.

Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn't recover, then some remedial action may be taken, including the possibility of plugging the well or reversing the flow.

#### **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, but due to some down-hole geological-physical characteristics, is only able to make a cut-brine with a density of 1.03 lb/gal.

### **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 have 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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. Wasserhund Inc used OCD records and field verification to confirm wells in the AOR.

Using OCD on-line files and actual on-site field verification, a well status list and AOR plot plan was constructed (see **Appendix “E”**) listing all wells within adjacent quarter sections of the BW-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.



In the 2013 review, there were no new wells added to the list. **Appendix “E”** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-22 brine well.

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. 122.8 ft ( $r = 61.4$  ft) up-dated for 2013, a 10:1 safety factor is applied that equates to about 614 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.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

#### **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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.701 million barrels of brine produced as of December 2013. The maximum diameter was calculated to be approximately 122.8 feet with a corresponding D/H ratio of .056 updated for the 2013 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in **Appendix “F”** is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .056 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 twelve times.

Included in **Appendix “F”** is an aerial view showing the 61.4-foot radius superimposed around the brine well and station.

## **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.*

**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.**

However, in order to meet the new permit requirements, 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 Request: 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-22 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-22 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.



**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”

- C-103
- Aerial Photo
- Discharge Plan BW-22



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

**HOBBS OGD**

State of New Mexico

Energy, Minerals and Natural Resources

Form C-103

Revised August 1, 2011

DEC 14 2012

CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

RECEIVED

|  |
|--|
| WELL API NO.<br>30-025-26883 <b>28162</b>  |
| 5. Indicate Type of Lease<br>STATE <input type="checkbox"/> FEE <input type="checkbox"/> |
| 6. State Oil & Gas Lease No.   |
| 7. Lease Name or Unit Agreement Name<br>Quality Brine                                    |
| 8. Well Number 1   |
| 9. OGRID Number<br>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 : 593 feet from the South line and 639 feet from the West line  
Section 20 Township 12s Range 36e 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: ☐

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.

1. Pull tubing because of light brine weight.
2. Run packer, test casing.
3. Drill to approximately 2850'.
4. Return to making brine.

Begin work as soon as we have OCD approval.

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 President

DATE 12/05/12

Type or print name Larry Gandy

E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

For State Use Only

APPROVED BY:

*Maureen Whitaker*

TITLE Compliance Officer

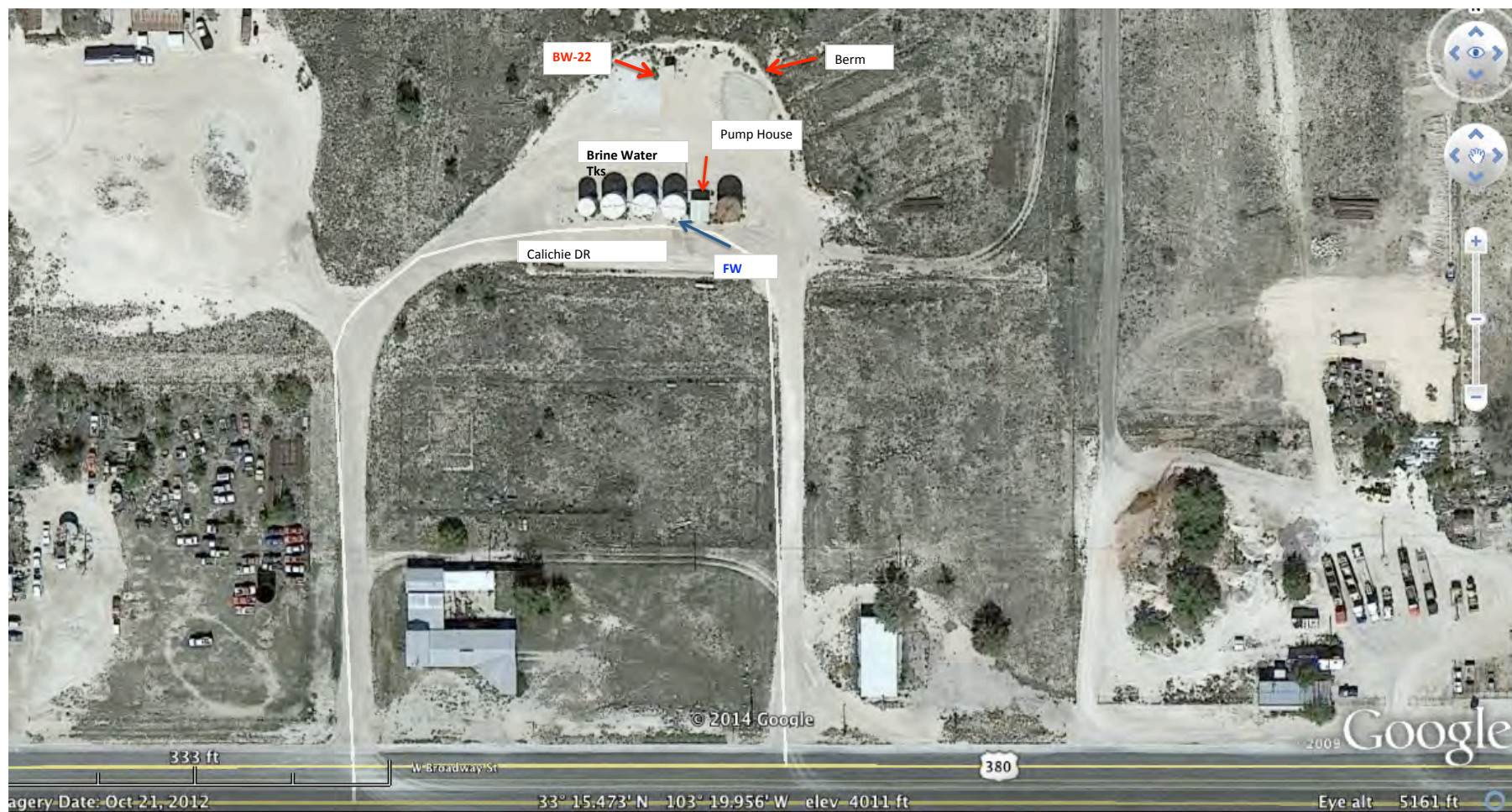
DATE 12-21-2012

Conditions of Approval (if any):

JAN 10 2013

*chm*







BW-22

Wasserhund/Tatum  
Watson #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-22 for the Watson #1 Brine Well in Unit M of Section 20, Township 12 South, Range 36 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-22 (API# 30-025-28162) 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



## DISCHARGE PERMIT BW-22

### 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-22 (Discharge Permit) to Wasserhund, Inc. (Permittee) to operate its Underground Injection Control (UIC) Class III well for the in situ extraction of salt (Watson #1 - API No. 30-025-28162) located 593 feet FSL and 639 feet FWL (SW/4 SW/4, Unit Letter M) in Section 20, Township 12 South, Range 36 East, NMPM, Lea County, New Mexico at its Brine Production Facility (Facility). The Facility is located within Tatum, New Mexico to the north of US 380.

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 30 feet below ground surface and has a total dissolved solids concentration of approximately 700 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







## 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 |

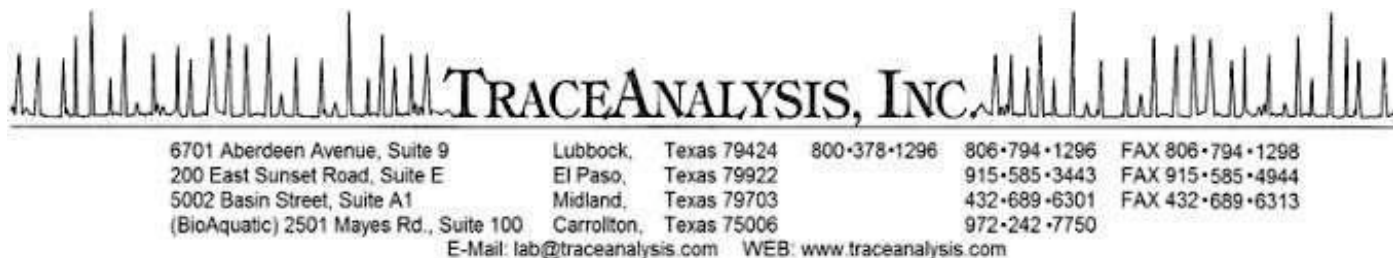
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**Sample: 359862 - BW-22 Brine**

| 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.

Dr. Blair Leftwich, Director  
 Dr. Michael Abel, Project Manager



# Report Contents

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| QC Batch 110975 - Duplicate (1) . . . . .    | 10        |
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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<br>Batch | Prep<br>Date        | QC<br>Batch | Analysis<br>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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# 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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          | 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<br>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<br>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<br>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   |                     |            |              |     |

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*sample 359861 continued ...*

| Parameter | Flag | Cert | RL<br>Result | Units | Dilution | RL   |
|-----------|------|------|--------------|-------|----------|------|
| Parameter | Flag | Cert | RL<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Sample<br>Result | Units | Dilution | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>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<br>Result | Units | Dil. | Spike<br>Amount | Matrix<br>Result | Rec. | Rec.<br>Limit | RPD | RPD<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | ICVs<br>Found<br>Conc. | ICVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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<br>True<br>Conc. | CCVs<br>Found<br>Conc. | CCVs<br>Percent<br>Recovery | Percent<br>Recovery<br>Limits | Date<br>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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The scanned attachments will follow this page.  
Please note, each attachment may consist of more than one page.



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BioAquatic Testing  
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Company Name: WASSER HUDD INC Phone #: 575-399-5721

Address: (Street, City, Zip) \_\_\_\_\_ Fax #: \_\_\_\_\_

Contact Person: WAYNE PRICE E-mail: WAYNE PRICE 770 EARTH LINKS.NET

Invoice to: (If different from above) WASSER HUDD 16235 MAIN LIVINGSTON NM 88260

Project #: BW-4 + BW-22 Project Name: ANNUAL REPORT

Project Location (including state): BUCKEYE (BW-4) TATUM BW-22 Sampler Signature: [Signature]

## ANALYSIS REQUEST (Circle or Specify Method No.)

| LAB #<br>(LAB USE ONLY) | FIELD CODE | # CONTAINERS | Volume / Amount | MATRIX |      |     |        | PRESERVATIVE METHOD |                  |                                |      |     |      | SAMPLING |          | MTBE 8021 / 602 | BTEX 8021 / 602 / 8260 / 624 | TPH 418.1 / TX1005 | 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, 55, TDS, CHLORIDE | SODIUM | Turn Around Time if different from standard | Hold |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
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|                         |            |              |                 | WATER  | SOIL | AIR | SLUDGE | HCl                 | HNO <sub>3</sub> | H <sub>2</sub> SO <sub>4</sub> | NaOH | ICE | NONE | DATE     | TIME     |                 |                              |                    |                           |                |   |                                     |                |                     |                 |     |                       |                             |                  |                       |              |                  |   |                        |                       |        |   |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
| 35989                   | BW-4 FRESH | 1            | 1000 mL         | X      |      |     |        |                     |                  |                                |      | X   |      | 4/4/14   | 11:43 AM |                 |                              |                    |                           |                |   |                                     |                |                     |                 |     |                       |                             |                  |                       |              |                  |   |                        |                       |        |   |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |

Relinquished by: WAYNE PRICE Company: PRICE LLC Date: 4/4/14 Time: 4:19 PM

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INST- IR-3  
OBS 3.5  
COR 2.9

**LAB USE ONLY**

Intact Y / N

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Log-in-Review [Signature]

**REMARKS:**  
FRESH + BRINE SAMPLES FOR BW-4 + BW-22

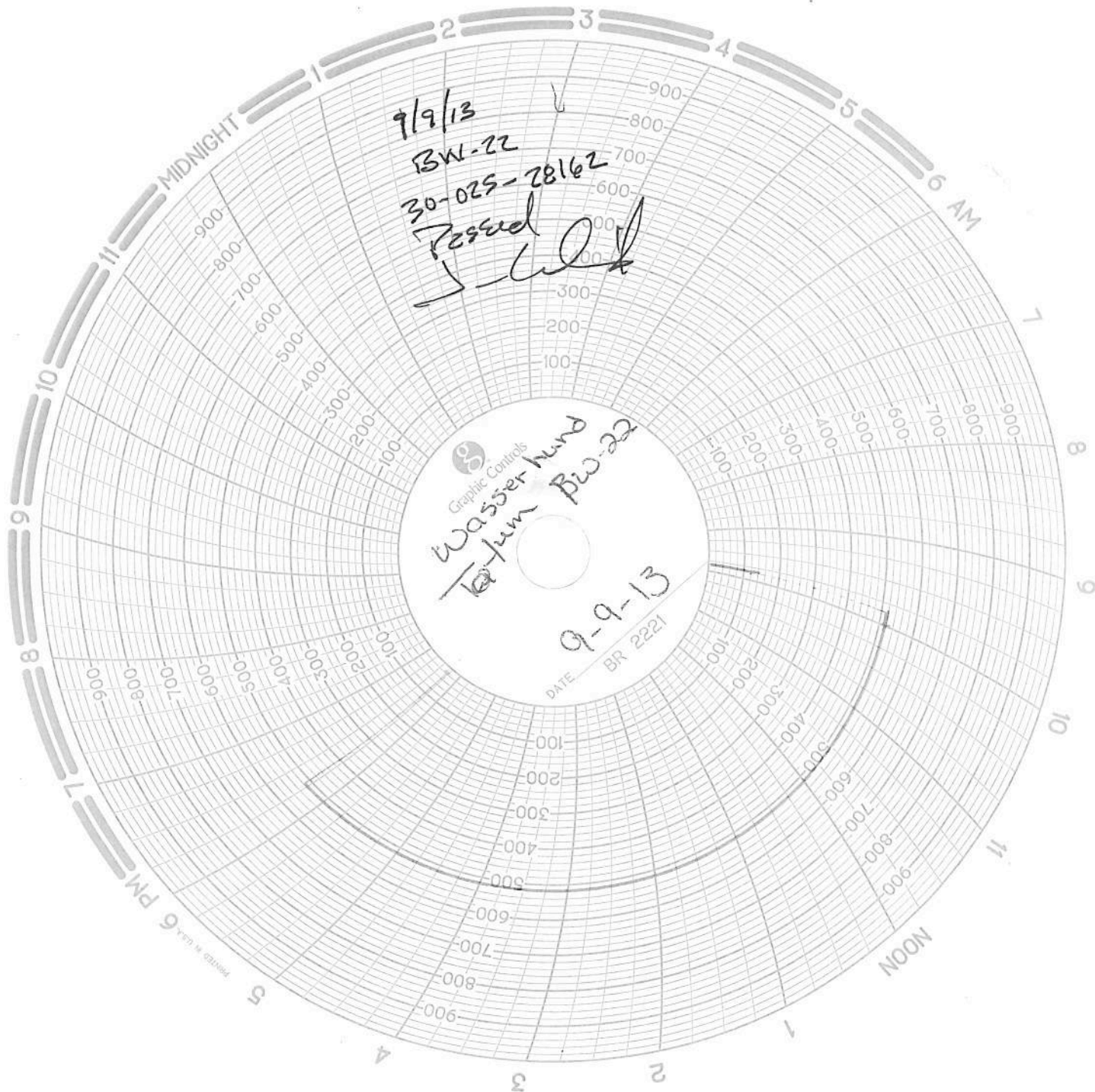
☐ Dry Weight Basis Required  
☐ TRRP Report Required  
☐ Check If Special Reporting Limits Are Needed



## Appendix “D”

- 2013 MIT Chart

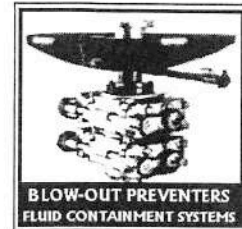






## **D & L Meters & Instrument Service, Inc.**

Lovington, NM 88260  
P.O. Box 1621  
Office: (575) 396-3715  
Fax: (575) 396-5812



Friday, June 28, 2013

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

**Company:** Celero Energy  
**Unit:** N/A  
**Model:** 8" Bristols  
**Pressure Rating:** 1,000#  
**Serial #:** 3914

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

  
Jesse Arenivas, Technician

BLOW-OUT PREVENTERS  
FLUID CONTAINMENT SYSTEMS



## Appendix “E”

- AOR Well Status List
- AOR Plot Plan



2013 BW-22 AOR Review-- Well Status List  
up-dated May 05, 2014

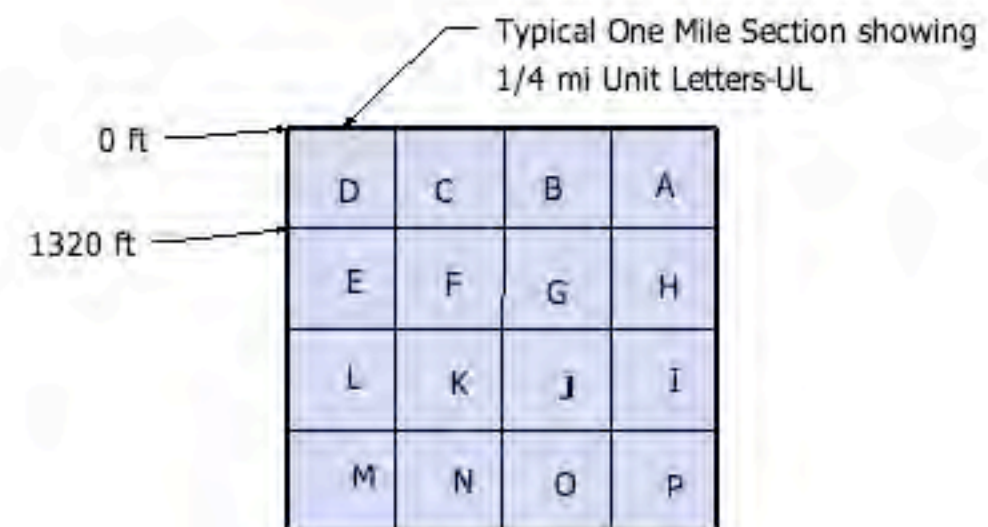
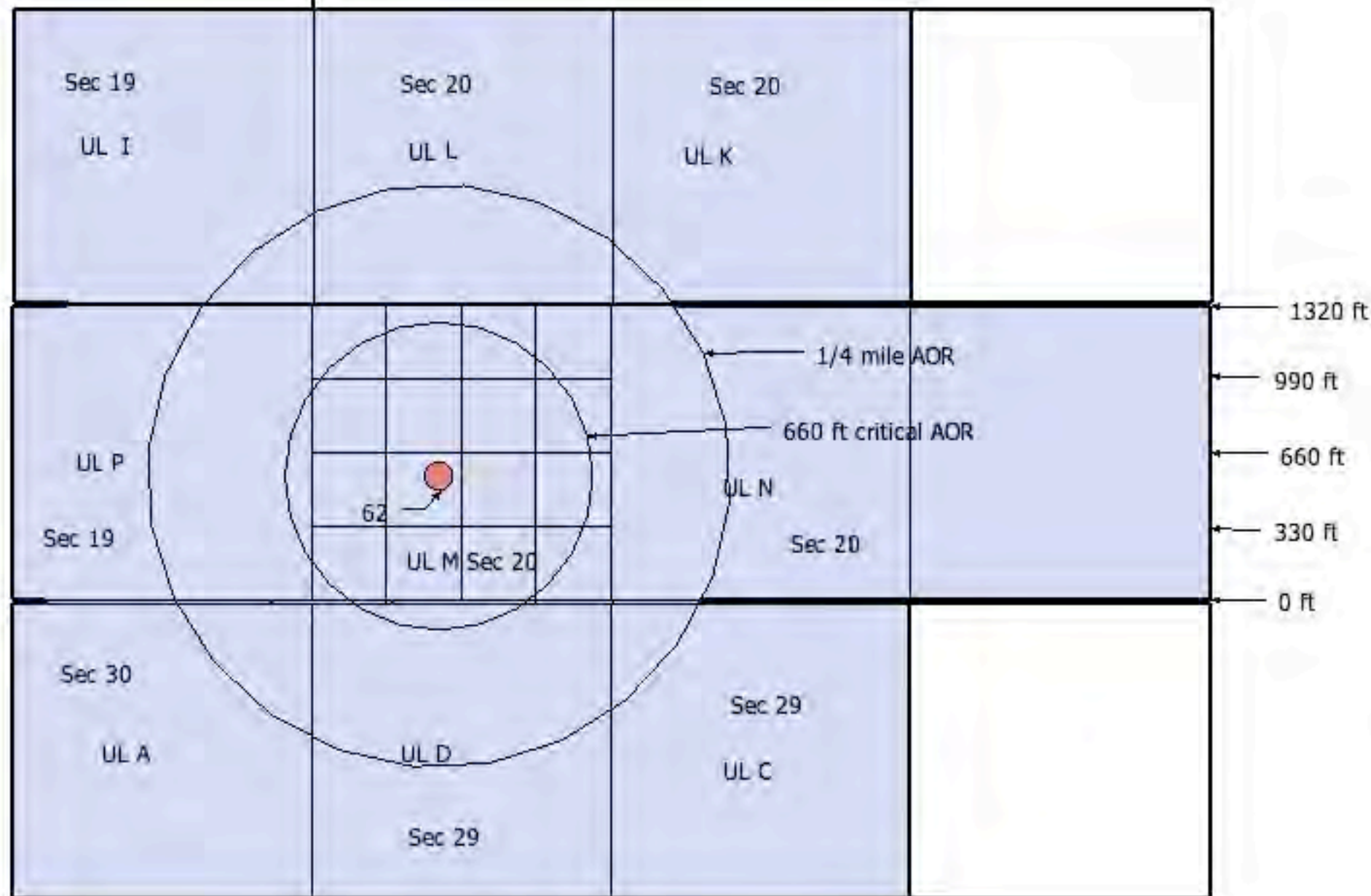
|   |              |                              |           |    |       | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR |                   | Casing Progra | Cased/Cemented | Corrective Action   |          |
|---|--------------|------------------------------|-----------|----|-------|---|-------------------|---------------|----------------|---------------------|----------|
|   |              | API#                         | Well Name | UL | ectic | Ts  | Rg                | Footage       | Checked        | across salt section | Required |
| 1 | 30-025-28162 | Wasserhund Quality Watson #1 | M         | 20 | 12s   | 36e   | 593 FSL & 639 FWL | NA            | NA             | Na                  | NA       |

0 0

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

Notes:  
\* Means the well is within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked annually.





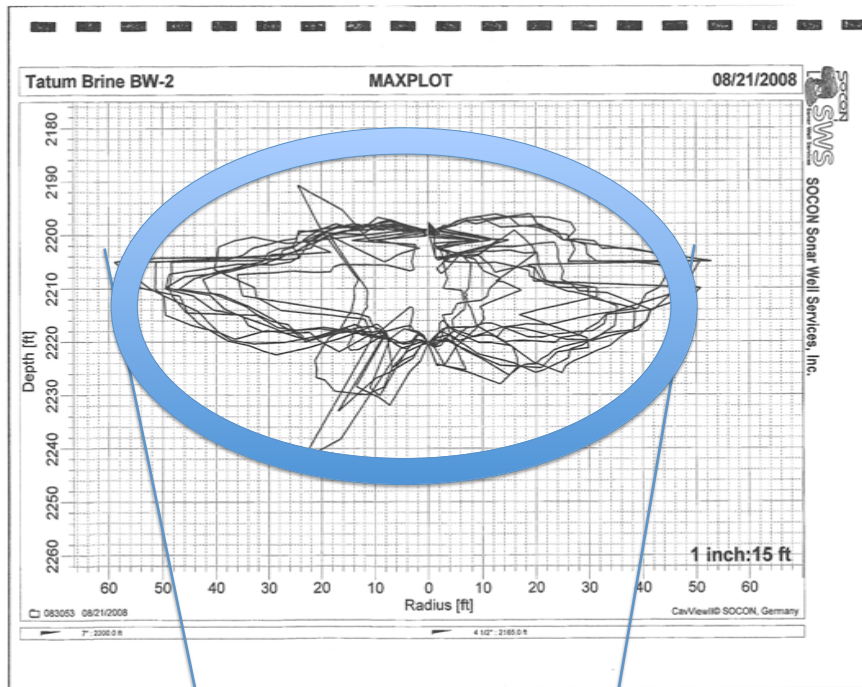
|  |                                  |   |
|--|----------------------------------|---|
| Brine Well Area of Review (AOR) UL Plot Plan | Well API#: 30-025-28162          | Note: Wells are identified by the last 2 digits of the well's API#. API #'s are listed in the well status list. |
| Operator Name: Wasserhund INC                | Permit # BW-22                   |   |
| AOR Year: 2013                               | Location: UL M-Sec 20-Ts12s-R36e |   |



## Appendix “F”

- Wellbore Sketch, Brine Cavity Calculations with new 2013 Radius and D/H calculations.
- Aerial View showing Cavern Radius





$$R = \sqrt[3]{\frac{V}{3.14 \cdot H}}$$

Vol = 2.701 million cuft  
Height = 685 ft from casing shoe to bottom

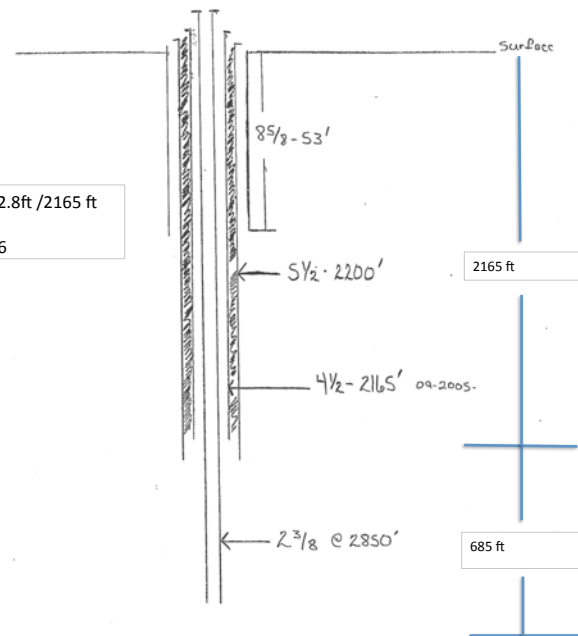
Radius = 61.4 feet  
Dia = 122.8 ft  
2013 year

2,701,105

Wasserhund Inc.  
Quality Brine  
Watson #1  
M 20-12e-36e  
30-025-28162

$$D/H = 122.8 \text{ ft} / 2165 \text{ ft}$$

$$D/H = .056$$





Wasserhund Brine Station Located on the west side of Tatum, NM. Aerial view shows 61.4 foot radius of calculated and measured cavern. May 14, 2014. For the 2013 annual report.





## Appendix “G”

- Solution Cavern Monitoring Plan Program



# ***“Solution Cavern Monitoring Plan Program”***

Wasserhund Inc. Brine Station  
Tatum Brine Station  
OCD Permit BW-22  
API No. 30-025-28162 Watson #1  
Unit Letter M-Section 20-Ts 12s – R 35e

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.

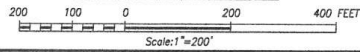
Attached: Examples Only:

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



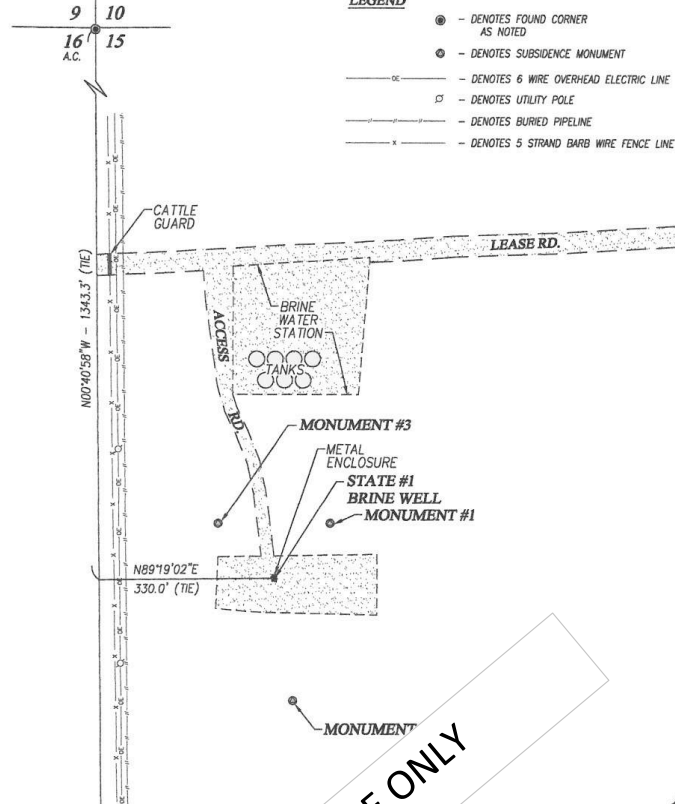
# TOPOGRAPHIC MAP

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**  
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(575) 393-3117

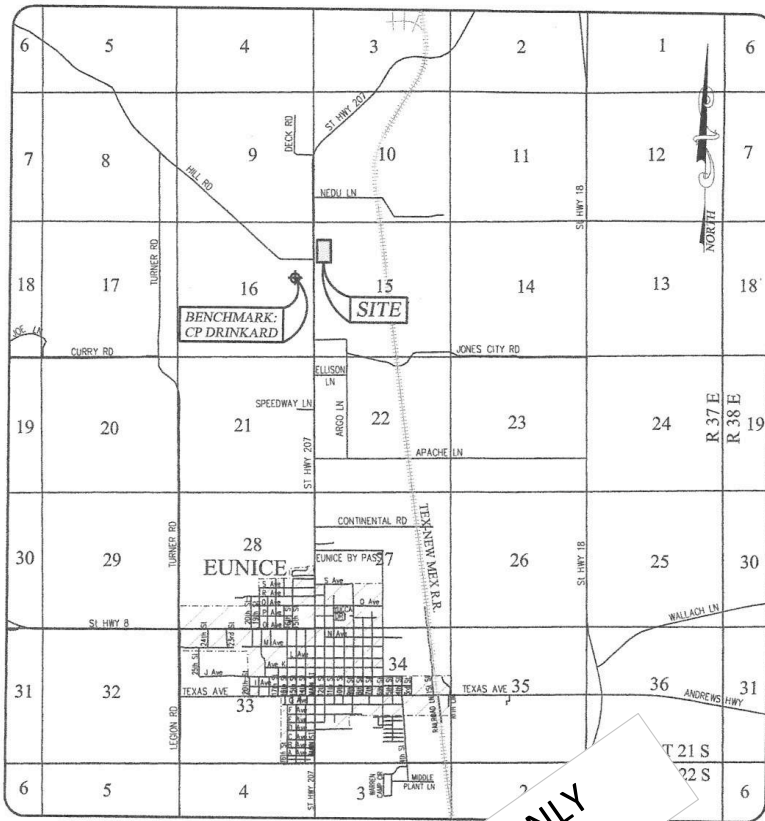
**ENERGY SERVICES, LLC**  
SUBSIDENCE MONITORING FOR THE  
ENERGY STATE #1 BRINE WELL IN SECTION 15,  
TOWNSHIP 24 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

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  
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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

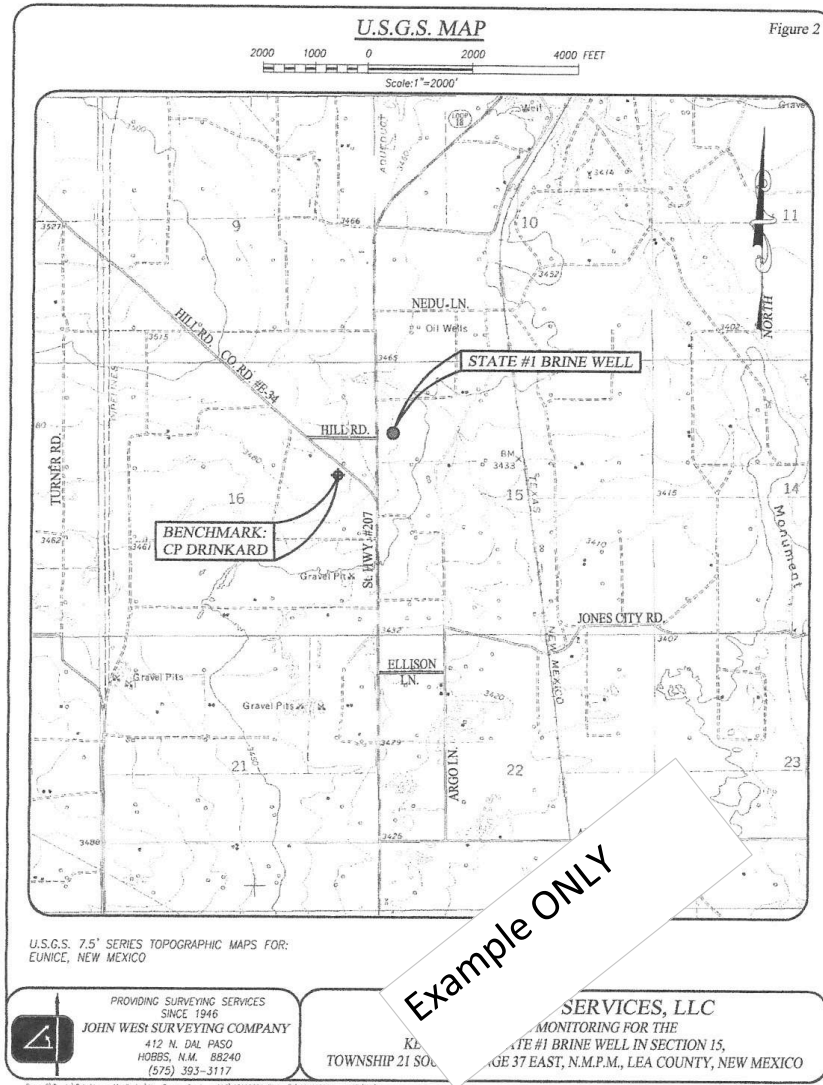
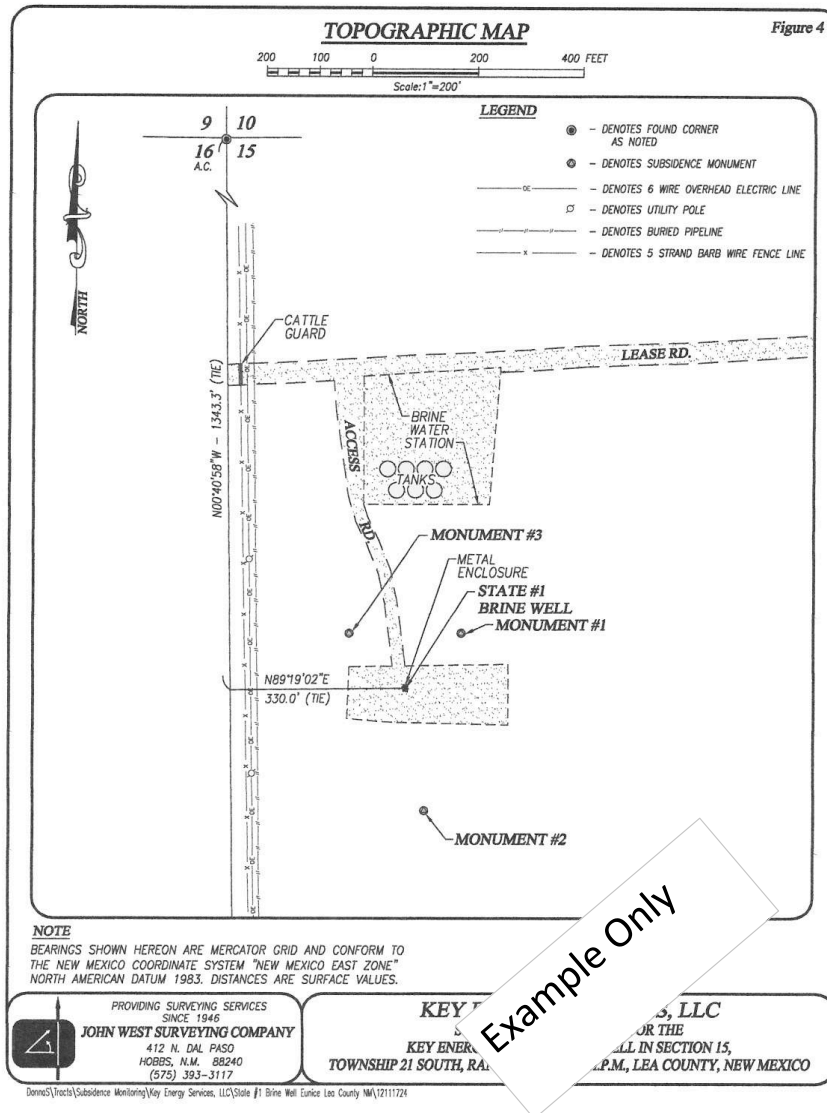




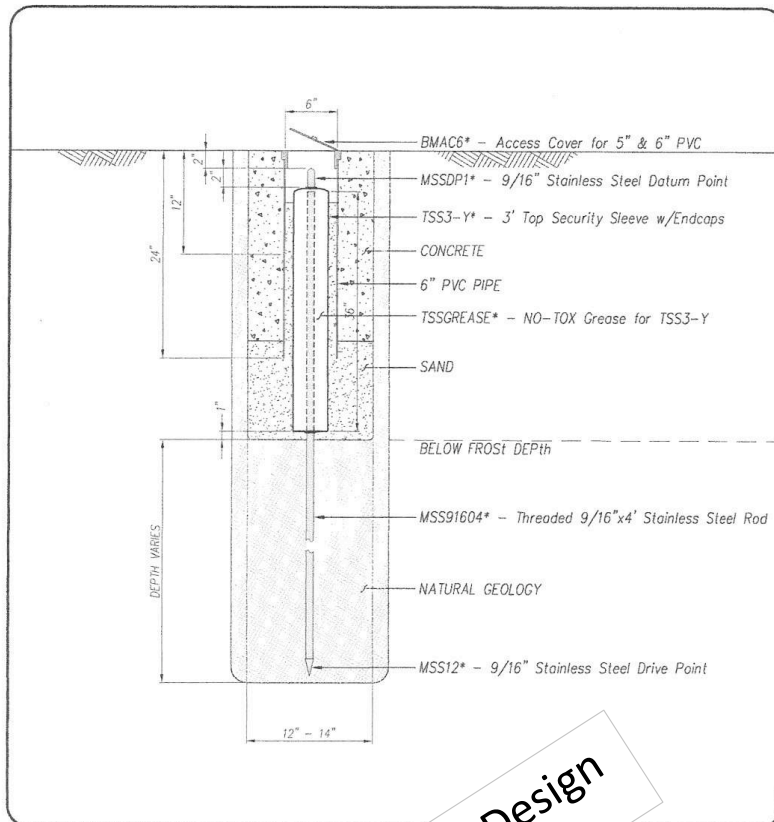
Figure 4





**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

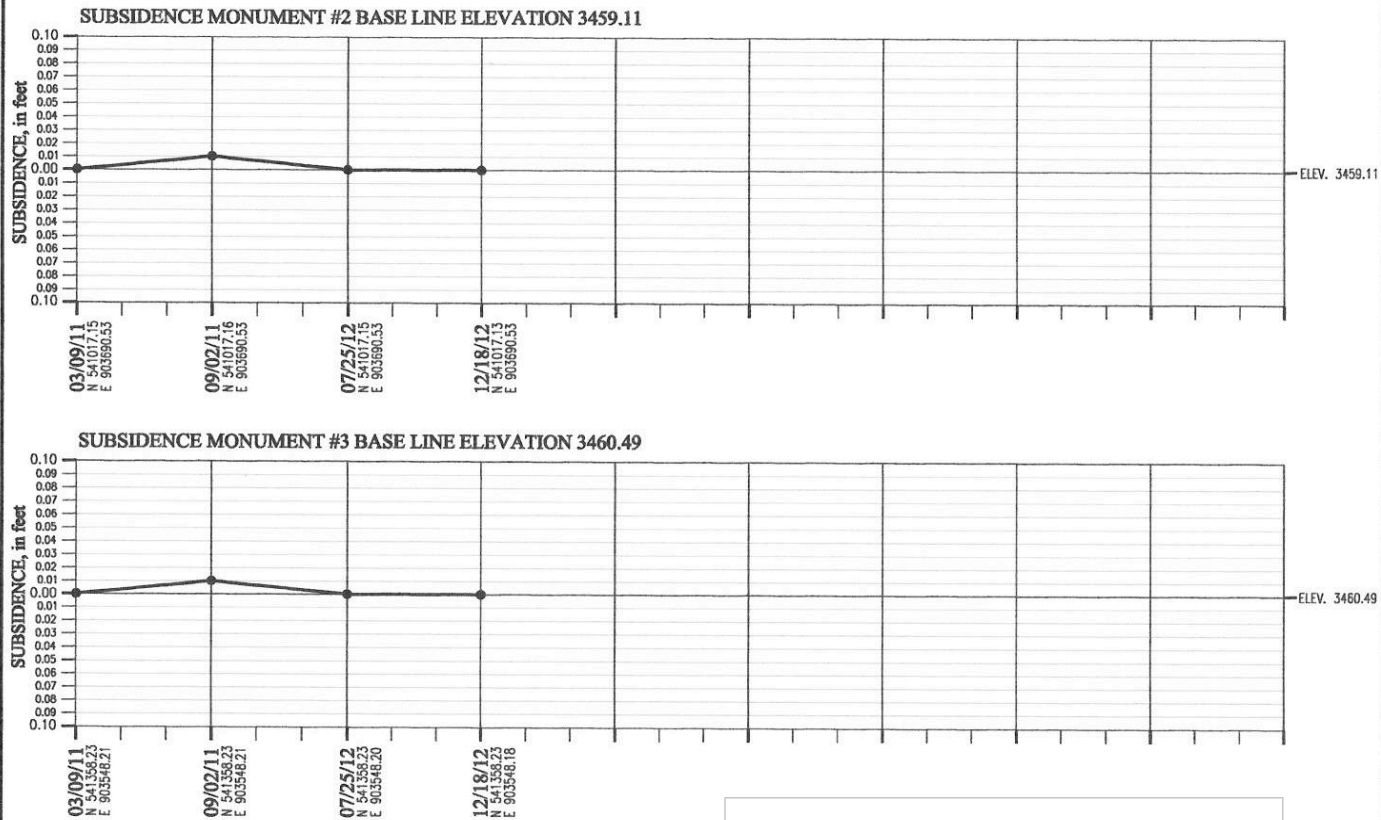
| Station | Adjusted Elev    | Standard Dev. |                        |
|---------|------------------|---------------|------------------------|
| L98     | <b>3434.3700</b> | 0.00000       | NGS MONUMENT L98       |
| 22      | 3434.3700        | 0.00000       |                        |
| 1       | 3436.9801        | 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<br>Elev. Diff.<br>(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”

Wasserhund Inc. Closure Cost Estimate.



2013 Annual Report  
BW-22 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.

Tatum Brine Station

OCD Permit BW-22

API No. 30-025-28162 Watson #1

Unit Letter M-Section 20-Ts 12s – R 35e

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 or remedial work performed on the brine well. Due to brine quality issues experienced during the year, Wasserhund Inc. submitted a C-103 to OCD in late December of 2012 to investigate why the well is not producing high quality brine water. (C-103 included in **Appendix "A"**)

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 "open-to-formation" pressure test requirement. Wasserhund Inc., as most operators, did not run an MIT in 2012.

The brine well was drilled in 1983 and has been in operation for approximately 30 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado "Salt Formation" at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small 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.

As will be discussed in Section 3 (Chemical Analysis) ever since the last open-hole formation test the well has not been able to produce 10# brine, either with reverse or conventional flow. In addition, an off color brine water has been noted from time to time.

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 on October 27, 2011. **Appendix B** contains the change of operator and renewal application.



General housekeeping was routinely performed and on-site training and inspections were conducted for awareness of the permit conditions. The brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions until the next permit is negotiated and approved.

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.

Depending upon OCD requirements and local economics, Wasserhund Inc will have to evaluate whether future operations of this well is warranted.

## **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 18,105 bbls and the lifetime production volume is 2,686,805 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 380 psig, which is approximately 70 pounds below the permit maximum pressure of 450 psig.

The average injection pressure as noted by Wasserhund Inc.’s personnel is approximately 260 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 in 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 north of the site and is of high quality that meets EPA's Safe Drinking Water Standards.

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 1.03, which equates to 8.77 lb/gal. This is lower than the usual 10 lb/gal normally produced. This was attributed to the fact that during the test in October of 2011, most of the brine water was sold leaving only fresh water for the MIT "Open to Formation Test." This loaded the hole with a large amount of fresh water and the well has not fully recovered from the time of this event. In addition, from time to time, an off red color of the produced brine has been noted.

Wasserhund Inc., will continue to monitor the density-quality issue and will report to OCD once the system recovers, or if for some reason it doesn't recover, then some remedial action may be taken, including the possibility of plugging the well.



#### **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.")

In 2012 the OCD started a review of permit conditions and past practices. As a result, most operators did not have to run an open-to-formation pressure test.

The well tubing was pulled and packer set in August of 2008. A successful 30-minute casing pressure test was completed. The agency generally requires an approved MIT to be run every 5 years. The next schedule time for this type of test, or an approved alternate, will be in 2013. **Appendix E** contains a copy of the 2008 test chart with notes.

#### **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 2012.

The loading areas have 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-22 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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.68 million barrels of brine produced as of December 2012. The maximum diameter was calculated to be approximately 122 feet with a corresponding D/H ratio of .055 updated for the 2012 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in Appendix F is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .055 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 twelve times.

Included in **Appendix F** is an aerial view showing the 60-foot radius superimposed around the brine well and station.

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.

#### **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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. 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-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

In the 2012 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-22 brine well.

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 established and all wells within that radius will be researched in greater detail.

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



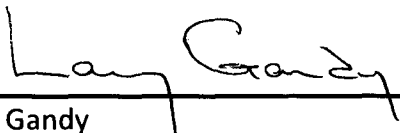
in close proximity. By just initially focusing on the current wells in the ¼ mile AOR and assuming the status of these wells will remain the same, could be a mistake. Therefore, Wasserhund Inc is taking a more dynamic approach and will study wells as the brine well grows, especially wells in the critical zone.

We used the current estimated diameter of the brine well i.e. 120 ft ( $r = 60$  ft) up-dated for 2012, and added a 10:1 safety factor which equates to about 600 ft. As the brine well grows, the critical AOR will be expanded and new wells will be added.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

**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"

- C-103
- Aerial Photo
- Discharge Plan BW-22



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  
DEC 14 2012 CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505  
RECEIVED

Form C-103  
Revised August 1, 2011

|   |  |  |
|---|--|--|
| <b>SUNDRY NOTICES AND REPORTS ON WELLS</b><br>(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.<br>30-025- <del>26883</del> <b>28162</b>                                    |
| 1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input checked="" type="checkbox"/> Other <input type="checkbox"/> Brine Well   |  | 5. Indicate Type of Lease<br>STATE <input type="checkbox"/> FEE <input type="checkbox"/> |
| 2. Name of Operator<br>Wasserhund, Inc.   |  | 6. State Oil & Gas Lease No.   |
| 3. Address of Operator<br>P.O. Box 2140 Lovington, NM 88260   |  | 7. Lease Name or Unit Agreement Name<br>Quality Brine                                    |
| 4. Well Location<br>Unit Letter M : 593 feet from the South line and 639 feet from the West line<br>Section 20 Township 12s Range 36e NMPM County Lea   |  | 8. Well Number 1   |
| 11. Elevation (Show whether DR, RKB, RT, GR, etc.)  |  | 9. OGRID Number<br>130851  |
|   |  | 10. Pool name or Wildcat   |

12. 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"/> | 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"/>               |   |  |  |
| OTHER: <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.

1. Pull tubing because of light brine weight.
2. Run packer, test casing.
3. Drill to approximately 2850'.
4. Return to making brine.

Begin work as soon as we have OCD approval.

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 President DATE 12/05/12

Type or print name Larry Gandy E-mail address: lgandy@gandycorporation.com PHONE: 575-396-0522

For State Use Only

APPROVED BY: Mark Whitaker TITLE Compliance Officer DATE 12-21-2012

Conditions of Approval (if any):

JAN 10 2013

chm





Wassershund Brine Station Located on the west side of Tatum, NM.  
Aerial view shows 60 foot radius of calculated and measured cavern.  
April 08, 2012.

© 2012 Google  
Image USDA Farm Service Agency  
© 2012 Europa Technologies

©2010 Google





# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**

Governor

**Joanna Prukop**

Cabinet Secretary

**Mark E. Fesmire, P.E.**

Director

**Oil Conservation Division**

March 28, 2007

Mr. Larry Gandy  
Gandy Corporation  
PO Box 827  
Tatum, New Mexico 88267

Re: Discharge Permit BW-022 Renewal

Dear Mr. Gandy:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 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 Gandy Corporation's Tatum Brine Station (**Owner/operator**) brine well BW-022 located in the SW/4, SW/4 of Section 20, Township 12 South, Range 36 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 Brad A. Jones of my staff at (505) 476-3487 or E-mail [brad.a.jones@state.nm.us](mailto:brad.a.jones@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/baj

Attachments-1

xc: OCD District Office

RECEIVED  
2007 SEP 28 AM 11:20



**ATTACHMENT TO THE DISCHARGE PERMIT  
GANDY CORPORATION'S TATUM BRINE STATION BRINE WELL (BW-022)  
DISCHARGE PERMIT APPROVAL CONDITIONS  
MARCH 28, 2007**

**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 March 11, 2012** 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.
- 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 February 9, 2007 discharge permit renewal 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 stormwater 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 # 30-025-28162 Quality Brine Watson #1
- 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 450 psig unless otherwise approved. 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:**

2006- 30 minute @ 300 psig casing test only (set packer to isolate formation)  
2007- 4 hour @ 300 psig casing open to formation test  
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

- 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  $\frac{1}{4}$  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 receive OCD approval to re-start injection operations.
- K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond 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  
BW-022  
March 28, 2007  
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 / trees.

Date: 9-24-07



## Appendix “B”

- Change of Operator
- Permit Renewal Application



From Operator GANDY CORP OGRID 8426  
To Operator WASSERHUND INC OGRID 130851  
Wells Selected for Transfer, Permit 138088  
Permit Status: APPROVED

**OCD District Hobbs**

**Property Well**

16527 EIDSON STATE #001  
309588 QUALITY BRINE WATSON #001

| Lease<br>Type | ULSTR        | OCD<br>Unit | API          | Well<br>Type | Pool<br>ID | Pool Name |
|---------------|--------------|-------------|--------------|--------------|------------|-----------|
| S             | 4-31-16S-35E | M           | 30-025-26883 | M            | 96173 BSW; | SALADO    |
| F             | M-20-12S-36E | M           | 30-025-28162 | M            | 96173 BSW; | SALADO    |



**District I**  
1025 N. Lincoln Dr. Hobbs, NM 88201  
Phone: (575) 391-6161 Fax: (575) 391-0729

**District II**  
3115 N. 1st St. Artesia, NM 88203  
Phone: (575) 748-1281 Fax: (575) 748-9729

**District III**  
1000 Rio Grande Rd. Aztec, NM 87410  
Phone: (505) 344-6178 Fax: (505) 344-6179

**District IV**  
1220 S. St. Francis Dr. Santa Fe, NM 87505  
Phone: (505) 476-3370 Fax: (505) 476-3462

**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: 13851  
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: Tatum Brine Station-BW-22  
II. Operator: Wasserhund Inc.  
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;  
Wasserhund Inc. is  
requesting that the previously submitted information be referenced for this permit renewal application  
and Wasserhund  
Inc. 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 20 Township 12S Range 36E  
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 Wasserhund Inc.

Signature:

Date: October 27, 2011

E-mailAddress:wayneprice77@earthlink.net\_\_\_\_\_

\_\_\_\_\_



## Appendix “C”

- Injection and Production Volumes/Comparison Charts
- Monthly/Quarterly Data Sheets



| 2012 Wasserhund Inc OCD BW-22 Annual Production Data         |  |  |  |            |  |            |  |   |  |  |
|--|--|--|--|------------|--|------------|--|---|--|--|
|  |  |  |  |            |  |            |  | Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite. |  |  |
|  |  |  |  | Brine-BBLS |  | Fresh-BBLS |  | % diff  |  |  |
| Jan  |  |  |  | 6015       |  | 6100       |  | 1.41%   |  |  |
| Feb  |  |  |  | 750        |  | 780        |  | 4.00%   |  |  |
| Mar  |  |  |  | 570        |  | 595        |  | 4.39%   |  |  |
| Apr  |  |  |  | 860        |  | 895        |  | 4.07%   |  |  |
| May  |  |  |  | 1420       |  | 1467       |  | 3.31%   |  |  |
| Jun  |  |  |  | 1695       |  | 1762       |  | 3.95%   |  |  |
| Jul  |  |  |  | 1440       |  | 1566       |  | 8.75%   |  |  |
| Aug  |  |  |  | 1340       |  | 1455       |  | 8.58%   |  |  |
| Sep  |  |  |  | 655        |  | 710        |  | 8.40%   |  |  |
| Oct  |  |  |  | 1320       |  | 1405       |  | 6.44%   |  |  |
| Nov  |  |  |  | 450        |  | 510        |  | 13.33%  |  |  |
| Dec  |  |  |  | 1590       |  | 1695       |  | 6.60%   |  |  |
| 2012 Total   |  |  |  | 18105      |  | 18940      |  | 4.61%   |  |  |
| Total Brine Water Production Carry Over from Years Past BBLs |  |  |  | 2,668,700  |  |            |  |   |  |  |
| Total Production year ending 2012                            |  |  |  | 2,686,805  |  |            |  |   |  |  |



## 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 20, 2012

Work Order: 12120305



Project Location: Tatum, NM  
Project Name: Wasserhund

| Sample | Description | Matrix | Date Taken | Time Taken | Date Received |
|--------|-------------|--------|------------|------------|---------------|
| 315451 | Brine       | water  | 2012-11-29 | 11:25      | 2012-12-01    |
| 315452 | Fresh       | water  | 2012-11-29 | 11:25      | 2012-12-01    |

### Sample: 315451 - 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 |      | 117      | mg/L as CaCo3 | 20    |
| Total Alkalinity       |      | 117      | mg/L as CaCo3 | 20    |
| Total Arsenic          |      | <0.0100  | mg/L          | 0.01  |
| Total Boron            |      | 3.27     | mg/L          | 0.01  |
| Total Barium           |      | 0.0260   | mg/L          | 0.01  |
| Total Beryllium        |      | <0.00500 | mg/L          | 0.005 |
| Dissolved Calcium      |      | 1380     | mg/L          | 1     |
| Dissolved Potassium    |      | 567      | mg/L          | 1     |
| Dissolved Magnesium    |      | 516      | mg/L          | 1     |
| Dissolved Sodium       |      | 12600    | mg/L          | 1     |
| Total Cadmium          |      | <0.0100  | mg/L          | 0.01  |
| Total Cobalt           |      | <0.0100  | mg/L          | 0.01  |
| Specific Conductance   |      | 64900    | uMHOS/cm      |       |
| Total Chromium         |      | <0.0100  | mg/L          | 0.01  |
| Total Copper           |      | 0.0190   | mg/L          | 0.005 |
| Density                |      | 1.03     | g/ml          |       |
| Total Iron             |      | 3.23     | mg/L          | 0.01  |

*continued ...*



*sample 315451 continued ...*

| Param                  | Flag | Result        | Units | RL     |
|------------------------|------|---------------|-------|--------|
| Total Mercury          |      | <0.000200     | mg/L  | 0.0002 |
| Fluoride               |      | <25.0         | mg/L  | 0.5    |
| Chloride               |      | <b>40100</b>  | mg/L  | 2.5    |
| Sulfate                |      | <b>7460</b>   | mg/L  | 2.5    |
| Total Manganese        |      | <b>0.136</b>  | mg/L  | 0.005  |
| Total Molybdenum       |      | <0.0500       | mg/L  | 0.05   |
| Total Nickel           |      | <0.0100       | mg/L  | 0.01   |
| Nitrate-N              |      | <2.00         | mg/L  | 0.04   |
| Total Lead             |      | <0.0100       | mg/L  | 0.01   |
| pH                     |      | <b>7.37</b>   | s.u.  | 2      |
| Total Antimony         |      | <0.0500       | mg/L  | 0.05   |
| Total Selenium         |      | <0.0200       | mg/L  | 0.02   |
| Total Dissolved Solids |      | <b>43700</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>0.0100</b> | mg/L  | 0.01   |

**Sample: 315452 - 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>155</b>    | mg/L as CaCo3 | 20     |
| Total Alkalinity       |      | <b>155</b>    | mg/L as CaCo3 | 20     |
| Total Arsenic          |      | <0.0100       | mg/L          | 0.01   |
| Total Boron            |      | <b>0.364</b>  | mg/L          | 0.01   |
| Total Barium           |      | <b>0.0290</b> | mg/L          | 0.01   |
| Total Beryllium        |      | <0.00500      | mg/L          | 0.005  |
| Dissolved Calcium      |      | <b>103</b>    | mg/L          | 1      |
| Dissolved Potassium    |      | <b>24.1</b>   | mg/L          | 1      |
| Dissolved Magnesium    |      | <b>14.4</b>   | mg/L          | 1      |
| Dissolved Sodium       |      | <b>154</b>    | mg/L          | 1      |
| Total Cadmium          |      | <0.0100       | mg/L          | 0.01   |
| Total Cobalt           |      | <0.0100       | mg/L          | 0.01   |
| Specific Conductance   |      | <b>1010</b>   | uMHOS/cm      |        |
| Total Chromium         |      | <0.0100       | mg/L          | 0.01   |
| Total Copper           |      | <0.00500      | mg/L          | 0.005  |
| Density                |      | <b>0.998</b>  | g/ml          |        |
| Total Iron             |      | <b>3.02</b>   | mg/L          | 0.01   |
| Total Mercury          |      | <0.000200     | mg/L          | 0.0002 |
| Fluoride               |      | <b>1.04</b>   | mg/L          | 0.5    |
| Chloride               |      | <b>68.8</b>   | mg/L          | 2.5    |
| Sulfate                |      | <b>207</b>    | mg/L          | 2.5    |

*continued ...*



*sample 315452 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>2.44</b>  | mg/L  | 0.04  |
| Total Lead             |      | <0.0100      | mg/L  | 0.01  |
| pH                     |      | <b>7.96</b>  | s.u.  | 2     |
| Total Antimony         |      | <0.0500      | mg/L  | 0.05  |
| Total Selenium         |      | <0.0200      | mg/L  | 0.02  |
| Total Dissolved Solids |      | <b>616.0</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  |



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

Project Location (including state): TATUM NM Sampler Signature: Lwph

ANALYSIS REQUEST  
(Circle or Specify Method No.)[illegible]

Relinquished by: Company: Date: Time:  
Lester Wayne Price Jr. Price LLC 11/30/12 2:00pm

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

|                  |          |       |       |
|------------------|----------|-------|-------|
| Relinquished by: | Company: | Date: | Time: |
|------------------|----------|-------|-------|

|              |          |       |       |
|--------------|----------|-------|-------|
| Received by: | Company: | Date: | Time: |
|--------------|----------|-------|-------|

[illegible]

Received by:      Company:      Date:      Time:

[illegible]

|              |          |       |       |
|--------------|----------|-------|-------|
| Received by: | Company: | Date: | Time: |
|--------------|----------|-------|-------|

Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Mg/C NiO TA 12/11/12 4:3

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OBS \_\_\_\_\_  
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INST

OBS \_\_\_\_\_

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INST

OBS 1.7 °C  
COR 6.4 °C

LAB USE ONLY

0

Intac: (Y) / N

Headspace Y/N/N

1

Log-in-Review 

REMARKS:

Сод 1

100

Dry Weight Basis Req  
TRRP Report Require

☐ Check If Special Repor

### Limits Are Needed

623260685

---

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C. O. C.

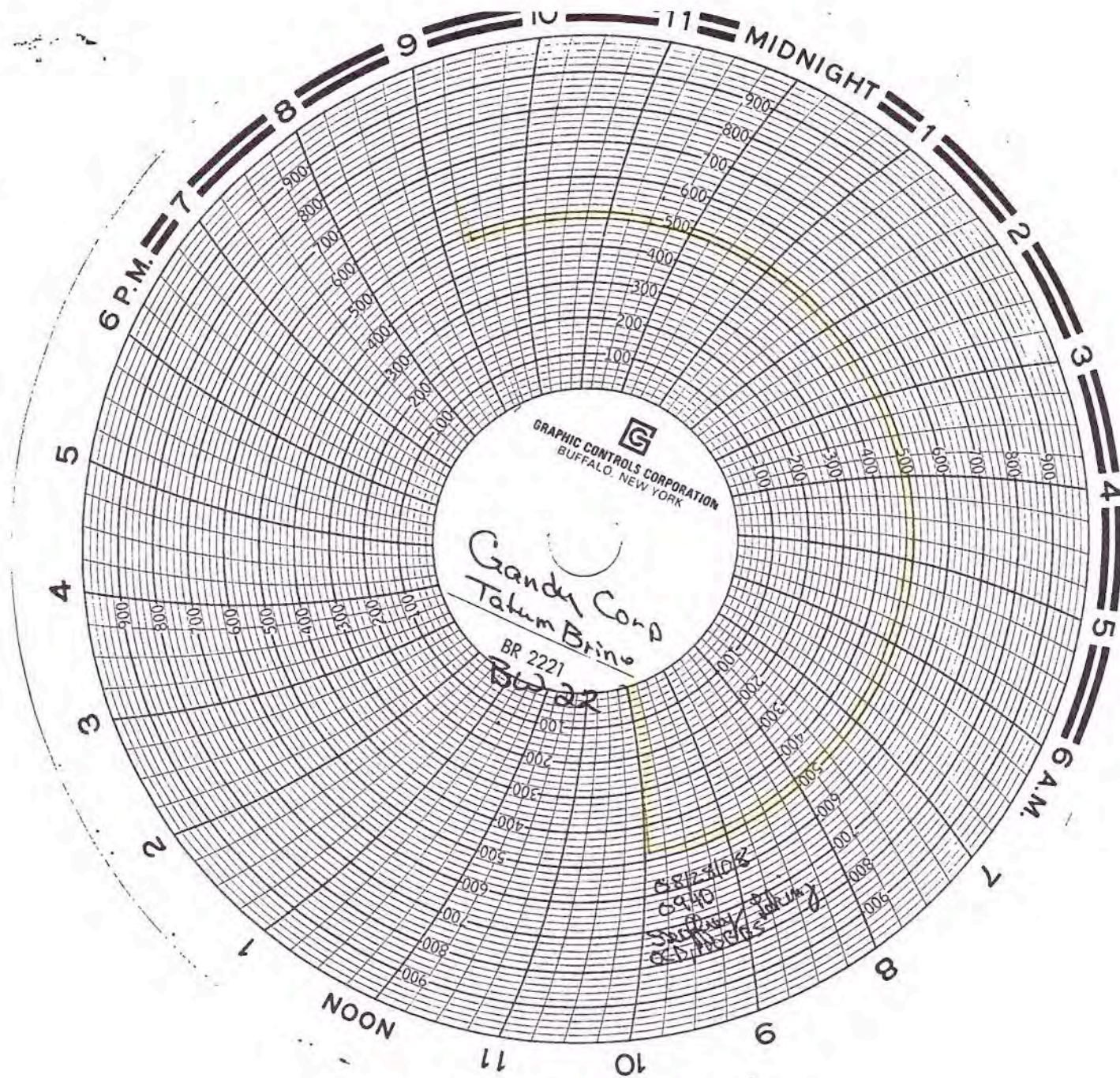
Carrier # Fed ex 862326068510



## Appendix “E”

- 2008 MIT Test Result-Chart
- Well Bore Sketch





30025.28162.00.00

packer set. @ 2139.40

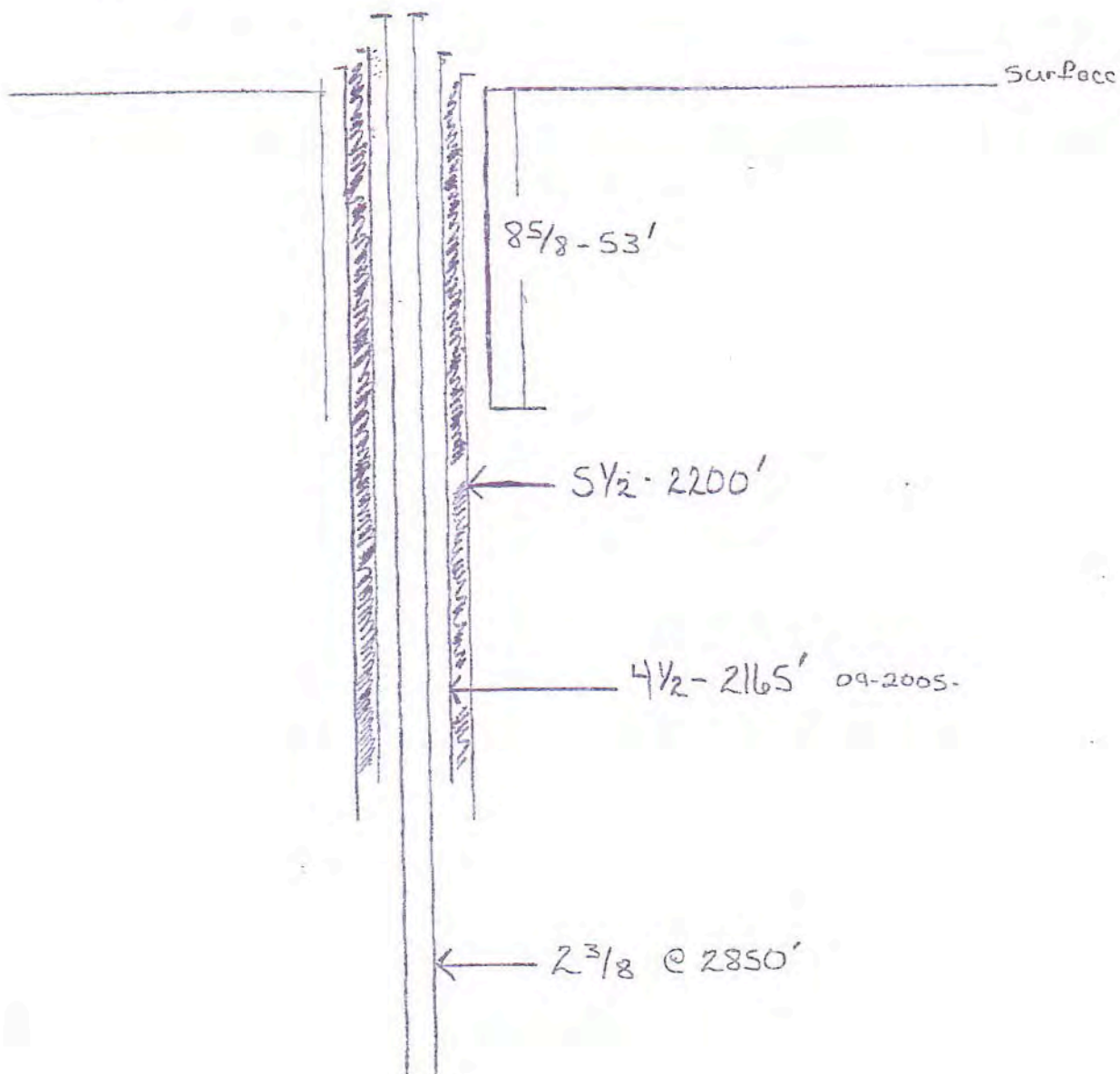


Calibrated  
8-19-08

24hr chart  
Set on 60m  
LQ.



Wasserhund Inc.  
Quality Brine  
Watson #1  
M 20-12s-36e  
30-025-28162

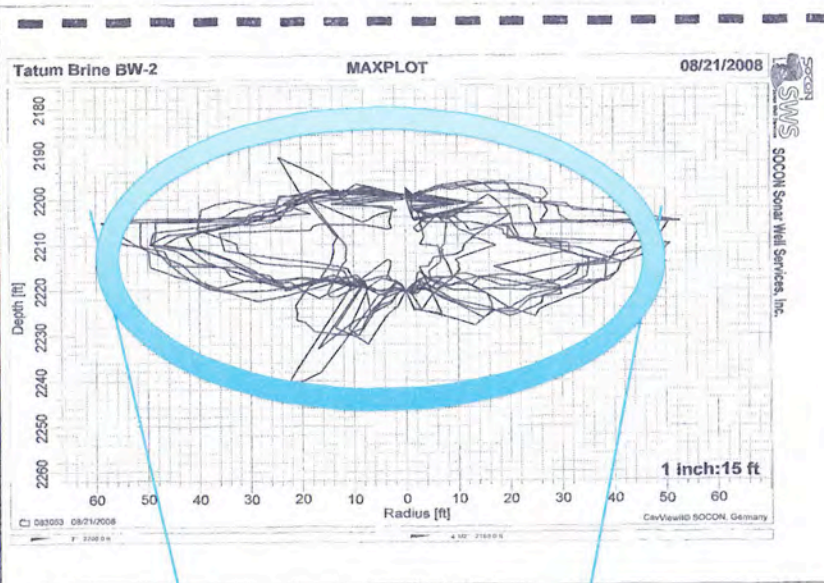




## Appendix "F"

- Brine Cavity Calculations with Wellbore Sketch
- D/H Calculations
- Aerial View showing Cavern Radius

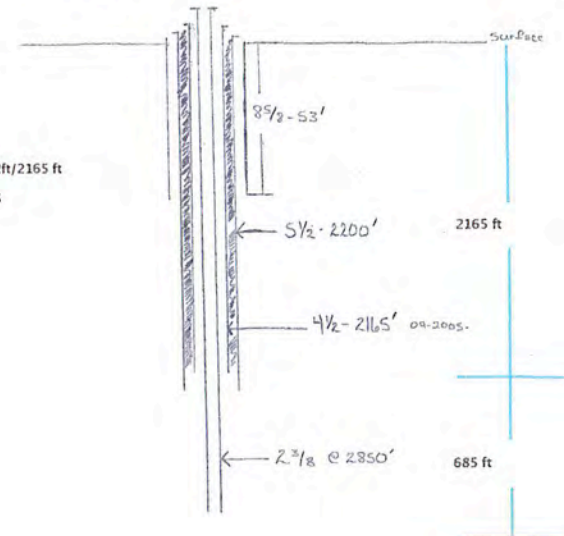




$R = \text{SQRT of } V \cdot 3.14 \cdot H$   
 Vol = 2.68 million cuft  
 Height = 685 ft from casing shoe to bottom  
 Radius = 61.1 feet Dia = 122ft

Wasserhund Inc.  
 Quality Brine  
 Watson #1  
 H 20-12S-36e  
 30-025-28162

$D/H = 122\text{ft}/2165\text{ ft}$   
 $D/H = .055$





Wasserhund Brine Station Located on the west side of Tatum, NM.  
Aerial view shows 60 foot radius of calculated and measured cavern.  
April 08, 2012.





## Appendix “G”

- AOR Well Status List
- AOR Plot Plan



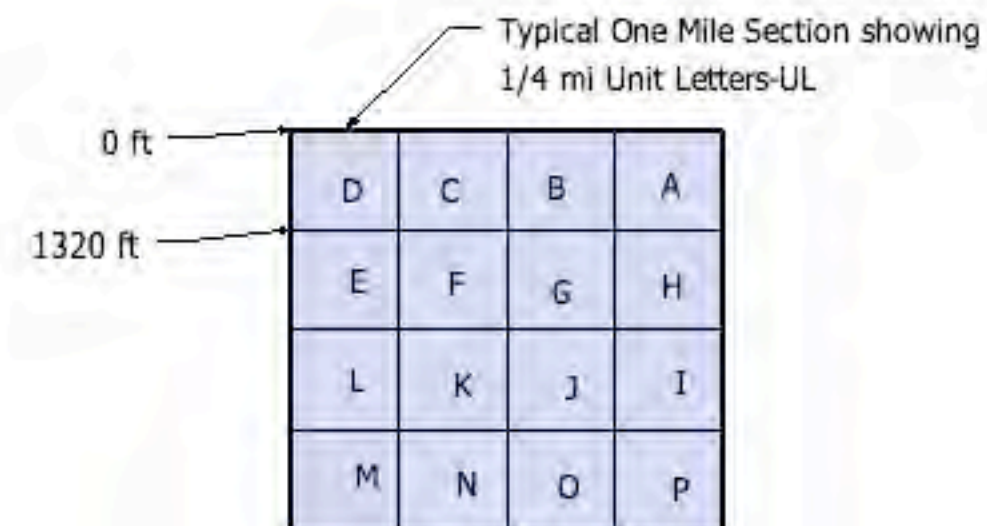
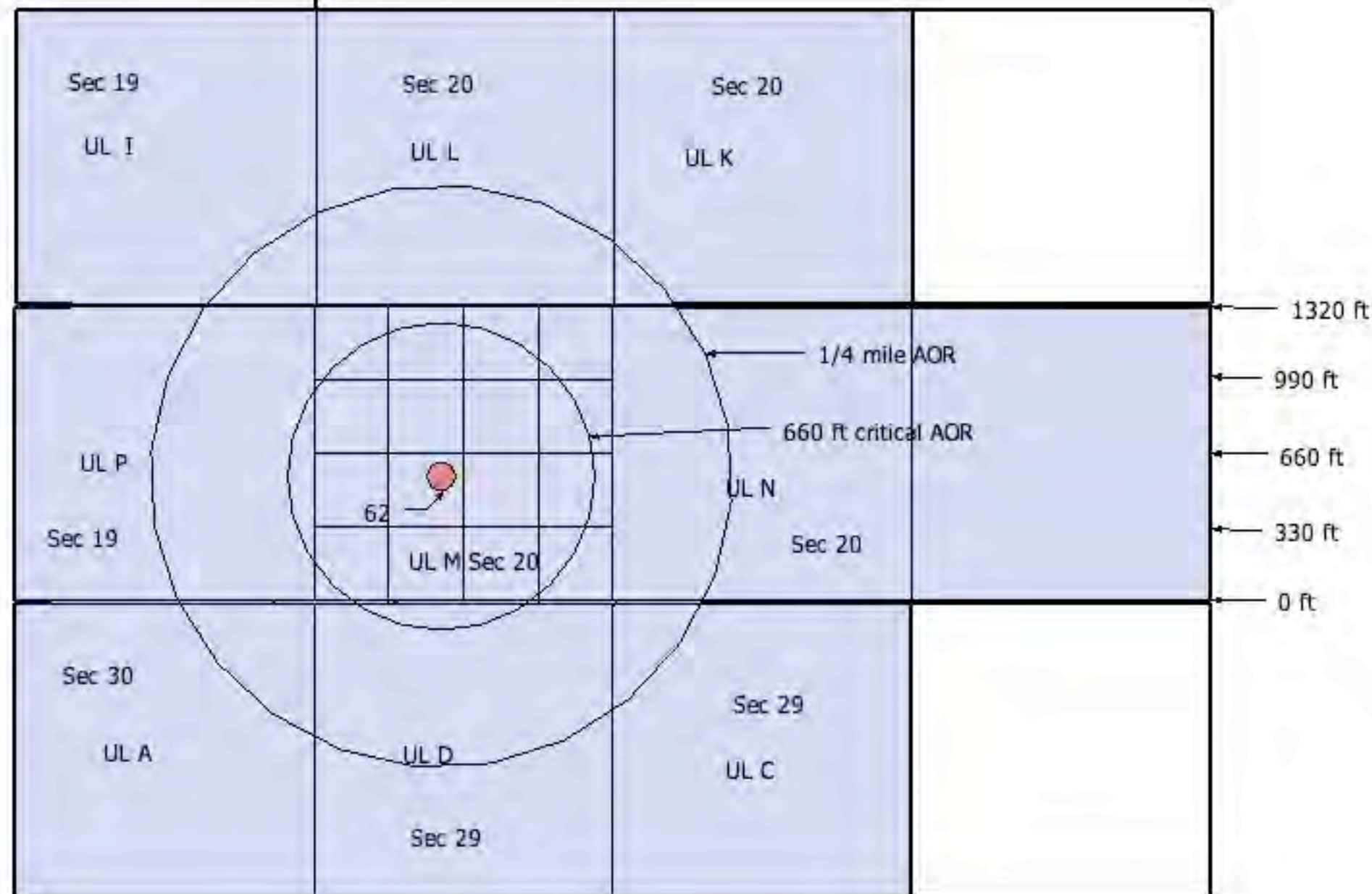
|   |                     |                                     |          |           |            |            |                              | Within 1/4 mi AOR<br>* within 660 ft or<br>Critical AOR | Casing Progra | Cased/Cemented      | Corrective Action |
|---|---------------------|-------------------------------------|----------|-----------|------------|------------|------------------------------|---|---------------|---------------------|-------------------|
|   | API#                | Well Name                           | UL       | ectio     | Ts         | Rg         | Footage                      |   | Checked       | across salt section | Required          |
| 1 | <u>30-025-28162</u> | <u>Wasserhund Quality Watson #1</u> | <u>M</u> | <u>20</u> | <u>12s</u> | <u>36e</u> | <u>593 FSL &amp; 639 FWL</u> | NA  | NA            | Na                  | NA                |
|   |                     |                                     |          |           |            |            |                              |   |               |                     |                   |
|   |                     |                                     |          |           |            |            |                              |   |               |                     |                   |
|   |                     |                                     |          |           |            |            |                              |   |               |                     |                   |
|   |                     |                                     |          |           |            |            |                              |   |               |                     |                   |

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

**Notes:**

\* Means the well is within 660 ft or the 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#: 30-025-28162

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-22

AOR Year: 2012

Location: UL M-Sec 20-Ts12s-R36e



**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.**

**Tatum Brine Station**

**OCD Permit BW-22**

**API No. 30-025-28162 Watson #1**

**Unit Letter M-Section 20-Ts 12s – R 35e**

**April 28, 2012**

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



## 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 1983 and has been in operation for approximately 29 years and is sited on the west side of Tatum, NM, just north of highway 380. The well is producing out of the Salado "Salt Formation" at a depth of approximately 2200-2850 feet below surface.

A copy of the most recent OCD approved Discharge Plan BW-22 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 been a relative low producer and the size of the cavity is quite small 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 premature down-hole problems, such as "sloughing" of the salt-anhydrite layers damaging the tubing and making re-entry virtually impossible and extremely expensive.

As will be discussed in Section 3 (Chemical Analysis) ever since the last open-hole formation test the well has not been able to produce 10# brine, either with reverse or conventional flow.

In addition, 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 on October 27, 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 brine tanks currently do not have secondary containment and Wasserhund Inc respectfully requests a waiver of those conditions until the next permit is negotiated and approved.

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.

Depending upon OCD requirements and local economics, Wasserhund Inc will have to evaluate whether future operations of this well is warranted.

## **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 23,350 bbls and the lifetime production volume is 2,650,595 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 380 psig, which is approximately 70 pounds below the permit maximum pressure of 450 psig.

The average injection pressure as noted by Wasserhund Inc.'s personnel is approximately 260 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 north of the site and is of high quality that meets EPA's Safe Drinking Water Standards.



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 1.054, which equates to 8.77 lb/gal. This is lower than the usual 10 lb/gal normally produced. This was 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." This loaded the hole with a large amount of fresh water and the well had not recovered from this event.

Wasserhund Inc will continue to monitor the density issue and will report to OCD once the system recovers, or if for some reason it doesn't recover, then some remedial action may be taken, including the possibility of plugging the well.

#### **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-22 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 have 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-22 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 provide some useful information pertaining to the size and shape of this particular cavern, but at a very limited depth. 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 2.68 million barrels of brine produced as of December 2011. The maximum diameter was calculated to be approximately 122 feet with a corresponding D/H ratio of .055 updated for the 2011 year.

While the sonar failed to provide information deeper in the cavern, it did show with some degree of accuracy, that the upper portion of the cavern



had a maximum center-line radius of approximately 60 feet with a corresponding diameter of approximately 110 feet over all, which correlates with the worst case calculated value. Attached in Appendix F is a copy of the MaxPlot of the last sonar test showing the sonar results.

Comparing the current D/H ratio of .055 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 twelve times.

Included in **Appendix F** is an aerial view showing the 60-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 Quality Watson #1 brine well, OCD permit # BW-22, located in UL M of Section 20-Ts12S-R36E. 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-22 location. The list shows API#, Operator well name, UL, Section, Township and Range, footages, Wells within 660 ft and ¼ mile, casing program status, casing/ cementing status, and corrective action required status.

In the 2011 review, there were no wells included in the list. **Appendix G** contains the check-off list showing the OCD wells in all adjacent quarter sections surrounding the BW-22 brine well.

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 established and all wells within that radius will be researched in greater detail.

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 study wells as the brine well grows, especially wells in the critical zone.

We used the current estimated diameter of the brine well i.e. 120 ft ( $r = 60$  ft) up-dated for 2011, and added a 10:1 safety factor which equates to about 600 ft. As the brine well grows, the critical AOR will be expanded and new wells will be added.

The critical zone was investigated by checking the OCD on-line well records. There was no well activity in the AOR.

### **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 Photo
- Discharge Plan BW-22









# NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

**BILL RICHARDSON**

Governor

**Joanna Prukop**

Cabinet Secretary

**Mark E. Fesmire, P.E.**

Director

**Oil Conservation Division**

March 28, 2007

Mr. Larry Gandy  
Gandy Corporation  
PO Box 827  
Tatum, New Mexico 88267

Re: Discharge Permit BW-022 Renewal

Dear Mr. Gandy:

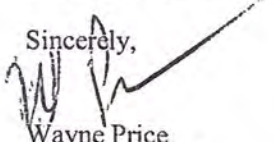
Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for Gandy Corporation's Tatum Brine Station (**Owner/operator**) brine well BW-022 located in the SW/4, SW/4 of Section 20, Township 12 South, Range 36 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 Brad A. Jones of my staff at (505) 476-3487 or E-mail [brad.a.jones@state.nm.us](mailto:brad.a.jones@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/baj

Attachments-1  
xc: OCD District Office

2007 SEP 28 AM 11:20  
RECEIVED



**ATTACHMENT TO THE DISCHARGE PERMIT  
GANDY CORPORATION'S TATUM BRINE STATION BRINE WELL (BW-022)  
DISCHARGE PERMIT APPROVAL CONDITIONS  
MARCH 28, 2007**

**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 March 11, 2012** 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.
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 February 9, 2007 discharge permit renewal 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 stormwater 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 # 30-025-28162 Quality Brine Watson #1

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 450 psig unless otherwise approved. 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:**

2006- 30 minute @ 300 psig casing test only (set packer to isolate formation)  
2007- 4 hour @ 300 psig casing open to formation test  
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

- 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 receive OCD approval to re-start injection operations.
- K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond 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  
BW-022  
March 28, 2007  
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: 9-24-07



## Appendix “B”

- Change of Operator
- Permit Renewal Application



From Operator GANDY CORP OGRID 8426  
To Operator WASSERHUND INC OGRID 130851  
Wells Selected for Transfer, Permit 138088  
Permit Status: APPROVED

**OCD District Hobbs**

**Property Well**

16527 EIDSON STATE #001  
309588 QUALITY BRINE WATSON #001

| Lease<br>Type | ULSTR        | OCD<br>Unit | API          | Well<br>Type | Pool<br>ID | Pool Name  |
|---------------|--------------|-------------|--------------|--------------|------------|------------|
| S             | 4-31-16S-35E | M           | 30-025-26883 | M            | 96173      | BSW;SALADO |
| F             | M-20-12S-36E | M           | 30-025-28162 | M            | 96173      | BSW;SALADO |



**District I**  
1025 N. Lincoln Dr. Hobbs, NM 88201  
Phone: (575) 391-6161 Fax: (575) 391-0720  
**District II**  
3115 N. 1st St. Artesia, NM 88203  
Phone: (575) 748-4284 Fax: (575) 748-9720  
**District III**  
1000 Rio Grande Rd. Aztec, NM 87410  
Phone: (505) 344-0178 Fax: (505) 344-0170  
**District IV**  
1220 S. St. Francis Dr. Santa Fe, NM 87505  
Phone: (505) 476-3370 Fax: (505) 476-3462

**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: PO Box 2140

City, State, Zip: Lovington NM 88260

**New Operator Information**

Effective Date: Effective on the date of approval by the OCD

OGRID: 13851  
Name: WASSERHUND INC  
Address: PO 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.



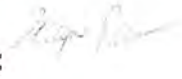
- IV. Attach the name and address of the landowner of the facility site.-**ON File with OCD**
- V. Attach a description of the types and quantities of fluids at the facility.-**ON File with OCD**
- VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.-**ON 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 Wasserhund Inc.

Signature: 

Date: October 27, 2011

E-mailAddress:wayneprice77@earthlink.net\_\_\_\_\_



## Appendix “C”

- Injection and Production Volumes/Comparison Charts
- Monthly/Quarterly Data Sheets



## 2011 Wasserhund Inc OCD BW-22 Annual Production Data

Plus numbers represent more fresh injected than brine produced. Neg numbers the opposite.

|  | Brine-BBLS | Fresh-BBLS | % diff  |
|--|------------|------------|---------|
| Jan  | 5694       | 5809       | 2.02%   |
| Feb  | 3075       | 3190       | 3.74%   |
| Mar  | 1280       | 1455       | 13.67%  |
| Apr  | 2595       | 2688       | 3.58%   |
| May  | 2585       | 2668       | 3.21%   |
| Jun  | 840        | 895        | 6.55%   |
| Jul  | 1930       | 2015       | 4.40%   |
| Aug  | 440        | 495        | 12.50%  |
| Sep  | 1520       | 1605       | 5.59%   |
| Oct  | 1800       | 1930       | 7.22%   |
| Nov  | 2090       | 440        | -78.95% |
| Dec  | 3430       | 1520       | -55.69% |
| 2011 Total   | 27279      | 24710      | -9.42%  |
| Total Brine Water Production Carry Over from Years Past Bt | 2,650,595  |            |         |
| Total Production year ending 2011                          | 2,677,874  |            |         |



GANDY CORPORATION  
OILFIELD SERVICES

RECEIVED OOD

2011 APR 18 P 1:35

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 Drive  
Santa Fe, NM 87505

Fresh Water injected at the Tatum Brine Station (BW-022)

|               |      |
|---------------|------|
| January 2011  | 5809 |
| February 2011 | 3190 |
| March 2011    | 1455 |

Brine Water Sold at the Tatum Brine Station (BW-022)

|               |      |
|---------------|------|
| January 2011  | 5694 |
| February 2011 | 3075 |
| March 2011    | 1280 |

Sincerely Yours;



Donny Collins



**WASSERHUND, INC.**  
**P.O. Box 2140**  
**Lovington, NM 88260-2140**

RECEIVED OCD  
2011 JUL 18 A 11:40

July 15, 2011

NM Oil Conservation Division  
1220 S. Saint Francis Drive  
Santa Fe, NM 87505

Fresh Water injected at the Tatum Brine Station (BW-022)

|            |      |
|------------|------|
| April 2011 | 2688 |
| May 2011   | 2668 |
| June 2011  | 895  |

Brine Water Sold at the Tatum Brine Station (BW-022)

|            |      |
|------------|------|
| April 2011 | 2595 |
| May 2011   | 2585 |
| June 2011  | 840  |

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 Drive  
Santa Fe, NM 87505

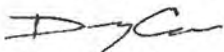
**Fresh Water injected at the Tatum Brine Station (BW-022)**

|               |      |
|---------------|------|
| October 2011  | 1875 |
| November 2011 | 2115 |
| December 2011 | 3495 |

**Brine Water Sold at the Tatum Brine Station (BW-022)**

|               |      |
|---------------|------|
| October 2011  | 1800 |
| November 2011 | 2090 |
| December 2011 | 3430 |

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: TATUM BRINE WELL

*BCU-22 AMENDED*

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



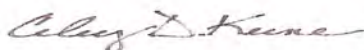
**Analytical Results For:**PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124Project: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWNReported:  
10-Apr-12 11:05

| Sample ID   | Laboratory ID | Matrix | Date Sampled    | Date Received   |
|-------------|---------------|--------|-----------------|-----------------|
| FRESHWATER  | H102248-01    | Water  | 18-Oct-11 09:50 | 18-Oct-11 16:30 |
| BRINE WATER | H102248-02    | Water  | 18-Oct-11 10:00 | 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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

**FRESHWATER**  
**H102248-01 (Water)**

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

**Cardinal Laboratories**

**Total Metals by ICPMS**

|            |         |          |      |    |         |    |           |       |     |
|------------|---------|----------|------|----|---------|----|-----------|-------|-----|
| Arsenic    | 0.0073  | 0.0005   | mg/L | 1  | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Barium     | 0.0316  | 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     | ND      | 0.00010  | mg/L | 1  | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Copper     | 0.0004  | 0.0001   | mg/L | 1  | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Lead       | ND      | 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 | 0.0038  | 0.0005   | mg/L | 1  | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Nickel     | 0.0017  | 0.0005   | mg/L | 1  | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Selenium   | 0.008   | 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    | 0.00410 | 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 |
|---------|----|--------|------|---|---------|----|-----------|-------|-----|

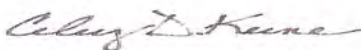
**Inorganic Compounds**

|                          |        |       |          |   |         |    |           |           |     |
|--------------------------|--------|-------|----------|---|---------|----|-----------|-----------|-----|
| Alkalinity, Bicarbonate  | 205    | 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                 | 84.0   | 16.0  | mg/L     | 4 | 1101905 | HM | 21-Oct-11 | 4500-Cl-B |     |
| Conductivity             | 1020   | 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                 | 1.04   | 0.200 | mg/L     | 1 | 1111414 | CK | 01-Nov-11 | 4500F C   | GAL |
| pH                       | 8.03   | 0.100 | pH Units | 1 | 1102705 | HM | 20-Oct-11 | 150.1     |     |
| Specific Gravity @ 60° F | 0.9935 | 0.000 | [blank]  | 1 | 1110307 | HM | 28-Oct-11 | SM 2710F  |     |
| Sulfate                  | 244    | 10.0  | mg/L     | 1 | 1103102 | HM | 28-Oct-11 | 375.4     |     |
| TDS                      | 639    | 5.00  | mg/L     | 1 | 1102603 | HM | 22-Oct-11 | 160.1     |     |
| Alkalinity, Total        | 168    | 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: TATUM BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 11:05

**FRESHWATER**  
**H102248-01 (Water)**

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

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

|     |      |      |      |   |         |    |           |       |  |
|-----|------|------|------|---|---------|----|-----------|-------|--|
| TSS | 6.00 | 2.00 | mg/L | 1 | 1111105 | HM | 25-Oct-11 | 160.2 |  |
|-----|------|------|------|---|---------|----|-----------|-------|--|

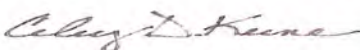
**TOTAL METALS BY ICP**

|           |        |        |      |   |         |    |           |       |     |
|-----------|--------|--------|------|---|---------|----|-----------|-------|-----|
| Aluminum  | 0.0580 | 0.0500 | mg/L | 1 | 1111410 | JM | 26-Oct-11 | 200.7 | GAL |
| Boron     | 0.351  | 0.300  | mg/L | 1 | 1111410 | JM | 26-Oct-11 | 200.7 | GAL |
| Calcium   | 94.6   | 1.00   | mg/L | 1 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |
| Iron      | 0.251  | 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 | 2.49   | 1.00   | mg/L | 1 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |
| Sodium    | 76.5   | 1.00   | mg/L | 1 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |

Cardinal Laboratories

\*=Accredited Analyte

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Celest D. Keene, Lab Director/Quality Manager



**Analytical Results For:**

PRICE LLC  
312 ENCANTADO RIDGE COURT, NE  
RIO RANCHO NM, 87124

Project: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

**BRINE WATER**  
**H102248-02 (Water)**

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

**Cardinal Laboratories**
**Total Metals by ICPMS**

|            |        |        |      |     |         |    |           |       |     |
|------------|--------|--------|------|-----|---------|----|-----------|-------|-----|
| Arsenic    | ND     | 0.0500 | mg/L | 100 | 1111412 | JM | 02-Nov-11 | 200.8 | GAL |
| Barium     | 0.0518 | 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     | 0.354  | 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  | 0.317  | 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    | 0.0116 | 0.0100 | mg/L | 100 | 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 |
|---------|----|--------|------|---|---------|----|-----------|-------|-----|

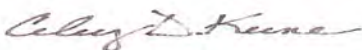
**Inorganic Compounds**

|                          |        |       |          |   |         |    |           |           |     |
|--------------------------|--------|-------|----------|---|---------|----|-----------|-----------|-----|
| Alkalinity, Bicarbonate  | 161    | 5.00  | mg/L     | 1 | 1102105 | HM | 21-Oct-11 | 310.1M    |     |
| Alkalinity, Carbonate    | ND     | 0.00  | mg/L     | 1 | 1102105 | HM | 21-Oct-11 | 310.1M    |     |
| Chloride                 | 47500  | 16.0  | mg/L     | 4 | 1101905 | HM | 21-Oct-11 | 4500-Cl-B |     |
| Conductivity             | 155000 | 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                 | 0.480  | 0.200 | mg/L     | 1 | 1111414 | CK | 01-Nov-11 | 4500F C   | GAL |
| pH                       | 7.24   | 0.100 | pH Units | 1 | 1102705 | HM | 20-Oct-11 | 150.1     |     |
| Specific Gravity @ 60° F | 1.054  | 0.000 | [blank]  | 1 | 1110307 | HM | 28-Oct-11 | SM 2710F  |     |
| Sulfate                  | 6180   | 10.0  | mg/L     | 1 | 1103102 | HM | 28-Oct-11 | 375.4     |     |
| TDS                      | 79400  | 5.00  | mg/L     | 1 | 1102603 | HM | 22-Oct-11 | 160.1     |     |
| Alkalinity, Total        | 132    | 4.00  | mg/L     | 1 | 1102105 | HM | 21-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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

**BRINE WATER**  
**H102248-02 (Water)**

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

**Cardinal Laboratories**

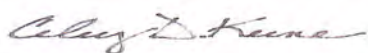
**Inorganic Compounds**

|                            |       |       |      |    |         |    |           |       |     |
|----------------------------|-------|-------|------|----|---------|----|-----------|-------|-----|
| TSS                        | 42.0  | 2.00  | mg/L | 1  | 1111105 | HM | 25-Oct-11 | 160.2 |     |
| <b>TOTAL METALS BY ICP</b> |       |       |      |    |         |    |           |       |     |
| Aluminum                   | 1.51  | 0.500 | mg/L | 10 | 1111410 | JM | 26-Oct-11 | 200.7 | GAL |
| Boron                      | 7.86  | 3.00  | mg/L | 10 | 1111410 | JM | 26-Oct-11 | 200.7 | GAL |
| Calcium                    | 1450  | 10.0  | mg/L | 10 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |
| Iron                       | 4.40  | 0.600 | mg/L | 10 | 1111410 | JM | 26-Oct-11 | 200.7 | GAL |
| Magnesium                  | 731   | 10.0  | mg/L | 10 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |
| Potassium                  | 509   | 10.0  | mg/L | 10 | 1111410 | CK | 26-Oct-11 | 200.7 | GAL |
| Sodium                     | 24400 | 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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

**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

|            |        |          |      |  |  |  |  |  |  |    |
|------------|--------|----------|------|--|--|--|--|--|--|----|
| Barium     | ND     | 0.000500 | mg/L |  |  |  |  |  |  |    |
| Selenium   | ND     | 0.001    | mg/L |  |  |  |  |  |  |    |
| Lead       | ND     | 0.0005   | mg/L |  |  |  |  |  |  |    |
| Uranium    | ND     | 0.000100 | mg/L |  |  |  |  |  |  |    |
| Zinc       | 0.018  | 0.001    | mg/L |  |  |  |  |  |  | BI |
| Chromium   | ND     | 0.001    | mg/L |  |  |  |  |  |  |    |
| Manganese  | 0.0035 | 0.0005   | mg/L |  |  |  |  |  |  | BI |
| Molybdenum | ND     | 0.0005   | mg/L |  |  |  |  |  |  |    |
| Arsenic    | ND     | 0.0005   | mg/L |  |  |  |  |  |  |    |
| Copper     | ND     | 0.0001   | mg/L |  |  |  |  |  |  |    |
| Nickel     | ND     | 0.0005   | mg/L |  |  |  |  |  |  |    |
| Silver     | ND     | 0.00010  | mg/L |  |  |  |  |  |  |    |
| Cobalt     | ND     | 0.00010  | mg/L |  |  |  |  |  |  |    |
| Cadmium    | ND     | 0.00010  | mg/L |  |  |  |  |  |  |    |

**LCS (1111412-BS1)**

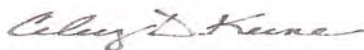
Prepared: 01-Nov-11 Analyzed: 02-Nov-11

|            |        |  |      |        |  |      |        |  |  |     |
|------------|--------|--|------|--------|--|------|--------|--|--|-----|
| Barium     | 0.0503 |  | mg/L | 0.0500 |  | 101  | 85-115 |  |  |     |
| Copper     | 0.0502 |  | mg/L | 0.0500 |  | 100  | 85-115 |  |  |     |
| Cobalt     | 0.0515 |  | mg/L | 0.0500 |  | 103  | 85-115 |  |  |     |
| Lead       | 0.0503 |  | mg/L | 0.0500 |  | 101  | 85-115 |  |  |     |
| Cadmium    | 0.0507 |  | mg/L | 0.0500 |  | 101  | 85-115 |  |  |     |
| Arsenic    | 0.0529 |  | mg/L | 0.0500 |  | 106  | 85-115 |  |  |     |
| Manganese  | 0.0429 |  | mg/L | 0.0500 |  | 85.8 | 85-115 |  |  |     |
| Chromium   | 0.049  |  | mg/L | 0.0500 |  | 98.6 | 85-115 |  |  |     |
| Nickel     | 0.0504 |  | mg/L | 0.0500 |  | 101  | 85-115 |  |  |     |
| Molybdenum | 0.0542 |  | mg/L | 0.0500 |  | 108  | 85-115 |  |  |     |
| Uranium    | 0.0490 |  | mg/L | 0.0500 |  | 98.0 | 85-115 |  |  |     |
| Silver     | 0.0521 |  | mg/L | 0.0500 |  | 104  | 85-115 |  |  |     |
| Zinc       | 0.059  |  | mg/L | 0.0500 |  | 118  | 85-115 |  |  | BS1 |
| Selenium   | 0.273  |  | mg/L | 0.250  |  | 109  | 85-115 |  |  |     |

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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: TATUM BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 11:05

**Total Metals by ICPMS - Quality Control**
**Cardinal Laboratories**

| Analyte | Result | Reporting<br>Limit | Units | Spike<br>Level | Source<br>Result | %REC | %REC<br>Limits | RPD | RPD<br>Limit | Notes |
|---------|--------|--------------------|-------|----------------|------------------|------|----------------|-----|--------------|-------|
|---------|--------|--------------------|-------|----------------|------------------|------|----------------|-----|--------------|-------|

**Batch 1111412 - EPA 3005**
**LCS Dup (1111412-BS1)**

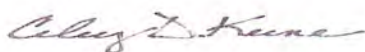
Prepared: 01-Nov-11 Analyzed: 02-Nov-11

|            |        |  |      |        |  |      |        |       |    |     |
|------------|--------|--|------|--------|--|------|--------|-------|----|-----|
| Barium     | 0.0492 |  | mg/L | 0.0500 |  | 98.4 | 85-115 | 2.21  | 20 |     |
| Molybdenum | 0.0523 |  | mg/L | 0.0500 |  | 105  | 85-115 | 3.57  | 20 |     |
| Uranium    | 0.0485 |  | mg/L | 0.0500 |  | 97.0 | 85-115 | 1.03  | 20 |     |
| Copper     | 0.0487 |  | mg/L | 0.0500 |  | 97.4 | 85-115 | 3.03  | 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 |     |
| Cadmium    | 0.0501 |  | mg/L | 0.0500 |  | 100  | 85-115 | 1.19  | 20 |     |
| Nickel     | 0.0493 |  | mg/L | 0.0500 |  | 98.6 | 85-115 | 2.21  | 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 |     |
| Cobalt     | 0.0503 |  | mg/L | 0.0500 |  | 101  | 85-115 | 2.36  | 20 |     |
| Manganese  | 0.0443 |  | mg/L | 0.0500 |  | 88.6 | 85-115 | 3.21  | 20 |     |
| Lead       | 0.0498 |  | mg/L | 0.0500 |  | 99.6 | 85-115 | 0.999 | 20 |     |
| Zinc       | 0.065  |  | mg/L | 0.0500 |  | 130  | 85-115 | 9.52  | 20 | BS1 |

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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: TATUM BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 11:05

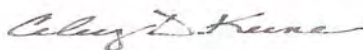
**Mercury (Total) by CVAA - Quality Control**
**Cardinal Laboratories**

| Analyte                          | Result | Reporting<br>Limit | Units | Spike<br>Level | Source<br>Result | %REC | %REC<br>Limits | RPD  | RPD<br>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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

### Inorganic Compounds - Quality Control

#### Cardinal Laboratories

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

#### 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 |  |  |  |  |  |  |  |
|----------|----|------|------|--|--|--|--|--|--|--|

##### 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: TATUM BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 11:05

**Inorganic Compounds - Quality Control**
**Cardinal Laboratories**

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

**Batch 1101905 - SPLP 1312**
**LCS Dup (1101905-BSD1)**

Prepared: 17-Oct-11 Analyzed: 20-Oct-11

|          |     |      |      |     |  |     |        |      |    |  |
|----------|-----|------|------|-----|--|-----|--------|------|----|--|
| Chloride | 108 | 4.00 | mg/L | 100 |  | 108 | 80-120 | 3.64 | 20 |  |
|----------|-----|------|------|-----|--|-----|--------|------|----|--|

**Batch 1102105 - General Prep - Wet Chem**
**Blank (1102105-BLK1)**

Prepared &amp; Analyzed: 21-Oct-11

|                         |    |      |      |  |  |  |  |  |  |  |
|-------------------------|----|------|------|--|--|--|--|--|--|--|
| Alkalinity, Carbonate   | ND | 0.00 | mg/L |  |  |  |  |  |  |  |
| Alkalinity, Bicarbonate | ND | 5.00 | mg/L |  |  |  |  |  |  |  |
| Alkalinity, Total       | ND | 4.00 | mg/L |  |  |  |  |  |  |  |

**LCS (1102105-BS1)**

Prepared &amp; Analyzed: 21-Oct-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 (1102105-BSD1)**

Prepared &amp; Analyzed: 21-Oct-11

|                         |     |      |      |     |  |     |        |      |    |  |
|-------------------------|-----|------|------|-----|--|-----|--------|------|----|--|
| Alkalinity, Carbonate   | ND  | 0.00 | mg/L |     |  |     | 80-120 |      | 20 |  |
| Alkalinity, Bicarbonate | ND  | 5.00 | mg/L |     |  |     | 80-120 |      | 20 |  |
| Alkalinity, Total       | 120 | 4.00 | mg/L | 100 |  | 120 | 80-120 | 6.90 | 20 |  |

**Duplicate (1102105-DUP1)**

Source: H102248-02

Prepared &amp; Analyzed: 21-Oct-11

|                         |     |      |      |  |      |  |  |      |    |  |
|-------------------------|-----|------|------|--|------|--|--|------|----|--|
| Alkalinity, Carbonate   | ND  | 0.00 | mg/L |  | 0.00 |  |  |      | 20 |  |
| Alkalinity, Bicarbonate | 156 | 5.00 | mg/L |  | 161  |  |  | 3.15 | 20 |  |
| Alkalinity, Total       | 128 | 4.00 | mg/L |  | 132  |  |  | 3.08 | 20 |  |

**Batch 1102603 - \*\*\* DEFAULT PREP \*\*\***
**Blank (1102603-BLK1)**

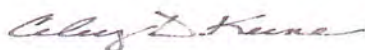
Prepared: 22-Oct-11 Analyzed: 26-Oct-11

|     |    |      |      |  |  |  |  |  |  |  |
|-----|----|------|------|--|--|--|--|--|--|--|
| TDS | ND | 5.00 | 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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

### Inorganic Compounds - Quality Control

#### Cardinal Laboratories

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

#### Batch 1102603 - \*\*\* DEFAULT PREP \*\*\*

##### LCS (1102603-BS1)

Prepared: 22-Oct-11 Analyzed: 26-Oct-11

|     |     |  |      |     |  |      |        |  |  |  |
|-----|-----|--|------|-----|--|------|--------|--|--|--|
| TDS | 235 |  | mg/L | 240 |  | 97.9 | 80-120 |  |  |  |
|-----|-----|--|------|-----|--|------|--------|--|--|--|

##### Duplicate (1102603-DUP1)

Source: H102277-01

Prepared: 22-Oct-11 Analyzed: 26-Oct-11

|     |      |      |      |  |      |  |  |      |    |  |
|-----|------|------|------|--|------|--|--|------|----|--|
| TDS | 3260 | 5.00 | mg/L |  | 3260 |  |  | 0.00 | 20 |  |
|-----|------|------|------|--|------|--|--|------|----|--|

#### Batch 1102705 - General Prep - Wet Chem

##### LCS (1102705-BS1)

Prepared & Analyzed: 20-Oct-11

|              |      |  |          |      |  |     |        |  |  |  |
|--------------|------|--|----------|------|--|-----|--------|--|--|--|
| Conductivity | 509  |  | uS/cm    | 500  |  | 102 | 80-120 |  |  |  |
| pH           | 7.11 |  | pH Units | 7.00 |  | 102 | 90-110 |  |  |  |

##### Duplicate (1102705-DUP1)

Source: H102247-01

Prepared & Analyzed: 20-Oct-11

|              |      |       |          |  |      |  |  |       |    |  |
|--------------|------|-------|----------|--|------|--|--|-------|----|--|
| Conductivity | 1410 | 1.00  | uS/cm    |  | 1410 |  |  | 0.00  | 20 |  |
| pH           | 7.75 | 0.100 | pH Units |  | 7.73 |  |  | 0.258 | 20 |  |

#### Batch 1103102 - General Prep - Wet Chem

##### Blank (1103102-BLK1)

Prepared & Analyzed: 28-Oct-11

|         |    |      |      |  |  |  |  |  |  |  |
|---------|----|------|------|--|--|--|--|--|--|--|
| Sulfate | ND | 10.0 | mg/L |  |  |  |  |  |  |  |
|---------|----|------|------|--|--|--|--|--|--|--|

##### LCS (1103102-BS1)

Prepared & Analyzed: 28-Oct-11

|         |      |      |      |      |  |     |        |  |  |  |
|---------|------|------|------|------|--|-----|--------|--|--|--|
| Sulfate | 20.9 | 10.0 | mg/L | 20.0 |  | 104 | 80-120 |  |  |  |
|---------|------|------|------|------|--|-----|--------|--|--|--|

##### LCS Dup (1103102-BSD1)

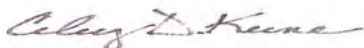
Prepared & Analyzed: 28-Oct-11

|         |      |      |      |      |  |      |        |      |    |  |
|---------|------|------|------|------|--|------|--------|------|----|--|
| Sulfate | 18.2 | 10.0 | mg/L | 20.0 |  | 91.0 | 80-120 | 13.8 | 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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

### Inorganic Compounds - Quality Control

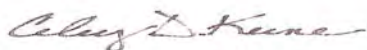
#### Cardinal Laboratories

| Analyte  | Result   | Reporting Limit | Units                                     | Spike Level | Source Result | %REC | %REC Limits | RPD   | RPD Limit | Notes |
|--|--|-----------------|---|-------------|---------------|------|-------------|-------|-----------|-------|
| <b>Batch 1103102 - General Prep - Wet Chem</b> |  |                 |   |             |               |      |             |       |           |       |
| <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        |       |
| <b>Batch 1110307 - General Prep - Wet Chem</b> |  |                 |   |             |               |      |             |       |           |       |
| <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       |       |
| <b>Batch 1111105 - Filtration</b>              |  |                 |   |             |               |      |             |       |           |       |
| <b>Blank (1111105-BLK1)</b>                    | <b>Prepared &amp; Analyzed: 25-Oct-11</b>      |                 |   |             |               |      |             |       |           |       |
| TSS  | ND   | 2.00            | mg/L                                      |             |               |      |             |       |           |       |
| <b>Duplicate (1111105-DUP1)</b>                | <b>Source: H102248-01</b>                      |                 | <b>Prepared &amp; Analyzed: 25-Oct-11</b> |             |               |      |             |       |           |       |
| TSS  | 6.00   | 2.00            | mg/L                                      |             | 6.00          |      |             | 0.00  | 20        |       |
| <b>Batch 1111413 - General Prep</b>            |  |                 |   |             |               |      |             |       |           |       |
| <b>Blank (1111413-BLK1)</b>                    | <b>Prepared: 25-Oct-11 Analyzed: 26-Oct-11</b> |                 |   |             |               |      |             |       |           |       |
| Cyanide (total)                                | ND   | 0.005           | mg/L                                      |             |               |      |             |       |           |       |
| <b>LCS (1111413-BS1)</b>                       | <b>Prepared: 25-Oct-11 Analyzed: 26-Oct-11</b> |                 |   |             |               |      |             |       |           |       |
| Cyanide (total)                                | 0.042  |                 | mg/L                                      | 0.0500      |               | 85.0 | 85-115      |       |           |       |
| <b>LCS Dup (1111413-BSD1)</b>                  | <b>Prepared: 25-Oct-11 Analyzed: 26-Oct-11</b> |                 |   |             |               |      |             |       |           |       |
| Cyanide (total)                                | 0.047  |                 | mg/L                                      | 0.0500      |               | 94.8 | 85-115      | 10.9  | 20        |       |

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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: TATUM BRINE WELL  
 Project Number: NONE GIVEN  
 Project Manager: LESTER WAYNE PRICE, JR  
 Fax To: UNK-NOWN

 Reported:  
 10-Apr-12 11:05

**Inorganic Compounds - Quality Control**
**Cardinal Laboratories**

| Analyte                             | Result | Reporting<br>Limit | Units | Spike<br>Level                 | Source<br>Result | %REC | %REC<br>Limits | RPD  | RPD<br>Limit | Notes |
|-------------------------------------|--------|--------------------|-------|--------------------------------|------------------|------|----------------|------|--------------|-------|
| <b>Batch 1111414 - General Prep</b> |        |                    |       |                                |                  |      |                |      |              |       |
| <b>Blank (1111414-BLK1)</b>         |        |                    |       | Prepared & Analyzed: 01-Nov-11 |                  |      |                |      |              |       |
| Fluoride                            | ND     | 0.200              | mg/L  |                                |                  |      |                |      |              |       |
| <b>LCS (1111414-BS1)</b>            |        |                    |       | Prepared & Analyzed: 01-Nov-11 |                  |      |                |      |              |       |
| Fluoride                            | 1.09   |                    | mg/L  | 1.00                           |                  | 109  | 80-120         |      |              |       |
| <b>LCS Dup (1111414-BSD1)</b>       |        |                    |       | Prepared & 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: TATUM BRINE WELL  
Project Number: NONE GIVEN  
Project Manager: LESTER WAYNE PRICE, JR  
Fax To: UNK-NOWN

Reported:  
10-Apr-12 11:05

**TOTAL METALS BY ICP - Quality Control**
**Cardinal Laboratories**

| Analyte | Result | Reporting<br>Limit | Units | Spike<br>Level | Source<br>Result | %REC | %REC<br>Limits | RPD | RPD<br>Limit | Notes |
|---------|--------|--------------------|-------|----------------|------------------|------|----------------|-----|--------------|-------|
|---------|--------|--------------------|-------|----------------|------------------|------|----------------|-----|--------------|-------|

**Batch 1111410 - EPA 3005**
**Blank (1111410-BLK1)**

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

|           |    |        |      |  |  |  |  |  |  |  |
|-----------|----|--------|------|--|--|--|--|--|--|--|
| Aluminum  | ND | 0.0500 | mg/L |  |  |  |  |  |  |  |
| Iron      | ND | 0.060  | mg/L |  |  |  |  |  |  |  |
| Sodium    | ND | 1.00   | mg/L |  |  |  |  |  |  |  |
| Calcium   | ND | 1.00   | mg/L |  |  |  |  |  |  |  |
| Potassium | ND | 1.00   | mg/L |  |  |  |  |  |  |  |
| Magnesium | ND | 1.00   | mg/L |  |  |  |  |  |  |  |
| Boron     | ND | 0.300  | mg/L |  |  |  |  |  |  |  |

**LCS (1111410-BS1)**

Prepared: 25-Oct-11 Analyzed: 26-Oct-11

|           |      |  |      |      |  |      |        |  |  |  |
|-----------|------|--|------|------|--|------|--------|--|--|--|
| Sodium    | 6.34 |  | mg/L | 6.48 |  | 97.8 | 85-115 |  |  |  |
| Magnesium | 19.9 |  | mg/L | 20.0 |  | 99.5 | 85-115 |  |  |  |
| Iron      | 3.89 |  | mg/L | 4.00 |  | 97.2 | 85-115 |  |  |  |
| Boron     | 3.86 |  | mg/L | 4.00 |  | 96.5 | 85-115 |  |  |  |
| Calcium   | 3.90 |  | mg/L | 4.00 |  | 97.5 | 85-115 |  |  |  |
| Aluminum  | 3.94 |  | mg/L | 4.00 |  | 98.5 | 85-115 |  |  |  |
| Potassium | 7.71 |  | mg/L | 8.00 |  | 96.4 | 85-115 |  |  |  |

**LCS Dup (1111410-BSD1)**


Prepared: 25-Oct-11 Analyzed: 26-Oct-11

|           |      |  |      |      |  |      |        |       |    |  |
|-----------|------|--|------|------|--|------|--------|-------|----|--|
| 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 |  |
| Calcium   | 3.91 |  | mg/L | 4.00 |  | 97.8 | 85-115 | 0.256 | 20 |  |
| Iron      | 3.92 |  | mg/L | 4.00 |  | 98.0 | 85-115 | 0.768 | 20 |  |
| Potassium | 8.08 |  | mg/L | 8.00 |  | 101  | 85-115 | 4.69  | 20 |  |
| Aluminum  | 3.95 |  | mg/L | 4.00 |  | 98.8 | 85-115 | 0.253 | 20 |  |
| Boron     | 3.89 |  | mg/L | 4.00 |  | 97.2 | 85-115 | 0.774 | 20 |  |

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Celey D. Keene, Lab Director/Quality Manager



**Notes and Definitions**

|     |   |
|-----|---|
| 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<br>Samples reported on an as received basis (wet) unless otherwise noted on report  |

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Celey 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> Price LLC<br><b>Project Manager:</b> Lorton Wayne Price Jr.<br><b>Address:</b> 712 Encanto Rd. NE<br><b>City:</b> Rio Rancho <b>State:</b> NM <b>Zip:</b> 87124<br><b>Phone #:</b> 505-278-5543 <b>Fax #:</b><br><b>Project #:</b> <b>Project Owner:</b><br><b>Project Name:</b> <b>Project Location:</b><br><b>Sampler Name:</b> Lorton Wayne Price Jr. |             |                                |             | <b>BILL TO</b><br><b>P.O. #:</b> 8140<br><b>Company:</b> Price LLC<br><b>Attn:</b><br><b>Address:</b><br><b>City:</b> <b>State:</b> NM <b>Zip:</b> 87124<br><b>Phone #:</b> 505-278-5543 <b>Fax #:</b> |      |          |        | <b>ANALYSIS REQUEST</b> |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| FOR LAB USE ONLY  |             |                                |             | MATRIX   |      | PRESERV. |        | SAMPLING                |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| Lab I.D.  | Sample I.D. | (GRAB OR (COMP<br># CONTAINERS | GROUNDWATER | WASTEWATER   | SOIL | OIL      | SLUDGE | OTHER                   | ACID/BASE | ICE / COOL | OTHER | DATE     | TIME |  |  |  |  |  |  |  |  |  |  |  |  |
| H102248   | Freshwater  |                                |             |  |      |          |        |                         |           |            |       | 10/11/11 | 9:51 |  |  |  |  |  |  |  |  |  |  |  |  |
| CIA   |             |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| B2  |             |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| C2  |             |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| 024   | Brine Water |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| B3  |             |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |
| C3  |             |                                |             |  |      |          |        |                         |           |            |       |          |      |  |  |  |  |  |  |  |  |  |  |  |  |

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|   |  |   |  |   |  |
|---|--|---|--|---|--|
| <b>Relinquished By:</b><br>Lorton Wayne Price Jr.<br><b>Date:</b> 10/11/11<br><b>Time:</b> 4:50 |  | <b>Received By:</b><br>Jodi Henson<br><b>Date:</b><br><b>Time:</b>  |  | <b>Phone Result:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Add'l Phone #:</b><br><b>Fax Result:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Add'l Fax #:</b><br><b>REMARKS:</b> |  |
| <b>Relinquished By:</b><br><br><b>Date:</b><br><b>Time:</b>                                     |  | <b>Received By:</b><br><br><b>Date:</b><br><b>Time:</b>   |  |   |  |
| <b>Delivered By: (Circle One)</b><br>Sampler - UPS - Bus - Other:                               |  | <b>Sample Condition</b><br>Cool - Intact<br><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No<br><b>CHECKED BY:</b><br>(Initials) |  |   |  |

† 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 87401

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 August 1, 2011

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

WELL API NO.

30-025-28162

5. Indicate Type of Lease

STATE ☒ FEE ☐

6. State Oil & Gas Lease No.

25-28162

7. Lease Name or Unit Agreement Name

Quality Watson

8. Well Number

1

9. OGRID Number

130851

10. Pool name or Wildcat

BSW Salado

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 : 593 feet from the South line and 639 feet from the West line

Section 20 Township 12s Range 36e 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:

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 - 10/21/08

\* 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:

Mark Brown

TITLE

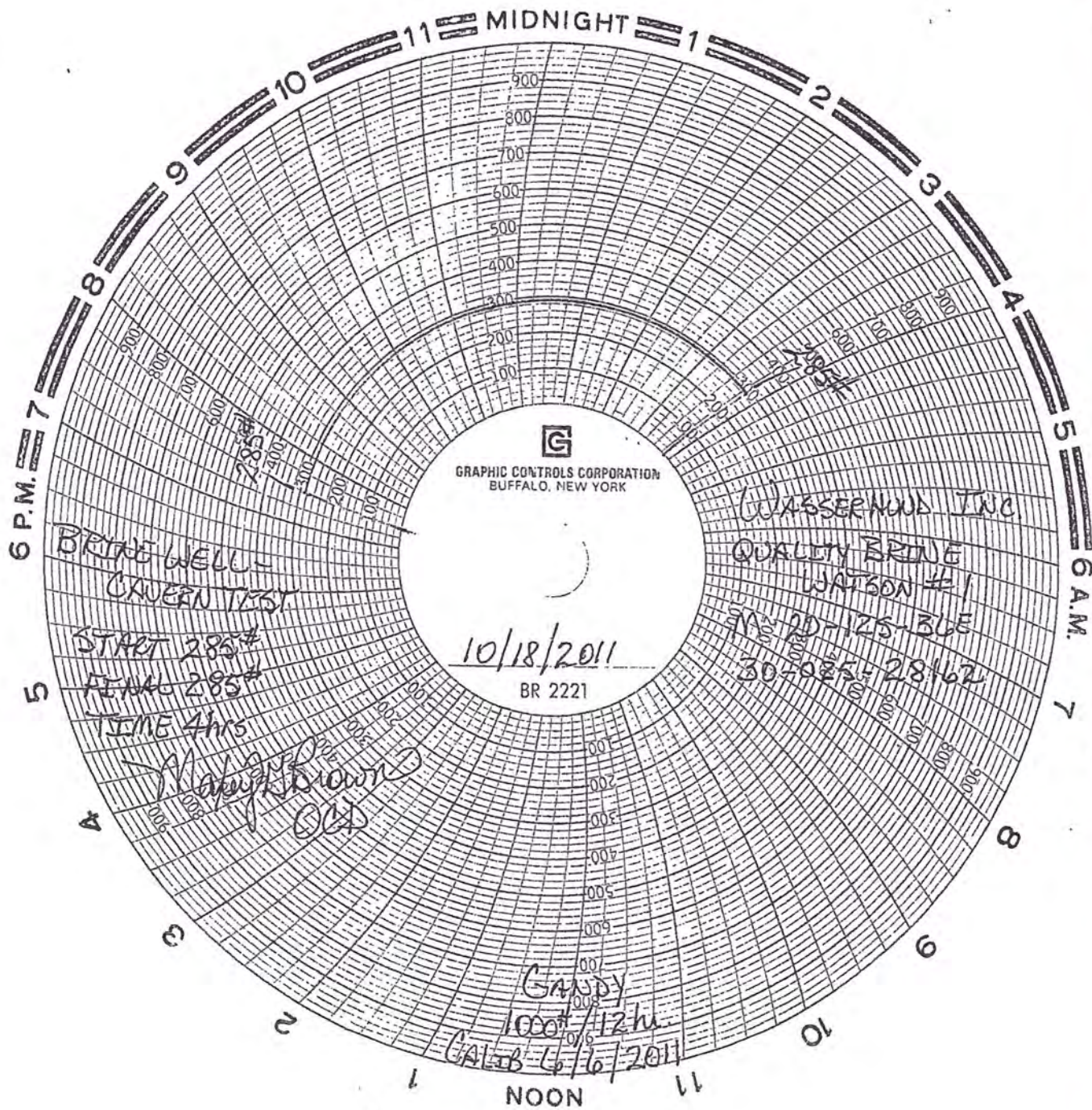
Compliance Officer

DATE

11/10/2011

Conditions of Approval (if any)





BRINE WELL -  
CAVERN TEST

START 285#

FINAL 285#

TIME 4hrs

*M. Brown*  
OC

10/18/2011

BR 2221

WASSERMAN INC

QUALITY BRINE

WATSON #1

MS 20-125-36E

30-025-28162

Gandy

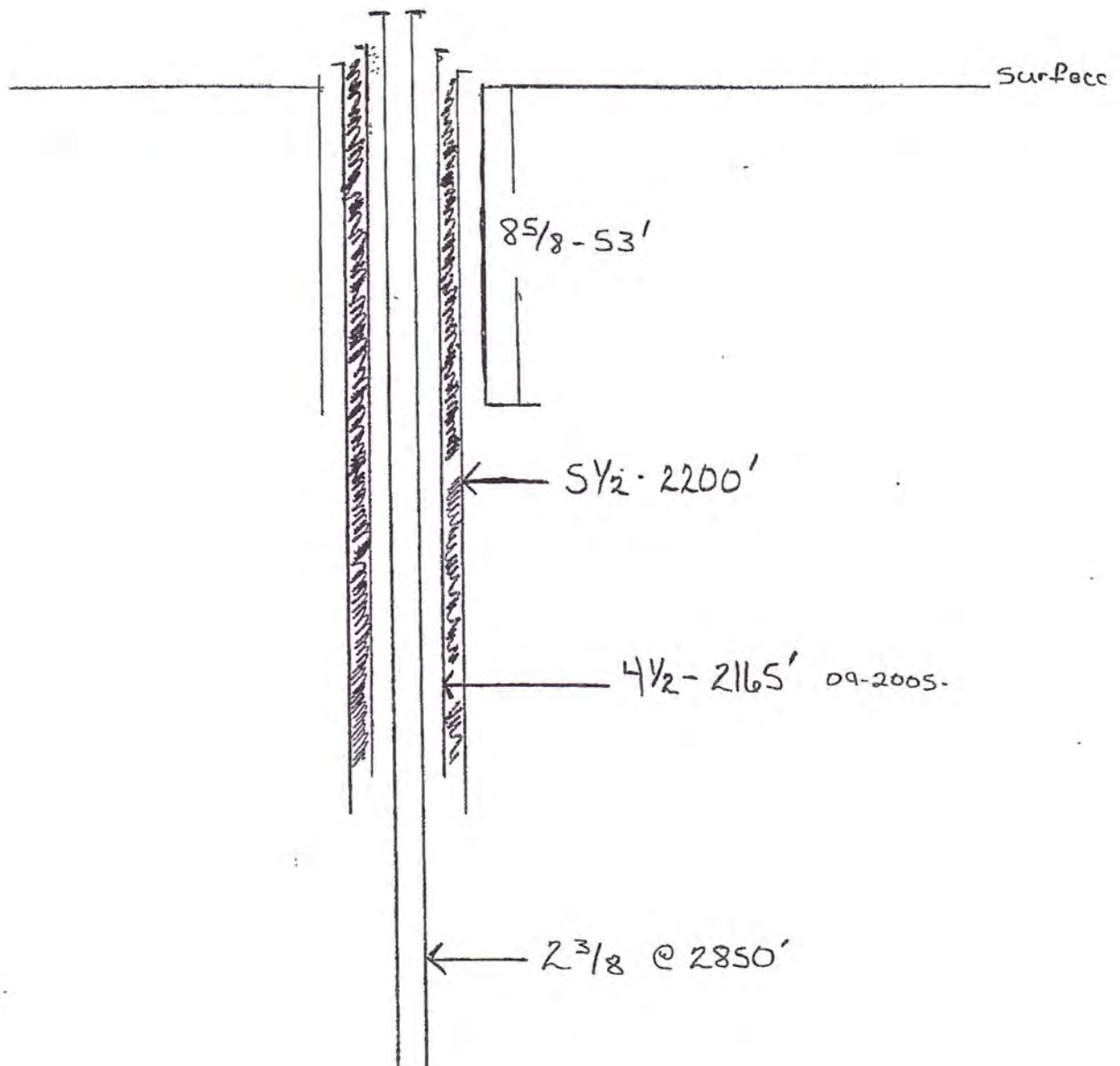
1000#/12hr

CALIB 6/6/2011

NOON



Wasserhund Inc.  
Quality Brine  
Watson #1  
M 20-12s-36e  
30-025-28162

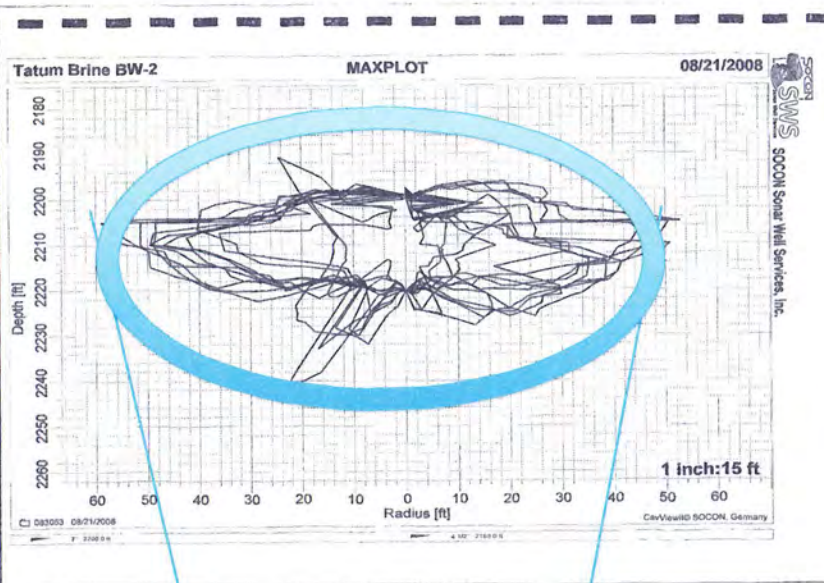




## Appendix “F”

- Brine Cavity Calculations with Wellbore Sketch
- D/H Calculations
- Aerial View showing Cavern Radius

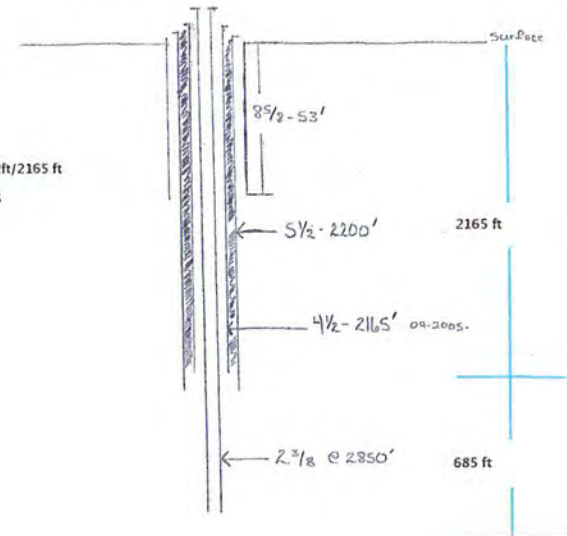




$R = \text{SQRT of } V \cdot 3.14 \cdot H$   
 Vol = 2.68 million cu ft  
 Height = 685 ft from casing shoe to bottom  
 Radius = 61.1 feet Dia = 122ft

Wasserhund Inc.  
 Quality Brine  
 Watson #1  
 H 20-12S-36e  
 30-025-28162

$D/H = 122\text{ft}/2165\text{ ft}$   
 $D/H = .055$





Wasserhund Brine Station Located on the west side of Tatum, NM.  
Aerial view shows 60 foot radius of calculated and measured cavern.  
April 08, 2012.





## Appendix “G”

- AOR Well Status List
- AOR Plot Plan
- OCD Well Records Search



2011 BW-22 AOR Review-- Well Status List  
up-dated Jan 01, 2012

|   | API#         | Well Name                    | UL | ectic | Ts  | Rg  | Footage           | Within 1/4 mi AOR                  | Casing Progra | Cased/Cemented      | Corrective Action |
|---|--------------|------------------------------|----|-------|-----|-----|-------------------|------------------------------------|---------------|---------------------|-------------------|
|   |              |                              |    |       |     |     |                   | * within 660 ft or<br>Critical AOR | Checked       | across salt section | Required          |
| 1 | 30-025-28162 | Wasserhund Quality Watson #1 | M  | 20    | 12s | 36e | 593 FSL & 639 FWL | NA                                 | NA            | Na                  | NA                |

0 0

1 Total # of wells in adjacent quarter-sections

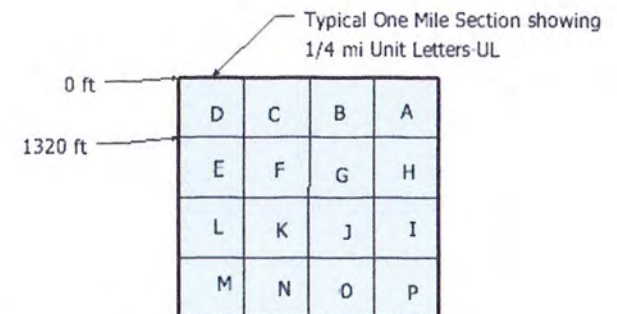
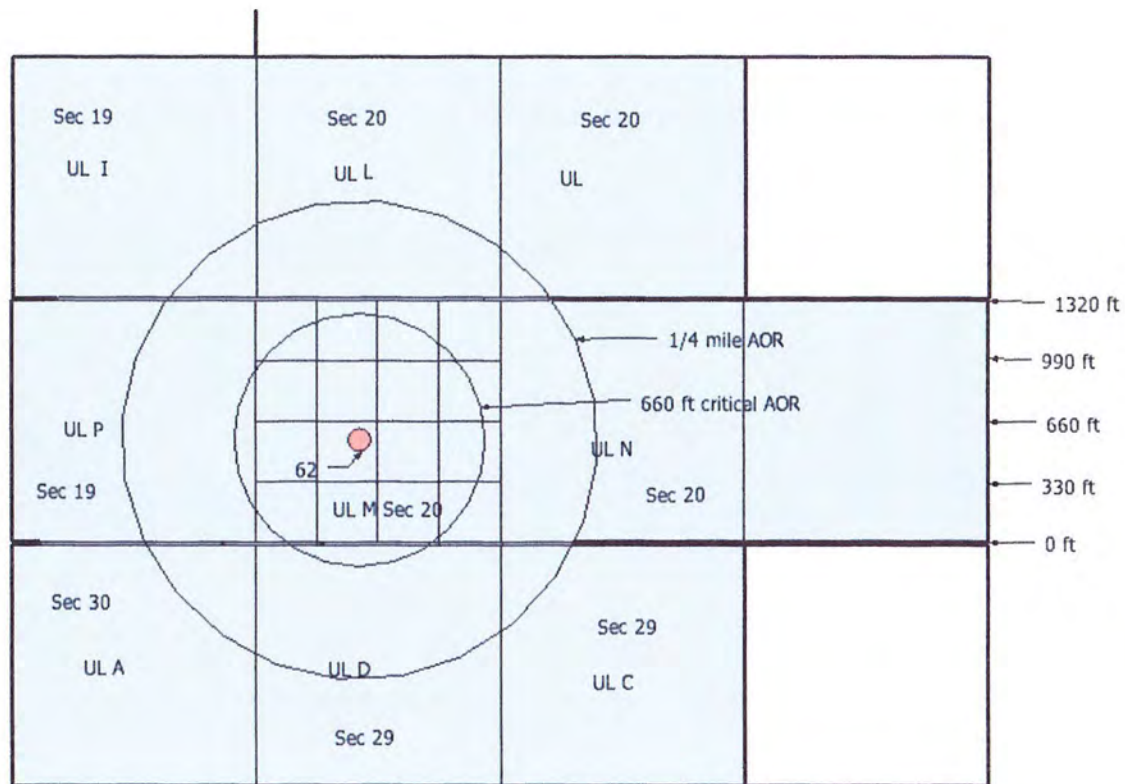
0 Total # of wells in 1/4 mile AOR

0 Total # of wells that within 660 ft or the Critical AOR of the outside radius of the brine well and casing program will be checked and reported annually.

Notes:

\* Means the well is within 660 ft or the 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#: 30-025-28162          | 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-22                   |   |
| AOR Year: 2011                               | Location: UL M-Sec 20-Ts12s-R36e |   |



## Well File Search - Select Documents to View

Please click on any thumbnail below in order to view the document. **Access to the OCD Internet images does not grant permission to reproduce, disseminate, disclose, or otherwise utilize materials subject to protection of United States copyright or trademark laws. Contact the copyright owner for specific permission to utilize any such materials.** Image size and approximate download times are shown below each thumbnail. Download times are based upon a 28.8Kb modem speed.

Clicking the "View All" button below will download a single file containing all documents. "View All" will select only those thumbnails shown in the currently selected API Number. If you wish to select a different API Number, please use the "Go Back" button. **"View All" may take several minutes.**

Sort Order:

☒ Ascending ☐ Descending

API Number

ULSTR

Footages

3002528162

M-20-12S-36E

593 FSL & 639 FWL

Well Name & Number: QUALITY BRINE WATSON No. 001

Operator: WASSERHUND INC

**Note:** If you are using Microsoft Internet Explorer and your system does not allow you to open TIFF images from the Internet without saving them first, please contact your administrator. You may be experiencing a problem with the Internet Explorer Cumulative Patch. Please refer to the Microsoft Knowledge Base Article, Q319829, "Cannot Open a Tagged Information File Format (TIFF) File in Internet Explorer", located [here](#).



( 53 Kb ~1 min.)



( 62 Kb ~1 min.)



( 19 Kb ~1 min.)



( 192 Kb ~1 min.)



( 63 Kb ~1 min.)



( 51 Kb ~1 min.)



( 123 Kb ~1 min.)



( 121 Kb ~1 min.)



( 42 Kb ~1 min.)



( 72 Kb ~1 min.)



( 389 Kb ~2 min.)



( 71 Kb ~1 min.)





( 66 Kb ~1 min.)



( 144 Kb ~1 min.)



( 187 Kb ~1 min.)



( 1047 Kb ~6 min.)



( 61 Kb ~1 min.)



( 225 Kb ~1 min.)



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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.

0 Records Found

API Number

ULSTR

Footages

[Go Back](#)

21133ERHUND BW-22  
AOR SEC 29-T125-R35E



## 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.

0 Records Found

API Number

ULSTR

Footages

[Go Back](#)

WASSERHUND BW-22

AOR- SEC19-T125-R36E

J 2012



## 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.

0 Records Found

API Number

ULSTR

Footages

[Go Back](#)

WASSERHUND BW-22

AOR SEC 30-T<sub>125</sub>-R36E

SP 2012



## Chavez, Carl J, EMNRD

---

**From:** Chavez, Carl J, EMNRD  
**Sent:** Friday, February 12, 2010 4:32 PM  
**To:** 'gandy2@leaco.net'  
**Subject:** BW-004 and 022 Annual Reports

Larry:

The OCD is in receipt of your annual reports and will get back with you soon.

Please contact me if you have questions.

Thank you.

Carl J. Chavez, CHMM  
New Mexico Energy, Minerals & Natural Resources Dept.  
Oil Conservation Division, Environmental Bureau  
1220 South St. Francis Dr., Santa Fe, New Mexico 87505  
Office: (505) 476-3490  
Fax: (505) 476-3462  
E-mail: [CarlJ.Chavez@state.nm.us](mailto:CarlJ.Chavez@state.nm.us)  
Website: <http://www.emnrd.state.nm.us/oed/index.htm>  
(Pollution Prevention Guidance is under "Publications")



RECEIVED OGD

200 FEB 12 PM 1:31

Annual Brine Well Report  
Gandy Corporation  
Tatum Brine Station  
BW Permit #BW-022  
API #30-025-26883  
January 31, 2010  
Larry Gandy



2. Summary:

Fresh water injected down tubing producing brine water through casing into storage tanks.

Remedial:

No remedial or major work done in 2009.

3. Production Volumes:

|                   |                  |
|-------------------|------------------|
| Beginning balance | 2,619,285        |
| 2009 total        | 7,960            |
| Ending balance    | <u>2,627,245</u> |

Maximum Pressure 380#

Average Pressure 260#

4. Chemical Analysis:

See attached.

5. MIT, Casing Test:

Chart attached.

6. Deviation:

None

7. Leaks or Spills:

None

8. Groundwater Monitoring:

None required.

9. Cavity Information:

See attached.

10. AOR Summary:

No wells within a quarter of a mile.

11. Sign-Off Requirements:

See attached.





# ARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
EDDIE SEAY CONSULTING  
ATTN: EDDIE SEAY  
601 W. ILLINOIS  
HOBBS, NM 88242  
FAX TO: (505) 392-6949

Receiving Date: 02/05/07  
Reporting Date: 02/07/07  
Project Owner: GANDY CORP.  
Project Name: TATUM BRINE FACILITY  
Project Location: TATUM, NM

Sampling Date: 02/02/07  
Sample Type: WATER  
Sample Condition: COOL & INTACT  
Sample Received By: HM  
Analyzed By: HM

| LAB NUMBER | SAMPLE ID | Na<br>(mg/L) | Ca<br>(mg/L) | Mg<br>(mg/L) | K<br>(mg/L) | Conductivity<br>( $\mu$ S/cm) | T-Alkalinity<br>(mgCaCO <sub>3</sub> /L) |
|------------|-----------|--------------|--------------|--------------|-------------|-------------------------------|--|
|------------|-----------|--------------|--------------|--------------|-------------|-------------------------------|--|

|                             |          |          |          |          |          |          |
|-----------------------------|----------|----------|----------|----------|----------|----------|
| ANALYSIS DATE:              | 02/06/07 | 02/06/07 | 02/06/07 | 02/06/07 | 02/05/07 | 02/06/07 |
| H12143-1 BRINE WATER #1     | #VALUE!  | 1164     | 3923     | 6900     | 277600   | 68       |
| H12143-2 FRESH WATER #2     | 147      | 92       | 15       | 1.87     | 1154     | 144      |
| Quality Control             | NR       | 53.2     | 51.6     | 1.94     | 1380     | NR       |
| True Value QC               | NR       | 50.0     | 50.0     | 2.00     | 1413     | NR       |
| % Recovery                  | NR       | 106      | 103      | 97       | 98       | NR       |
| Relative Percent Difference | NR       | 7.8      | 1.6      | 4.2      | 0.3      | NR       |

|          |             |           |      |       |       |
|----------|-------------|-----------|------|-------|-------|
| METHODS: | SM3500-Ca-D | 3500-Mg E | 8049 | 120.1 | 310.1 |
|----------|-------------|-----------|------|-------|-------|

|                             | Cl <sup>-</sup><br>(mg/L) | SO <sub>4</sub><br>(mg/L) | CO <sub>3</sub><br>(mg/L) | HCO <sub>3</sub><br>(mg/L) | pH<br>(s.u.) | TDS<br>(mg/L) |
|-----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|--------------|---------------|
| ANALYSIS DATE:              | 02/05/07                  | 02/06/07                  | 02/06/07                  | 02/06/07                   | 02/05/07     | 02/06/07      |
| H12143-1 BRINE WATER #1     | 138957                    | 13665                     | 0                         |                            | 6.91         | 239980        |
| H12143-2 FRESH WATER #2     | 208                       | 169                       | 0                         | 176                        | 7.57         | 693           |
| Quality Control             | 510                       | 20.8                      | NR                        | 915                        | 6.88         | NR            |
| True Value QC               | 500                       | 20.0                      | NR                        | 1000                       | 7.00         | NR            |
| % Recovery                  | 102                       | 104                       | NR                        | 92                         | 98           | NR            |
| Relative Percent Difference | 1                         | 4.4                       | NR                        | 2.7                        | 0.7          | NR            |

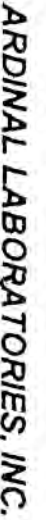
|          |             |       |       |       |       |       |
|----------|-------------|-------|-------|-------|-------|-------|
| METHODS: | SM4500-Cl-B | 375.4 | 310.1 | 310.1 | 150.1 | 160.1 |
|----------|-------------|-------|-------|-------|-------|-------|

Chemist

Date

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 and 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. Cardinal shall 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.



Page        of       

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

+ Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.



[illegible]





**SOCON Sonar Well Services, Inc.**

## **ECHO - LOG**

**Gandy Corporation**

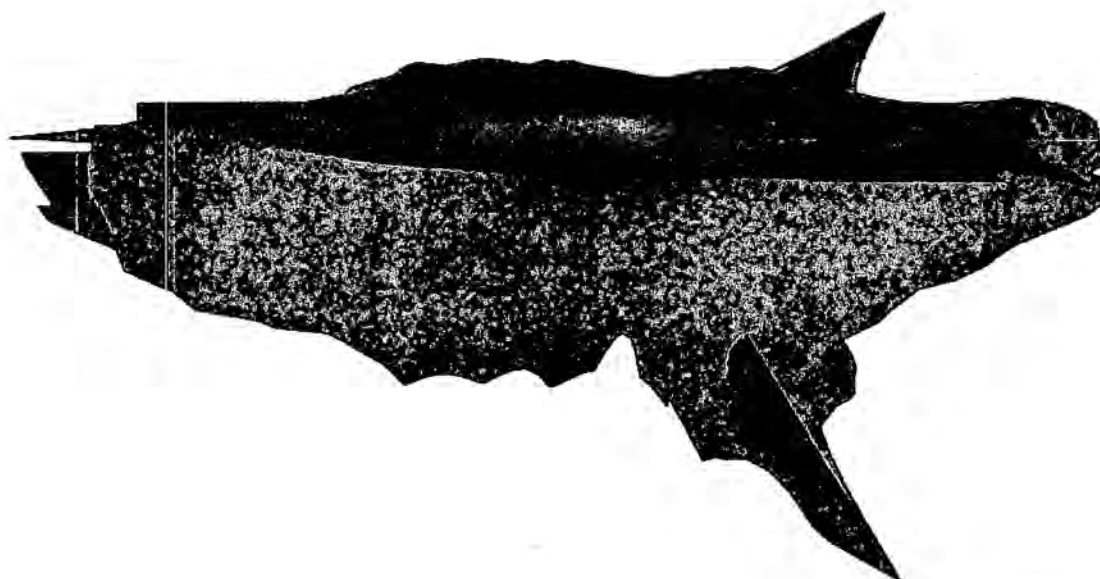
**Tatum Brine BW-2**

**Tatum, New Mexico**

1st. Survey

08/21/2008

083053



**SOCON Sonar Well Services, Inc.**

11133 I-45 South, Ste. E

Conroe, Texas 77302

Phone (936) 441-5801

Fax (936) 539-6847

e-mail: [soconusa@socon.com](mailto:soconusa@socon.com)





**SOCON Sonar Well Services, Inc.**

Tatum Brine BW-2

083053

08/21/2008

**Results of the Cavern Survey**

**By means of Echo-Sounding**

**In the cavern**

**Tatum Brine BW-2**

**Date: 08/21/2008**

**083053**

**Customer: Gandy Corporation**

**Tatum, New Mexico**

**Responsible for the survey:**

|              |                  |
|--------------|------------------|
| Surveyor:    | Richard Lawrence |
| Leadership:  | Larry Gandy      |
| Interpreter: | Richard Lawrence |
| Control:     | Jason McCartney  |





**SOCON Sonar Well Services, Inc.**

Tatum Brine BW-2

083053

08/21/2008

## **Contents**

Summary of results

Legend

Enclosures:

Volume (diagrams and lists)

Diameter and radii (diagrams and lists)

Perspective views

Maximum plots (top view)

Horizontal sections

Maximum plot (side view)

Vertical sections





## Summary of results

### Well details

|   |         |
|---|---------|
| All depths are given as:                            | MD      |
| Datum level for all depths:                         | BHF     |
| Shoe of the cemented 7"-casing:                     | 2200 ft |
| Shoe of the 4 1/2"- casing<br>during the surveying: | 2165 ft |
| Reference depth for ECHO-LOG:                       | 2200 ft |
| Depth correction:                                   | -29 ft  |
| Pressure at the well head:                          | 0 psi   |

### Details of survey equipment

|                         |                          |
|-------------------------|--------------------------|
| Measuring vehicle used: | Portable                 |
| Tools used:             | Echo tool BSF 39, BSF 39 |

### General details

|                               |         |
|-------------------------------|---------|
| Number of runs:               | 1       |
| Measured horizontal sections: | 13      |
| Measured tilted sections:     | 41      |
| Lowest survey depth:          | 2220 ft |





**Maximum and minimum dimensions with ref. to the measuring axis**

**Reference direction:**

**magnetic north**

Determination out of 12 vertical sections derived from horizontally and tilted measured data at 5/15 degree intervals:

|                 |           |
|-----------------|-----------|
| Minimum radius: | 0.0 ft    |
| Depth:          | 2220.3 ft |
| Direction:      | 0°        |

|                 |           |
|-----------------|-----------|
| Maximum radius: | 58.9 ft   |
| Depth:          | 2205.0 ft |
| Direction:      | 330°      |

|                          |           |
|--------------------------|-----------|
| Highest point of cavern: | 2190.7 ft |
| Horizontal distance:     | 24.4 ft   |
| Direction:               | 195°      |

|                         |           |
|-------------------------|-----------|
| Lowest point of cavern: | 2242.1 ft |
| Horizontal distance:    | 23.5 ft   |
| Direction:              | 225°      |

|                                     |           |
|-------------------------------------|-----------|
| Lowest point in the measuring axis: | 2220.3 ft |
|-------------------------------------|-----------|

Determination out of 29 horizontal sections in the depths between 2201 ft and 2241 ft at 5/15 degree intervals:

|                 |           |
|-----------------|-----------|
| Maximum radius: | 59.4 ft   |
| Depth:          | 2205.0 ft |
| Direction:      | 331°      |

|                   |           |
|-------------------|-----------|
| Maximum diameter: | 83.8 ft   |
| Depth:            | 2206.0 ft |
| Direction:        | 45 - 225° |

**Volume**

|         |             |
|---------|-------------|
| Volume: | 11,289 bbls |
|---------|-------------|

|              |                      |
|--------------|----------------------|
| Depth range: | 2191 ft <--> 2241 ft |
|--------------|----------------------|





### Interpretation

Supposing a rectilinear propagation of ultrasonic waves all recorded echo travel times were converted into distances by using the subsequent speeds of sound:

1810.0 m/s (5938.3 ft/s) in brine (measured)

In the case of recording several echoes along one trace of echo signals, the representative echo signal was selected according to the level of amplitude, transmission time, and density of measured points and the shape of the cavern.

### Horizontal sections

13 horizontal sections at following measured depths are included as graphical plots in this report:

|           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2201.0 ft | 2202.0 ft | 2204.0 ft | 2205.0 ft | 2206.0 ft | 2208.0 ft | 2210.0 ft |
| 2212.0 ft | 2214.0 ft | 2215.0 ft | 2216.0 ft | 2218.0 ft | 2220.0 ft |           |

The following 16 sections are constructed:

|           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2191.0 ft | 2193.0 ft | 2195.0 ft | 2197.0 ft | 2199.0 ft | 2221.0 ft | 2223.0 ft |
| 2225.0 ft | 2227.0 ft | 2229.0 ft | 2231.0 ft | 2233.0 ft | 2235.0 ft | 2237.0 ft |
| 2239.0 ft | 2241.0 ft |           |           |           |           |           |

### Tilted sections

41 sections recorded with tilted echo-transducer at following measured depths are presented in the vertical sections:

20 sections of these with upwards-tilted echo-transducer:

Depth / Tilting Angle

|             |             |             |             |             |             |
|-------------|-------------|-------------|-------------|-------------|-------------|
| 2215.0 / 6  | 2215.0 / 9  | 2215.0 / 12 | 2215.0 / 15 | 2215.0 / 18 | 2215.0 / 21 |
| 2215.0 / 24 | 2215.0 / 27 | 2215.0 / 30 | 2215.0 / 33 | 2215.0 / 39 | 2215.0 / 45 |
| 2215.0 / 51 | 2215.0 / 57 | 2215.0 / 63 | 2215.0 / 69 | 2215.0 / 74 | 2215.0 / 81 |
| 2215.0 / 84 | 2215.0 / 87 |             |             |             |             |





21 sections of these with downwards-tilted echo-transducer:

**Depth / Tilting Angle**

|             |             |             |             |             |             |
|-------------|-------------|-------------|-------------|-------------|-------------|
| 2210.0 / 6  | 2210.0 / 12 | 2210.0 / 18 | 2210.0 / 24 | 2210.0 / 30 | 2210.0 / 36 |
| 2210.0 / 42 | 2210.0 / 48 | 2210.0 / 51 | 2210.0 / 54 | 2210.0 / 57 | 2210.0 / 60 |
| 2210.0 / 63 | 2210.0 / 66 | 2210.0 / 69 | 2210.0 / 72 | 2210.0 / 75 | 2210.0 / 78 |
| 2210.0 / 81 | 2210.0 / 84 | 2210.0 / 88 |             |             |             |

**Vertical sections**

The shape of the cavern was determined by interpretation of all horizontally and tilted measured data and is presented by 36 vertical sections in this report.

**Maximum plots (top view)**

The maximum plot presents the largest extension of the cavern in a top view. The first picture shows the areas of all horizontal sections and the area resulting out of the vertical sections (hatched). The resulting total area is shown in the second picture (cross hatching) together with the largest single area.

In both pictures the total centre of gravity of the cavern is shown with its distance and its direction referring to the measuring axis.

The total centre of gravity is derived out of the envelope, which is the connection line of the largest cavern extension in every direction

**Perspective views**

Several perspective drawings are included in this report to give a quick review of detailed relations.

**Pockets in the cavern wall**

Pockets in the cavern wall, which have been identified by the tilted echo-transducer, were transferred from the vertical sections to the respective horizontal sections.

The resulting additional areas have been added to the calculated areas.





**SOCON Sonar Well Services, Inc.**

Tatum Brine BW-2

083053

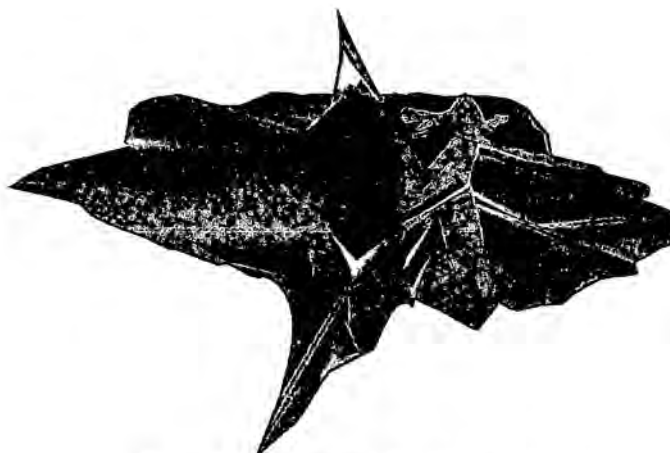
08/21/2008

## **LEGEND**

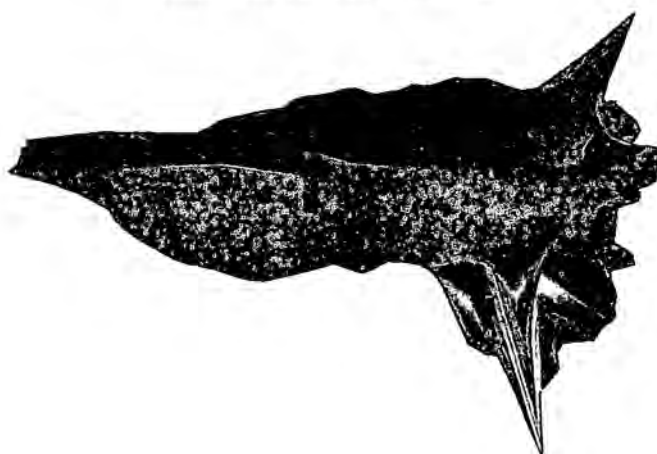
- Measured point recorded with horizontal adjusted ultrasonic transducer
- Measured point recorded with tilted or vertical orientated ultrasonic transducer
- △ Interpolated point derived from the vertical sections
- Connection line between two measured points in order to calculate the volume
- Assumed connection line (in areas which are not sufficiently covered by measured points)
- N** Magnetic north determined with compass inside the tool  
(Magnetic compass in areas without tubing)  
(Fibre gyro compass in areas with tubing)
- (N)** Assumed north direction (for sections in magnetic disturbed surroundings without fibre gyro compass)
- a** Longest extension in section  
(Without considering of hidden leached pockets)
- b** Longest extension in section perpendicular to a  
(Without considering of hidden leached pockets)
- a/b** Ratio of longest extensions in section which are perpendicular to each other
- (xx m<sup>2</sup>)** Area in actual section resulting from hidden leached pockets
- r~** Average radius

□ 021835 29.04 2002 Job number and survey date





Tatum Brine BW-2 --> 0° <--



Tatum Brine BW-2 --> 60° <--



Tatum Brine BW-2 --> 120° <--



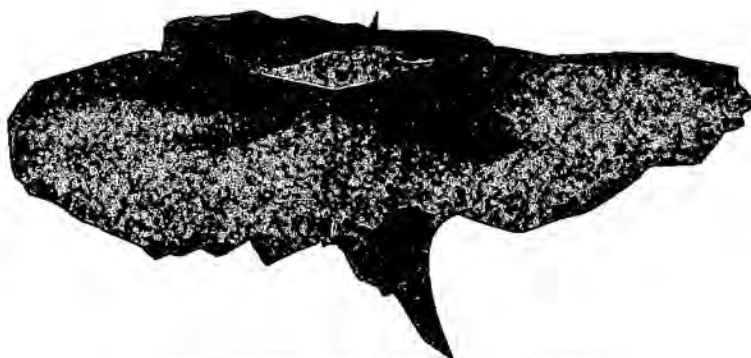


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

083053

08/21/2008



Tatum Brine BW-2 --> 180° <--



Tatum Brine BW-2 --> 240° <--



Tatum Brine BW-2 --> 300° <--



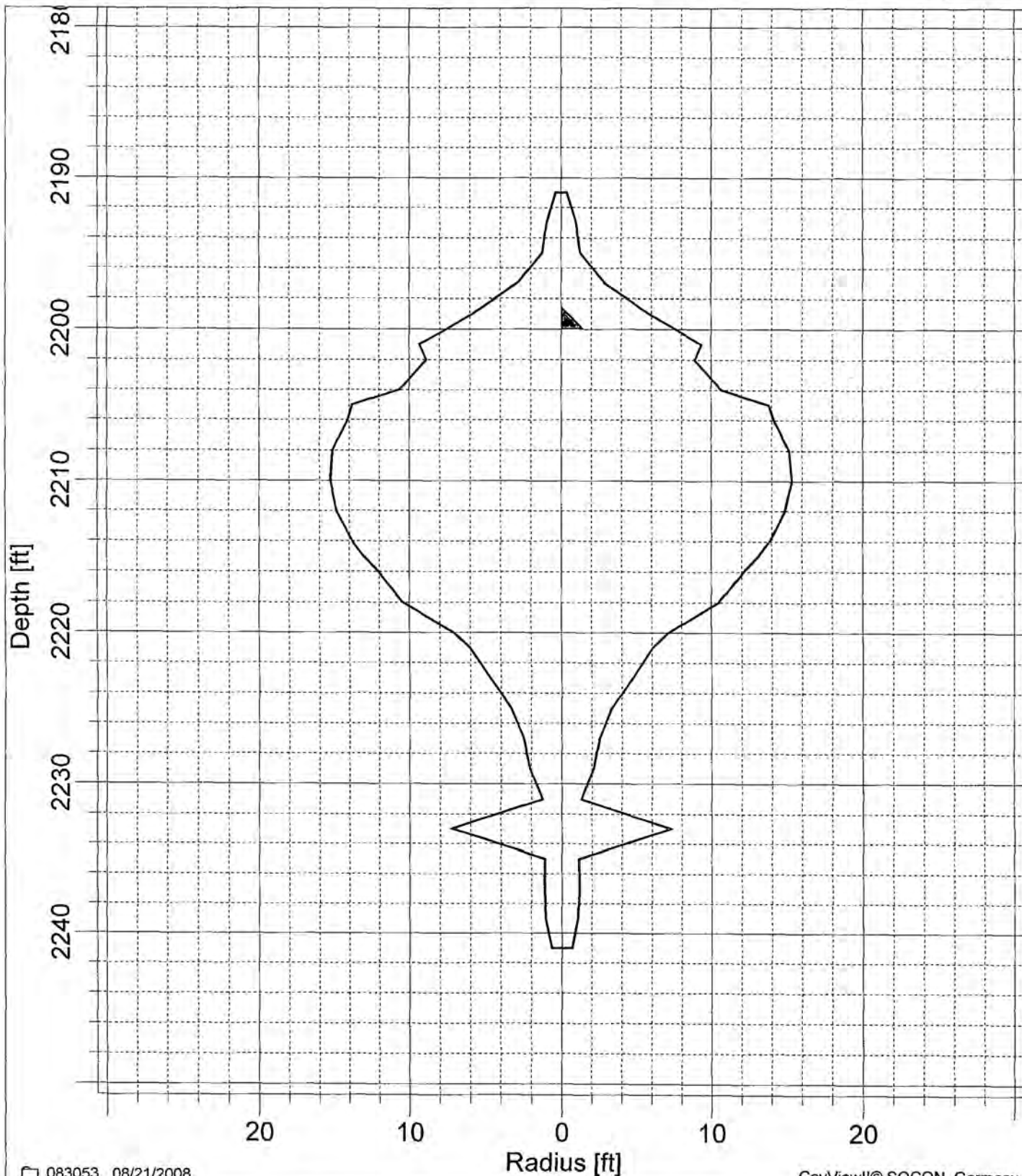


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

AVERAGE RADIUS

08/21/2008



083053 08/21/2008

CavViewII© SOCON, Germany

7" : 2200.0 ft

4 1/2" : 2165.0 ft

— Average radius (08/21/2008)



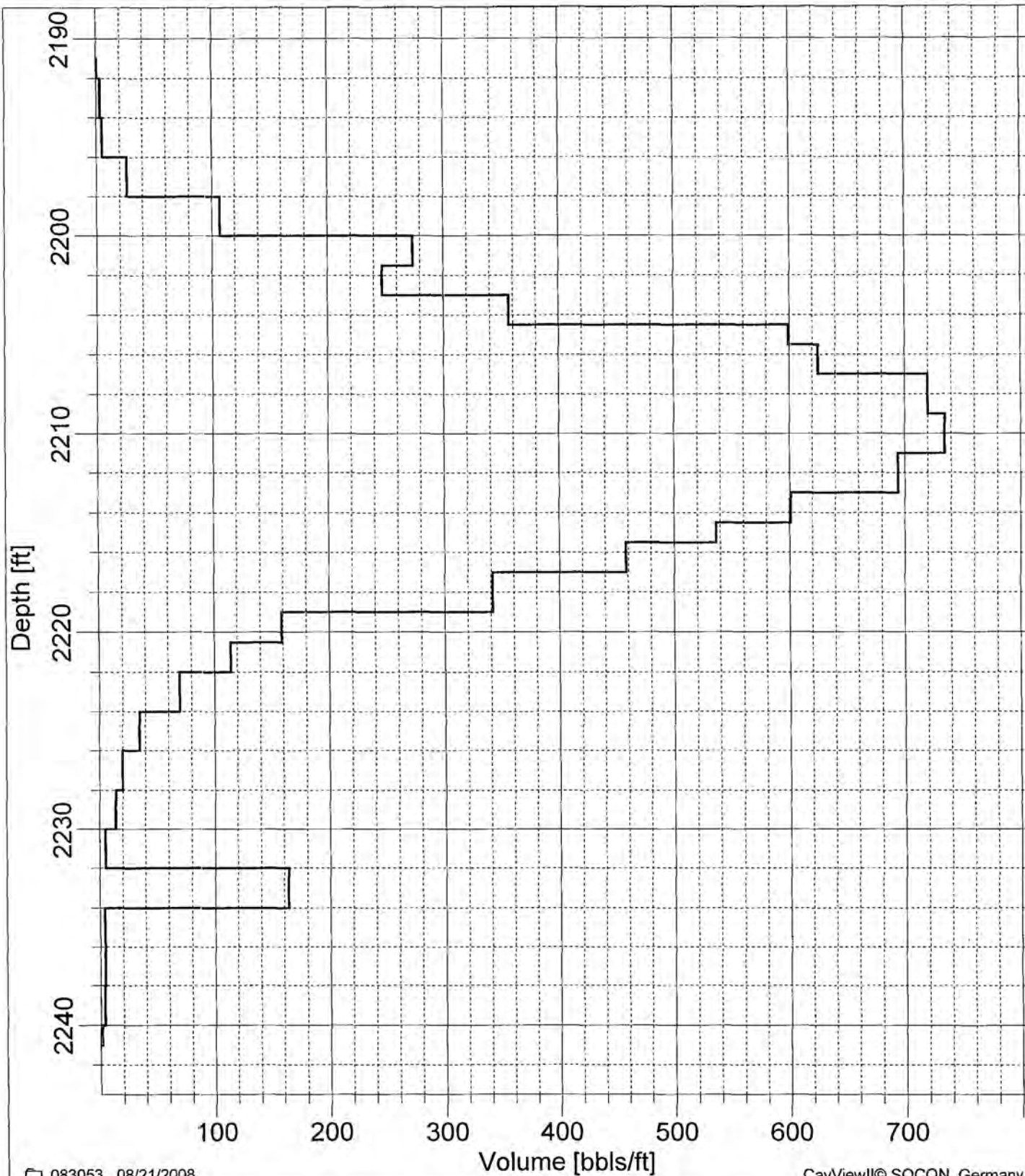


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

PARTIAL VOLUME

08/21/2008



083053 08/21/2008

CavViewII© SOCON, Germany

Partial volume





**SOCON Sonar Well Services, Inc.**

### Volume list

Cavern: Tatum Brine BW-2

083053

08/21/2008

| Depth [ft] | Radius [ft] | Area [ft²] | Depth range [ft] |        | Volume [bbls] |       |
|------------|-------------|------------|------------------|--------|---------------|-------|
|            |             |            | from             | to     | partial       | total |
| 2191.0     | 0.9         | 2          | 2191.0           | 2192.0 | 0             | 0     |
| 2193.0     | 2.3         | 17         | 2192.0           | 2194.0 | 6             | 6     |
| 2195.0     | 3.0         | 28         | 2194.0           | 2196.0 | 10            | 16    |
| 2197.0     | 6.8         | 147        | 2196.0           | 2198.0 | 52            | 69    |
| 2199.0     | 13.8        | 600        | 2198.0           | 2200.0 | 214           | 283   |
| 2201.0     | 22.1        | 1537       | 2200.0           | 2201.5 | 411           | 693   |
| 2202.0     | 21.0        | 1389       | 2201.5           | 2203.0 | 371           | 1064  |
| 2204.0     | 25.2        | 2002       | 2203.0           | 2204.5 | 535           | 1599  |
| 2205.0     | 32.7        | 3363       | 2204.5           | 2205.5 | 599           | 2198  |
| 2206.0     | 33.4        | 3510       | 2205.5           | 2207.0 | 938           | 3136  |
| 2208.0     | 35.9        | 4041       | 2207.0           | 2209.0 | 1440          | 4575  |
| 2210.0     | 36.2        | 4124       | 2209.0           | 2211.0 | 1469          | 6044  |
| 2212.0     | 35.2        | 3898       | 2211.0           | 2213.0 | 1388          | 7432  |
| 2214.0     | 32.8        | 3374       | 2213.0           | 2214.5 | 901           | 8334  |
| 2215.0     | 31.0        | 3010       | 2214.5           | 2215.5 | 536           | 8870  |
| 2216.0     | 28.6        | 2573       | 2215.5           | 2217.0 | 687           | 9557  |
| 2218.0     | 24.7        | 1918       | 2217.0           | 2219.0 | 683           | 10240 |
| 2220.0     | 16.8        | 891        | 2219.0           | 2220.5 | 238           | 10479 |
| 2221.0     | 14.3        | 642        | 2220.5           | 2222.0 | 172           | 10650 |
| 2223.0     | 11.2        | 391        | 2222.0           | 2224.0 | 139           | 10789 |
| 2225.0     | 7.9         | 195        | 2224.0           | 2226.0 | 69            | 10859 |
| 2227.0     | 5.9         | 111        | 2226.0           | 2228.0 | 39            | 10898 |
| 2229.0     | 5.0         | 78         | 2228.0           | 2230.0 | 28            | 10926 |
| 2231.0     | 3.0         | 29         | 2230.0           | 2232.0 | 10            | 10937 |
| 2233.0     | 17.1        | 919        | 2232.0           | 2234.0 | 327           | 11264 |
| 2235.0     | 2.7         | 23         | 2234.0           | 2236.0 | 8             | 11272 |
| 2237.0     | 2.7         | 24         | 2236.0           | 2238.0 | 8             | 11281 |
| 2239.0     | 2.5         | 20         | 2238.0           | 2240.0 | 7             | 11288 |
| 2241.0     | 1.6         | 8          | 2240.0           | 2241.0 | 1             | 11289 |



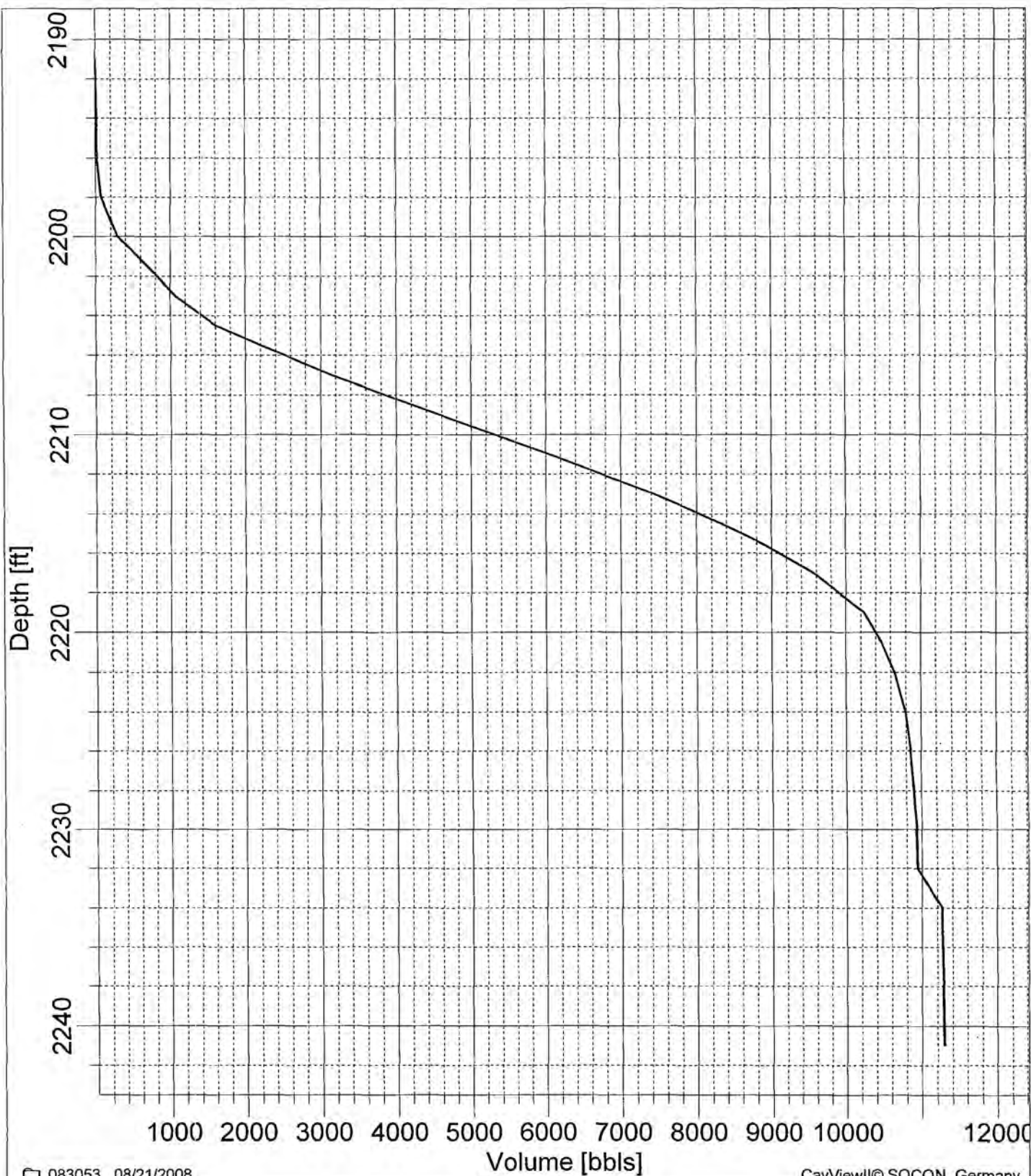


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

TOTAL VOLUME

08/21/2008



083053 08/21/2008

CavViewII© SOCON, Germany

Total volume = 11289.1 bbls





SOCON Sonar Well Services, Inc.

## Table of volumes (foot by foot)

Job-No.: 083053, Name: Tatum Brine BW-2, Date: 08/21/2008

| depth<br>[ft] | volume<br>[bbls] | depth<br>[ft] | volume<br>[bbls] | depth<br>[ft] | volume<br>[bbls] | depth<br>[ft] | volume<br>[bbls] | depth<br>[ft] | volume<br>[bbls] |
|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|               |                  | 2191          | 0                | 2192          | 0                | 2193          | 3                | 2194          | 6                |
| 2195          | 11               | 2196          | 16               | 2197          | 43               | 2198          | 69               | 2199          | 176              |
| 2200          | 283              | 2201          | 556              | 2202          | 817              | 2203          | 1064             | 2204          | 1421             |
| 2205          | 1899             | 2206          | 2511             | 2207          | 3136             | 2208          | 3856             | 2209          | 4575             |
| 2210          | 5310             | 2211          | 6044             | 2212          | 6738             | 2213          | 7432             | 2214          | 8033             |
| 2215          | 8602             | 2216          | 9099             | 2217          | 9557             | 2218          | 9899             | 2219          | 10240            |
| 2220          | 10399            | 2221          | 10536            | 2222          | 10650            | 2223          | 10720            | 2224          | 10789            |
| 2225          | 10824            | 2226          | 10859            | 2227          | 10879            | 2228          | 10898            | 2229          | 10912            |
| 2230          | 10926            | 2231          | 10931            | 2232          | 10937            | 2233          | 11100            | 2234          | 11264            |
| 2235          | 11268            | 2236          | 11272            | 2237          | 11276            | 2238          | 11281            | 2239          | 11284            |
| 2240          | 11288            | 2241          | 11289            |               |                  |               |                  |               |                  |

Cavity: Tatum Brine BW-2 Report number: 083053 Date: 08/21/2008



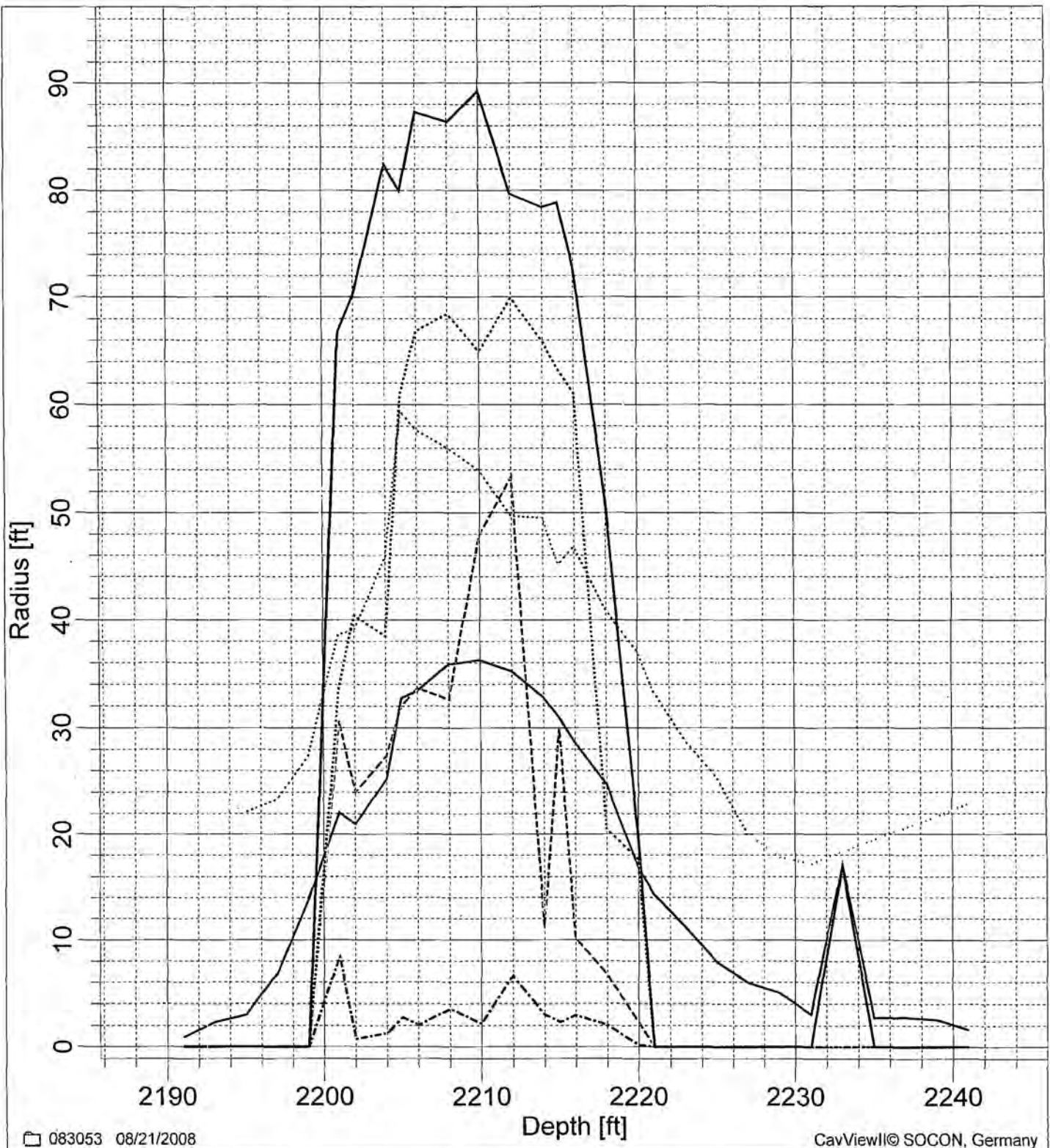


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

RADII / DIAMETERS

08/21/2008



|                                       |                        |                      |
|---------------------------------------|------------------------|----------------------|
| — Average radius                      | ----- Minimum radius   | ..... Maximum radius |
| ---- Minimum diameter                 | ----- Maximum diameter | — Largest extension  |
| ..... Largest perpendicular extension |                        |                      |





SOCON Sonar Well Services, Inc.

# Table of radii and diameters

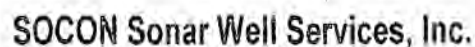
Cavern: Tatum Brine BW-2

083053

08/21/2008

| Depth<br>[ft] | Radius [MIN] |     | Radius [MAX] |     | Diameter [MIN] |             | [MAX] |             |
|---------------|--------------|-----|--------------|-----|----------------|-------------|-------|-------------|
|               | [ft]         | [°] | [ft]         | [°] | [ft]           | [°]         | [ft]  | [°]         |
| 2191.0        | 0.0          | 0   | 24.2         | 195 | 0.0            | 0 <-> 180   | 24.2  | 15 <-> 195  |
| 2193.0        | 0.0          | 0   | 23.2         | 195 | 0.0            | 0 <-> 180   | 23.2  | 15 <-> 195  |
| 2195.0        | 0.0          | 0   | 22.1         | 195 | 0.0            | 0 <-> 180   | 22.1  | 15 <-> 195  |
| 2197.0        | 0.0          | 1   | 23.3         | 45  | 0.0            | 1 <-> 181   | 36.3  | 15 <-> 195  |
| 2199.0        | 0.0          | 1   | 27.3         | 45  | 0.0            | 1 <-> 181   | 41.2  | 15 <-> 195  |
| 2201.0        | 8.4          | 144 | 38.6         | 259 | 30.6           | 144 <-> 324 | 62.3  | 79 <-> 259  |
| 2202.0        | 0.8          | 61  | 39.0         | 225 | 24.0           | 79 <-> 259  | 68.4  | 45 <-> 225  |
| 2204.0        | 1.3          | 62  | 45.9         | 0   | 27.4           | 151 <-> 331 | 69.8  | 45 <-> 225  |
| 2205.0        | 2.7          | 121 | 59.4         | 331 | 32.0           | 81 <-> 261  | 76.7  | 150 <-> 330 |
| 2206.0        | 2.1          | 149 | 57.6         | 330 | 33.6           | 0 <-> 180   | 83.8  | 45 <-> 225  |
| 2208.0        | 3.5          | 120 | 56.0         | 315 | 32.6           | 0 <-> 180   | 82.1  | 45 <-> 225  |
| 2210.0        | 2.1          | 130 | 53.9         | 325 | 48.0           | 25 <-> 205  | 80.9  | 105 <-> 285 |
| 2212.0        | 6.6          | 120 | 49.7         | 345 | 53.4           | 130 <-> 310 | 74.1  | 45 <-> 225  |
| 2214.0        | 3.0          | 329 | 49.5         | 345 | 11.3           | 155 <-> 335 | 74.7  | 60 <-> 240  |
| 2215.0        | 2.3          | 154 | 45.1         | 81  | 30.0           | 151 <-> 331 | 78.0  | 71 <-> 251  |
| 2216.0        | 2.9          | 59  | 46.8         | 345 | 10.2           | 156 <-> 336 | 70.5  | 60 <-> 240  |
| 2218.0        | 2.0          | 59  | 40.9         | 315 | 6.7            | 164 <-> 344 | 62.8  | 60 <-> 240  |
| 2220.0        | 0.2          | 301 | 37.1         | 315 | 2.3            | 72 <-> 252  | 58.0  | 60 <-> 240  |
| 2221.0        | 0.0          | 0   | 33.3         | 60  | 0.0            | 1 <-> 181   | 48.5  | 135 <-> 315 |
| 2223.0        | 0.0          | 0   | 28.8         | 60  | 0.0            | 1 <-> 181   | 39.3  | 60 <-> 240  |
| 2225.0        | 0.0          | 0   | 25.4         | 60  | 0.0            | 0 <-> 180   | 37.0  | 60 <-> 240  |
| 2227.0        | 0.0          | 0   | 20.0         | 195 | 0.0            | 0 <-> 180   | 20.0  | 15 <-> 195  |
| 2229.0        | 0.0          | 0   | 17.8         | 195 | 0.0            | 0 <-> 180   | 17.8  | 15 <-> 195  |
| 2231.0        | 0.0          | 0   | 17.2         | 225 | 0.0            | 0 <-> 180   | 17.2  | 45 <-> 225  |
| 2233.0        | 0.0          | 0   | 18.3         | 225 | 0.0            | 0 <-> 180   | 18.3  | 45 <-> 225  |
| 2235.0        | 0.0          | 0   | 19.5         | 225 | 0.0            | 0 <-> 180   | 19.5  | 45 <-> 225  |
| 2237.0        | 0.0          | 0   | 20.6         | 225 | 0.0            | 0 <-> 180   | 20.6  | 45 <-> 225  |
| 2239.0        | 0.0          | 0   | 21.7         | 225 | 0.0            | 0 <-> 180   | 21.7  | 45 <-> 225  |
| 2241.0        | 0.0          | 0   | 22.9         | 225 | 0.0            | 0 <-> 180   | 22.9  | 45 <-> 225  |





Cavern: Tatum Brine BW-2

083053

08/21/2008

[illegible]



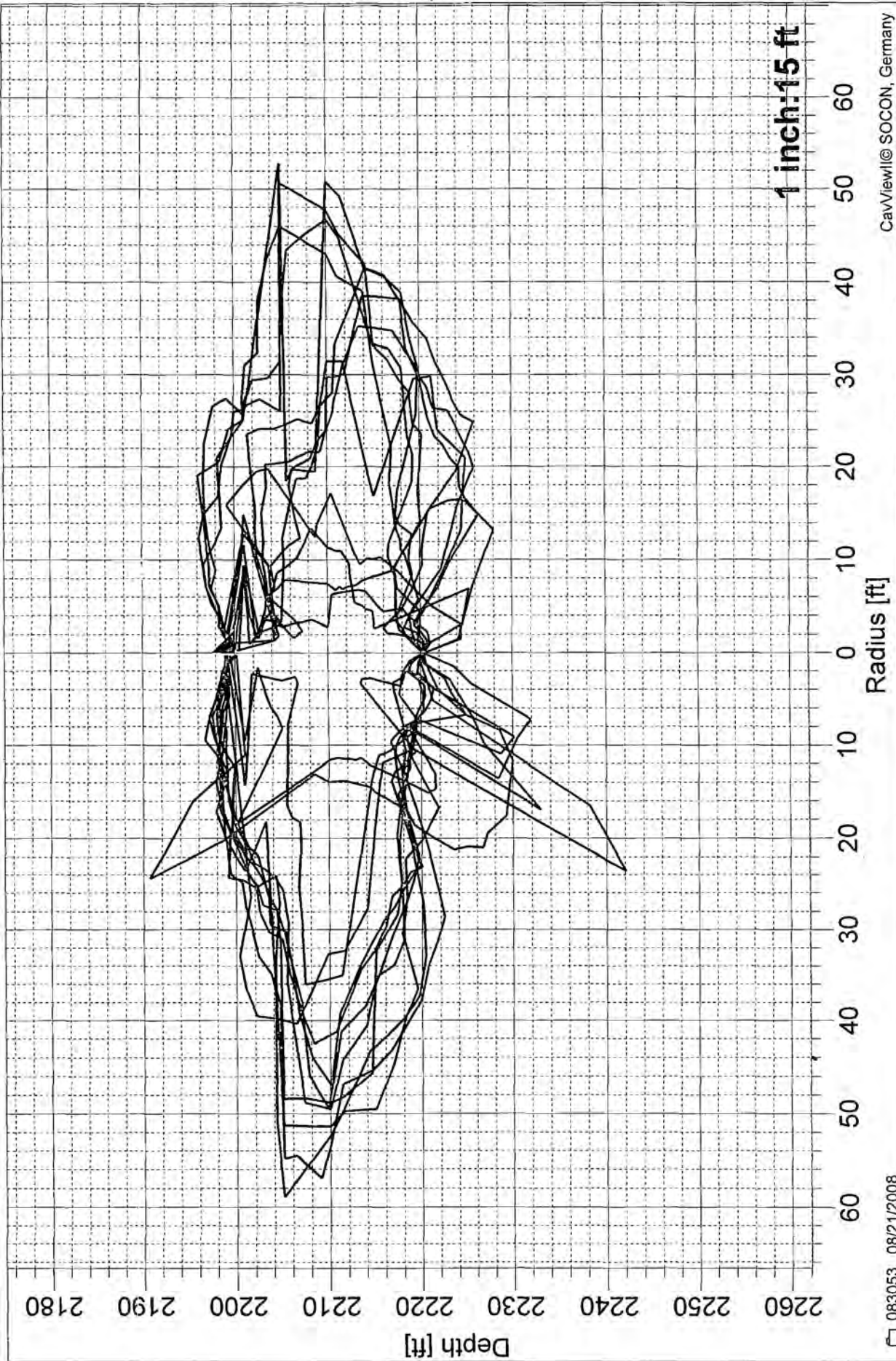


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08/21/2008

MAXPLOT

Tatum Brine BW-2

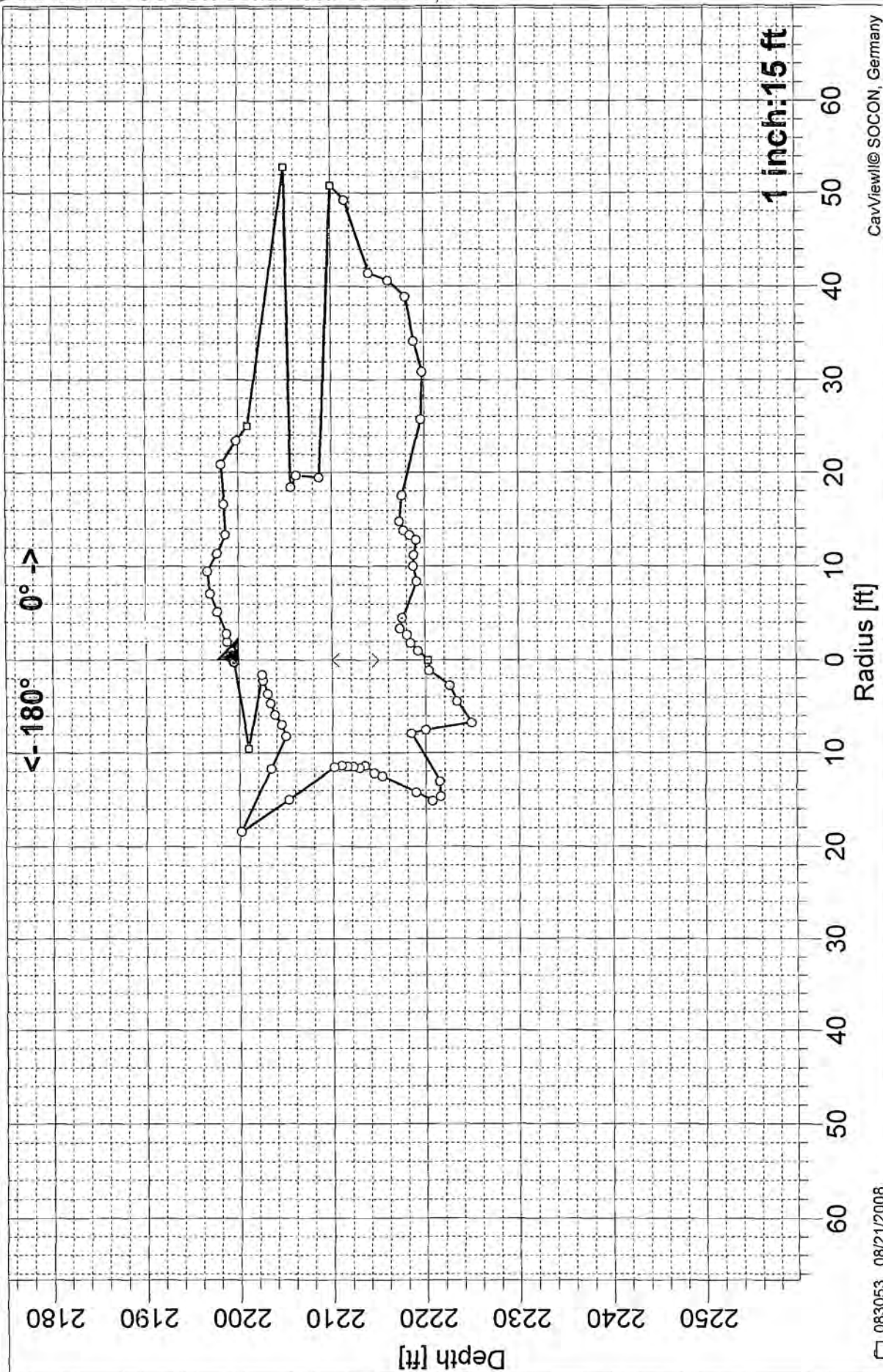






08/21/2008

## Tatum Brine BW-2



083053 08/21/2008

— (08/21/2008)

Tilting position

7" : 2200.0 ft

— 4 1/2" : 2165.0 ft

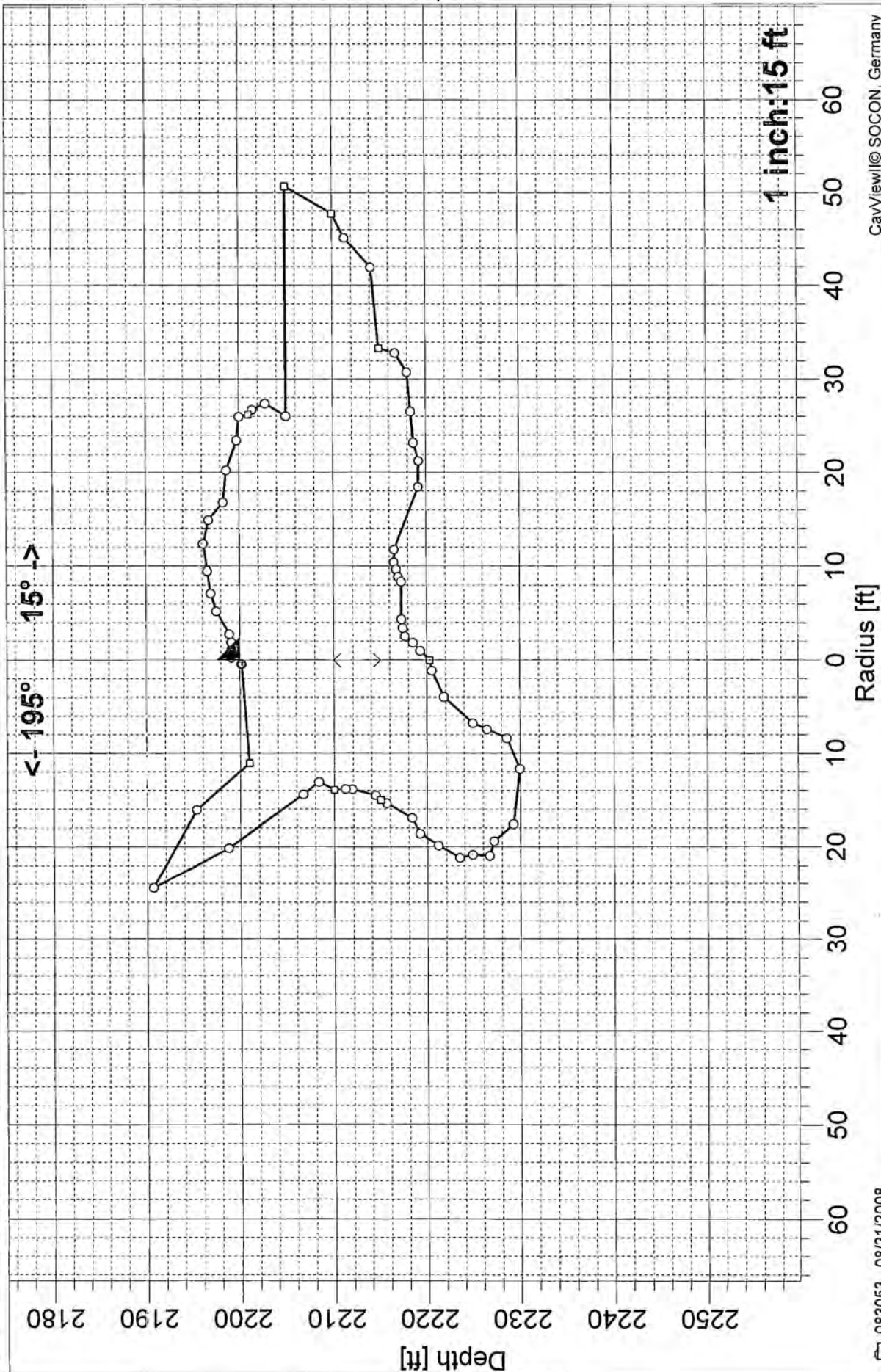




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08/21/2008

Tatum Brine BW-2



083053 08/21/2008

(08/21/2008)  
Tilting position

7" : 2200.0 ft

4 1/2" : 2165.0 ft

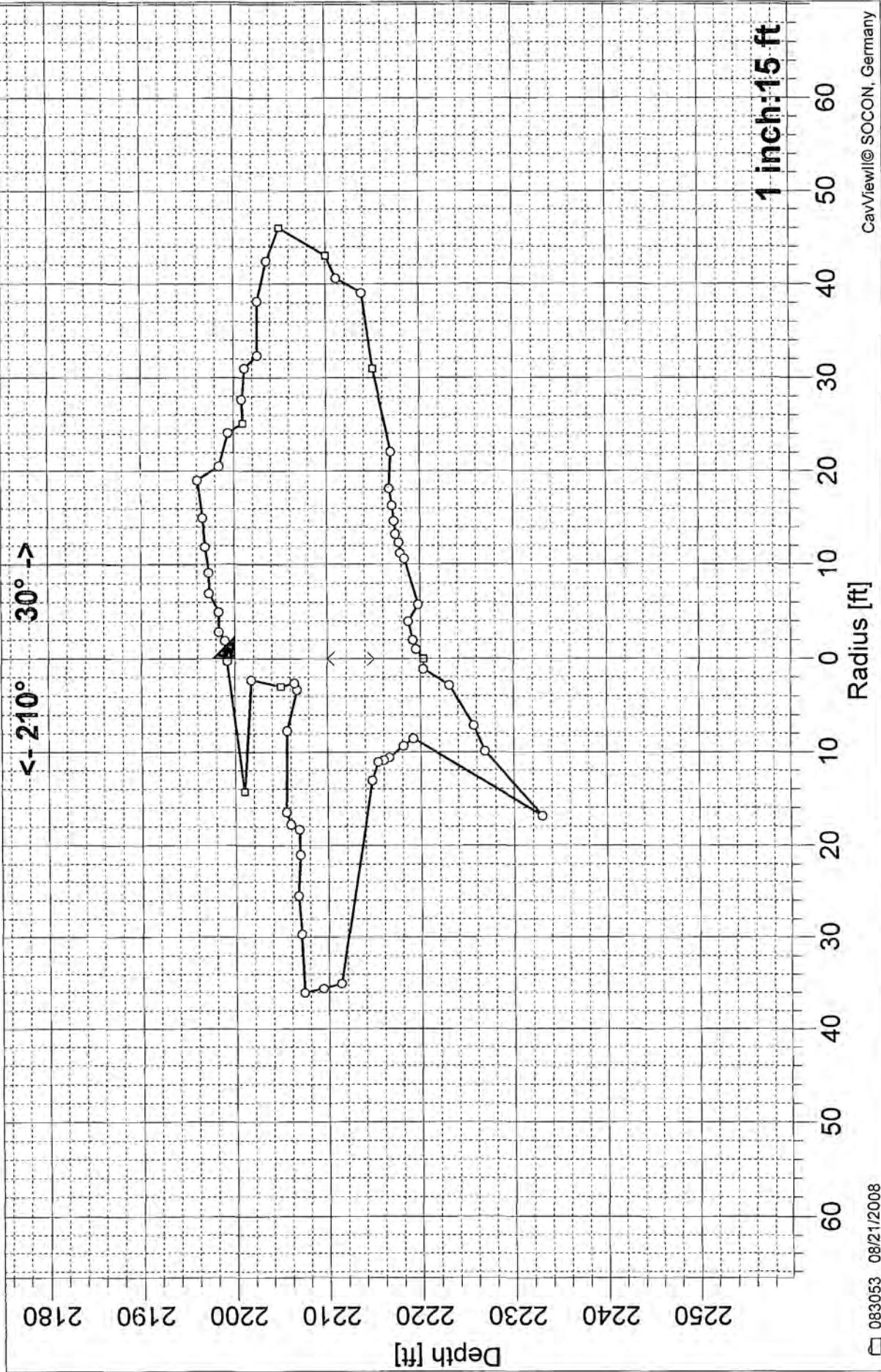




SOCON Sonar Well Services, Inc.

08/21/2008

Tatum Brine BW-2



(08/21/2008)  
Tilting position

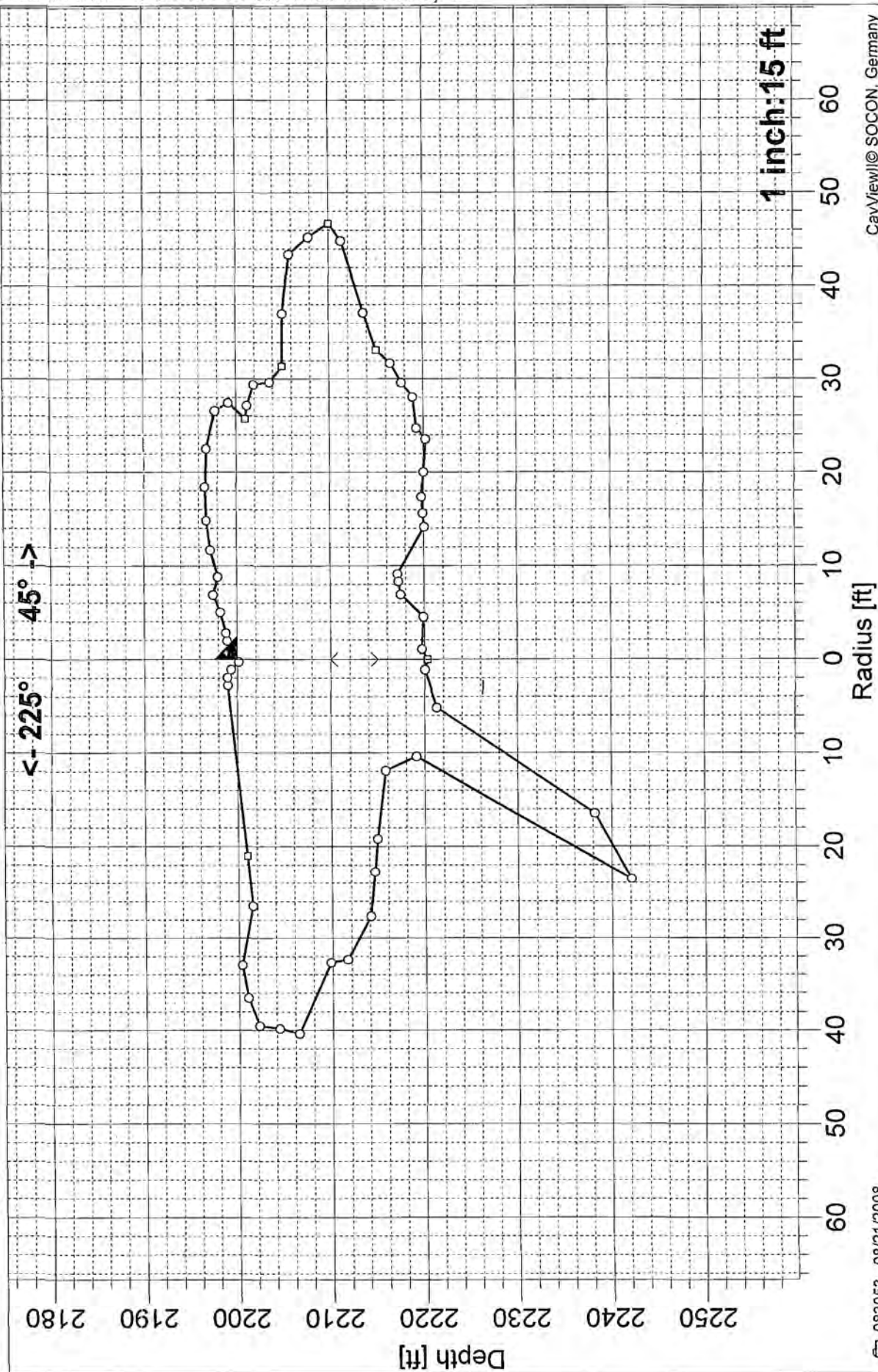




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08/21/2008

Tatum Brine BW-2



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083053 08/21/2008

4 1/2" : 2165.0 ft

7" : 2200.0 ft

(08/21/2008)  
Tilting position

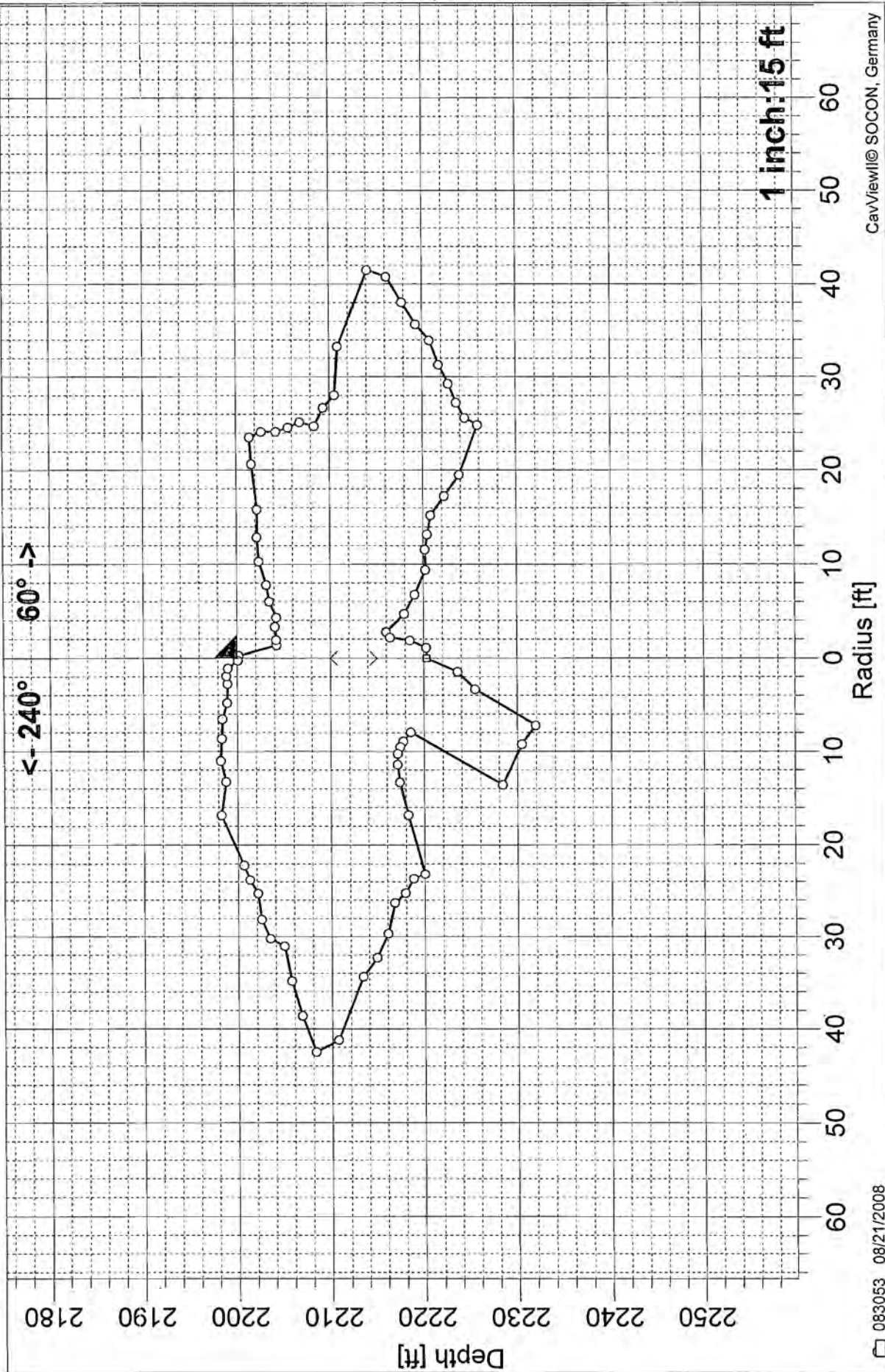




SOCON Sonar Well Services, Inc.

08/21/2008

Tatum Brine BW-2



CavViewII© SOCON, Germany

083053 08/21/2008

4 1/2" : 2165.0 ft

7" : 2200.0 ft

(08/21/2008)

Tilting position

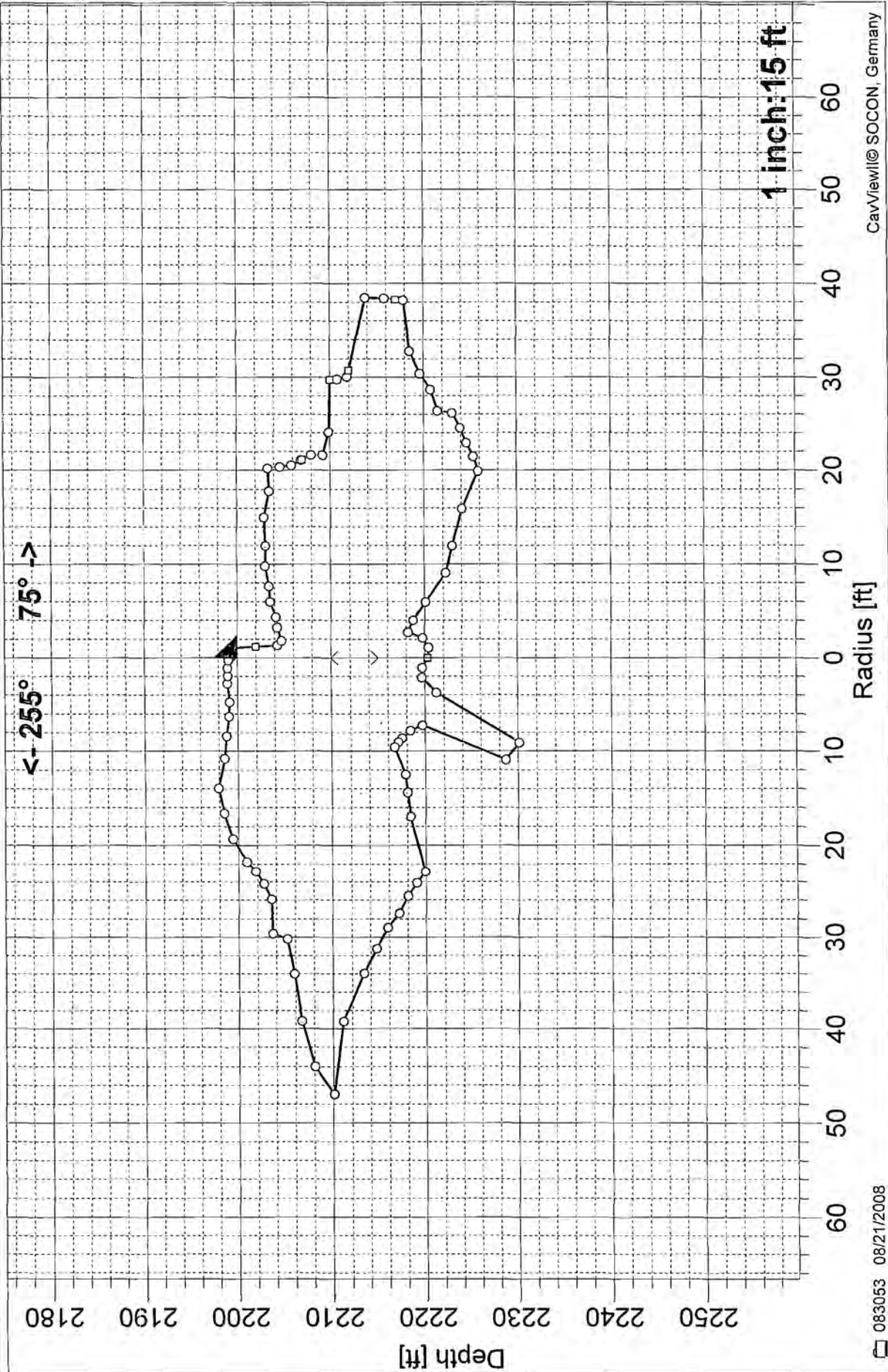




SOCON Sonar Well Services, Inc.

08/21/2008

Tatum Brine BW-2



083053 08/21/2008

(08/21/2008)

Tilting position

7" : 2200.0 ft

4 1/2" : 2165.0 ft

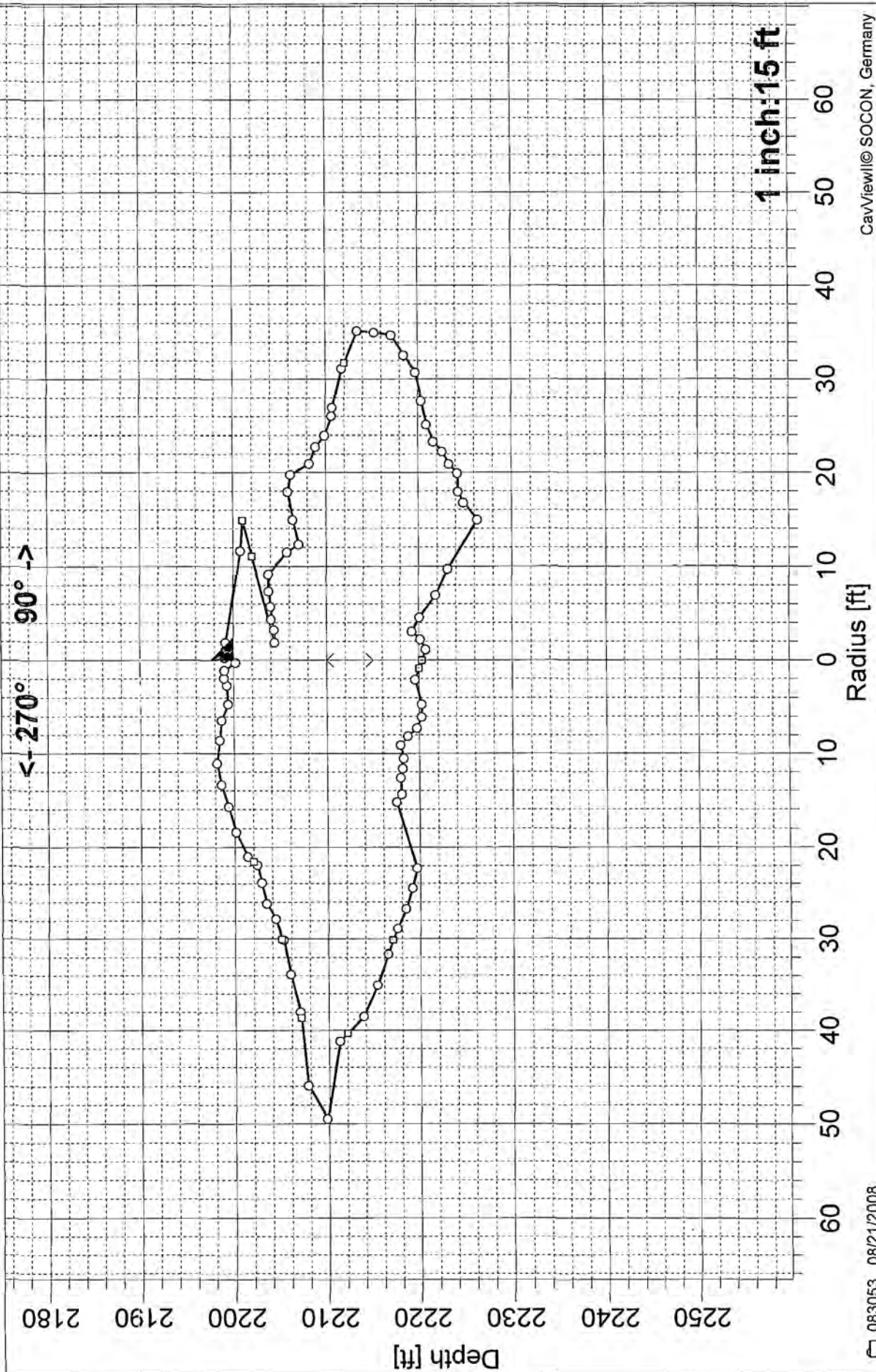




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08/21/2008

Tatum Brine BW-2



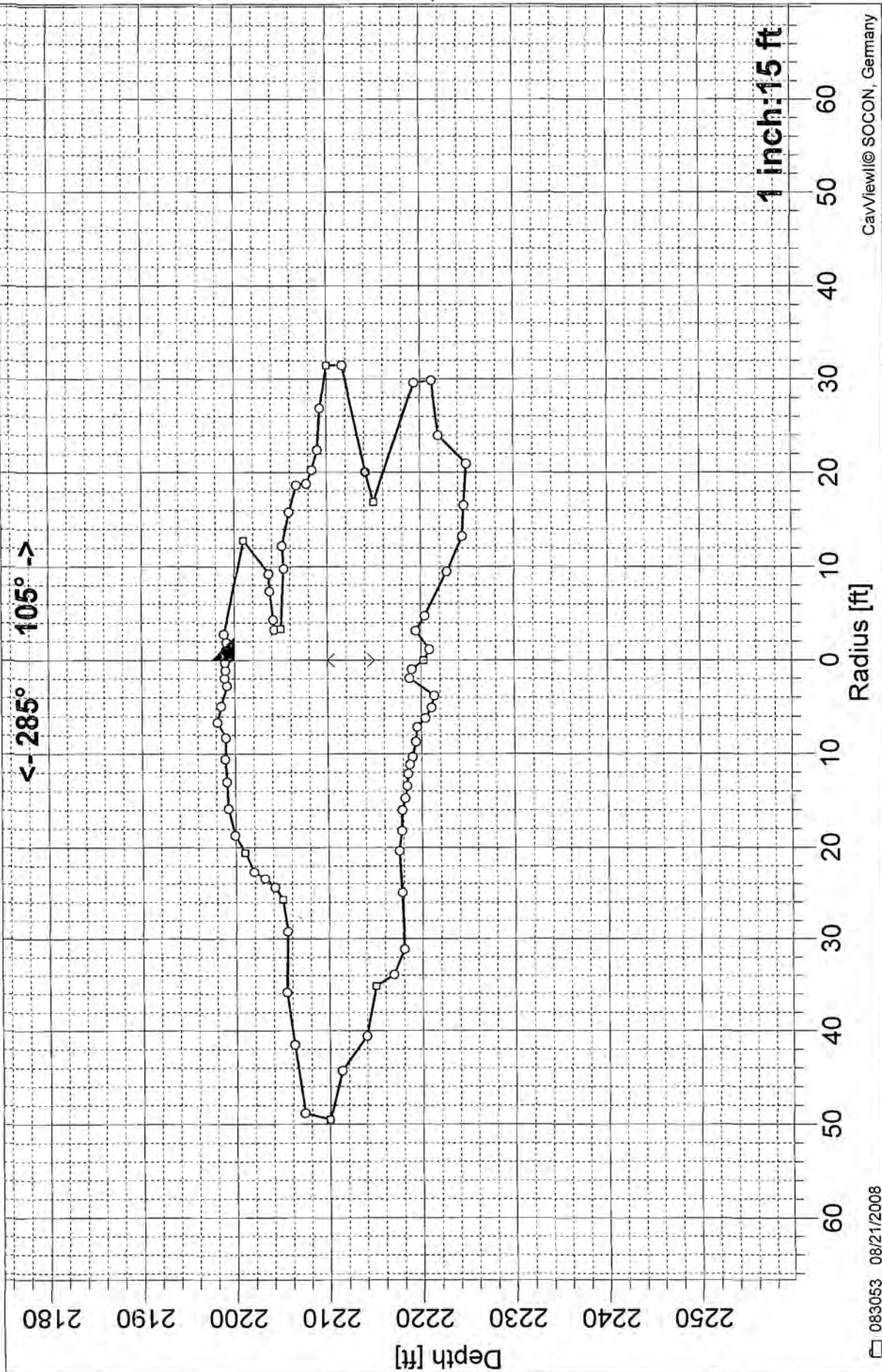




SOCON Sonar Well Services, Inc.

08/21/2008

Tatum Brine BW-2



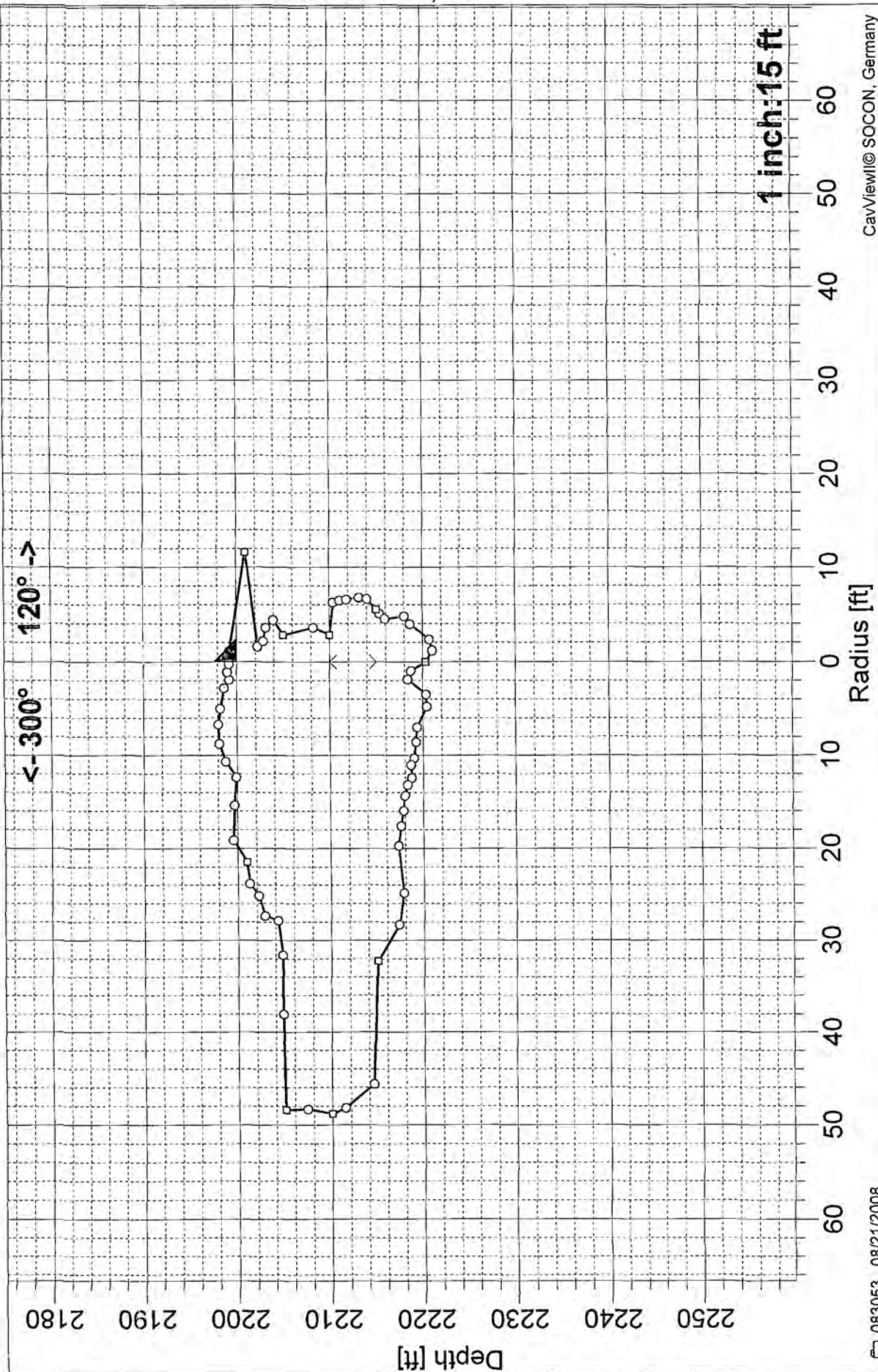




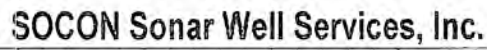
SOCON Sonar Well Services, Inc.

08/21/2008

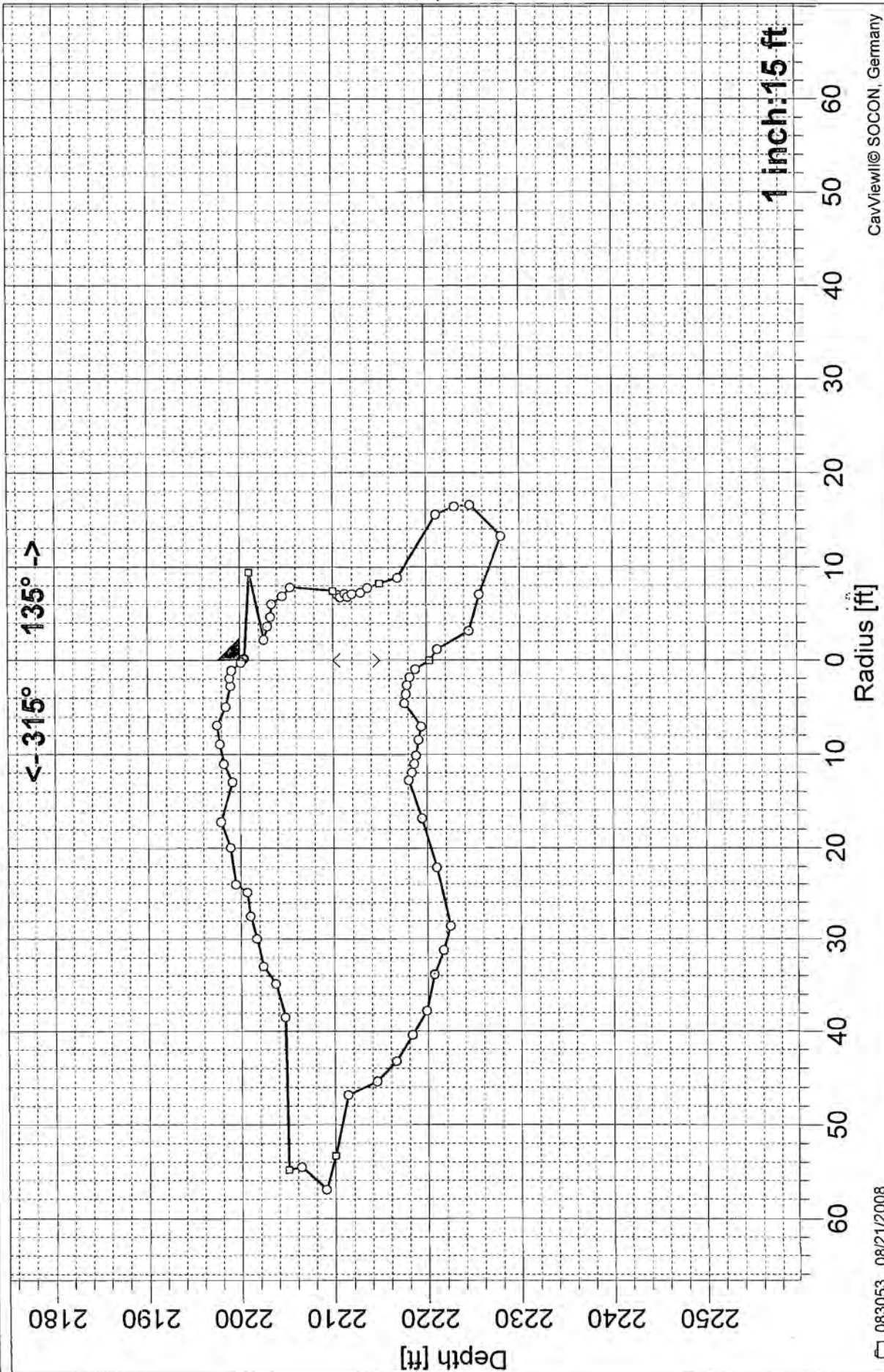
Tatum Brine BW-2







## Tatum Brine BW-2



083053 08/21/2008

—□— (08/21/2008)

Tilting position

— 7" : 2200.0 ft

— 4 1/2" : 2165.0 fl

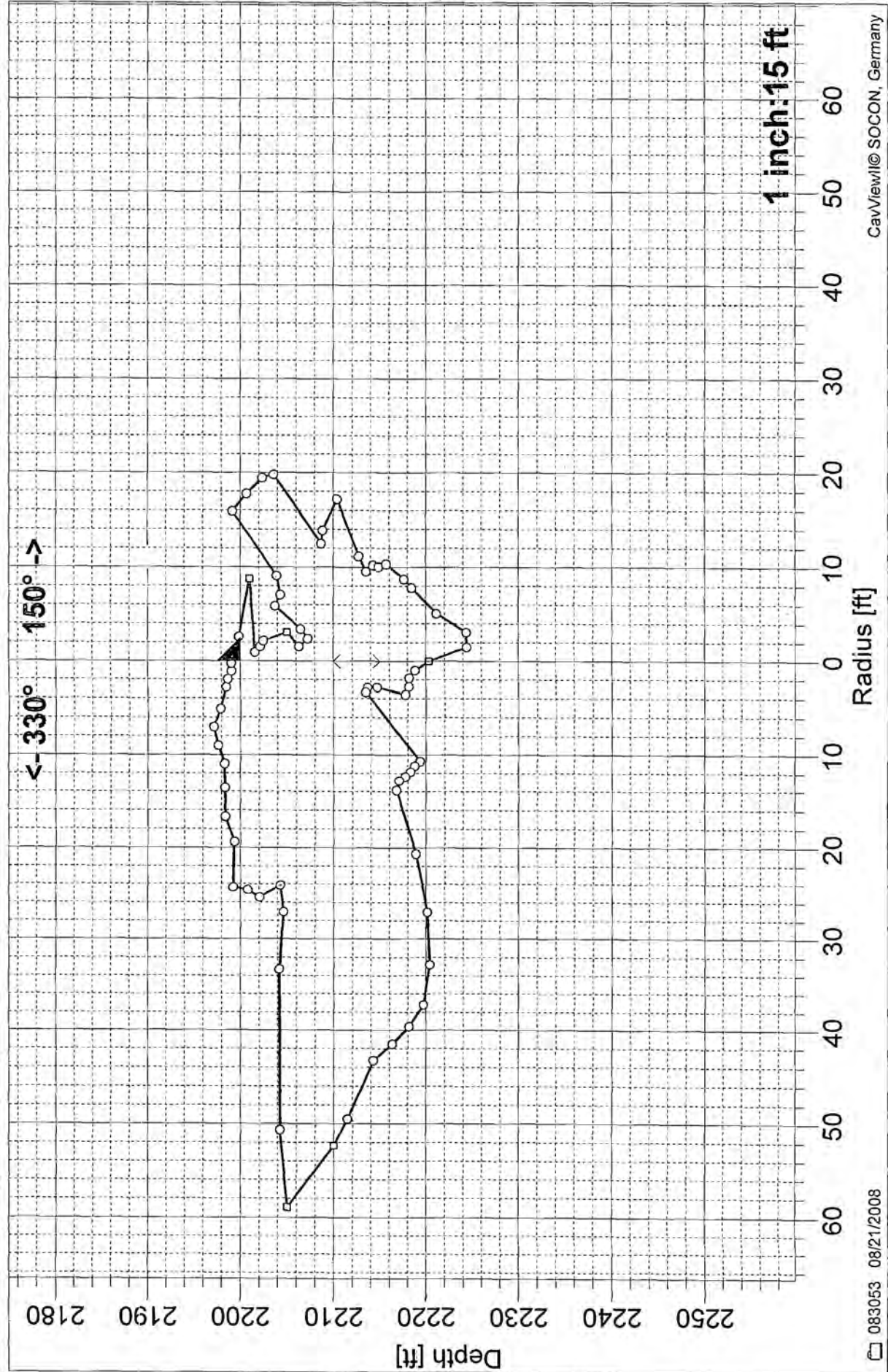




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08/21/2008

Tatum Brine BW-2



08/21/2008  
Tilting position

7" : 2200.0 ft

4 1/2" : 2165.0 ft

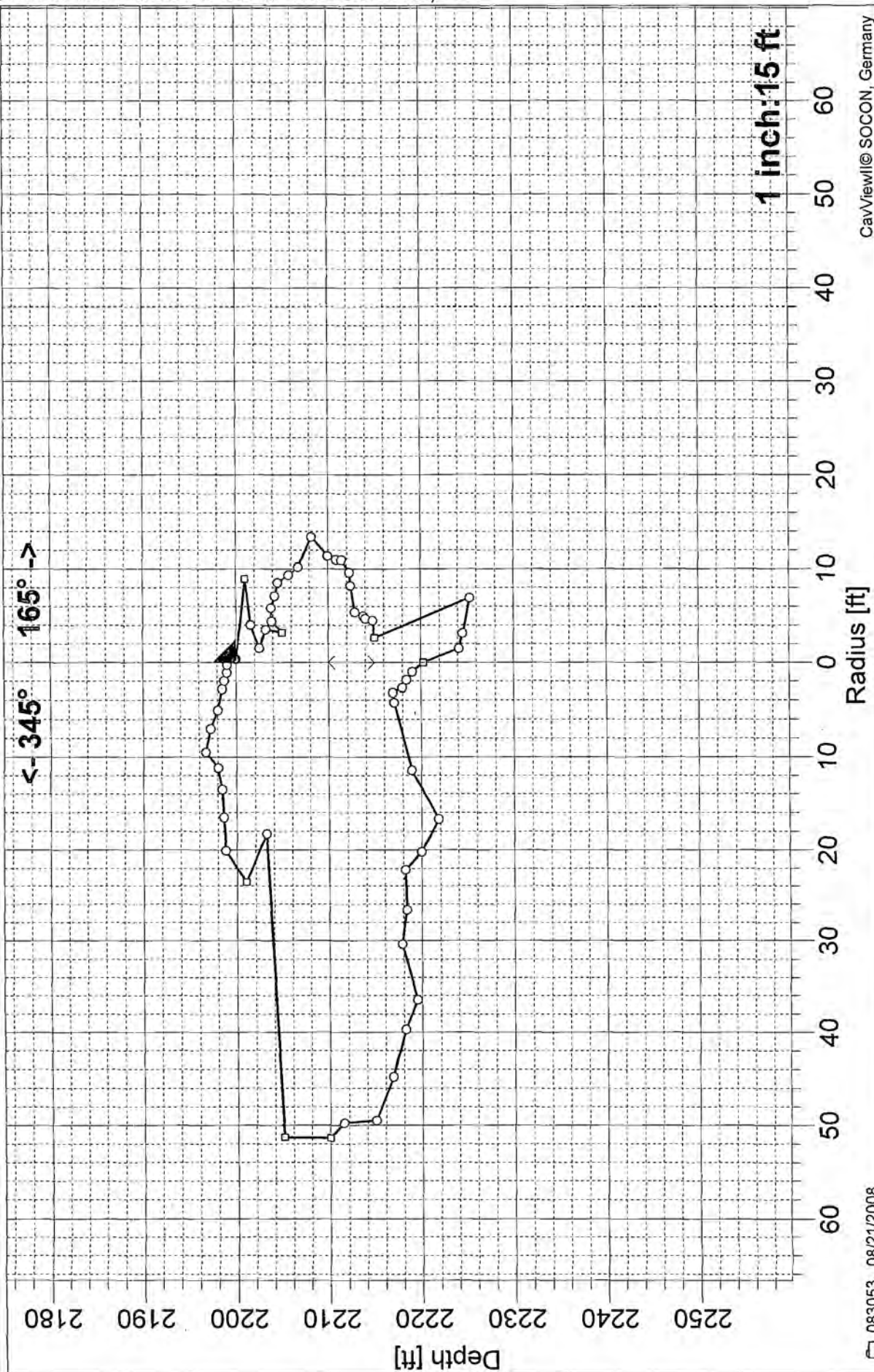




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08/21/2008

Tatum Brine BW-2



— 4 1/2" : 2165.0 ft

— 7" : 2200.0 ft

— (08/21/2008)  
— Tilling position





SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

083053

08/21/2008

## HORIZONTAL SECTIONS

Cavern: Tatum Brine BW-2

Report No.: 083053

Utilized speed of sound: 1810.0 m/s (5938.3 ft/s)

Measuring date: 08/21/2008

Scale: 1: 20

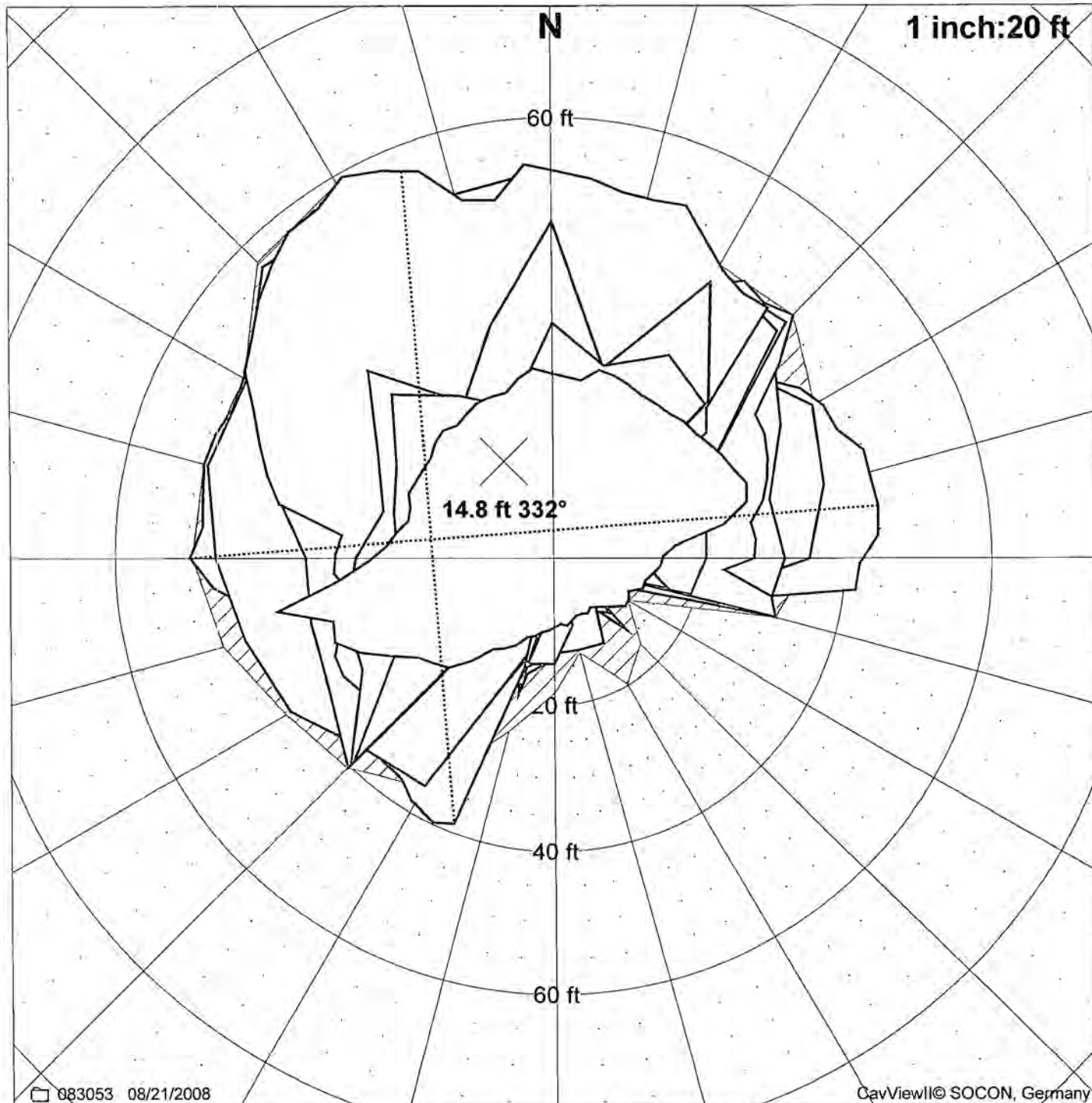
Horizontal sections measured at following depths:

|           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2201.0 ft | 2202.0 ft | 2204.0 ft | 2205.0 ft | 2206.0 ft | 2208.0 ft | 2210.0 ft |
| 2212.0 ft | 2214.0 ft | 2215.0 ft | 2216.0 ft | 2218.0 ft | 2220.0 ft |           |

The following 16 sections are constructed:

|           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2191.0 ft | 2193.0 ft | 2195.0 ft | 2197.0 ft | 2199.0 ft | 2221.0 ft | 2223.0 ft |
| 2225.0 ft | 2227.0 ft | 2229.0 ft | 2231.0 ft | 2233.0 ft | 2235.0 ft | 2237.0 ft |
| 2239.0 ft | 2241.0 ft |           |           |           |           |           |





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Vertical maximum plot

Horizontal sections

..... a/b

Center of gravity

$d_{max}$ : 93.1 ft 86° ↔ 266°  $r_{min}$ : 11.6 ft → 120°  $r$ : 41.7 ft  $r_{max}$ : 59.4 ft → 331°

a/b = 1.063 a = 94.7 ft (80°-270°) b = 89.1 ft (201°-338°)

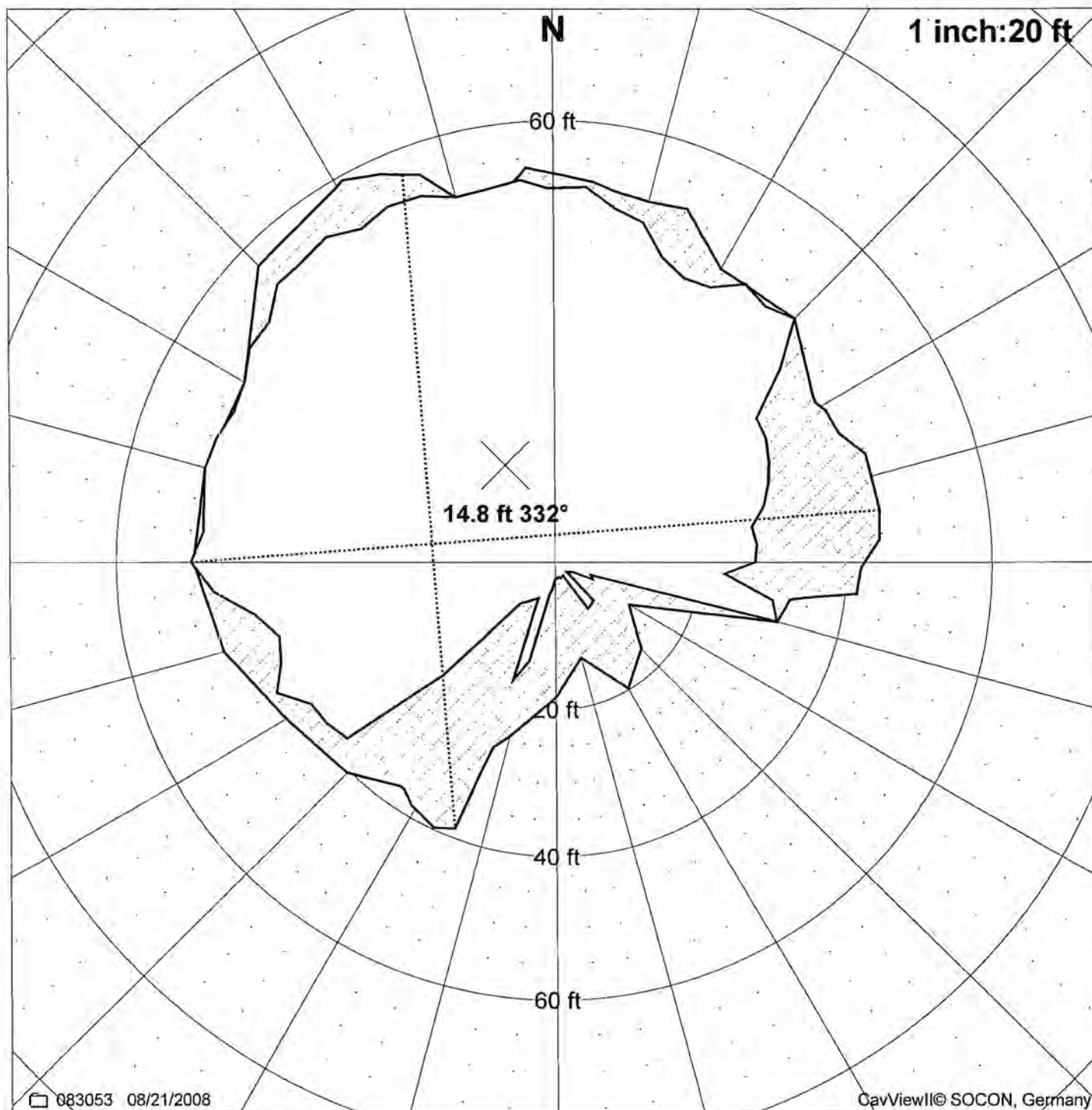
Area from vertical sections: 5192 ft², Area from horizontal and vertical sections: 5463 ft²



**Tatum Brine BW-2**

**MAXPLOT**

**08/21/2008**



..... a/b      X Center of gravity      □ Horizontal/vertical maximum plot  
 □ Largest single area

$d_{max}$ : 93.1 ft 86° <--> 266°  $r_{min}$ : 11.6 ft -> 120°  $r_{\sim}$ : 41.7 ft  $r_{max}$ : 59.4 ft -> 331°

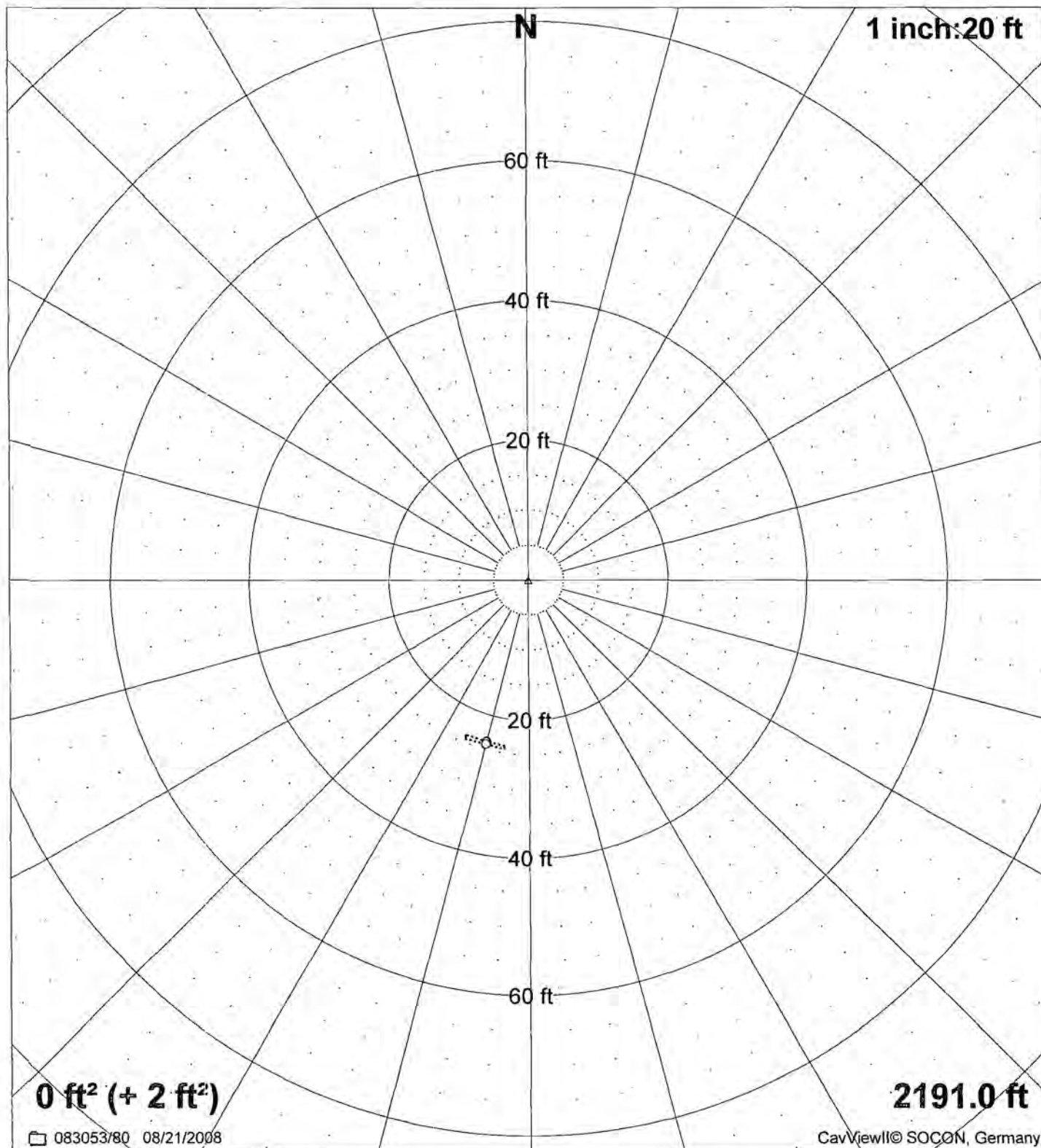
a/b = 1.063 a = 94.7 ft (80°-270°) b = 89.1 ft (201°-338°)

Largest single area: 4124 ft<sup>2</sup> in depth: 2210.0 ft, Area from horizontal and vertical sections: 5463 ft<sup>2</sup>



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 24.2 ft 195° <--> 15°  $r_{min}$ : 0.0 ft -> 0°  $r_{~}$ : 0.9 ft  $r_{max}$ : 24.2 ft -> 195°



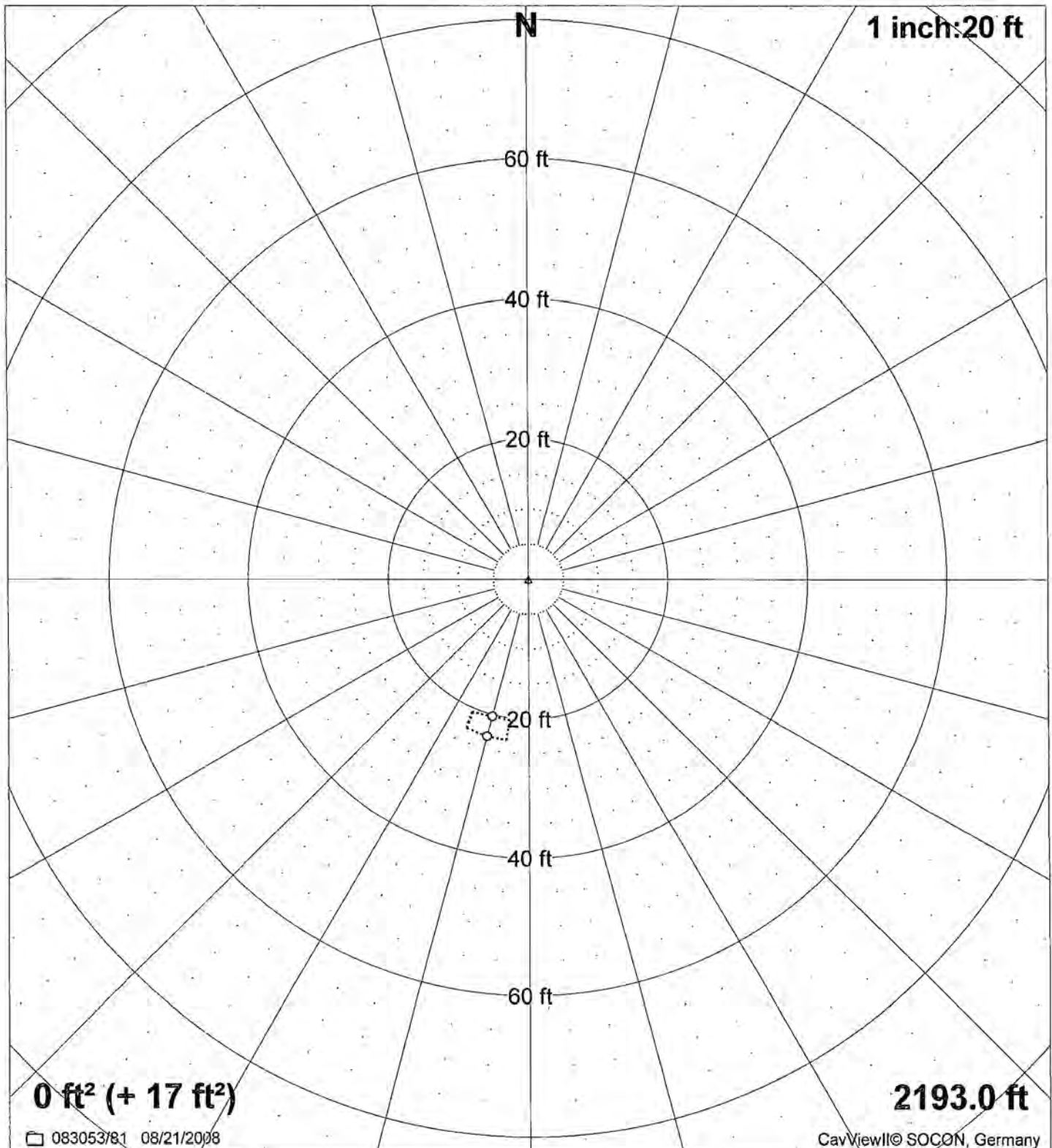


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

08/21/2008

1 inch:20 ft



0 ft<sup>2</sup> (+ 17 ft<sup>2</sup>)

2193.0 ft

083053/81 08/21/2008

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—○— (08/21/2008)

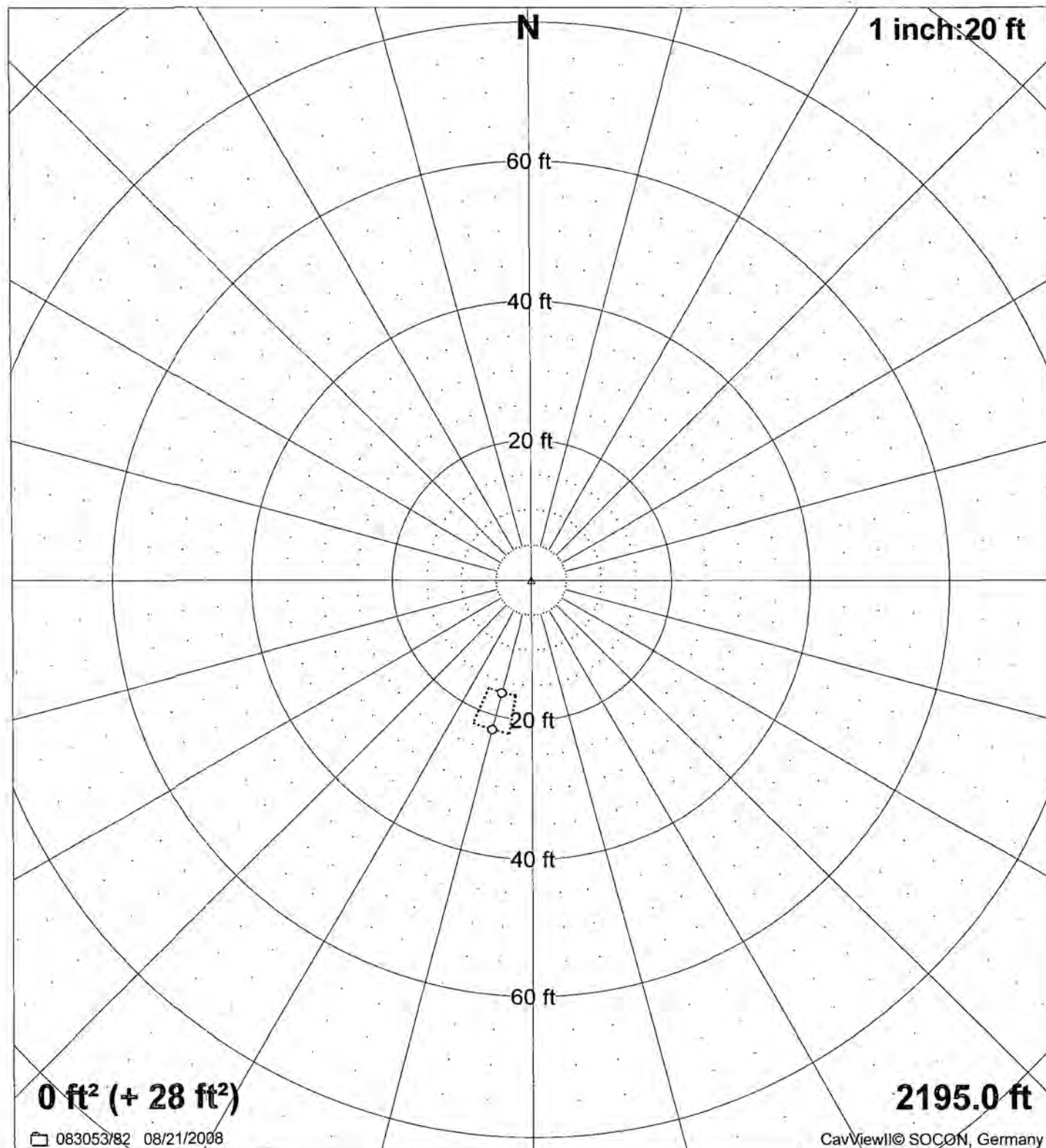
—○— Leached pocket (08/21/2008)

$d_{max}$ : 23.2 ft 195° <--> 15°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 2.3 ft  $r_{max}$ : 23.2 ft -> 195°



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 22.1 ft 195° <--> 15°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 3.0 ft  $r_{max}$ : 22.1 ft -> 195°

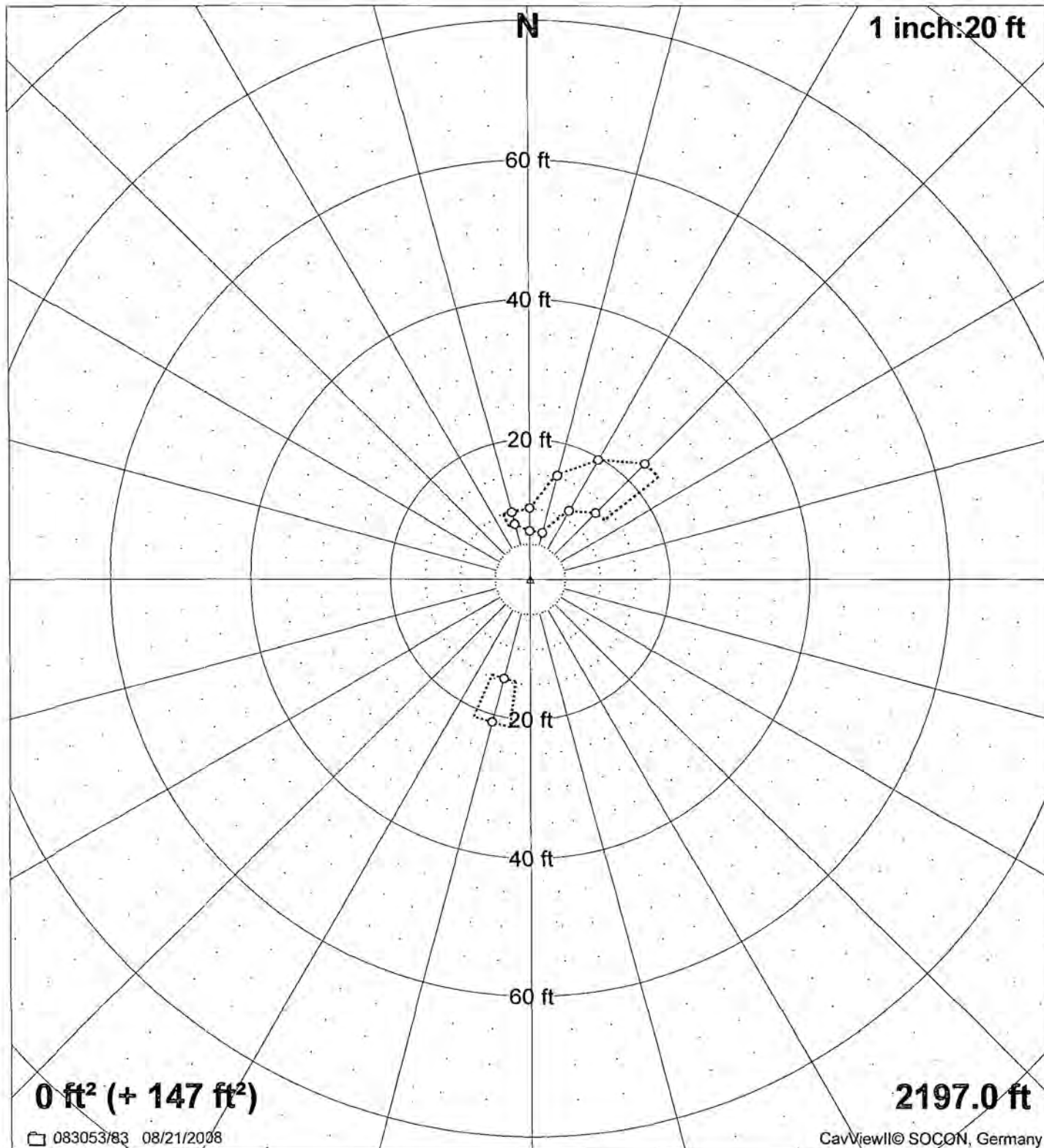




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Tatum Brine BW-2

08/21/2008



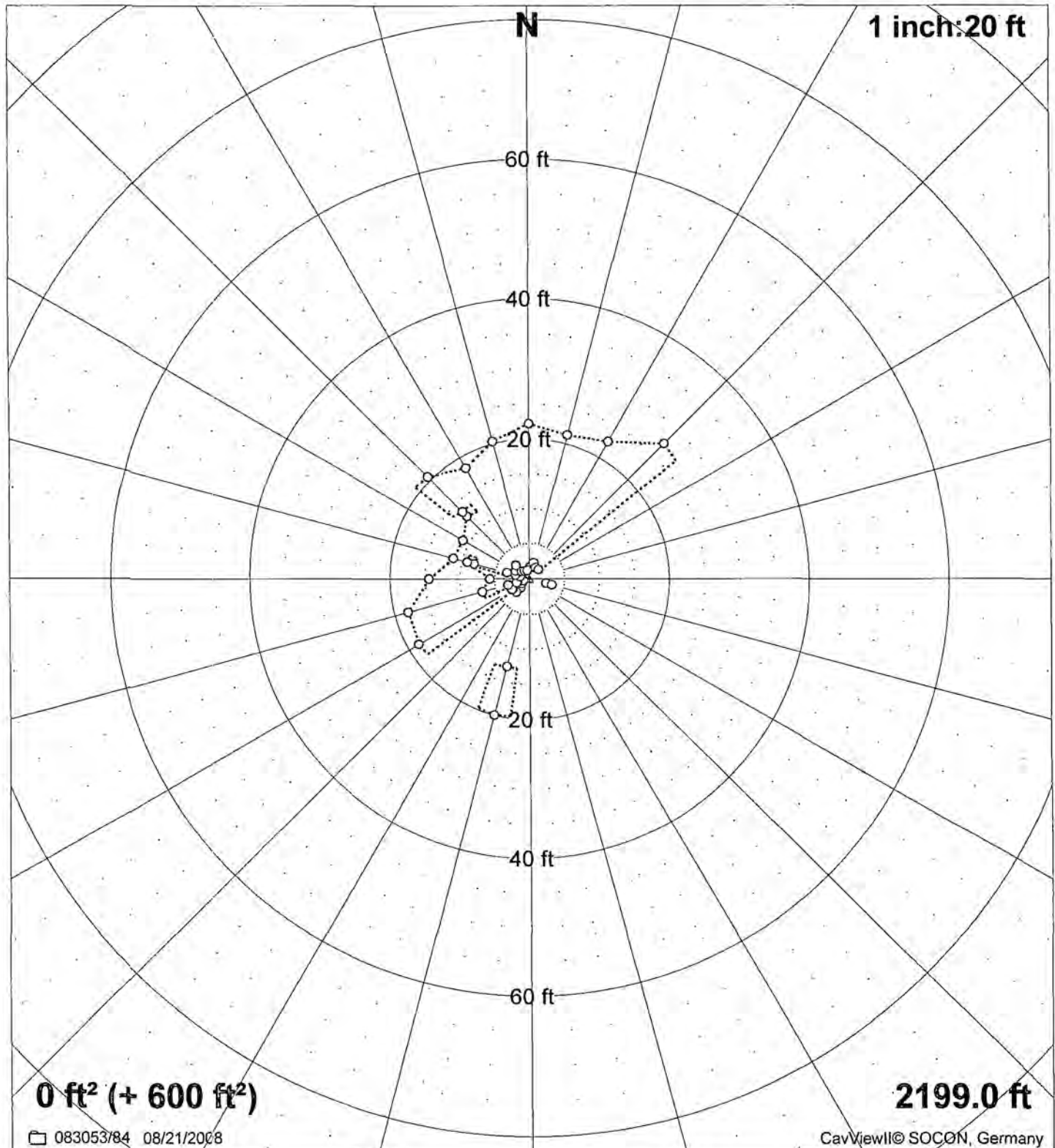




SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

08/21/2008



—○— (08/21/2008)

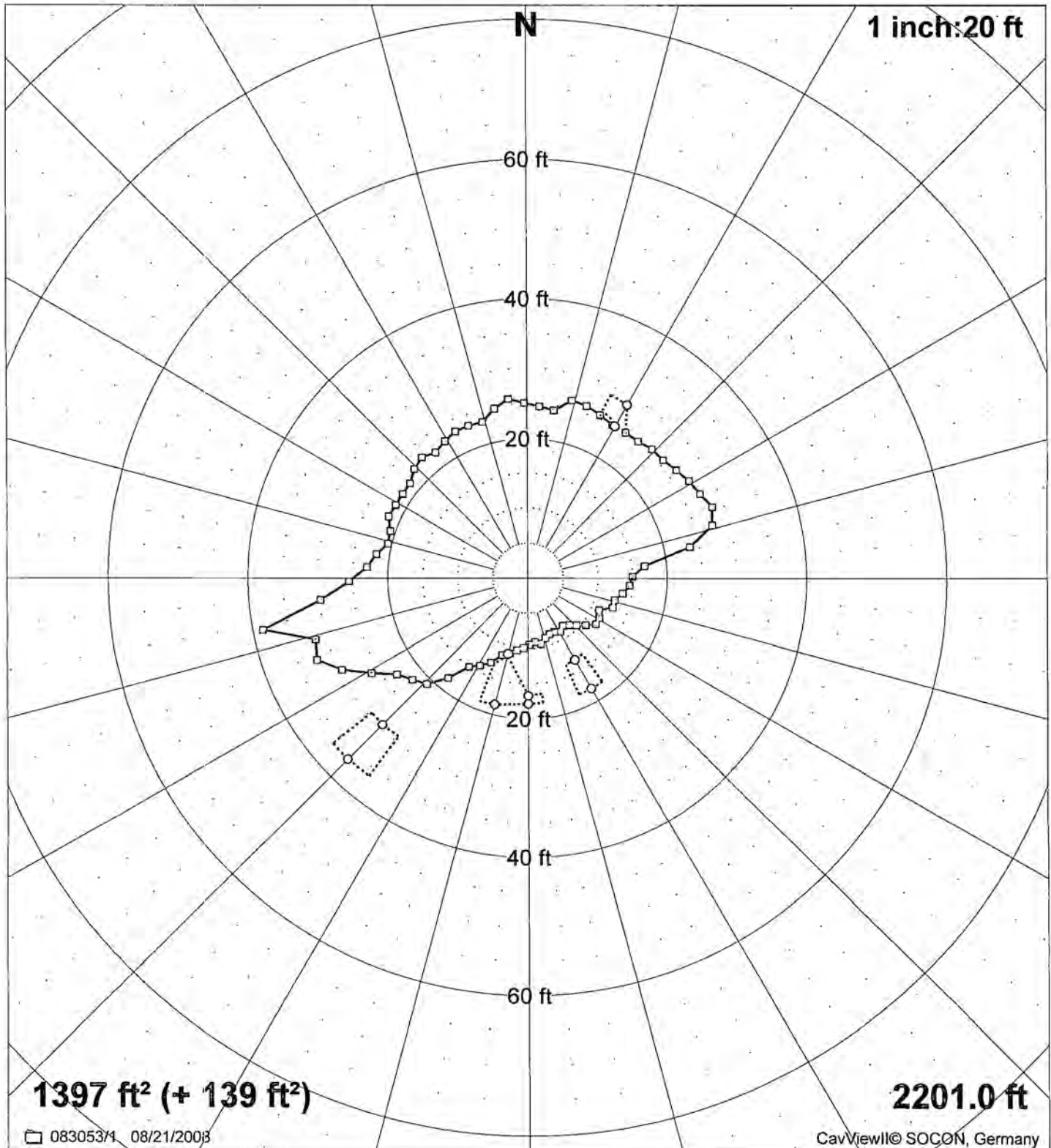
—○— Leached pocket (08/21/2008)

d<sub>max</sub>: 41.2 ft 15° <--> 195° r<sub>min</sub>: 0.0 ft -> 1° r~: 13.8 ft r<sub>max</sub>: 27.3 ft -> 45°



**Tatum Brine BW-2**

**08/21/2008**



—□— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 62.3 ft 259° <--> 79°  $r_{min}$ : 8.4 ft --> 144°  $r_{\sim}$ : 22.1 ft  $r_{max}$ : 38.6 ft --> 259°

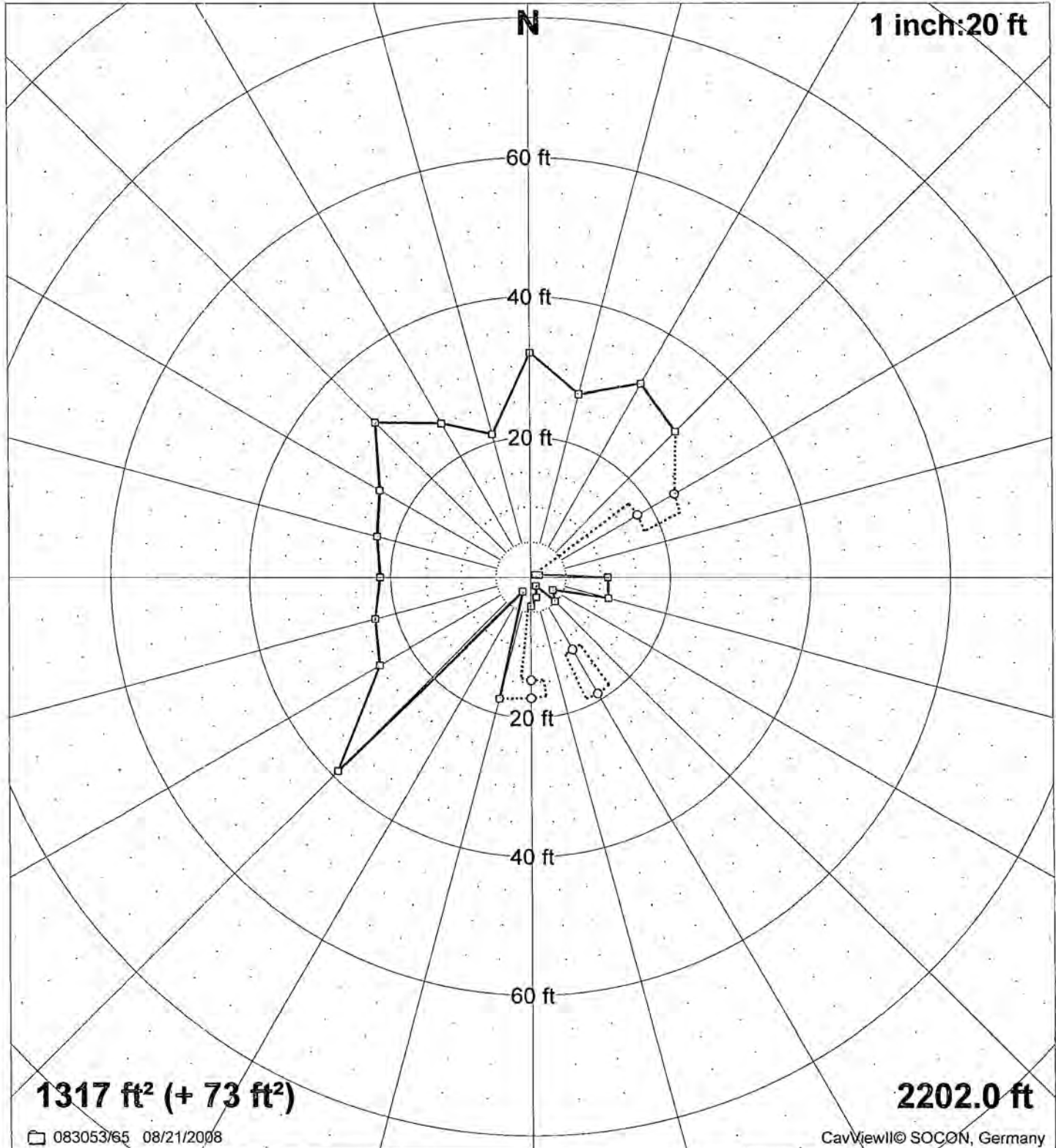




SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

08/21/2008



—□— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 68.4 ft 225° <--> 45°  $r_{min}$ : 0.8 ft -> 61°  $r_{\sim}$ : 21.0 ft  $r_{max}$ : 39.0 ft -> 225°



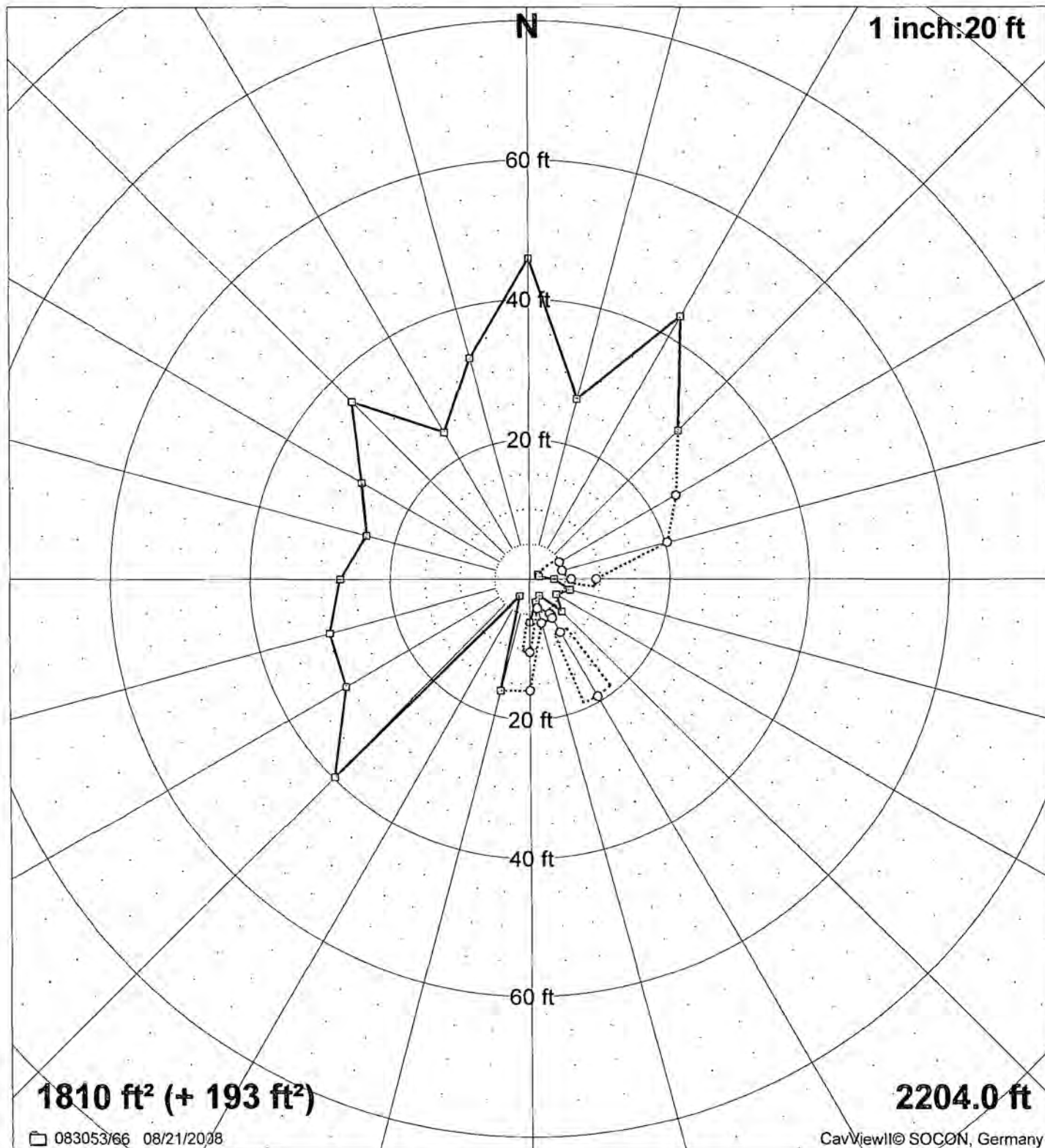


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Tatum Brine BW-2

08/21/2008

1 inch:20 ft



1810 ft<sup>2</sup> (+ 193 ft<sup>2</sup>)

2204.0 ft

083053/66 08/21/2008

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—□— (08/21/2008)

—○— Leached pocket (08/21/2008)

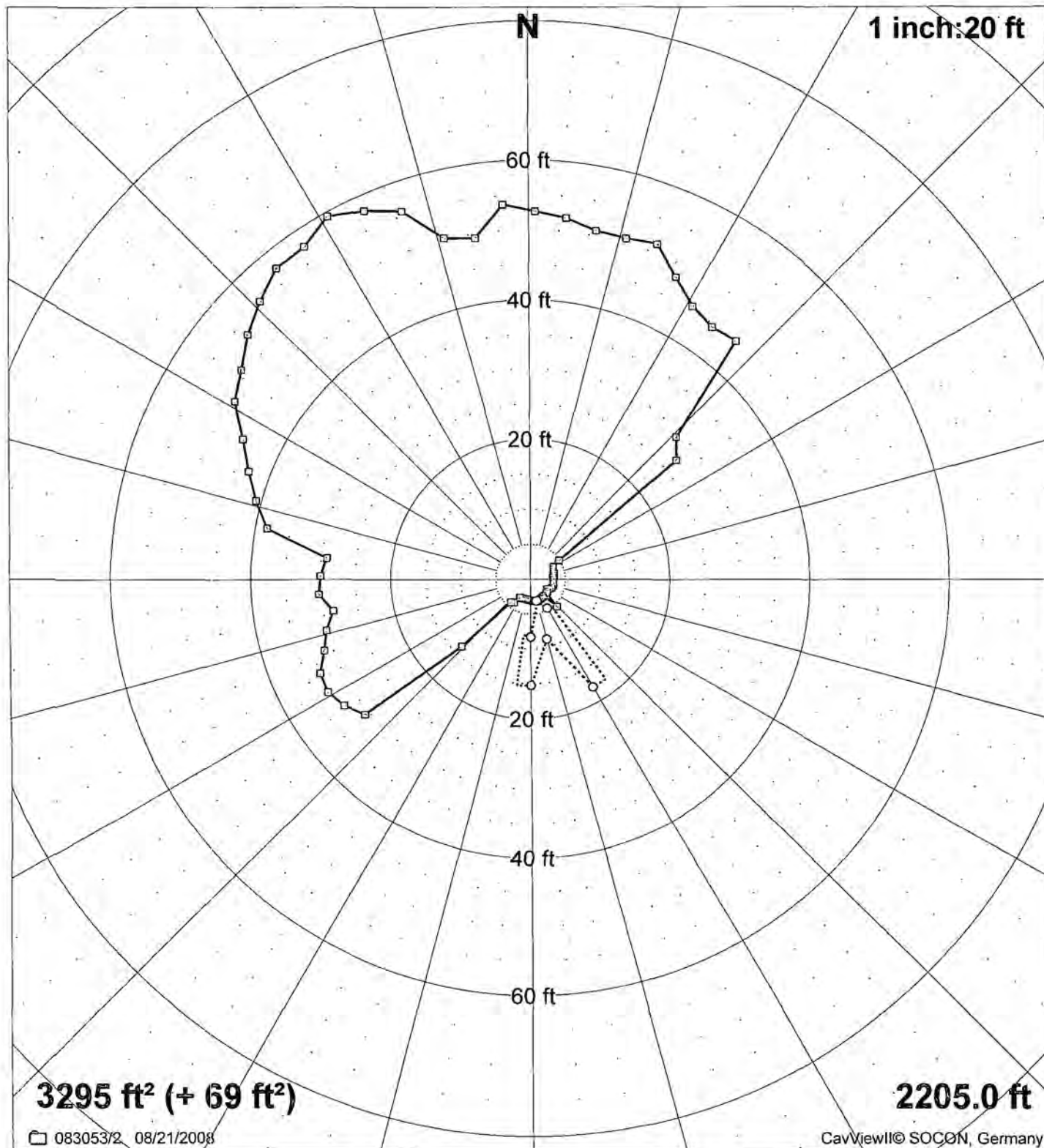
$d_{max}$ : 69.8 ft 45° <--> 225°  $r_{min}$ : 1.3 ft -> 62°  $r_{\sim}$ : 25.2 ft  $r_{max}$ : 45.9 ft -> 360°



**Tatum Brine BW-2**

**08/21/2008**

**1 inch:20 ft**



**3295 ft² (+ 69 ft²)**

**2205.0 ft**

083053/2 08/21/2008

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—□— (08/21/2008)

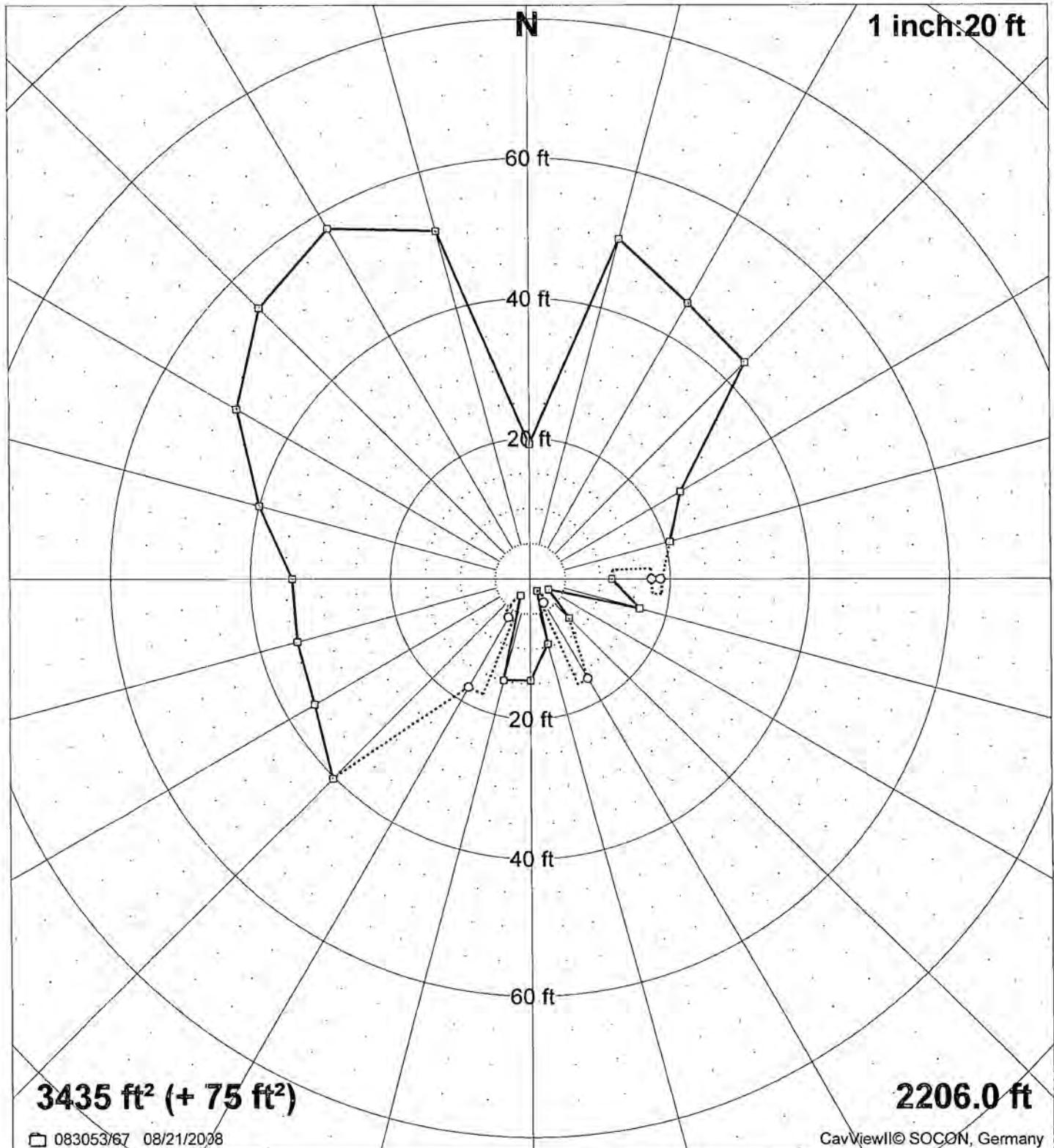
—○— Leached pocket (08/21/2008)

$d_{max}$ : 76.7 ft 330° <--> 150°  $r_{min}$ : 2.7 ft -> 121°  $r_{\sim}$ : 32.7 ft  $r_{max}$ : 59.4 ft -> 331°



**Tatum Brine BW-2**

**08/21/2008**



—□— (08/21/2008)

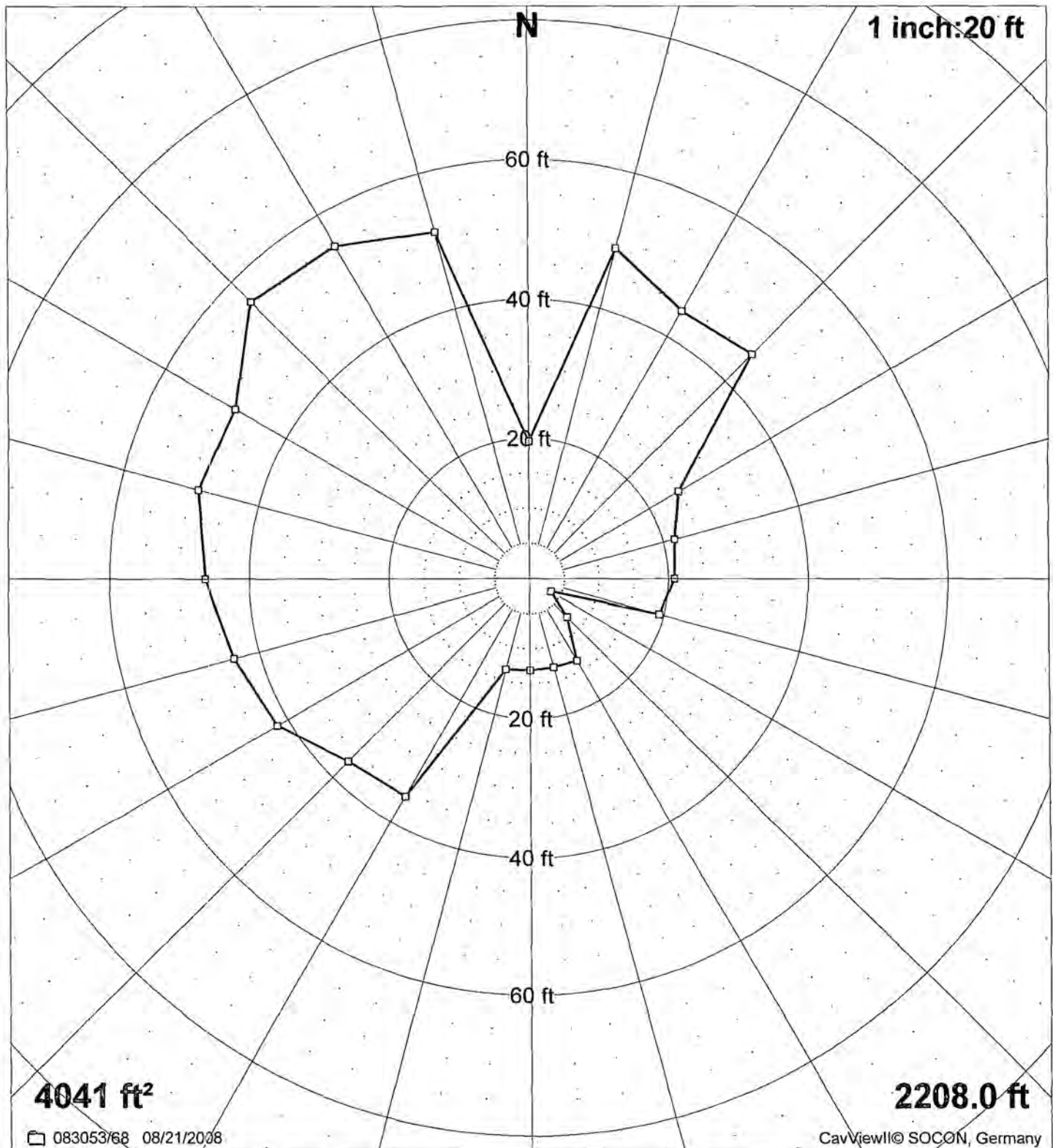
—○— Leached pocket (08/21/2008)

$d_{max}$ : 83.8 ft 45° <--> 225°  $r_{min}$ : 2.1 ft -> 149°  $r_{\sim}$ : 33.4 ft  $r_{max}$ : 57.6 ft -> 330°



**Tatum Brine BW-2**

**08/21/2008**



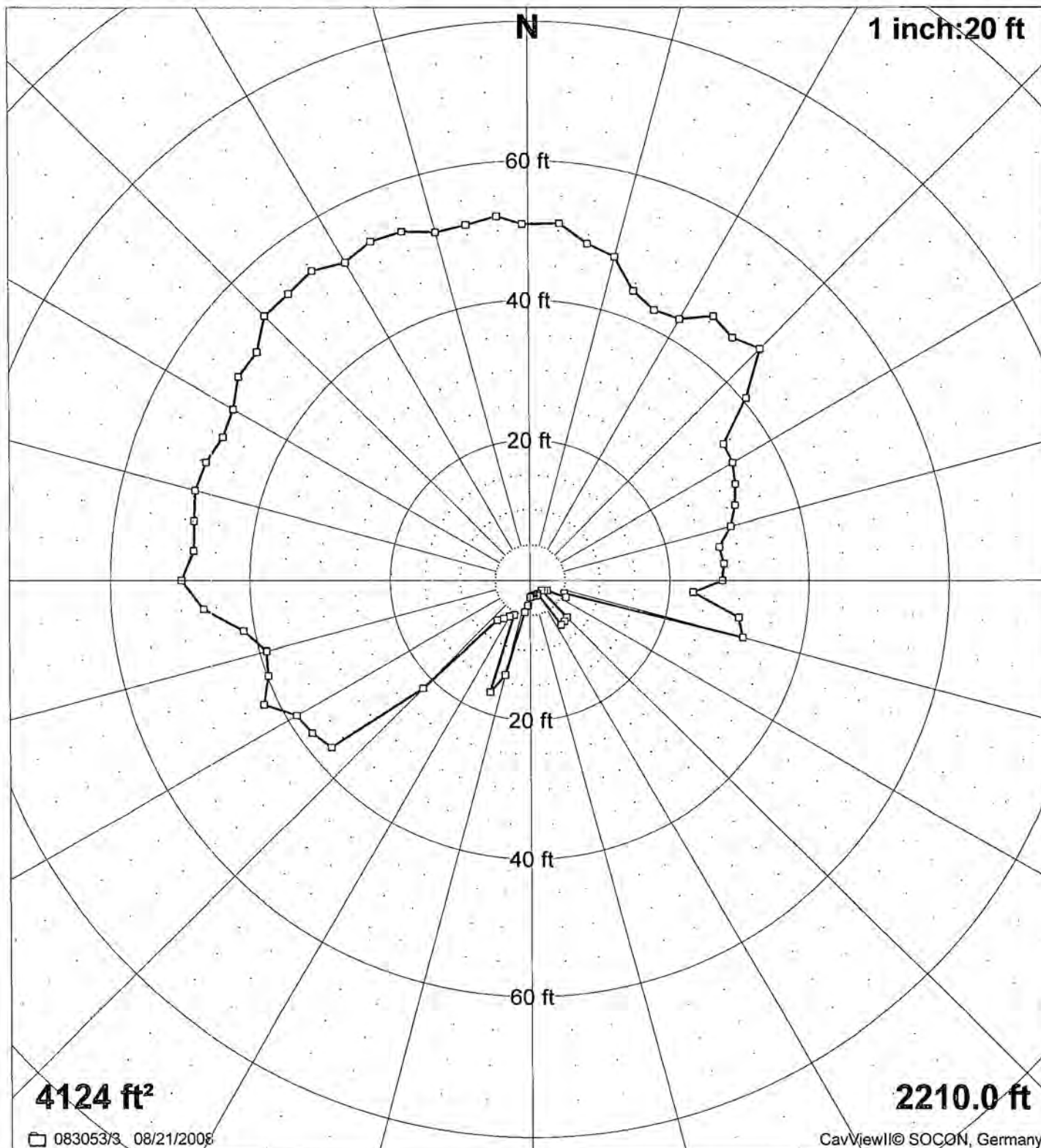
(08/21/2008)

$d_{max}$ : 82.1 ft 45° <--> 225°  $r_{min}$ : 3.5 ft -> 120°  $r_{\sim}$ : 35.9 ft  $r_{max}$ : 56.0 ft -> 315°



**Tatum Brine BW-2**

**08/21/2008**



|   |         |                |              |         |          |
|---|---------|----------------|--------------|---------|----------|
| <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 2px; background-color: black; margin-right: 5px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> <span>(08/21/2008)</span> </div> |         |                |              |         |          |
| $d_{max}$ :   | 80.9 ft | 105° <--> 285° | $r_{min}$ :  | 2.1 ft  | --> 130° |
|   |         |                | $r_{\sim}$ : | 36.2 ft |          |
|   |         |                | $r_{max}$ :  | 53.9 ft | --> 325° |

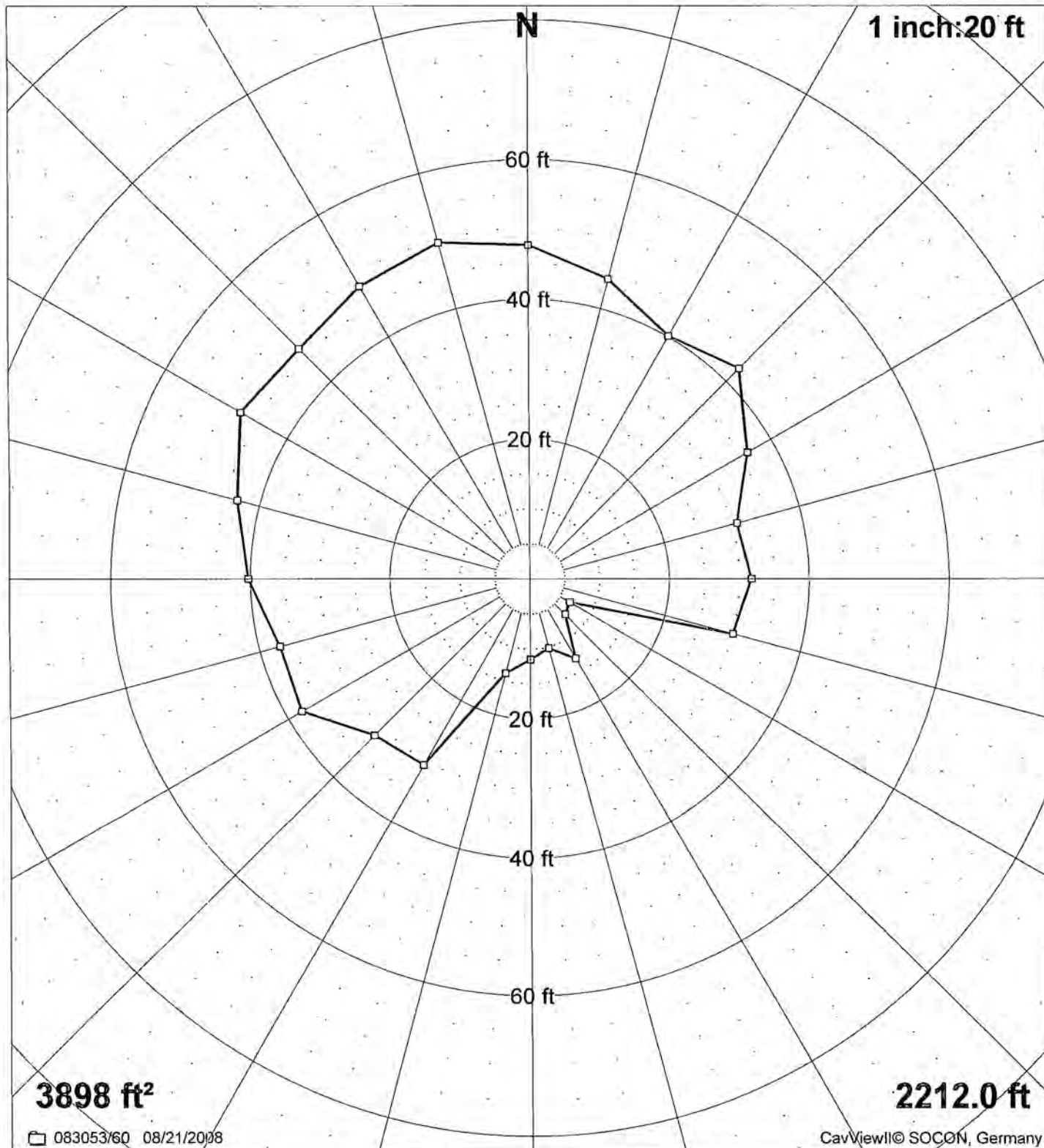




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Tatum Brine BW-2

08/21/2008



—□— (08/21/2008)

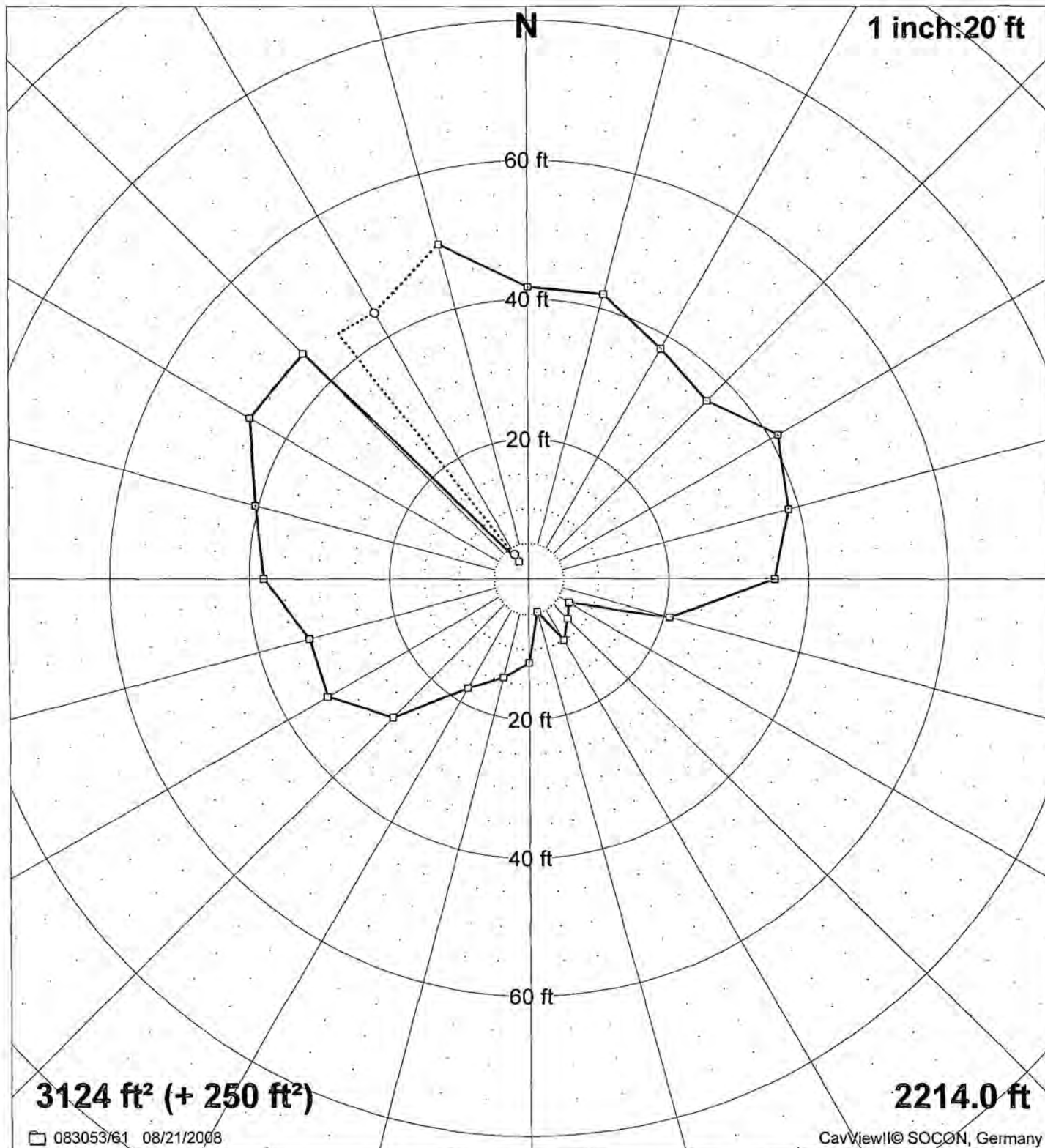
d<sub>max</sub>: 74.1 ft 45° <--> 225° r<sub>min</sub>: 6.6 ft -> 120° r~: 35.2 ft r<sub>max</sub>: 49.7 ft -> 345°



**Tatum Brine BW-2**

**08/21/2008**

**1 inch:20 ft**



—□— (08/21/2008)

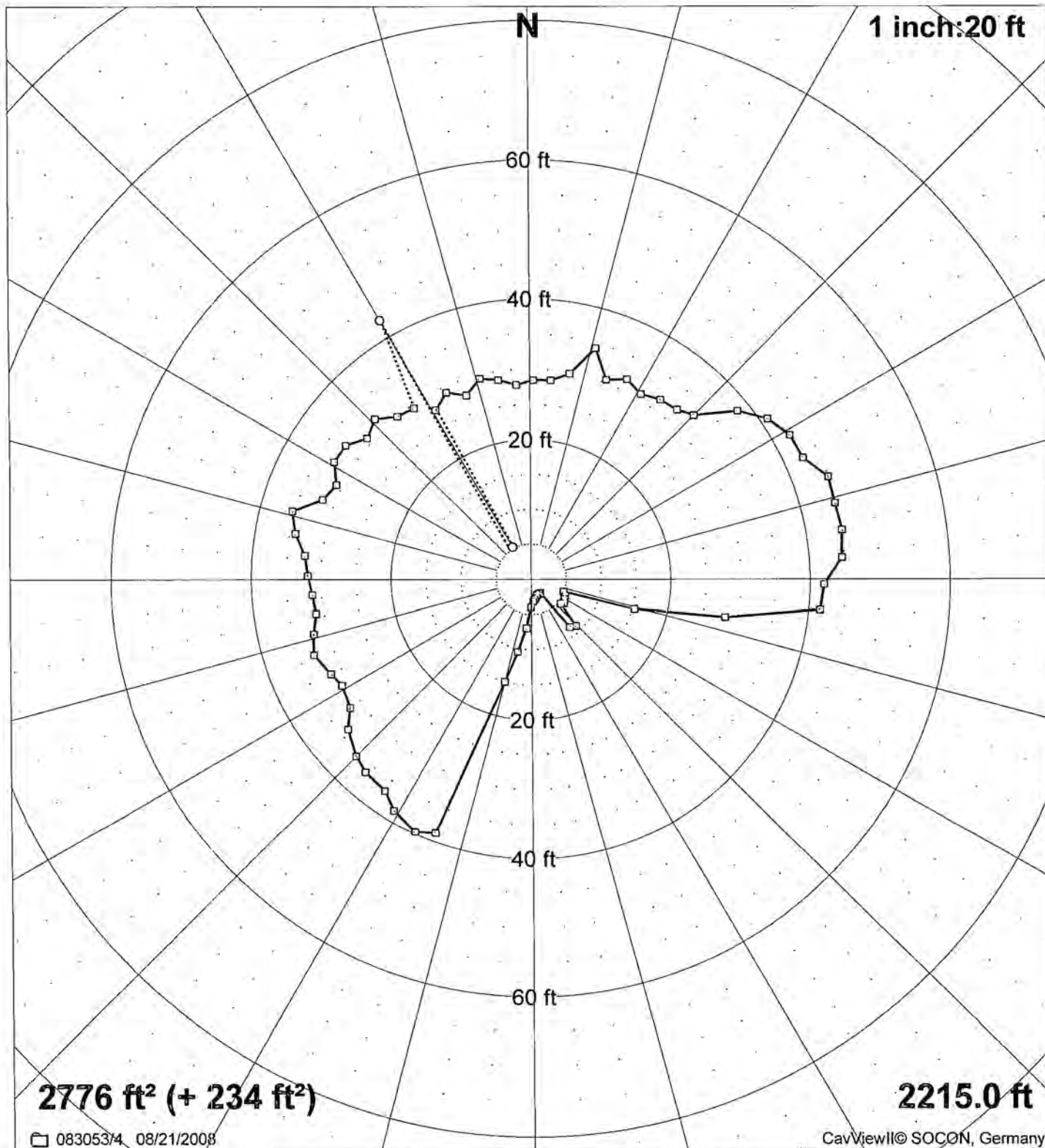
—○— Leached pocket (08/21/2008)

$d_{max}$ : 74.7 ft 240° <--> 60°  $r_{min}$ : 3.0 ft -> 329°  $r_{\sim}$ : 32.8 ft  $r_{max}$ : 49.5 ft -> 345°



**Tatum Brine BW-2**

**08/21/2008**



—□— (08/21/2008)

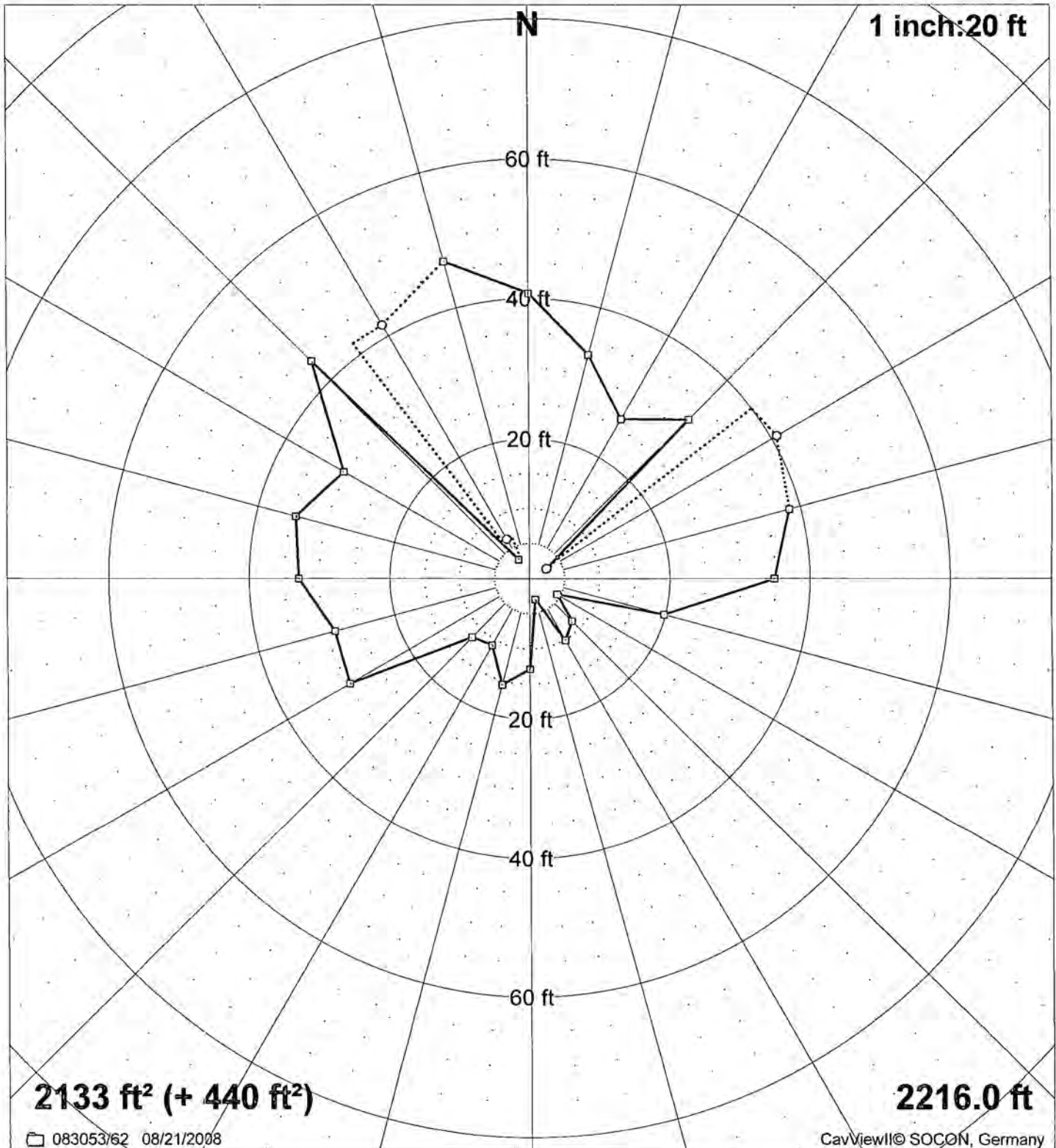
—○— Leached pocket (08/21/2008)

$d_{max}$ : 78.0 ft 251° <--> 71°  $r_{min}$ : 2.3 ft -> 154°  $r_{\sim}$ : 31.0 ft  $r_{max}$ : 45.1 ft -> 81°



**Tatum Brine BW-2**

**08/21/2008**



—□— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 70.5 ft 240° <--> 60°  $r_{min}$ : 2.9 ft -> 59°  $r_{\sim}$ : 28.6 ft  $r_{max}$ : 46.8 ft -> 345°



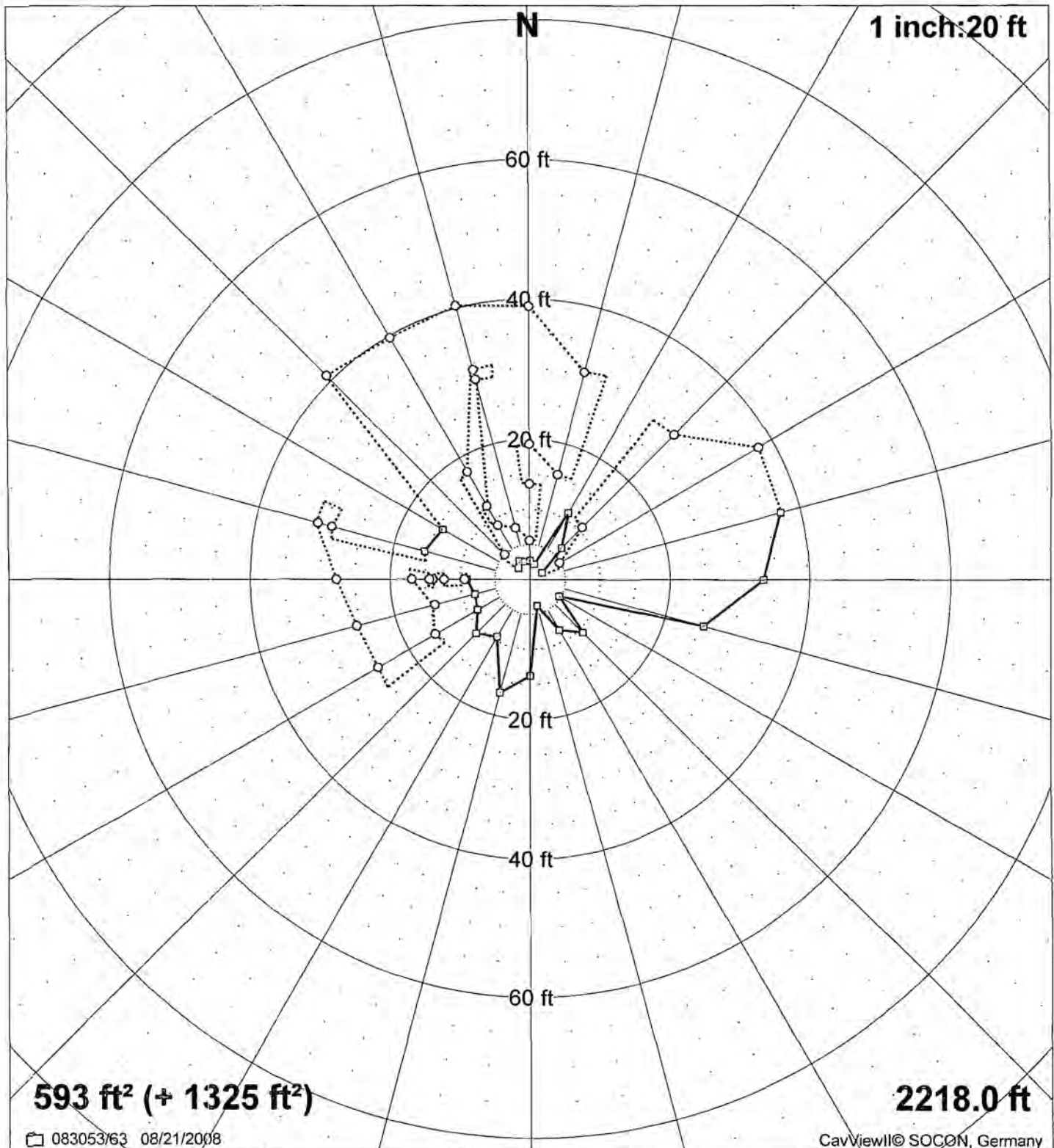


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Tatum Brine BW-2

08/21/2008

1 inch:20 ft



593 ft<sup>2</sup> (+ 1325 ft<sup>2</sup>)

2218.0 ft

083053/63 08/21/2008

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—□— (08/21/2008)

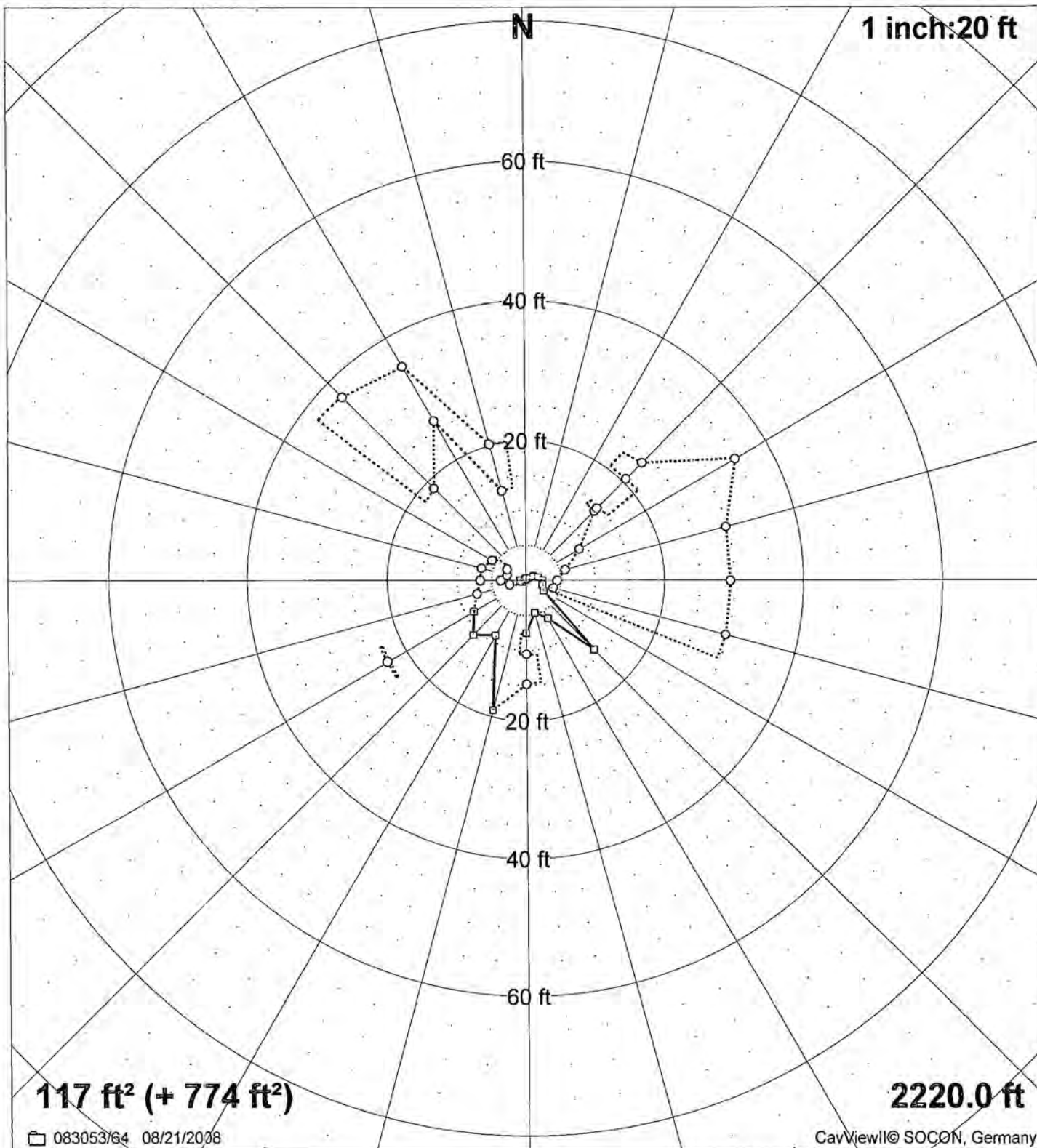
—○— Leached pocket (08/21/2008)

d<sub>max</sub>: 62.8 ft 240° <--> 60° r<sub>min</sub>: 2.0 ft -> 59° r~: 24.7 ft r<sub>max</sub>: 40.9 ft -> 315°



**Tatum Brine BW-2**

**08/21/2008**



—□— (08/21/2008)

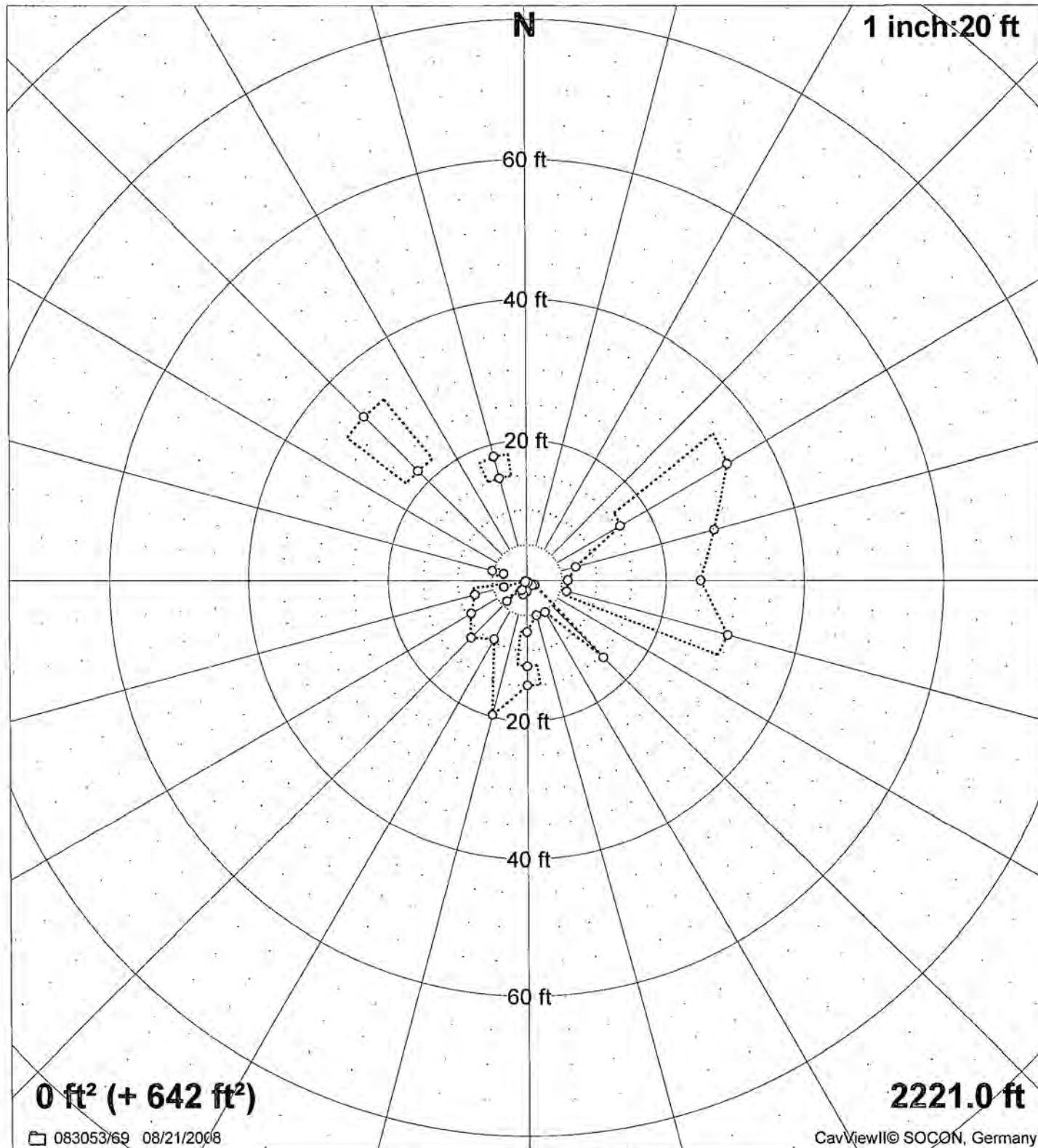
—○— Leached pocket (08/21/2008)

$d_{max}$ : 58.0 ft 60° <--> 240°  $r_{min}$ : 0.2 ft -> 301°  $r_{\sim}$ : 16.8 ft  $r_{max}$ : 37.1 ft -> 315°



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

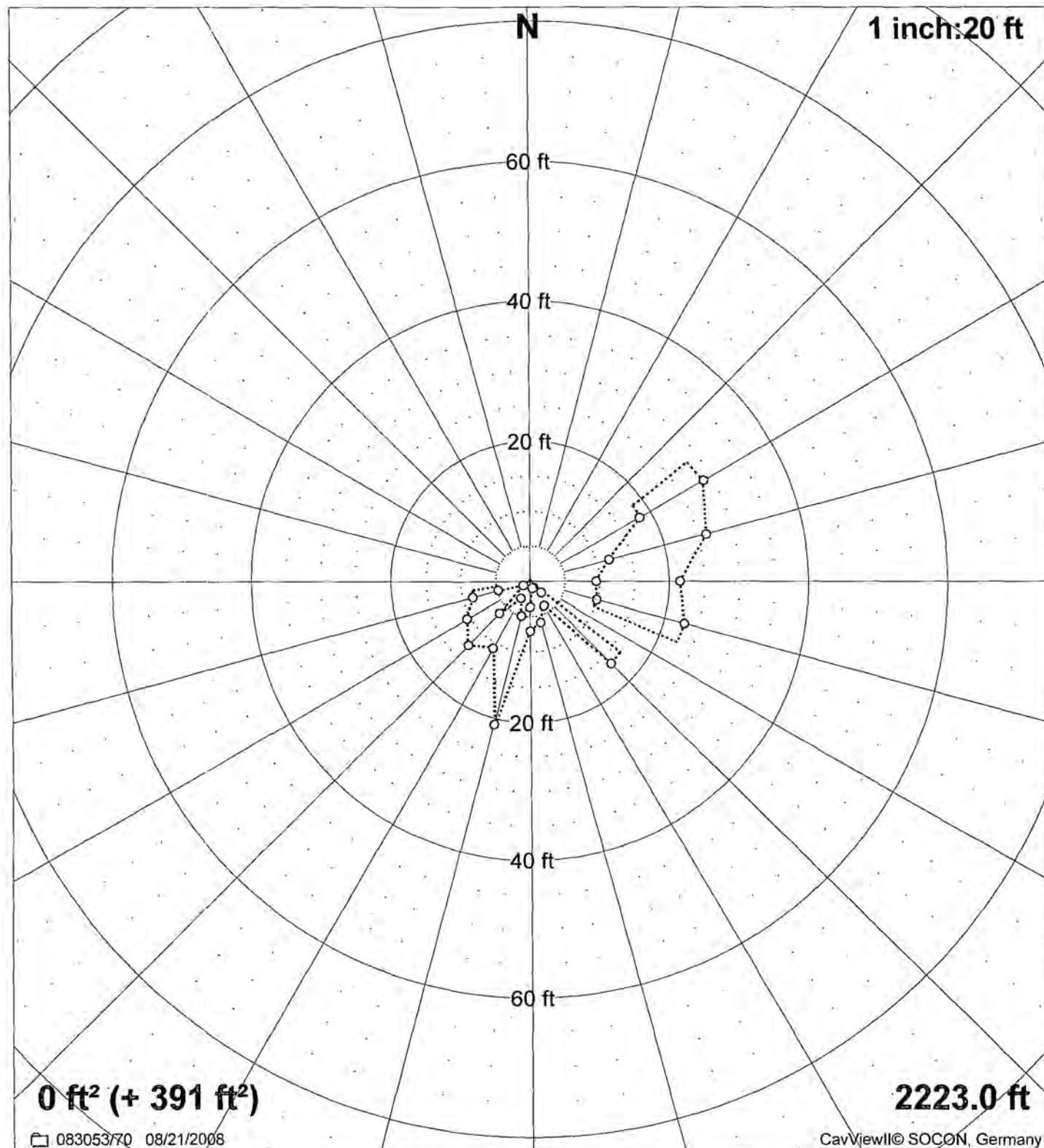
—○— Leached pocket (08/21/2008)

$d_{max}$ : 48.5 ft 315° <--> 135°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 14.3 ft  $r_{max}$ : 33.3 ft -> 60°



**Tatum Brine BW-2**

**08/21/2008**

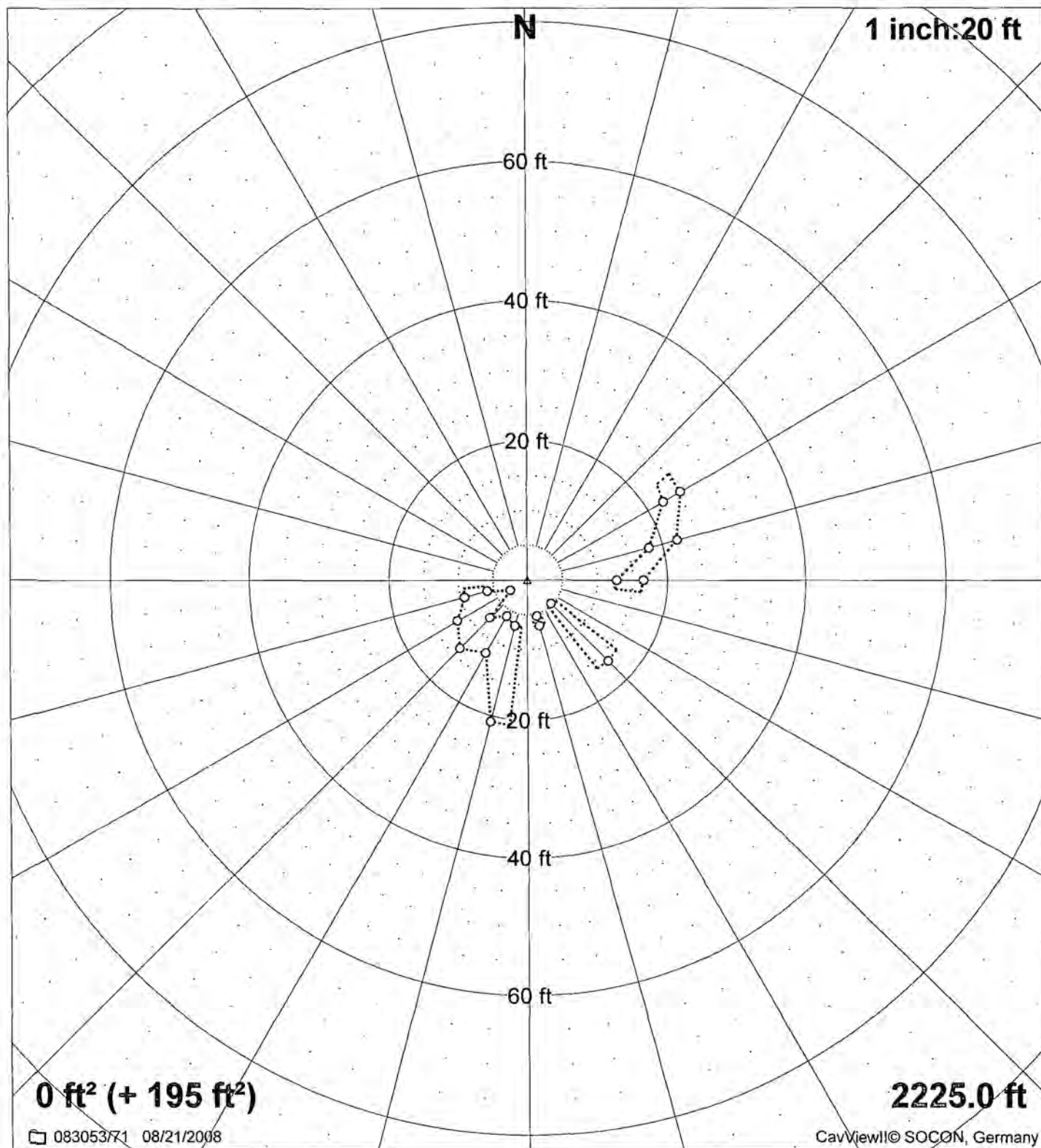


$d_{max}$ : 39.3 ft 60° <--> 240°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 11.2 ft  $r_{max}$ : 28.8 ft -> 60°



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 37.0 ft 240° <--> 60°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 7.9 ft  $r_{max}$ : 25.4 ft -> 60°

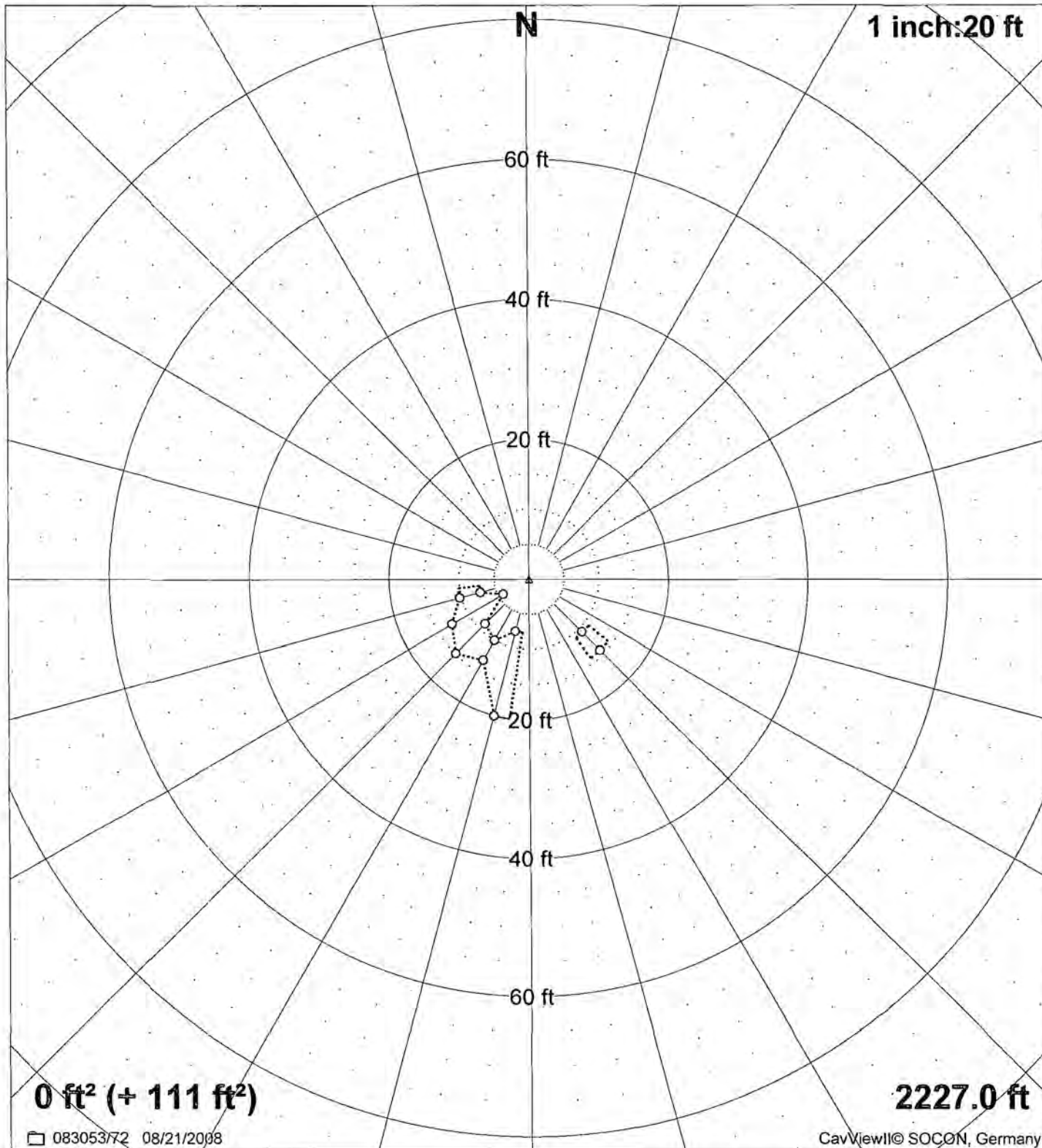




SOCO Sonar Well Services, Inc.

Tatum Brine BW-2

08/21/2008



0 ft<sup>2</sup> (+ 111 ft<sup>2</sup>)

2227.0 ft

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—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

d<sub>max</sub>: 20.0 ft 15° <--> 195° r<sub>min</sub>: 0.0 ft -> 0° r~: 5.9 ft r<sub>max</sub>: 20.0 ft -> 195°

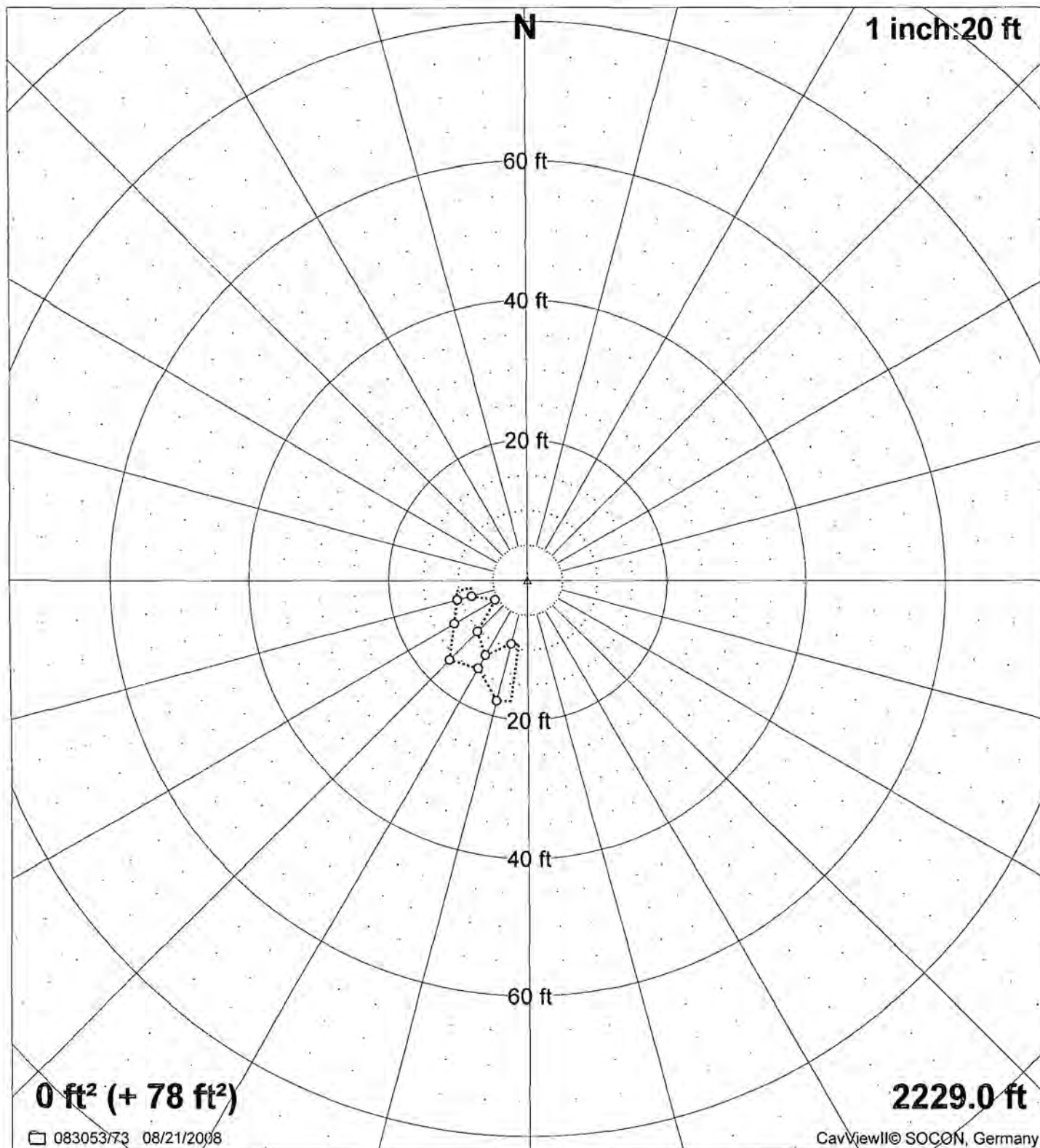




SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

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—□— (08/21/2008)

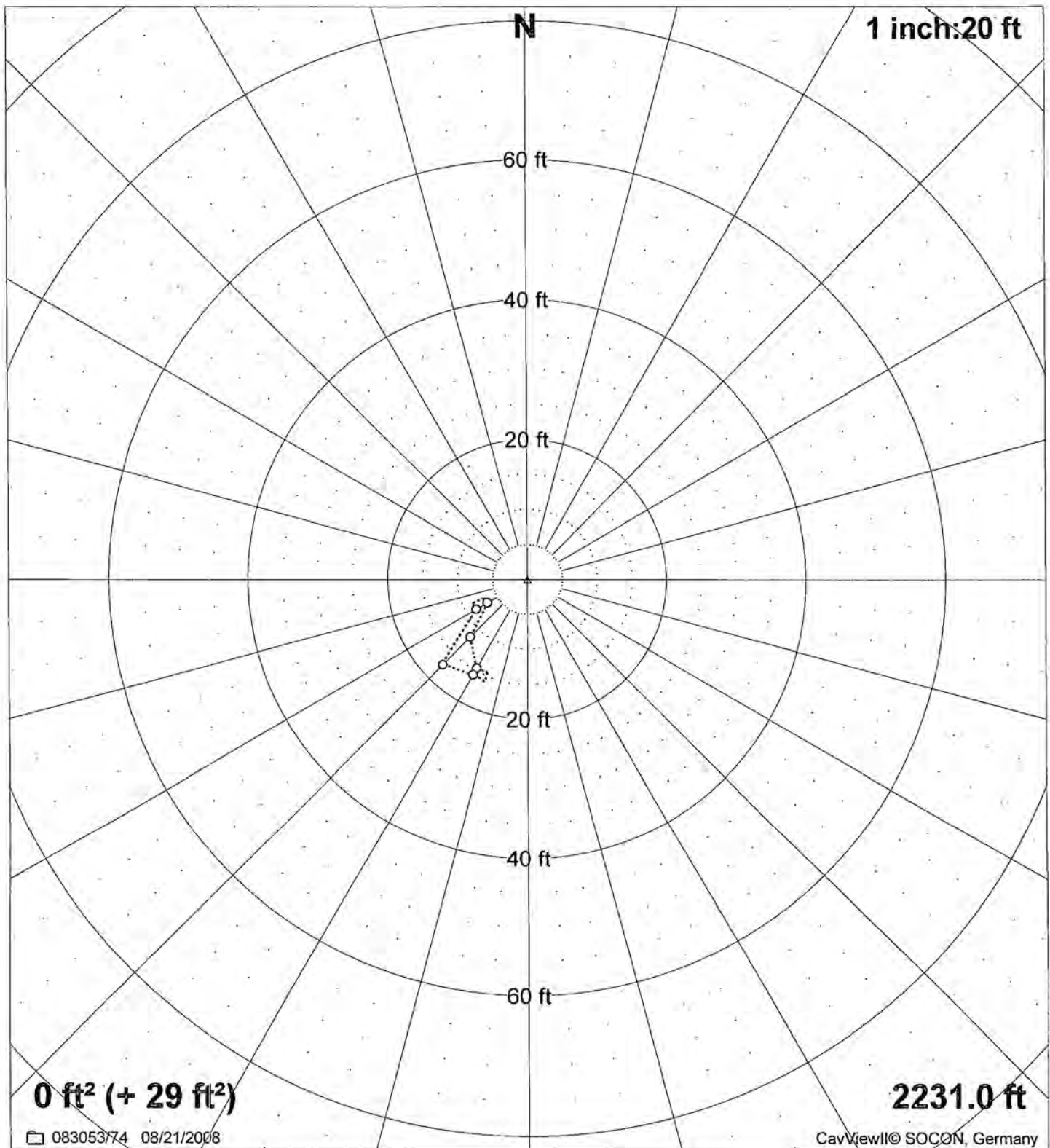
—○— Leached pocket (08/21/2008)

$d_{\max}$ : 17.8 ft 15° <--> 195°  $r_{\min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 5.0 ft  $r_{\max}$ : 17.8 ft -> 195°



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 17.2 ft 225° <--> 45°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 3.0 ft  $r_{max}$ : 17.2 ft -> 225°



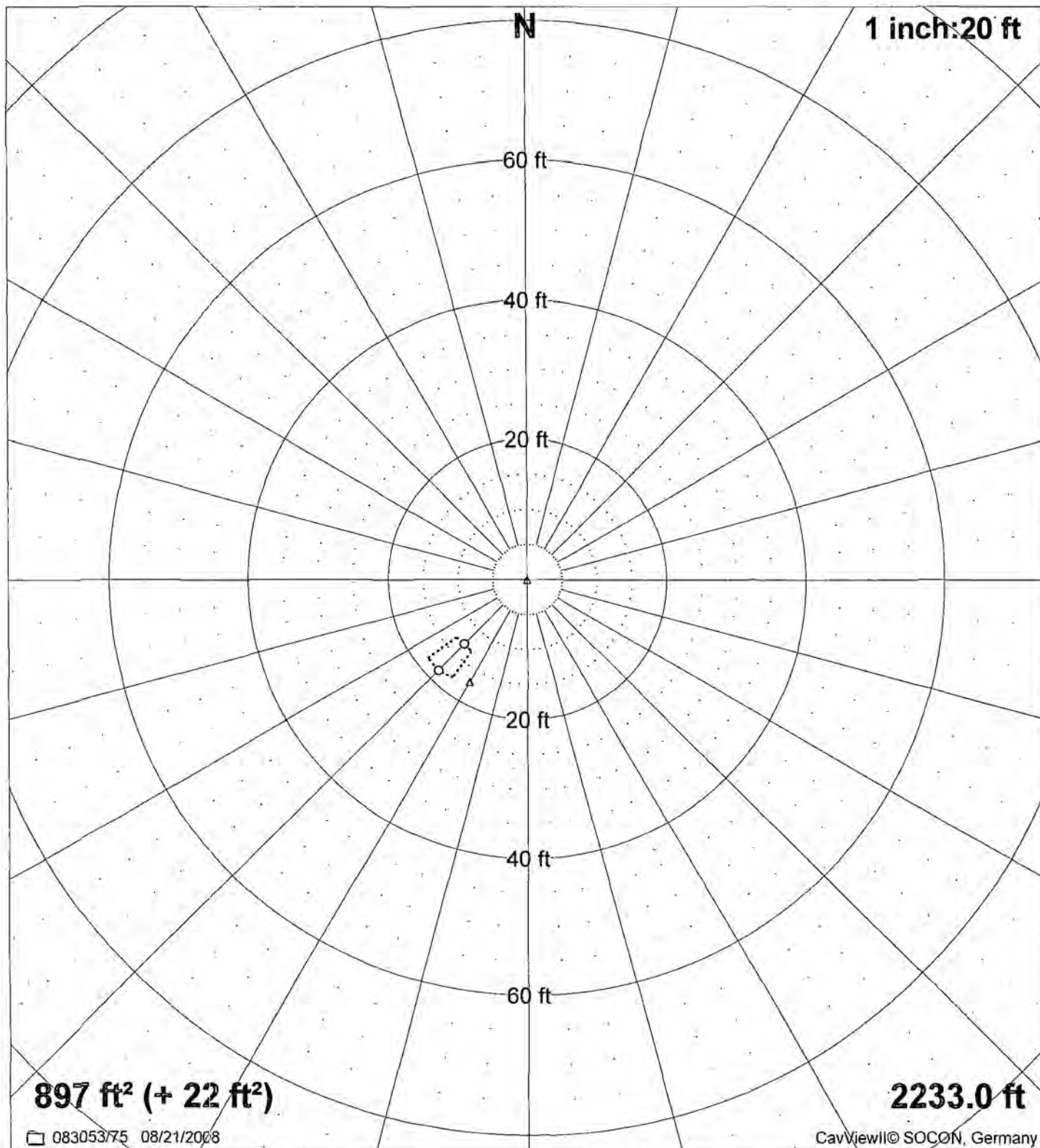


SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

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1 inch:20 ft



897 ft<sup>2</sup> (+ 22 ft<sup>2</sup>)

2233.0 ft<sup>2</sup>

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—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 18.3 ft 45° <--> 225°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 17.1 ft  $r_{max}$ : 18.3 ft -> 225°

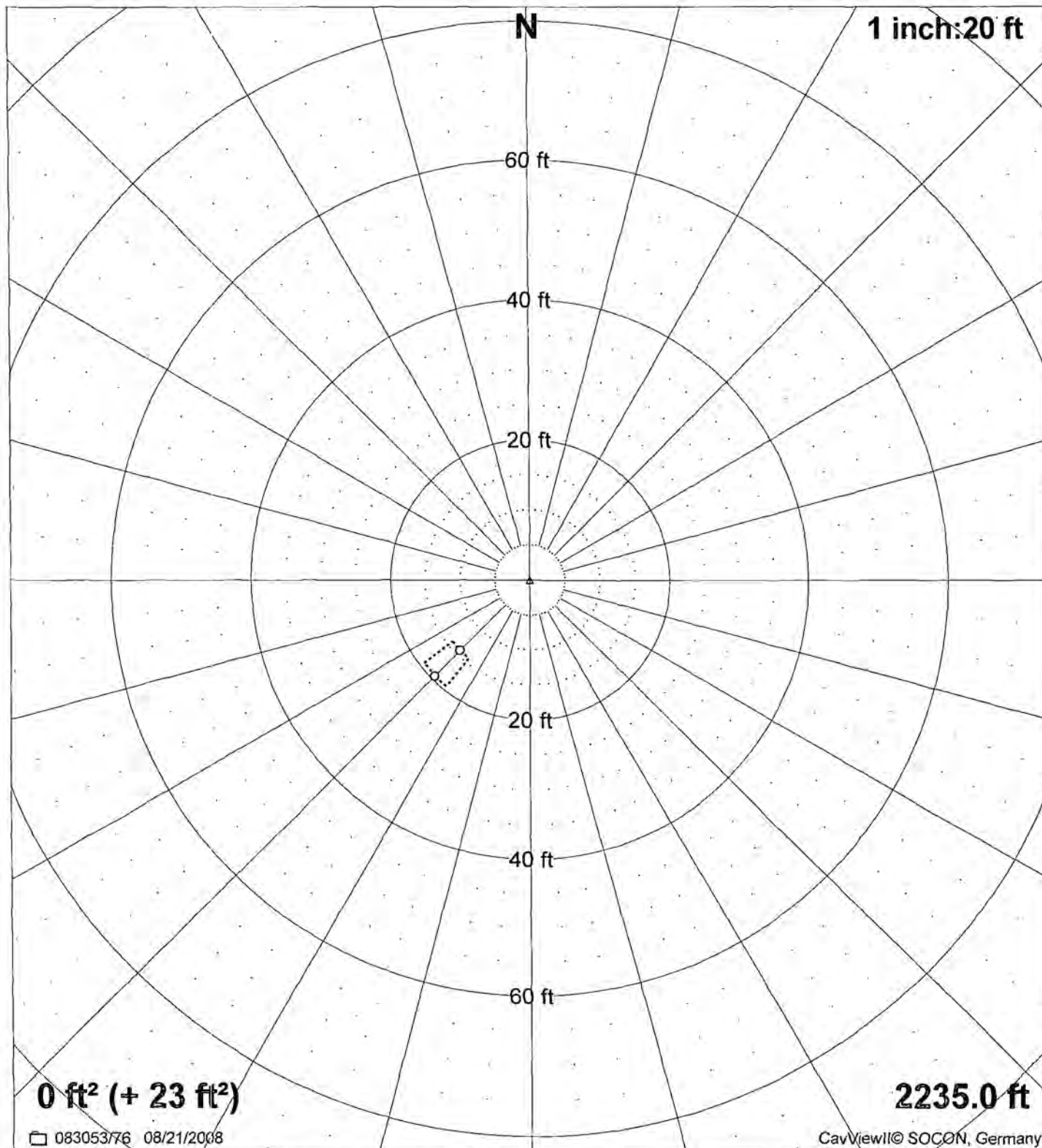




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Tatum Brine BW-2

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—○— (08/21/2008)

—○— Leached pocket (08/21/2008)

$d_{max}$ : 19.5 ft 225° <--> 45°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 2.7 ft  $r_{max}$ : 19.5 ft -> 225°

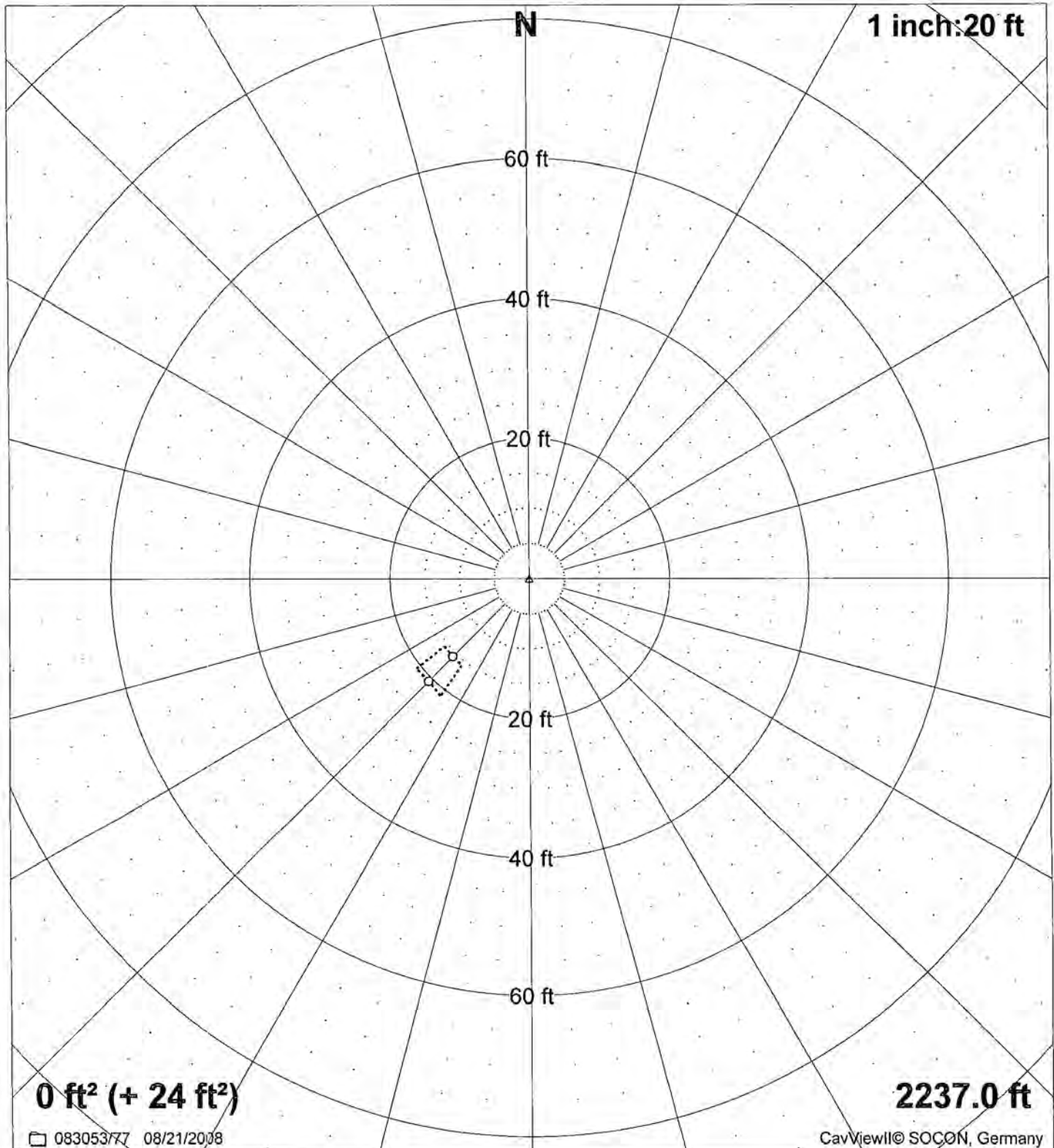




SOCON Sonar Well Services, Inc.

Tatum Brine BW-2

08/21/2008



0 ft² (+ 24 ft²)

2237.0 ft

08305377 08/21/2008

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—○— (08/21/2008)

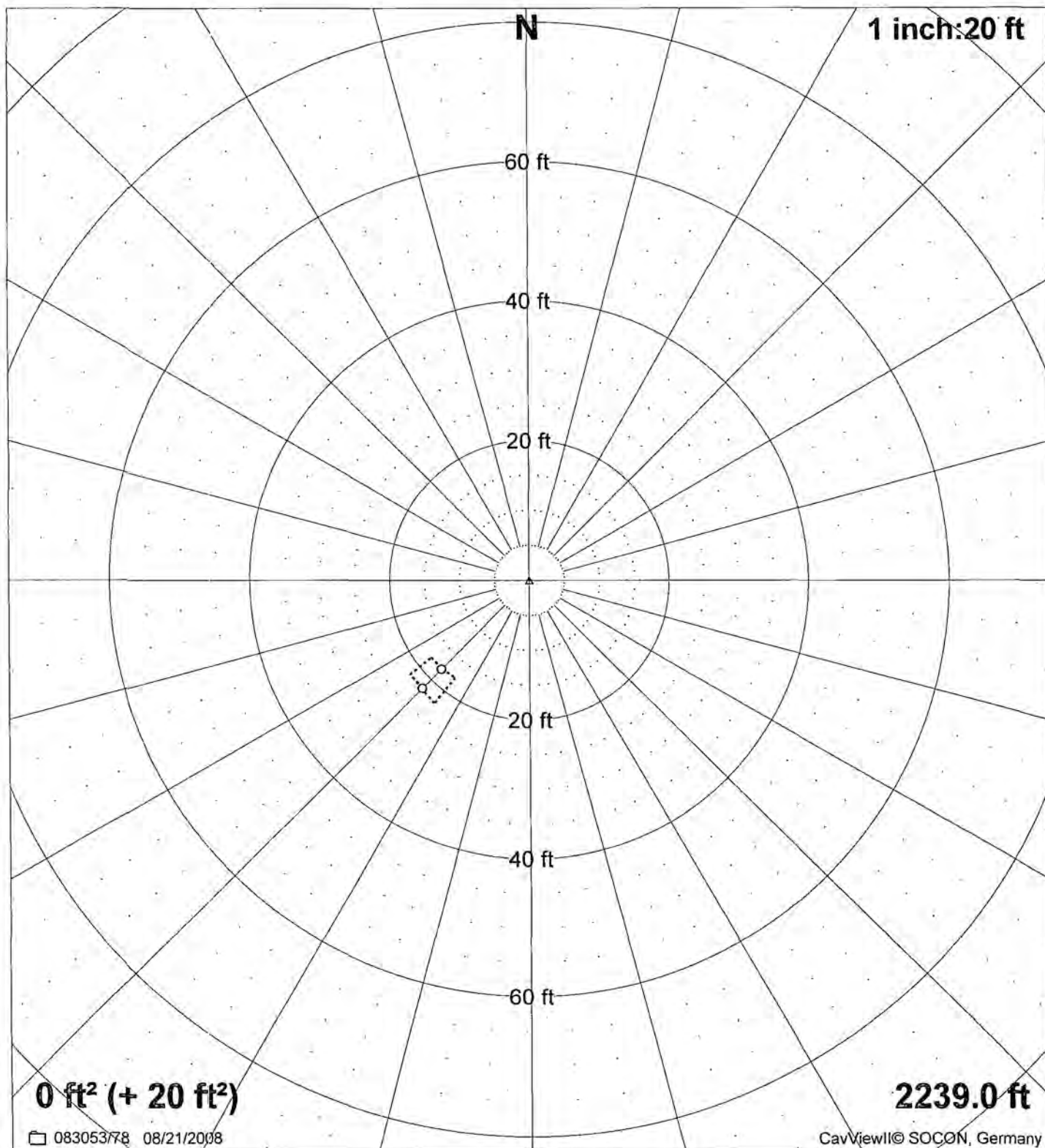
—○— Leached pocket (08/21/2008)

$d_{max}$ : 20.6 ft 45° <--> 225°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 2.7 ft  $r_{max}$ : 20.6 ft -> 225°



**Tatum Brine BW-2**

**08/21/2008**



—○— (08/21/2008)

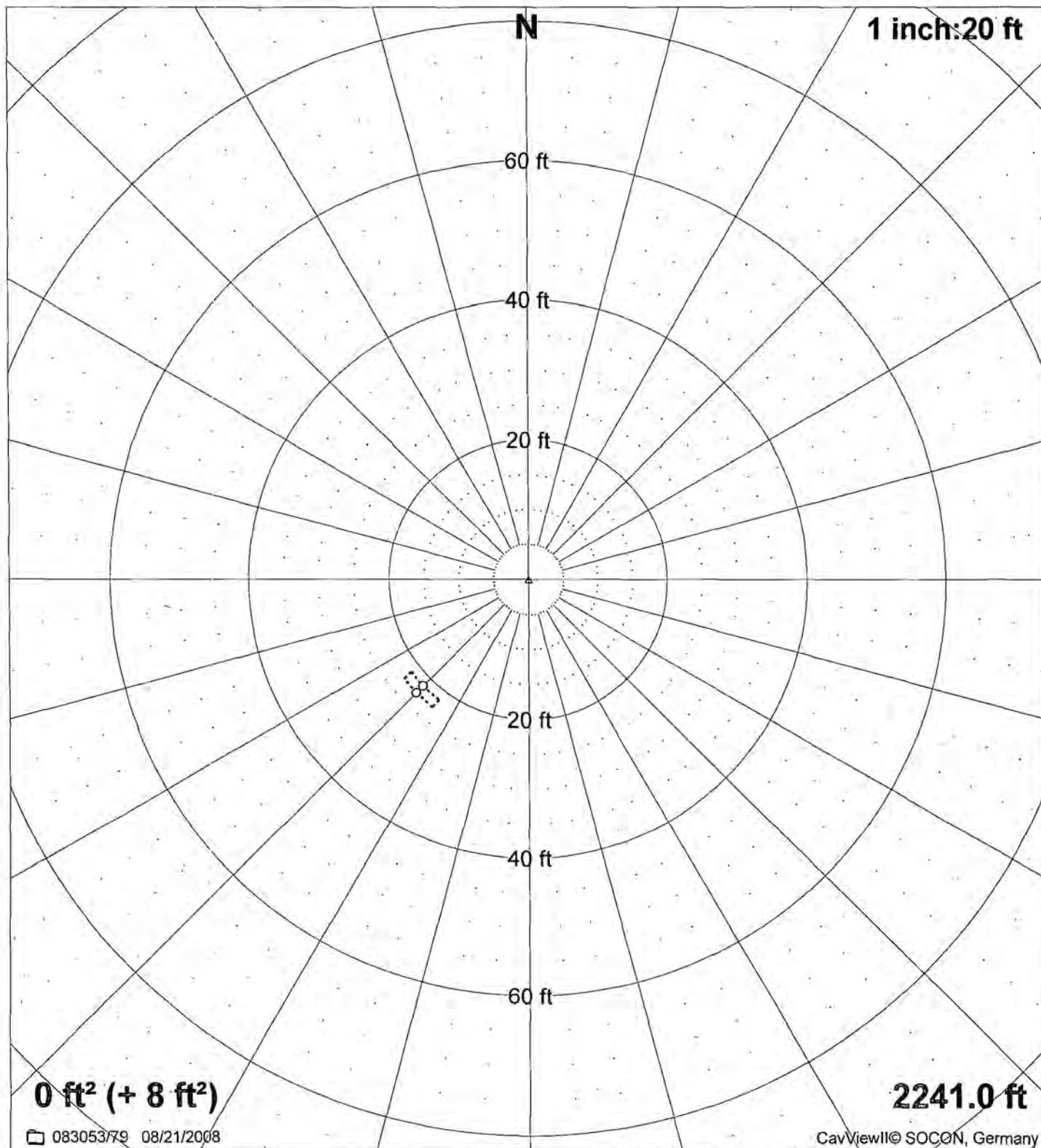
—○— Leached pocket (08/21/2008)

$d_{max}$ : 21.7 ft 45° <--> 225°  $r_{min}$ : 0.0 ft -> 0°  $r_{\sim}$ : 2.5 ft  $r_{max}$ : 21.7 ft -> 225°



**Tatum Brine EW-2**

**08/21/2008**



— (08/21/2008)

— Leached pocket (08/21/2008)

$d_{max}$ : 22.9 ft 45° <--> 225°  $r_{min}$ : 0.0 ft -> 0°  $r$ : 1.6 ft  $r_{max}$ : 22.9 ft -> 225°





**SOCON Sonar Well Services, Inc.**

**Table of radii**

Cavern: Tatum Brine BW-2

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8/21/2008

Depth: 2201.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 25.0          | 24.6 | 24.7 | 26.2 | 26.0 | 25.5 | 25.1 | 25.2 | 25.3 | 25.7 |
| 50  | 25.9          | 26.5 | 27.1 | 27.6 | 28.2 | 26.7 | 21.9 | 16.4 | 14.9 | 14.4 |
| 100 | 13.5          | 12.8 | 12.4 | 11.2 | 11.6 | 11.4 | 10.4 | 9.4  | 8.7  | 8.5  |
| 150 | 8.8           | 8.5  | 8.6  | 9.0  | 9.4  | 9.1  | 9.5  | 10.0 | 10.4 | 11.1 |
| 200 | 11.7          | 13.3 | 14.3 | 15.6 | 18.6 | 21.0 | 22.1 | 23.7 | 26.7 | 30.1 |
| 250 | 32.1          | 32.8 | 36.4 | 28.8 | 25.0 | 22.8 | 21.6 | 20.6 | 20.9 | 21.6 |
| 300 | 21.5          | 21.5 | 21.7 | 22.5 | 22.8 | 22.4 | 23.0 | 23.4 | 23.4 | 23.5 |
| 350 | 25.0          | 25.7 |      |      |      |      |      |      |      |      |

Depth: 2202.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 31.9          | 29.9 | 28.2 | 27.0 | 28.2 | 29.8 | 31.8 | 30.7 | 29.9 | 29.4 |
| 50  | 27.0          | 25.2 | 23.8 | 3.3  | 1.8  | 1.2  | 1.7  | 3.0  | 11.1 | 11.1 |
| 100 | 11.3          | 11.5 | 6.6  | 4.6  | 3.6  | 3.9  | 4.3  | 4.9  | 6.4  | 9.6  |
| 150 | 19.0          | 6.7  | 4.1  | 2.9  | 4.0  | 6.5  | 17.2 | 17.3 | 17.5 | 17.8 |
| 200 | 5.5           | 3.3  | 2.3  | 3.4  | 6.2  | 39.0 | 32.6 | 28.1 | 24.9 | 24.1 |
| 250 | 23.4          | 23.0 | 22.3 | 21.8 | 21.5 | 21.7 | 22.1 | 22.7 | 23.2 | 23.9 |
| 300 | 24.8          | 26.4 | 28.5 | 31.2 | 28.8 | 26.8 | 25.3 | 23.6 | 22.2 | 21.1 |
| 350 | 23.6          | 27.1 |      |      |      |      |      |      |      |      |

Depth: 2204.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 45.9          | 36.7 | 30.8 | 26.7 | 30.4 | 35.6 | 43.4 | 37.5 | 33.3 | 30.1 |
| 50  | 27.6          | 25.6 | 24.1 | 22.5 | 21.3 | 20.3 | 14.6 | 11.4 | 9.5  | 7.8  |
| 100 | 6.7           | 5.9  | 5.3  | 4.7  | 4.4  | 4.9  | 5.5  | 6.5  | 8.3  | 11.5 |
| 150 | 19.2          | 11.5 | 8.2  | 6.5  | 8.0  | 10.6 | 15.9 | 15.9 | 16.1 | 16.4 |
| 200 | 6.2           | 3.8  | 2.8  | 4.0  | 7.3  | 39.7 | 35.8 | 32.8 | 30.5 | 30.0 |
| 250 | 29.7          | 29.7 | 28.6 | 27.8 | 27.2 | 25.9 | 24.9 | 24.2 | 25.1 | 26.2 |
| 300 | 27.7          | 29.8 | 32.4 | 35.9 | 30.7 | 27.0 | 24.3 | 26.3 | 29.1 | 32.7 |
| 350 | 35.9          | 40.1 |      |      |      |      |      |      |      |      |

Depth: 2205.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 52.8          | 52.1 | 51.0 | 50.7 | 51.2 | 48.7 | 46.0 | 44.7 | 44.9 | 31.4 |
| 50  | 27.4          | 5.9  | 3.9  | 3.6  | 3.5  | 3.5  | 3.5  | 3.2  | 3.3  | 3.3  |
| 100 | 3.4           | 3.4  | 3.3  | 3.1  | 2.8  | 2.9  | 3.0  | 4.7  | 3.3  | 3.0  |
| 150 | 3.1           | 3.1  | 3.3  | 3.2  | 3.2  | 3.1  | 3.0  | 3.0  | 2.9  | 2.9  |
| 200 | 3.0           | 3.0  | 3.0  | 3.8  | 4.3  | 9.6  | 24.6 | 31.9 | 33.0 | 33.0 |
| 250 | 31.6          | 30.3 | 28.8 | 29.9 | 30.0 | 29.4 | 36.1 | 40.2 | 42.5 | 45.0 |
| 300 | 48.4          | 50.5 | 52.8 | 54.8 | 56.8 | 57.3 | 58.9 | 58.0 | 56.1 | 51.3 |
| 350 | 49.5          | 52.8 |      |      |      |      |      |      |      |      |





SOCON Sonar Well Services, Inc.

Table of radii

Cavern: Tatum Brine BW-2

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Depth: 2206.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 19.2          | 24.0 | 32.3 | 50.1 | 48.0 | 46.5 | 45.4 | 44.4 | 43.9 | 43.6 |
| 50  | 34.5          | 28.7 | 24.8 | 23.0 | 21.7 | 20.6 | 19.7 | 19.1 | 18.6 | 17.5 |
| 100 | 16.7          | 16.1 | 6.5  | 4.1  | 3.0  | 3.8  | 5.1  | 7.8  | 9.4  | 11.9 |
| 150 | 16.3          | 13.1 | 11.0 | 9.6  | 10.7 | 12.3 | 14.5 | 14.5 | 14.7 | 14.9 |
| 200 | 15.6          | 16.6 | 17.8 | 21.7 | 28.1 | 40.2 | 38.3 | 36.9 | 35.8 | 35.1 |
| 250 | 34.7          | 34.6 | 34.1 | 34.0 | 34.1 | 35.6 | 37.5 | 40.0 | 42.2 | 44.9 |
| 300 | 48.3          | 49.9 | 51.9 | 54.6 | 55.1 | 56.1 | 57.6 | 54.9 | 52.8 | 51.3 |
| 350 | 32.6          | 24.0 |      |      |      |      |      |      |      |      |

Depth: 2208.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 19.5          | 24.3 | 32.3 | 48.9 | 46.9 | 45.3 | 44.2 | 44.2 | 44.6 | 45.3 |
| 50  | 35.3          | 29.0 | 24.8 | 23.5 | 22.4 | 21.6 | 21.2 | 20.9 | 20.8 | 20.2 |
| 100 | 19.6          | 19.3 | 7.7  | 4.8  | 3.5  | 4.3  | 5.5  | 7.6  | 8.8  | 10.6 |
| 150 | 13.4          | 13.2 | 13.0 | 13.0 | 12.9 | 12.9 | 13.1 | 13.1 | 13.2 | 13.4 |
| 200 | 16.8          | 22.8 | 35.8 | 35.9 | 36.2 | 36.8 | 38.0 | 39.6 | 41.7 | 42.1 |
| 250 | 42.8          | 43.8 | 44.3 | 45.1 | 46.3 | 46.8 | 47.7 | 48.9 | 48.4 | 48.2 |
| 300 | 48.4          | 50.3 | 52.8 | 56.0 | 55.2 | 54.9 | 54.9 | 53.3 | 52.1 | 51.3 |
| 350 | 33.0          | 24.5 |      |      |      |      |      |      |      |      |

Depth: 2210.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 50.8          | 51.1 | 48.8 | 47.7 | 43.9 | 42.5 | 43.1 | 46.0 | 45.2 | 46.7 |
| 50  | 40.5          | 33.9 | 33.5 | 32.5 | 31.2 | 29.7 | 27.5 | 27.8 | 27.5 | 24.2 |
| 100 | 30.3          | 31.5 | 5.2  | 5.6  | 2.8  | 2.4  | 2.1  | 7.4  | 7.6  | 7.7  |
| 150 | 2.1           | 2.3  | 2.3  | 2.1  | 2.3  | 2.3  | 2.4  | 3.6  | 4.6  | 13.9 |
| 200 | 16.9          | 5.5  | 5.9  | 6.6  | 7.4  | 21.8 | 37.2 | 38.1 | 38.5 | 42.0 |
| 250 | 39.8          | 39.0 | 41.6 | 46.8 | 49.8 | 48.2 | 48.7 | 49.5 | 49.2 | 48.3 |
| 300 | 48.8          | 50.7 | 50.7 | 53.3 | 53.3 | 53.9 | 52.3 | 53.3 | 52.9 | 51.4 |
| 350 | 51.5          | 52.1 |      |      |      |      |      |      |      |      |

Depth: 2212.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 47.6          | 46.1 | 45.0 | 44.3 | 42.5 | 41.1 | 40.1 | 40.6 | 41.4 | 42.6 |
| 50  | 39.9          | 37.7 | 36.1 | 33.9 | 32.1 | 30.7 | 30.8 | 31.2 | 31.8 | 30.9 |
| 100 | 30.4          | 30.1 | 13.6 | 8.8  | 6.6  | 6.7  | 6.9  | 7.1  | 8.3  | 10.1 |
| 150 | 13.0          | 11.8 | 10.9 | 10.2 | 10.5 | 10.9 | 11.4 | 12.1 | 12.8 | 13.9 |
| 200 | 16.8          | 21.6 | 30.6 | 30.7 | 31.0 | 31.6 | 33.1 | 35.2 | 37.8 | 37.2 |
| 250 | 37.0          | 37.0 | 37.8 | 38.8 | 40.3 | 40.9 | 41.9 | 43.3 | 44.3 | 45.7 |
| 300 | 47.6          | 46.9 | 46.5 | 46.5 | 46.7 | 47.3 | 48.2 | 48.3 | 48.8 | 49.7 |
| 350 | 48.6          | 47.9 |      |      |      |      |      |      |      |      |





# SOCON Sonar Well Services, Inc.

## Table of radii

Cavern: Tatum Brine BW-2

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Depth: 2214.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 41.7          | 41.5 | 41.6 | 42.1 | 40.3 | 38.9 | 37.9 | 37.0 | 36.4 | 36.1 |
| 50  | 37.4          | 39.1 | 41.2 | 40.0 | 39.1 | 38.5 | 37.0 | 35.9 | 35.1 | 28.3 |
| 100 | 23.9          | 20.8 | 12.0 | 8.5  | 6.6  | 7.0  | 7.4  | 7.9  | 8.4  | 9.1  |
| 150 | 10.0          | 7.2  | 5.7  | 4.7  | 5.9  | 7.8  | 11.8 | 12.5 | 13.3 | 14.4 |
| 200 | 15.3          | 16.4 | 17.8 | 20.1 | 23.2 | 27.8 | 29.2 | 31.0 | 33.4 | 32.9 |
| 250 | 32.6          | 32.5 | 33.9 | 35.7 | 37.9 | 38.5 | 39.3 | 40.5 | 41.9 | 43.7 |
| 300 | 46.0          | 45.5 | 45.4 | 45.6 | 44.6 | 44.1 | 43.9 | 45.2 | 47.1 | 49.5 |
| 350 | 46.2          | 43.7 |      |      |      |      |      |      |      |      |

Depth: 2215.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 28.3          | 28.5 | 29.6 | 33.3 | 31.2 | 31.5 | 31.0 | 31.5 | 32.0 | 33.1 |
| 50  | 37.2          | 40.4 | 42.2 | 42.7 | 44.6 | 44.9 | 45.1 | 44.7 | 42.5 | 41.6 |
| 100 | 30.1          | 16.9 | 5.7  | 5.3  | 5.5  | 5.7  | 5.5  | 8.2  | 8.8  | 2.7  |
| 150 | 2.3           | 2.3  | 2.4  | 2.7  | 2.9  | 3.1  | 3.8  | 6.0  | 9.5  | 15.0 |
| 200 | 30.6          | 39.7 | 38.6 | 36.8 | 36.4 | 35.6 | 34.1 | 31.7 | 31.1 | 31.7 |
| 250 | 32.7          | 32.2 | 31.3 | 31.3 | 31.8 | 32.3 | 33.9 | 35.1 | 32.4 | 31.0 |
| 300 | 32.3          | 32.6 | 31.1 | 31.6 | 30.3 | 29.6 | 28.0 | 28.9 | 28.0 | 29.1 |
| 350 | 28.9          | 28.0 |      |      |      |      |      |      |      |      |

Depth: 2216.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 40.7          | 37.5 | 35.0 | 33.0 | 30.2 | 28.0 | 26.3 | 27.8 | 29.7 | 32.2 |
| 50  | 34.4          | 37.2 | 40.8 | 39.7 | 38.9 | 38.4 | 36.9 | 35.7 | 34.9 | 27.6 |
| 100 | 22.9          | 19.8 | 9.2  | 6.0  | 4.5  | 5.3  | 6.5  | 8.6  | 8.9  | 9.5  |
| 150 | 10.1          | 5.7  | 4.0  | 3.1  | 4.1  | 6.2  | 12.8 | 13.5 | 14.4 | 15.6 |
| 200 | 13.5          | 12.0 | 10.9 | 11.1 | 11.4 | 11.8 | 14.6 | 19.5 | 29.7 | 29.2 |
| 250 | 28.9          | 28.8 | 29.8 | 31.2 | 32.9 | 33.2 | 33.7 | 34.5 | 32.8 | 31.5 |
| 300 | 30.5          | 33.7 | 38.0 | 43.8 | 42.8 | 42.1 | 41.7 | 43.0 | 44.6 | 46.8 |
| 350 | 44.2          | 42.2 |      |      |      |      |      |      |      |      |

Depth: 2218.0 ft

| [°] | Radii in [ft] |      |      |      |      |      |      |      |      |      |
|-----|---------------|------|------|------|------|------|------|------|------|------|
| 0   | 38.9          | 35.4 | 32.7 | 30.5 | 19.1 | 13.9 | 11.0 | 13.8 | 18.7 | 29.2 |
| 50  | 31.3          | 34.1 | 37.8 | 37.3 | 37.1 | 37.1 | 35.5 | 34.2 | 33.3 | 30.1 |
| 100 | 27.6          | 25.6 | 10.3 | 6.5  | 4.8  | 5.8  | 7.5  | 10.6 | 9.6  | 8.9  |
| 150 | 8.3           | 6.0  | 4.7  | 3.9  | 5.1  | 7.4  | 13.7 | 14.5 | 15.5 | 16.7 |
| 200 | 13.2          | 10.9 | 9.4  | 9.8  | 10.3 | 10.9 | 13.3 | 17.3 | 25.1 | 25.1 |
| 250 | 25.2          | 25.6 | 26.1 | 26.7 | 27.7 | 28.6 | 29.7 | 31.3 | 22.2 | 17.3 |
| 300 | 14.3          | 18.1 | 25.0 | 40.9 | 40.2 | 39.8 | 39.7 | 39.6 | 39.8 | 40.3 |
| 350 | 39.6          | 39.1 |      |      |      |      |      |      |      |      |





SOCON Sonar Well Services, Inc.

Table of radii

Cavern: Tatum Brine BW-2

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8/21/2008

Depth: 2220.0 ft

[°]

Radii in [ft]

|     |      |      |      |      |      |      |      |      |      |      |
|-----|------|------|------|------|------|------|------|------|------|------|
| 0   | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.4  | 0.4  | 0.6  | 1.1  | 23.8 |
| 50  | 26.4 | 30.0 | 34.9 | 32.7 | 31.1 | 29.8 | 29.4 | 29.3 | 29.4 | 29.3 |
| 100 | 29.4 | 29.7 | 7.2  | 4.1  | 2.9  | 3.9  | 6.1  | 13.9 | 9.8  | 7.6  |
| 150 | 6.2  | 5.6  | 5.1  | 4.7  | 6.1  | 8.6  | 14.7 | 15.8 | 17.2 | 19.1 |
| 200 | 13.8 | 10.8 | 9.0  | 9.5  | 10.1 | 10.9 | 13.1 | 16.7 | 23.1 | 13.4 |
| 250 | 9.5  | 7.4  | 7.0  | 6.8  | 6.6  | 6.6  | 6.6  | 6.7  | 6.2  | 5.9  |
| 300 | 5.7  | 7.8  | 12.9 | 37.1 | 36.2 | 35.6 | 35.3 | 28.0 | 23.4 | 20.2 |
| 350 | 0.8  | 0.4  |      |      |      |      |      |      |      |      |



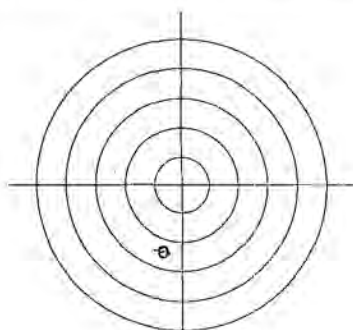


SOCON Sonar Well Services, Inc.

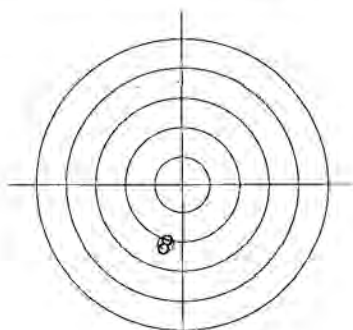
## Horizontal slices 1 - 12



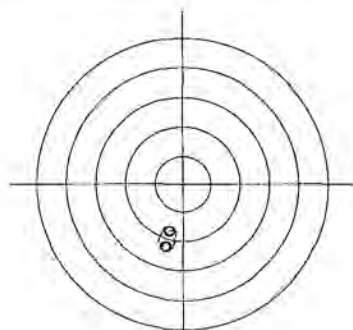
Cavity: Tatum Brine BW-2 Report number: 083053 Date: 08/21/2008



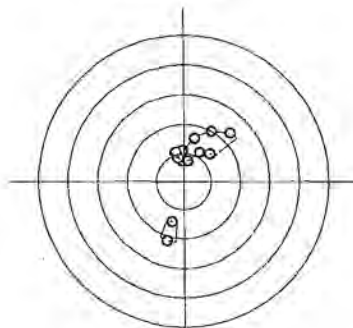
2191.0 ft / 0 ft<sup>2</sup>



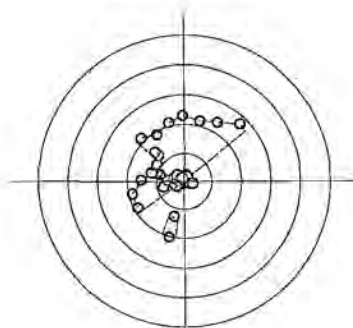
2193.0 ft / 0 ft<sup>2</sup>



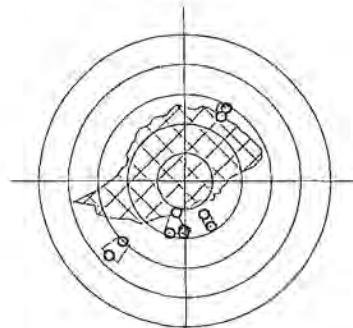
2195.0 ft / 0 ft<sup>2</sup>



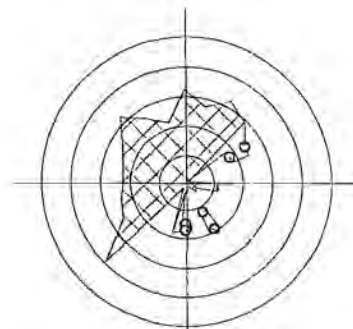
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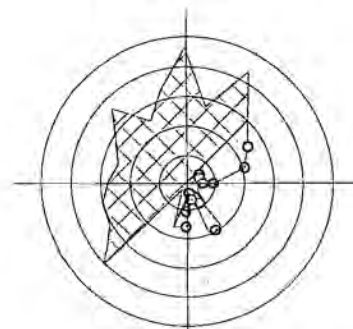
2199.0 ft / 0 ft<sup>2</sup>



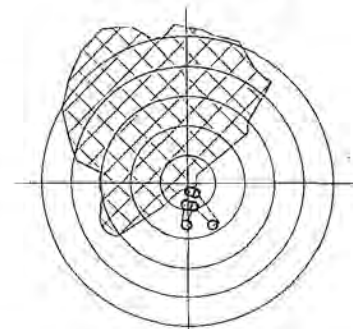
2201.0 ft / 1397 ft<sup>2</sup>



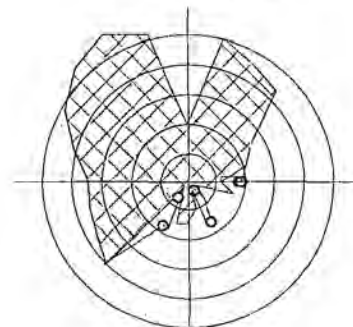
2202.0 ft / 1317 ft<sup>2</sup>



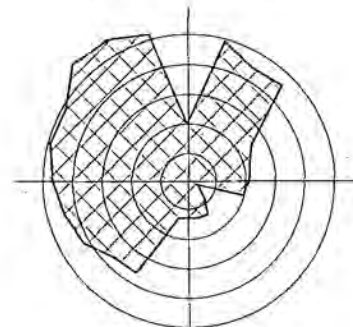
2204.0 ft / 1810 ft<sup>2</sup>



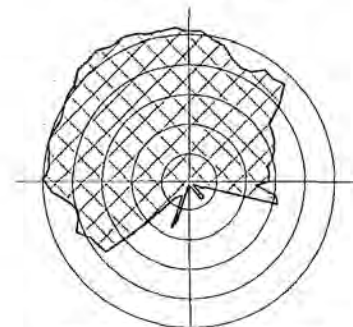
2205.0 ft / 3295 ft<sup>2</sup>



2206.0 ft / 3435 ft<sup>2</sup>



2208.0 ft / 4041 ft<sup>2</sup>



2210.0 ft / 4124 ft<sup>2</sup> (max)

The distance between 2 circles equals 10 ft



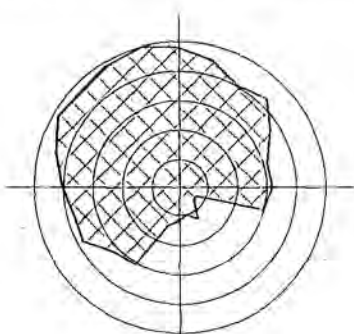


SOCON Sonar Well Services, Inc.

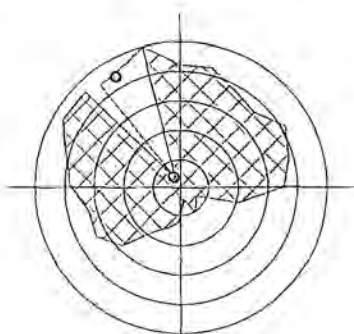
## Horizontal slices 13 - 24



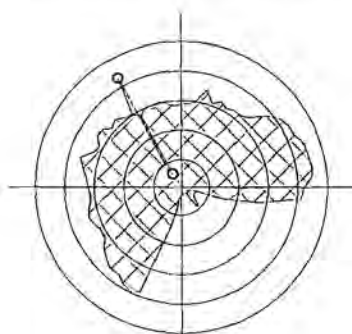
Cavity: Tatum Brine BW-2 Report number: 083053 Date: 08/21/2008



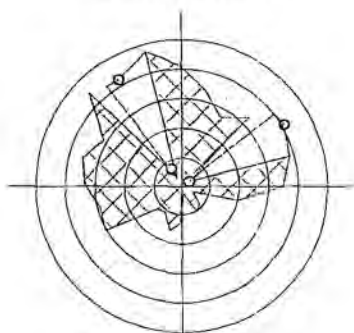
2212.0 ft / 3898 ft<sup>2</sup>



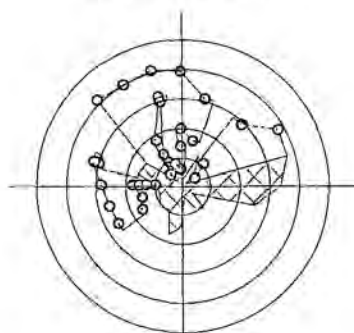
2214.0 ft / 3124 ft<sup>2</sup>



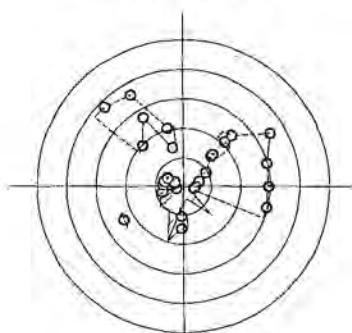
2215.0 ft / 2776 ft<sup>2</sup>



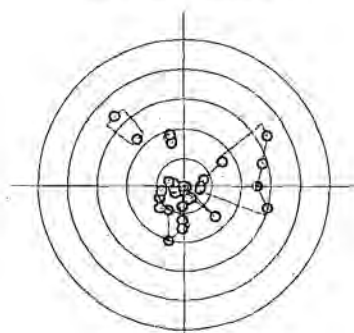
2216.0 ft / 2133 ft<sup>2</sup>



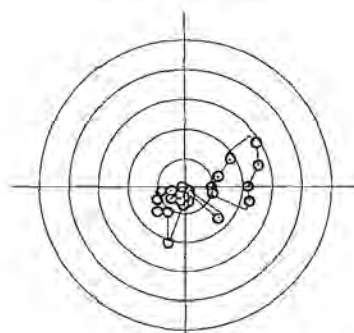
2218.0 ft / 593 ft<sup>2</sup>



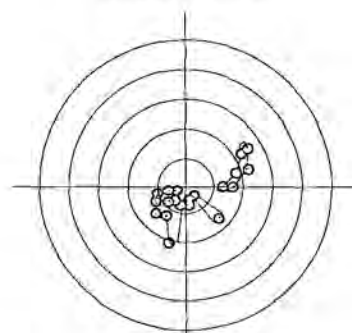
2220.0 ft / 117 ft<sup>2</sup>



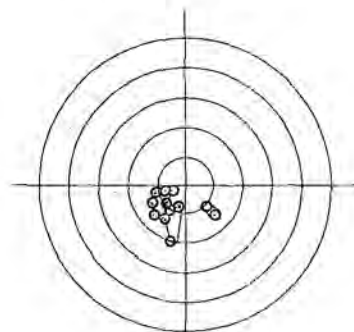
2221.0 ft / 0 ft<sup>2</sup>



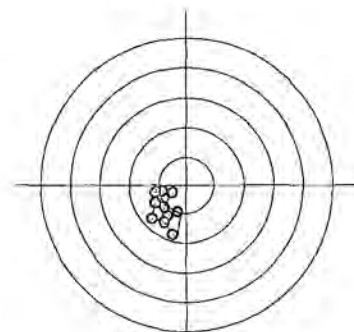
2223.0 ft / 0 ft<sup>2</sup>



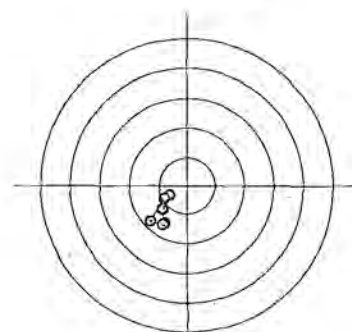
2225.0 ft / 0 ft<sup>2</sup>



2227.0 ft / 0 ft<sup>2</sup>



2229.0 ft / 0 ft<sup>2</sup>



2231.0 ft / 0 ft<sup>2</sup>

The distance between 2 circles equals 10 ft



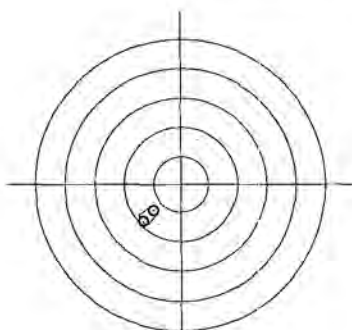


SOCON Sonar Well Services, Inc.

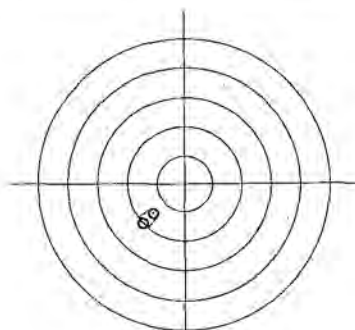
## Horizontal slices 25 - 29



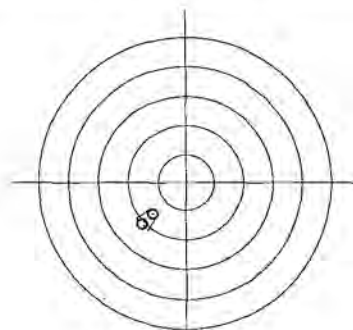
Cavity: Tatum Brine BW-2 Report number: 083053 Date: 08/21/2008



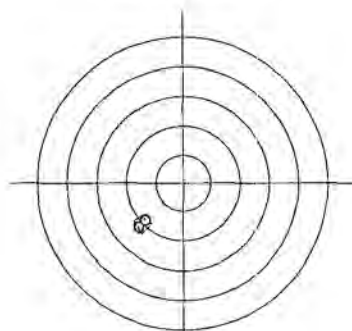
2233.0 ft / 897 ft<sup>2</sup>



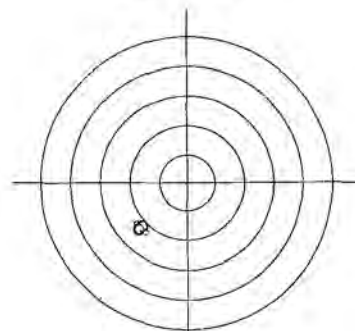
2235.0 ft / 0 ft<sup>2</sup>



2237.0 ft / 0 ft<sup>2</sup>



2239.0 ft / 0 ft<sup>2</sup>



2241.0 ft / 0 ft<sup>2</sup>



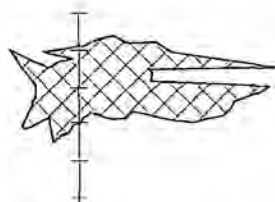


SOCON Sonar Well Services, Inc.

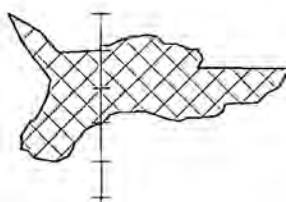
## Vertical slices 1 - 12



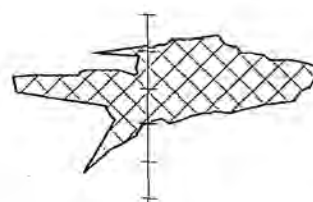
Cavity: Tatum Brine BW-2 Report number: 083053 Date: 08/21/2008



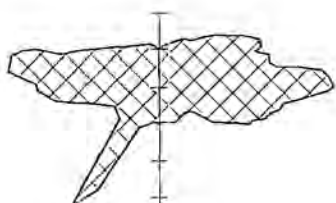
180° 0°



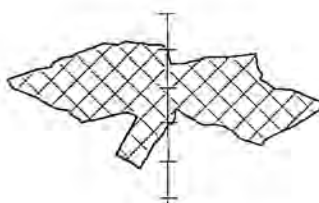
195° 15°



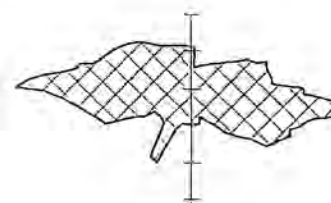
210° 30°



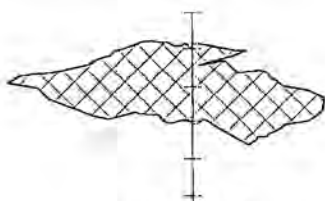
225° 45°



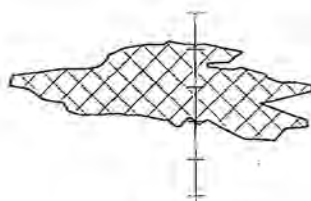
240° 60°



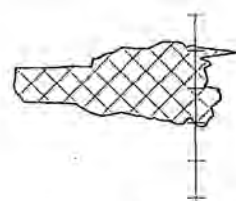
255° 75°



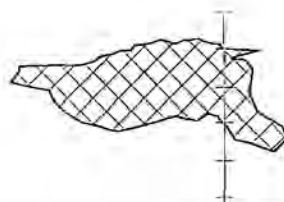
270° 90°



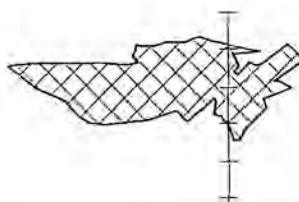
285° 105°



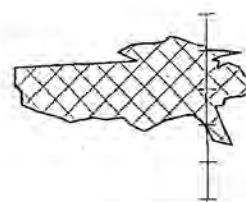
300° 120°



315° 135°



330° 150°



345° 165°

Range from 2190 ft to 2242 ft, step 10 ft



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

Larry Gandy  
Company Representative-Printed

Larry Gandy  
Company Representative-Signed

Secretary/Treasurer  
Title

02/11/10  
Date



## **Chavez, Carl J, EMNRD**

---

**From:** Chavez, Carl J, EMNRD  
**Sent:** Wednesday, November 18, 2009 7:02 AM  
**To:** 'Prather, Steve'; 'gandy2@leaco.net'; 'James Millett'; 'Clay Wilson'; 'Bob Patterson'; 'David Pyeatt'; 'garymschubert@aol.com'; 'Gary Schubert'  
**Cc:** Griswold, Jim, EMNRD; VonGonten, Glenn, EMNRD; Sanchez, Daniel J., EMNRD  
**Subject:** UIC Class III Well Annual Report Schedule for Submittal & Content REMINDER- 2010  
**Attachments:** Annual Reports 2010.xls

Gentlemen:

Good morning. You may recall an e-mail message from me this past Summer alerting you to the reporting provision of your current discharge permit (permit) and how the New Mexico Oil Conservation Division (OCD) is stepping up its efforts to track reporting under issued permits.

Please find attached a spreadsheet listing the dates that OCD expects to receive your Annual Reports and/or any reporting requirements from your permit. If you are an operator with limited reporting requirements based on your permit, you are welcome to follow the format and content required from more recent permit renewals issued by the OCD, which are more comprehensive and constitute a report. Any renewed permits will likely require similar content anyway.

Please plan on meeting the Annual Report submittal dates in January of 2010 as failure to submit the report will constitute a violation under the Federal Underground Injection Control (UIC) Program and reporting to the United States Environmental Protection Agency, which could result in the shut-in and/or plug and abandonment of your brine production well.

Please contact me if you have questions. Thank you in advance for your cooperation in this matter.

Carl J. Chavez, CHMM  
New Mexico Energy, Minerals & Natural Resources Dept.  
Oil Conservation Division, Environmental Bureau  
1220 South St. Francis Dr., Santa Fe, New Mexico 87505  
Office: (505) 476-3490  
Fax: (505) 476-3462  
E-mail: [CarlJ.Chavez@state.nm.us](mailto:CarlJ.Chavez@state.nm.us)  
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>  
(Pollution Prevention Guidance is under "Publications")

CC: Brine Well File "Annual Reporting"



# NMOC D UIC Annual Reports

11/18/09

Annual Rpt. Due Date Submitted

Annual Report Contents

Operator

Permit ID

Basic Energy

BW-2

01/31/10

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, permit #, API# of well(s), date of report, and person submitting report. BW
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 .1-l.
5. A copy of any mechanical integrity test chart, including the type of test, i.e., open to formation or easing 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.



BW-4 Gandy Corp. 01/31/10

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 .1-l.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or easing 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.

BW-8 PAB- Salty Dog Mo. w/ Qilly Rpis.



|       |              |          |   |
|-------|--------------|----------|---|
| BW-22 | Gandy Corp.  | 01/31/10 | <p>L. Annual Report: All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.</li> <li>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.</li> <li>4. A copy of the chemical analysis as required above in 21.H.</li> <li>5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.</li> <li>6. Brief explanation describing deviations from normal production methods.</li> <li>7. A copy of any leaks and spills reports.</li> <li>8. If applicable, results of any groundwater monitoring.</li> <li>9. Information required from cavity/subsidence 21 .F. above.</li> <li>10. An Area of Review (AOR) summary.</li> <li>11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.</li> </ol> |
| BW-25 | Basic Energy | 01/31/10 | <ol style="list-style-type: none"> <li>6. Production/Injection Volumes/Annual Report: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in an annual report due on the thirty-first (31) day of January of each year.</li> </ol>  |



|       |                        |          |   |
|-------|------------------------|----------|---|
| BW-27 | Mesquite               | 01/01/10 | <p>7. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Sanla Fe Office in an annual report due on the first day of January of each year.</p> <p>L. Annual Report: All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:</p> <ol style="list-style-type: none"> <li>1. Cover sheet marked as "Annual Brine Well Report, name of operator, permit #, API# of well(s), date of report, and person submitting report.</li> <li>2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.</li> <li>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.</li> <li>4. A copy of the chemical analysis as required above in 21 .H.</li> <li>5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.</li> <li>6. Brief explanation describing deviations from normal production methods.</li> <li>7. A copy of any leaks and spills reports.</li> <li>8. If applicable, results of any groundwater monitoring.</li> <li>9. Information required from cavity/subsidence 21 .F. above.</li> <li>10. An Area of Review (AOR) summary.</li> <li>11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.</li> </ol> |
| BW-28 | ey Ernergy Services LL | 01/31/10 |   |



BW-30      Liquid Resources      01/31/10

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 20.6.2.5 101.

BW-31      HRC- Schubert      01/31/10

6. Production/Injection Volumes/Annual Report: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in an annual report due on the thirty-first (31) day of January of each year.



## Chavez, Carl J, EMNRD

---

**From:** Chavez, Carl J, EMNRD  
**Sent:** Friday, September 25, 2009 1:48 PM  
**To:** 'Prather, Steve'; 'gandy2@leaco.net'; 'James Millett'; 'Clay Wilson'; 'Bob Patterson'; 'Blevins, Sam'; 'David Pyeatt'; 'garymschubert@aol.com'  
**Cc:** Sanchez, Daniel J., EMNRD; VonGonten, Glenn, EMNRD; Griswold, Jim, EMNRD; Jones, William V., EMNRD  
**Subject:** New Mexico Oil Conservation Division Class III Solution Mining Well Operator Notice-- ANNUAL REPORTS

Gentlemen:

### Re: Annual Reporting

You are receiving this message because you are currently operating a Underground Injection Control (UIC) Class III Solution Mining Well in New Mexico under an Oil Conservation Division (OCD) Discharge Permit. You may be aware of the most recent events related to OCD Class III Wells in New Mexico and can find out more by visiting the OCD's Website at <http://www.emnrd.state.nm.us/OCD/brinewells.htm> and OCD Brine Well Work Group Website at <http://ocdimage.emnrd.state.nm.us/imaging/AEOrderFileView.aspx?appNo=pCJC0906359521>.

The OCD is writing to inform you that it will be monitoring the receipt of your "Annual Reports" under the applicable section of your OCD discharge permit. The OCD has been deficient in tracking reporting obligations in the past; however, the OCD has recently upgraded our online system to track operators who are not meeting the reporting requirements specified in OCD Discharge Permits. Please plan on submitting the report with the required information by the date required in your discharge permit.

To access your OCD Discharge Permit Online for the date of submittal and contents of the report, please go to OCD Online at <http://ocdimage.emnrd.state.nm.us/imaging/AEOrderCriteria.aspx> (enter "Order Type" as BW and your "Order Number"). If you have not submitted an Annual Report (report) for your well, a historical review of your injection and production records will be required in order to provide cumulative injection and production information in this year's report.

Please contact me if you have questions or need assistance.

Thank you in advance for your cooperation in this matter.

Copy: Brine Well Files BWs 2, 4, 8, 22, 25, 27, 28, 30 & 31

Carl J. Chavez, CHMM  
New Mexico Energy, Minerals & Natural Resources Dept.  
Oil Conservation Division, Environmental Bureau  
1220 South St. Francis Dr., Santa Fe, New Mexico 87505  
Office: (505) 476-3490  
Fax: (505) 476-3462  
E-mail: [CarlJ.Chavez@state.nm.us](mailto:CarlJ.Chavez@state.nm.us)  
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>  
(Pollution Prevention Guidance is under "Publications")