

**AP-062**

**Annual Monitor Report**

**DATE:**

**2009**

**April 12, 2010**



**Samson Livestock "30" Reserve Pit  
NMOCD Case # AP-62**

**2009 Annual Monitoring Report**

**R.T. Hicks Consultants, Ltd.**

901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

# R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

April 12, 2010

Glenn Von Gonten  
New Mexico Oil Conservation Division  
1220 South St. Francis Drive  
Santa Fe, New Mexico 87505

RE: Samson Livestock "30" Reserve Pit, T21S, R35E, Section 30, Unit P;  
NMOCD Case # AP-62

Dear Mr. Von Gonten:

Attached is the 2009 Annual Report for the above-referenced site. At the end of this letter are several issues that Samson would like to bring forward to NMOCD in an effort to move toward regulatory site closure.

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## Brief Summary

- The engineered ET infiltration barrier functions as designed; the chloride flux from the vadose zone to ground water is at or near zero.
- The extent and magnitude of ground water impairment is defined
- The average chloride concentration of the plume is not changing and there is no evidence of down gradient migration.
- Natural restoration has improved ground water quality of the upper portion of the aquifer, but several wells remain above ground water standards for TDS and chloride.
- While pumping ground water from MW-3d is beneficial with respect to the removal of contaminant mass, monitoring data suggest meaningful improvement of ground water quality will require long-term pumping.
- In our opinion, there is no reasonable relationship between the economic and social costs and benefits of a ground water restoration strategy that calls for pumping the water and:
  - Treating the water sufficiently to permit use for agriculture or E&P operations
  - Treating the water sufficiently to permit site re-injection
  - Deep well disposal

In 2008, Samson attempted a pump-and-use restoration strategy and found that neither drillers, earthwork contractors nor any water user would accept water pumped from the site in its present condition. We also evaluated the potential of treating the water to remove the contaminants completely at the point of extraction, but because fresh water is available in the immediate area and at locations that are more convenient for commercial or agricultural uses this option was considered not

valid. Finally, we considered the addition of salt to create brine for drilling, but the economics of this solution are not favorable.

In light of this, Samson requests input from NMOCD regarding possible pathways to close the regulatory file. We believe that a 25-acre area (the former pit and current production pad) is not "a place of withdrawal for present or reasonably foreseeable future use". Although concurrence with this opinion on the part of NMOCD and the surface owner would be required to insure that the site complies with NMOCD Rules.

Some of the questions of concern for Samson include the following:

1. In light of the WQCC decision in the Phelps-Dodge hearing, what data or evaluation would NMOCD require to define the "point of compliance", which some call "a place of withdrawal for present or reasonably foreseeable future use"?
2. Should Samson provide arguments to NMOCD to support a finding that a certain area (e.g. 25 acres around the site) is not a "place of withdrawal for present or reasonably foreseeable future use"?
3. Because the site is subject to the Abatement Plan requirements, if NMOCD finds that the area is a place of reasonably foreseeable future use, under what circumstances would NMOCD support a petition for alternative abatement standards appropriate?

Samson will continue to monitor ground water in all wells on an annual basis until directed otherwise.

Sincerely,  
R.T. Hicks Consultants, Ltd.



Randall Hicks  
Principal

Copy: Hobbs NMOCD office;  
Samson Resources  
Merchant Cattle Company

**April 12, 2010**

**Samson Livestock "30" Reserve Pit  
NMOCD Case # AP-62**

**2009 Annual Monitoring Report**

**prepared for:  
Samson**

**R.T. Hicks Consultants, Ltd.**

901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Location: T-21-S, R-35-E, Sec 30, Unit P  
Latitude: North 32° 26' 41.2"  
Longitude: West 103° 24' 6.9"  
NMOCD#: AP-62

## 1.0 EXECUTIVE SUMMARY

The Livestock "30" site, which is operated by Samson Resources Company (Samson), is located approximately 16 miles west of Eunice, New Mexico. The data presented in this 2009 Annual Monitoring Report permits us to conclude:

- The extent and magnitude of ground water impairment is stable; the average chloride concentration of the plume is not changing and there is no evidence of down gradient migration.
- While pumping ground water from MW-3d is beneficial with respect to the removal of contaminant mass, monitoring data suggest meaningful improvement of ground water quality will require long-term pumping.
- The engineered ET infiltration barrier functions as designed; the chloride flux from the vadose zone to ground water is at or near zero.
- A ground water restoration strategy that calls for using the water in E&P operations or other uses does not create a reasonable relationship between the economic and social costs and benefits.
- Samson requests input from NMOCD regarding possible pathways to close the regulatory file including a decision on the part of NMOCD and the surface owner that a 25-acre area that includes the former pit and production pad is not "a place of withdrawal for present or reasonably foreseeable future use".
- Samson will continue to monitor ground water in all wells on an annual basis.

This report is consistent with the commitments made in the September 2006 Stage 1/Stage 2 Abatement Plan, Progress reports submitted in December 2006, May 2007, August 2007, the November 2007 Abatement Report, and the 2008 Annual Ground Water Monitoring Report.

## 2.0 WORK ELEMENTS PERFORMED

Appendix A presents the chronology of events at the site followed by a brief description of all characterization and corrective action activities performed at the site. A table of the historic gauging and laboratory results is also provided in Appendix A. The ground water monitoring laboratory reports and chain-of-custody documents are included in Appendix B, and Appendix C provides graphs that depict the historic ground water impairment for each monitoring well.

Since November 2008, site activities included only the quarterly ground water sampling of the shallow and deep monitoring wells, and monitoring of the soil moisture below the ET Barrier.

### 3.0 CONCLUSIONS

#### 3.1 ET Barrier Performing as Predicted

Soil moisture monitoring demonstrates that the moisture content within the ET Barrier is very low and has continued to decline over the past year. Table 1 indicates that the lower portion of the ET barrier has dried more slowly than the upper portion. This is expected because the upper portion of the barrier loses water to evaporation to a larger extent than the lower portion of the barrier. This result confirms the performance expectations of the ET Barrier presented in the November 2007 Report.

Table 1. Results of Soil Moisture Monitoring at Samson Livestock 30

Vadose Zone Measurement Date	ET Cover Monitoring Port		
	No. 1 West 2.8-foot	No. 2 Center 5-foot	No. 3 East 9-foot
4/17/07	80	81	80
5/1/07	7	15	17
5/21/07	3	10	9
7/18/07	1	1	7
8/9/07	1	1	7
12/6/07	0	0	4
4/3/08	0	0	3
8/19/08	0	0	4
11/20/08	0	0	3
2/16/09	0	0	2
5/26/09	0	1	2
8/20/09	0	1	3
11/3/09	0	1	2

As discussed below, ground water monitoring results also demonstrate that the chloride concentration of the upper portion of the aquifer beneath the ET cover is stable or declining over time. This observation supports a conclusion that the flux of chloride from the vadose zone to ground water beneath the cover is very low or nil.

#### 3.2 Ground Water Flow Direction is Constant

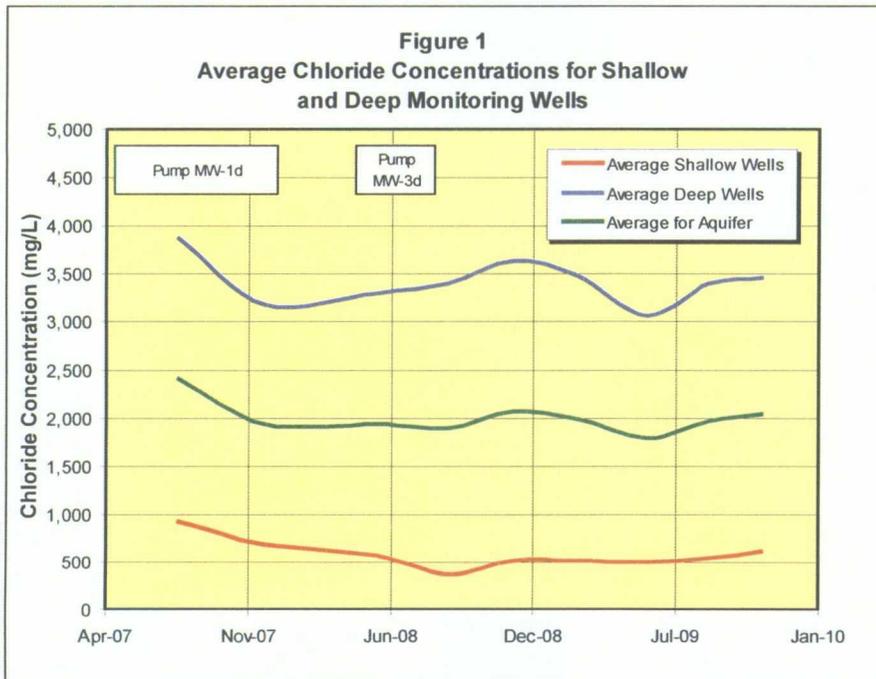
Hicks Consultants gauged and sampled each of the monitoring wells on a quarterly basis during 2009. Ground water gradient maps (Plates 1A - 1D) indicate essentially no change in the gradient. Observations continue to support a flow

rate of about 10 ft per 100 yrs as calculated and provided in the 2007 Abatement Report.

**3.3 Short-Term Pumping Is a Marginally Effective Abatement Strategy**

A total of 494,000 gallons of impaired ground water (14.4 tons chloride / 24.2 tons TDS) have been removed from the site to date. Water removed from the aquifer could not be used and was sent to a disposal well. No ground water removal operations were conducted in 2009.

Plate 2 depicts the laboratory results for both the shallow and deep zones for each 2009 sampling event. Figure 1 depicts the average chloride concentrations for both the shallow and deep ground water zones over time. In figure 1, the width of the text box describing the pumping is equivalent to the duration of the pumping event.

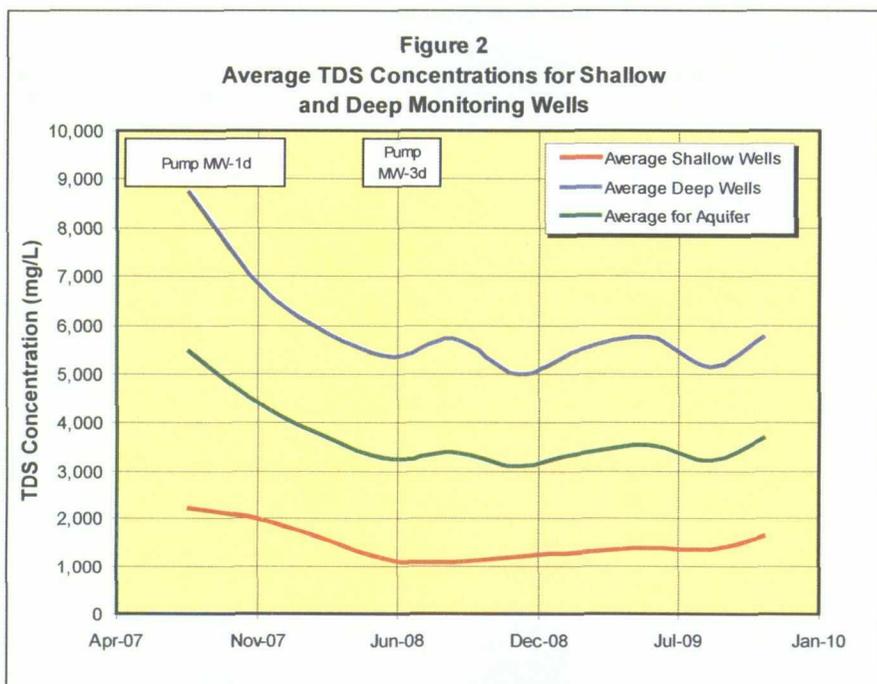


The data show the average site chloride concentrations in both the shallow and deep ground water zones decreased during the pumping that was performed from MW-1d (12/06 to 12/07). Because pumping occurred more than 2 years after the April 2004 flood event that damaged the liner (see Appendix A), we conclude that the pumping, not natural restoration, is primarily responsible for the observed decrease in chloride concentrations.

During pumping from MW-3d (5/12/08 to 7/30/08) the average chloride concentration in the shallow ground water zone decreased, albeit temporarily. The

rate of increase for the average chloride concentration in the deep ground water zone declined slightly during this same time. We conclude that the pumping of MW-3d temporarily caused fresh water from outside of the zone of impact to flow into the upper portion of the aquifer near the pumping well. In the lower portion of the aquifer, pumping removed chloride mass and caused a small decline in chloride concentrations in MW-1d, MW-3d and MW-5d. However, pumping MW-3d probably perturbed brine zones perched on the underlying red bed aquiclude, causing chloride concentrations to increase in MW-2d. After pumping ceased, dispersion and diffusion caused equilibration of chloride concentration between the upper and lower aquifer, resulting in a slight increase in chloride concentrations in the shallow wells. Despite the changes observed during pumping MW-3d, the average chloride concentration for the aquifer has remained stable at approximately 2,000 mg/L since the pumping of MW-1d was terminated.

Figure 2 depicts the average TDS concentrations for both the shallow and deep ground water zones over time.



The data demonstrate that average site TDS concentrations in both the shallow and deep ground water zones decreased during the pumping that was performed from MW-1d, but were not significantly affected by the pumping from MW-3d. The average TDS concentration for the aquifer has remained stable at less than 4,000 mg/L since the pumping of MW-1d was terminated.

These results suggest that while the chloride (and TDS) mass/barrel removed from MW-3d (1.67 kg/bbl) was much greater than the chloride mass/barrel removed from MW-1d (0.96 kg/bbl), the removal of saline water from MW-3d has produced no permanent benefit to the overall quality of the ground water. We conclude that only a long-term, continual pumping effort at MW-3d could be an effective abatement strategy.

### **3.4 The Chloride and TDS Plume is Stable**

In the upper portion of the aquifer, chloride concentrations are essentially unchanged over the past two years in wells MW-1, 2, 4 and 5. Chloride concentrations in the MW-3s have fluctuated slightly between May of 2008 (2021 mg/L) to November 2009 (2390 mg/L).

The lower portion of the aquifer the following wells have exhibited stable chloride concentrations since January 2008: MW-1d, MW-3d and MW-4d. Chloride concentrations in MW-2d have been stable since November 2008. At MW-5d, chloride concentrations have risen consistently over time from 117 mg/L to 246 mg/L.

Although the increasing chloride concentration in MW-5d may indicate chemical diffusion or lateral dispersion of chloride in slow moving ground water, monitoring results from MW-4s and MW-4d indicate that no detectable, down gradient plume migration is occurring.

### **3.5 A Limited Pump-and-Use Abatement Strategy Is Problematic**

After speaking to several individuals that routinely use water for E&P operations (e.g. mud engineers, well cementing contractors), we conclude that E&P contractors will not use water from the Livestock site. Drilling mud and casing cement demand that one of the primary ingredients, water, is of a known and constant quality. A failure of drilling mud or cement caused by constituents in the ground water from MW-3d is unacceptable. Therefore, despite attempts to put the water from the MW-3d to use, we found no takers. Moreover, several deep ground water wells that exist west of the site are capable of providing fresh water for E&P operations at a much greater rate due to an increased aquifer thickness.

Additionally, we explored the feasibility of pumping water from MW-3d to tank then adding salt to create saturated brine for drilling. This would involve creating a brine station with the capacity and access suitable for area drilling operations. Costs associated with building the station, transporting salt, and supplying the additional water to satisfy the potential demand are prohibitive relative to benefit.

Treating the water to create a source of stock water provides no benefit. In addition to the more prolific water wells listed above, a windmill serves stock and wildlife less than ½ mile west (up gradient) from the site. Treating water produced from MW-3d in the absence of a defined need does not create a reasonable relationship between the social and economic costs and benefits.

### **3.6 Options for Closing the Regulatory File Are Limited**

We have identified two options for closure of the regulatory file. Of these, option No. 1 is the most appropriate for the site, based on future land use and available ground water resources.

1. File closure based upon a finding by NMOCD and the surface owner that a 25-acre area at and down gradient of the Livestock site is not a place of withdrawal for present or reasonably foreseeable future use.
2. A successful petition for alternative abatement standards under Part 30 of NMOCD Rules.

#### 4.0 RECOMMENDATIONS

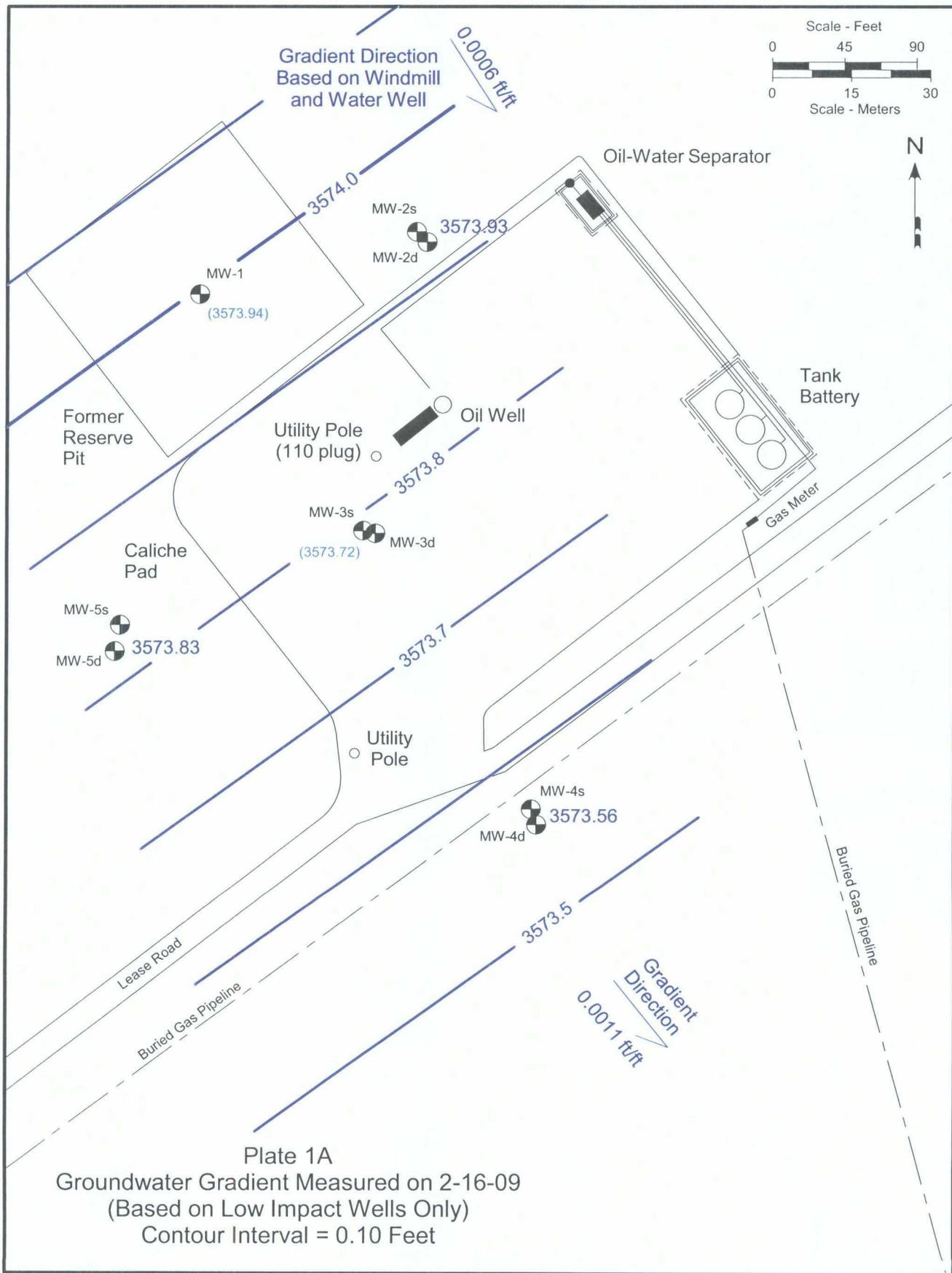
- Obtain a response from NMOCD regarding the proposed closure options.
- Collect and analyze ground water samples on annual basis for chloride, TDS and field specific conductance.

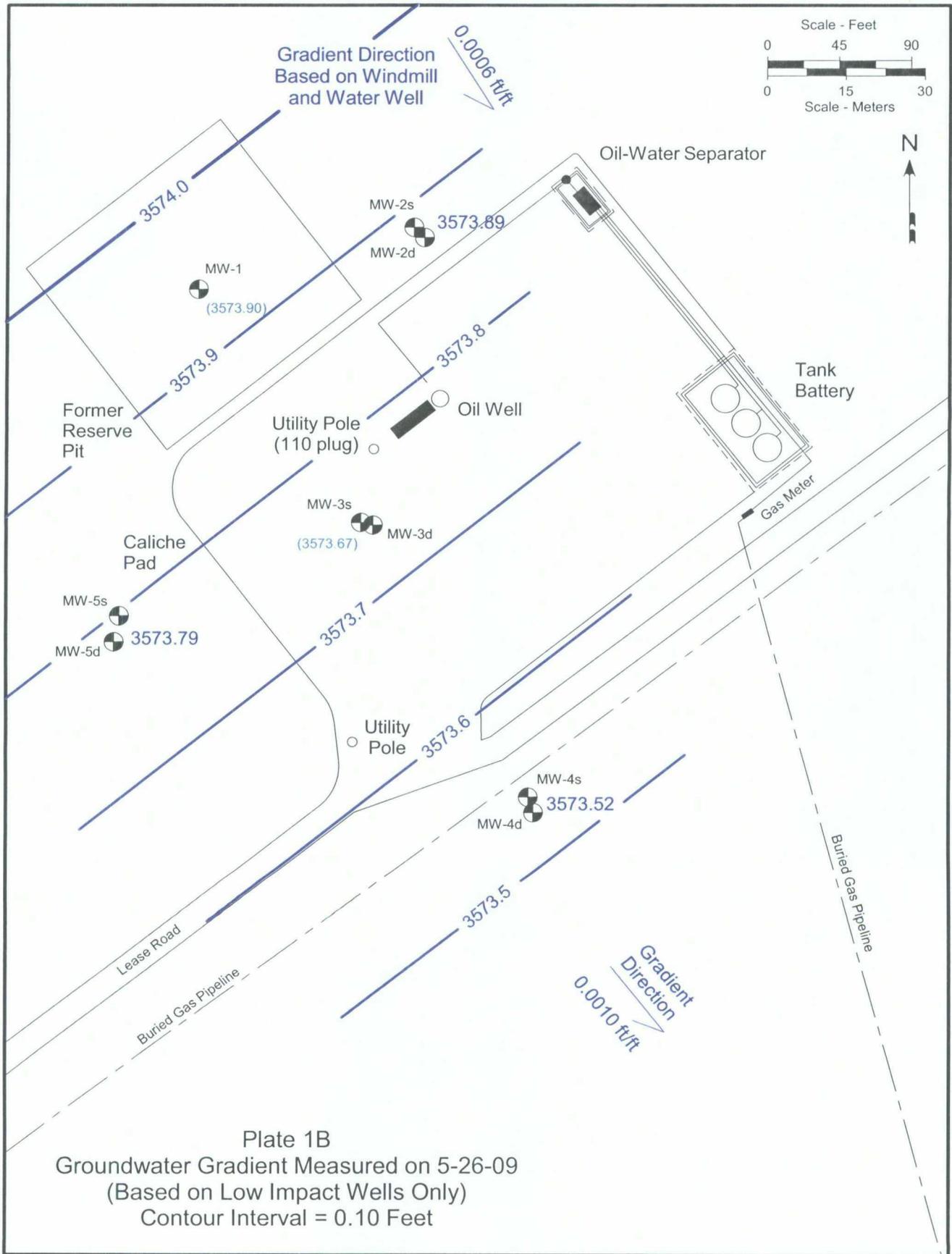


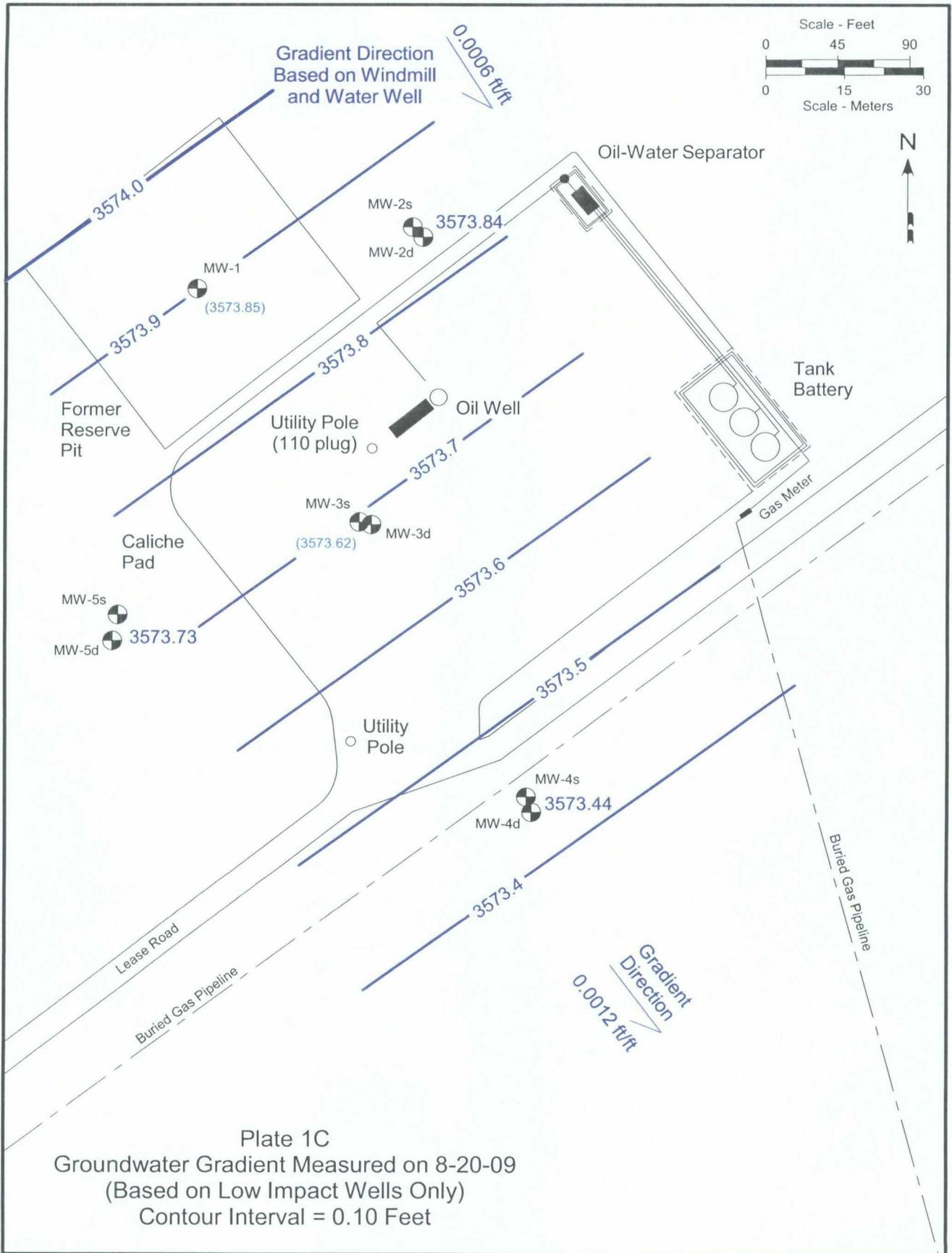
# Plates

**R.T. Hicks Consultants, Ltd.**

901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104







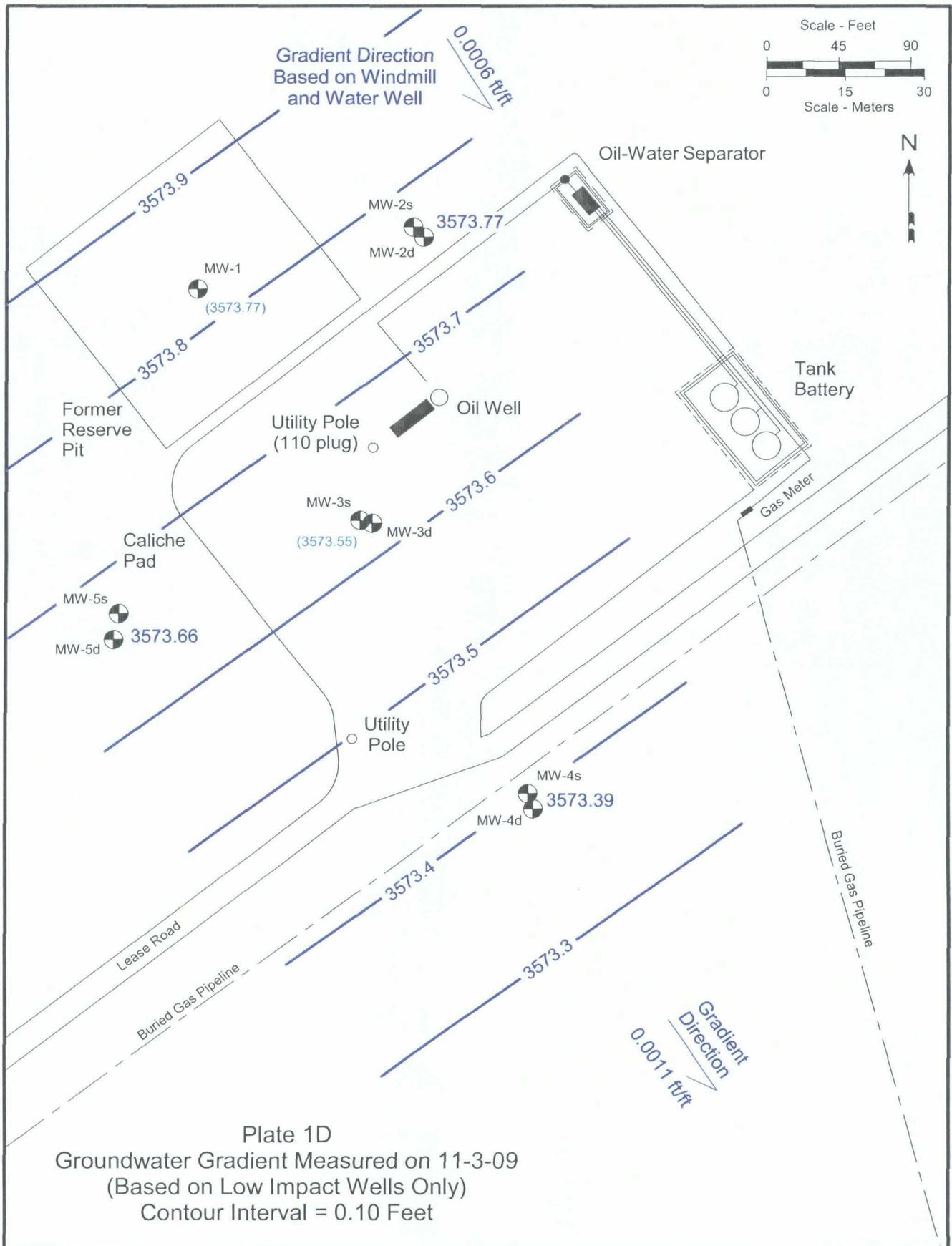
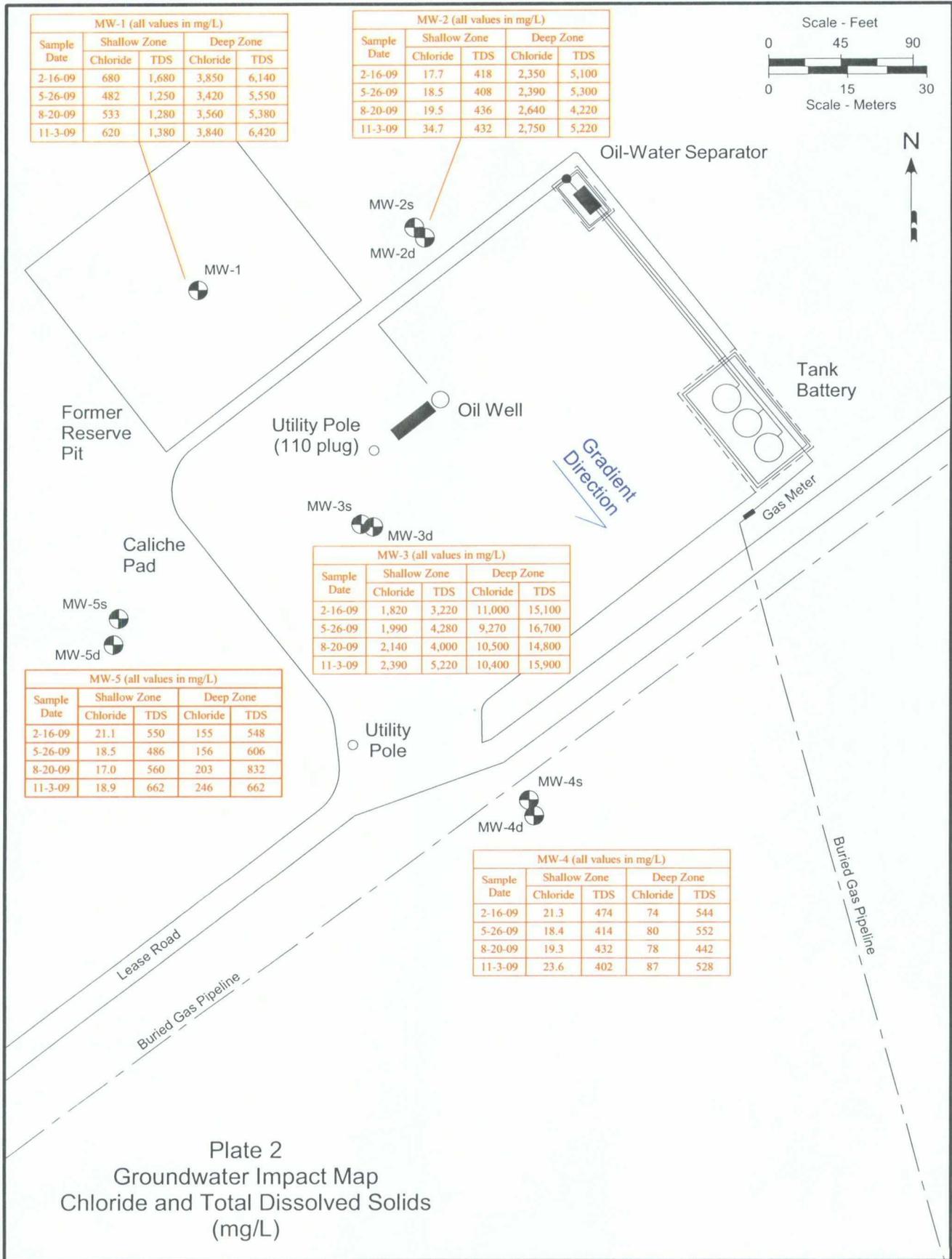
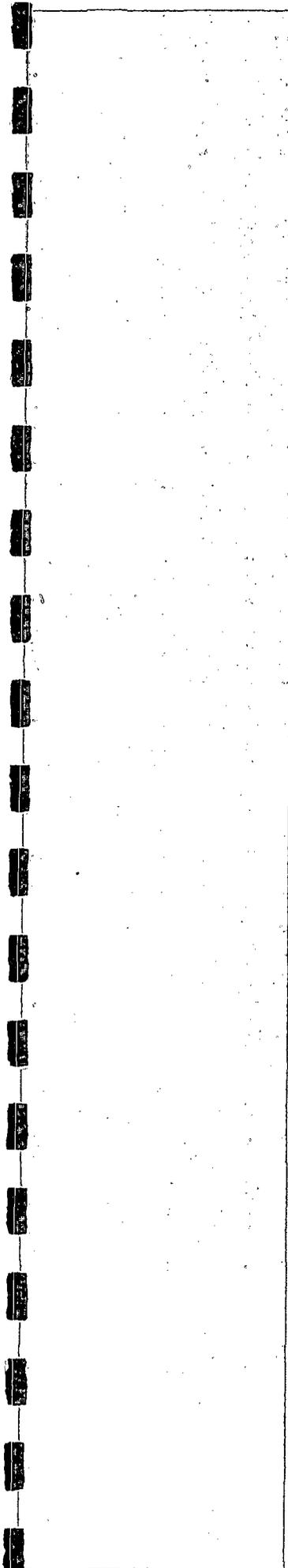


Plate 1D  
 Groundwater Gradient Measured on 11-3-09  
 (Based on Low Impact Wells Only)  
 Contour Interval = 0.10 Feet





# **Appendix A**

## **Chronology of Events, Table of Historic Data**

**R.T. Hicks Consultants, Ltd.**

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## Appendix A Chronology of Events

- 09-30-02: Following the installation of the reserve pit, drilling of the Livestock "30" State No. 1 gas well commenced. The well lies within the Grama Ridge Morrow East Field.
- 04/05/04: After the completion of the gas well, while the reserve pit was drying out in preparation for closure, a significant precipitation event flooded the reserve pit and damaged the liner. Rainwater probably flushed the chloride from the cuttings, flowed through the liner tears and caused impact to the underlying soil and ground water.
- 05-11-05: Samson contracted for the removal of the cuttings and some underlying material to a centralized facility. Soil samples collected in the excavation indicated that the material underlying the pit contained chloride concentrations and diesel-range organics but there is no evidence that regulated hydrocarbons were present in soil.
- 09-16-05: Ocotillo Environmental installed nine hollow-stem auger holes within and surrounding the reserve pit. The data showed elevated chloride concentrations (>1,000 mg/kg) in several locations from the base of the excavation to the water table (approximately 40 feet below ground surface).
- 09-19-05: A sample from a temporary monitoring well (TMW-1) in the center of the pit showed elevated chloride concentrations.
- Undated: A report by Ocotillo included recommendations to over-excavate the reserve pit to a depth of 30-feet, install a 20-mil plastic liner, backfill the pit with clean soil, and install monitoring wells surrounding the area to delineate the chloride impact to ground water.
- 03-15-06: Samson contracted with RT Hicks Consultants, Ltd to re-evaluate the reserve pit site and determine the feasibility of an alternate remedy for closure.
- 03-30-06: TMW-1 was purged of 30 gallons of water using a disposable bailer prior to sampling to determine the concentrations of chloride and total dissolved solids. The results indicated that the chloride concentration at TMW-1 had decreased significantly from the sample recovered on 9-19-05 but remained above WQCC Standards. A water sample recovered from the windmill-equipped water well located 1,800 feet to the northwest of the site established background water quality for the area.

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

- 05-10-06: The first of three additional ground water samples was recovered from TMW-1 over a 2-month period. In each case the well was purged of approximately 400 gallons prior to sampling. Chloride concentrations from each sample were generally consistent with the sample recovered on March 30, 2006.
- 06-12-06: Hicks Consultants submitted a Corrective Action Plan (CAP) for the proposed pit closure at the Livestock "30" site to Mr. Glenn Von Gonten, with the NMOCD in Santa Fe. The CAP presented a design for an evapotranspiration (ET) cover and recommended installation of the barrier over the reserve pit area to control the migration of additional chloride into the ground water. The CAP proposed a "point-of-use" ground water remedy.
- 07-12-06: A solar-powered pump installed in the 2-inch monitoring well (TMW-1) withdrew water at a rate of 1-2 gpm in order to determine if more aggressive water recovery would significantly decrease the chloride concentration in the ground water below the pit. Water discharged to the produced water tank.
- 08-30-06: In a meeting with Mr. Glenn Von Gonten and David Sanchez at the NMOCD offices in Santa Fe, Hicks Consultants and Samson presented the June 12, 2006 CAP and results of the ground water purging/sampling feasibility test. The result of the meeting was a commitment to submit a Stage 1/Stage 2 Abatement Plan and to proceed with construction of the ET Infiltration Barrier in advance of NMOCD approval of the Abatement Plan.
- 09-22-06: Hicks Consultants submitted a Stage 1/Stage 2 Abatement Plan to the NMOCD. The plan made minor changes to the CAP and to the planned closure of the reserve pit. The plan included a proposal to abate the chloride-impacted ground water through a point-of-use water withdrawal program.
- 09-28-06: Hicks Consultants supervised closure of the former reserve pit according to the plan provided to the NMOCD on September 22, 2006.
- 10-23-06: Closure of the former reserve pit was complete and the final surface topography was shaped and mapped.
- 10-30-06: Hicks Consultants supervised the installation of a 4-inch monitoring/recovery well (MW-1) at the location of the former 2-inch temporary monitoring well (TMW-1). MW-1 included screened intervals at the vadose zone/ground water interface and at the base of the aquifer, above the lower confining Triassic red shale formation. In addition, three vadose zone moisture monitoring ports were installed into the backfilled pit material.

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

- 11-30-06: Following the development of MW-1, a solar-powered pump (Abyss No. 1), was installed at the base of the aquifer. A rubber packer was placed five feet above the pump to restrict flow from the upper portion of the aquifer. Each month, a ground water sampling program sampled chloride-impacted ground water from the lower screen (pump) and upper screen (bailer).
- 12-18-06: A progress report submitted to the NMOCD described the closure of the former reserve pit, provided information regarding the final ET cover and described the installation of MW-1 and vadose zone moisture monitoring ports. The proposed Abatement Plan public notice and a request to begin using the withdrawn water for use in drilling was part of this submittal.
- 04-17-07: Gypsum blocks were installed in the soil moisture ports and checked to verify that they were working properly. Ground water samples were recovered from the deep screen (pump) and shallow screen (bailer) of MW-1.
- 05-01-07: Abyss No. 1 was replaced with Abyss No. 2 in MW-1. Abyss No. 1 ran for approximately 3,600 hours.
- 05-21-07: The MW-1 pump was direct wired to the solar power control box to by-pass faulty plug. Ground water samples were recovered from the deep screen (pump) and shallow screen (bailer) of MW-1.
- 05-23-07: A progress report submitted to the NMOCD described the on-going ground water recovery and monitoring efforts. A recommendation for additional monitoring well installation was part of this submittal.
- 05-30-07: Hicks Consultants supervised the installation of monitoring wells MW-2(s), MW-2(d), MW-3(s), and MW-3(d) to delineate the dissolved chloride plume in the ground water. Field activities continued through June 1, 2007. MW-2(s) was fully developed and MW-2(d), MW-3(s), and MW-3(d) were partially developed. All of the new monitoring wells were surveyed to determine the casing elevations relative to MW-1.
- 06-13-07: All of the monitoring wells, nearest water well, and the North windmill well were gauged. The North windmill was shut in and the pump in MW-1 was turned off on June 12, 2007 to allow the static water levels to recover. MW-2(d) and MW-3(s) were fully developed and MW-3(d) was partially developed (poor producer). All of the monitoring wells, including MW-1 (deep and shallow) were sampled.

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

- 07-18-07: Abyss No. 2 pump was replaced after 1,800 hours of operation with Abyss No. 1R (rebuilt) pump. The monitoring well casing elevations were re-surveyed to verify the June 1, 2007 data.
- 08-02-07: A progress report submitted to the NMOCD described the on-going ground water recovery /monitoring efforts, and the results of the monitoring well installation and sampling conducted in May and June 2007. A recommendation for two additional monitoring well clusters was part of this submittal.
- 08-07-07: Monitoring wells MW-4(s), MW-4(d), MW-5(s), and MW-5(d) were installed to the southwest and southeast of the former reserve pit in order to complete the delineation of the dissolved chloride in the ground water. Each of the new wells were developed and surveyed to determine the casing elevations relative to the existing wells. Sediment in MW-3(d) was cleaned out using compressed air and the well was fully developed. All of the monitoring wells were sampled to determine the concentrations of chloride and total dissolved solids.
- 11-20-07: The Final Abatement Plan was submitted to Mr. Glenn Von Goten of the NMOCD by RT Hicks Consultants on behalf of Samson.
- 12-06-07: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids. The Abyss No. 1R pump was removed after approximately 3,300 hours of operation. Abyss No. 2R (rebuilt) pump was installed but failed immediately.
- 04-03-08: Each of the monitoring wells were gauged. MW-4(s) and MW-4(d) (down gradient) was sampled to determine the concentrations of chloride and total dissolved solids.
- 05-06-08: A 110-volt electric pump was installed in MW-3(d), however the transformer for the on-site electric supply was too small to operate the 11.9-amp pump. A electrician installed new transformer and the pump was started at 1.5 gpm on 5/7/08.
- 05-12-08: The pump in MW-3(d) was operating at 1.2 gpm but the water level was at the pump depth. Approximately 5,500 gallons of water had been recovered in two frac tanks since the pumping operation began. A ground water sample was recovered from the pumping well and the flow rate was choked down to 1.15 gpm. Each of the other monitoring wells were gauged and MW-1, MW-2(s), MW-2(d), MW-3(s), MW-5(s), and MW-5(d) was sampled to determine the concentrations of chloride and total dissolved solids.

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

- 06-02-08: Lobo Trucking transported 650 bbls of water from MW-3(d) to the Samson Osudo 33 State Com. No. 1 well for use in the drilling reserve pit.
- 06-04-08: Key Energy transported 110 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 06-19-08: Key Energy transported 120 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 07-03-08: Key Energy transported 240 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 07-15-/08: Key Energy transported 220 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 07-18-08: The pump in MW-3(d) was operating at 1.25 gpm. A ground water sample was recovered from the pumping well but the flow rate was not adjusted.
- 07-23-08: Key Energy transported 220 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 07-30-08: Key Energy transported 330 bbls of water from MW-3(d) to the Atha SWD for disposal.
- 07-31-08: The pump in MW-3(d) was turned off, but left in the well. Key Energy transported 660 bbls of water to the Atha SWD for disposal. Both frac tanks were removed from the site.
- 08-19-08: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.
- 11-20-08: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.
- 01/30/09: RT Hicks Consultants submitted the 2008 Annual Monitoring Report to the NMOCD on behalf of Samson.
- 02-16-09: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.
- 05-26-09: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

- 08-20-09: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.
- 11/03/09: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.

**Summary of Activities Completed to Date**

***Initial Assessment***

Following the discovery of elevated chloride concentrations in the soil below the former reserve pit by Samson, Ocotillio Environmental installed nine soil borings to define the extent of the impact to the soil. One of the soil borings was converted into a temporary monitoring well (TMW-1) in order to verify the impact to ground water. Details concerning these activities were provided with the September 22, 2006 Stage 1/Stage 2 Abatement Plan.

***Closure of the Former Reserve Pit***

From September 28 to October 23, 2006 the reserve pit was backfilled. An evapotranspiration (ET) cover and surface run-off infiltration area were constructed during the backfill operations. Following completion of the ET cover MW-1 was installed as a replacement to TMW-1 and three soil moisture monitoring ports were installed to verify the effectiveness of the ET cover. Detailed information concerning these activities were provided in the December 18, 2006 Progress Report. Re-seeding of the ET cover and the installation of gypsum blocks into the moisture ports occurred in April 2006. Based on monitoring of the gypsum blocks performed through November 3, 2009 there is no indication that rain water was infiltrating the ET barrier.

***Dissolved Chloride Plume Delineation***

Two clusters of monitoring wells, which included a shallow well screened at the surface of the aquifer and a deep well screened at the base of the aquifer, were installed to provide delineation of the chloride-impacted ground water to the northeast (MW-2) and the southeast (MW-3) of the former reserve pit. Information concerning the remediation/monitoring activities and the installation of MW-2 and MW-3 were provided in the August 2, 2007 Progress Report.

From August 7, to August 9, 2007 two additional clusters of monitoring wells were installed at the site. MW-4(s) and MW-4(d) were placed approximately 300 feet southeast from the former reserve pit to verify the down gradient extent of the chloride-impacted ground water. MW-5(s) and MW-5(d) were placed approximately 120 feet south of the former reserve pit in order to delineate the plume to the southwest of MW-3.

Following completion, each for the new wells were gauged, developed, and surveyed relative to the casing elevations of the existing monitoring wells. A site ground water gradient map was constructed using data from only MW-2, MW-4, and MW-5. Elevated dissolved solids in the ground water at the MW-1 and MW-3 locations increase the specific gravity of the water such

**Samson Livestock "30" Reserve Pit  
Appendix A – Description of Activities**

that measured fluid levels do not accurately reflect the potentiometric energy of the aquifer. Information and lithologic logs concerning these activities were provided in the November 20, 2007 Final Abatement Report.

***Ground Water Pumping (Source Removal)***

A solar-powered pump was used to recover brine water released for the reserve pit, along with ground water from MW-1 at an average rate of 0.8 gallons per minute (gpm) from November 30, 2006 to December 6, 2007. Approximately 386,769 gallons of brine water were recovered from the deep screened interval of the well over 8,700 hours of operation. All of the removed water was discharged into the on-site 500-barrel fiberglass tank, mixed with produced water from the gas well, and periodically transferred to a disposal facility. Information concerning this activity was provided in the May 23, 2007 Progress Report and January 22, 2009 Annual Monitoring Report.

An additional 107,100 gallons of water was recovered from MW-3(d) using a 110-volt submersible pump. The recovered water was temporarily stored in two on-site frac tanks before being transferred to an oil well drilling operation for use in the reserve pit or transported to a disposal facility. Information concerning this activity was provided in the January 22, 2009 Annual Monitoring Report.

**Activities Completed Since Previous Update**

***Ground Water Monitoring***

From November 2008 to November 2009, four ground water monitoring events were conducted to verify the plume stability.

**Table 1**  
**Laboratory Results Summary - Groundwater Samples**

Sample Date Location	DTW (csg)	GW Elevation (ft)	Recv. Vol (gal)	Field Cond.	Sample Depth	Chloride (mg/L)	TDS (mg/L)
<b>TMW-1 Casing Elev.=</b>		<b>3607.11</b>					
9/19/05	No Data	--	--	--	Shallow	3,999	--
3/30/06	31.65	3575.46	30	7.49	Shallow	2,240	4,520
5/10/06	31.74	3575.37	450	7.51	Shallow	2,580	3,900
6/7/06	31.86	3575.25	830	5.93	Shallow	2,150	4,080
6/27/06	31.83	3575.28	1,230	7.70	Shallow	2,520	4,160
8/22/06	31.99	3575.12	6,830	5.52	Shallow	1,930	3,720
					Deep	1,880	3,570
<b>MW-1 Casing Elev.=</b>		<b>3616.06</b>					
11/6/06	41.28	3574.78	765	11.00	Deep	5,520	9,240
11/30/06	41.32	3574.74	837	6.03	Shallow	1,030	2,280
				11.19	Deep	4,390	5,870
12/12/06	43.03	3573.03	13,209	12.01	Deep	5,210	9,600
1/9/07	43.02	3573.04	42,609	4.80	Shallow	1,870	2,940
				12.25	Deep	5,840	8,670
2/20/07	43.12	3572.94	87,609	5.46	Shallow	2,130	3,120
				12.92	Deep	6,690	7,680
3/20/07	43.37	3572.69	121,881	4.94	Shallow	2,110	3,930
				11.99	Deep	7,820	9,030
4/17/07	43.44	3572.62	154,137	5.54	Shallow	2,050	3,510
				13.07	Deep	6,350	11,400
5/21/07	41.60	3574.46	194,529	3.91	Shallow	1,400	2,490
				11.88	Deep	6,360	10,400
6/13/07	41.65	3574.41	218,289	5.68	Shallow	1,620	3,180
				15.89	Deep	6,770	13,000
7/18/07	41.64	3574.42	253,929	--	--	--	--
8/9/07	41.75	3574.31	277,689	5.60	Shallow	1,650	3,150
				14.62	Deep	6,810	12,000
12/6/07	41.72	3574.34	386,769	2.41	Shallow	440	1,310
				11.38	Deep	4,090	13,800
4/3/08	41.80	3574.26	386,769	--	--	--	--
5/12/08	41.85	3574.21	386,871	2.24	Shallow	745	1,160
				9.99	Deep	4,254	6,490
8/19/08	42.02	3574.04	386,946	2.46	Shallow	470	1,150
				9.33	Deep	3,960	6,200
11/20/08	42.06	3574.00	387,018	2.75	Shallow	681	1,450
				9.18	Deep	4,626	5,680
2/16/09	42.12	3573.94	387,090	3.51	Shallow	680	1,680
				10.76	Deep	3,850	6,140
5/26/09	42.16	3573.90	387,162	2.28	Shallow	482	1,250
				9.48	Deep	3,420	5,550
8/20/09	42.21	3573.85	387,234	2.66	Shallow	533	1,280
				11.71	Deep	3,560	5,380
11/3/09	42.29	3573.77	387,306	2.92	Shallow	620	1,380
				11.53	Deep	3,840	6,420
<b>MW-2s Casing Elev.=</b>		<b>3616.26</b>					
6/13/07	41.83	3574.43	113	1.27	Shallow	348	1,260
7/18/07	41.83	3574.43	--	--	--	--	--
8/9/07	41.89	3574.37	119	0.93	Shallow	213	624

**Table 1**  
**Laboratory Results Summary - Groundwater Samples**

Sample Date Location	DTW (csg)	GW Elevation (ft)	Recv. Vol (gal)	Field Cond.	Sample Depth	Chloride (mg/L)	TDS (mg/L)
12/6/07	41.93	3574.33	124	0.82	Shallow	142	634
4/3/08	41.98	3574.28	124	--	--	--	--
5/12/08	42.07	3574.19	132	0.76	Shallow	53.2	314
8/19/08	42.22	3574.04	139	0.64	Shallow	7.90	360
11/20/08	42.27	3573.99	145	0.77	Shallow	42.5	384
2/16/09	42.33	3573.93	150	0.75	Shallow	17.7	418
5/26/09	42.37	3573.89	158	0.59	Shallow	18.5	408
8/20/09	42.42	3573.84	163	0.68	Shallow	19.5	436
11/3/09	42.50	3573.76	169	0.70	Shallow	34.7	432
<b>MW-2d Casing Elev.=</b>		<b>3615.92</b>					
6/13/07	41.44	3574.48	320	4.59	Deep	<b>1,460</b>	<b>3,810</b>
7/18/07	41.46	3574.46	--	--	--	--	--
8/9/07	41.50	3574.42	405	3.63	Deep	<b>1,380</b>	<b>3,180</b>
12/6/07	41.55	3574.37	511	4.41	Deep	<b>1,640</b>	<b>3,160</b>
4/3/08	41.63	3574.29	511	--	--	--	--
5/12/08	41.69	3574.23	616	5.65	Deep	<b>1,170</b>	<b>2,200</b>
8/19/08	41.85	3574.07	704	5.48	Deep	<b>2,190</b>	<b>4,080</b>
11/20/08	41.91	3574.01	770	5.70	Deep	<b>2,552</b>	<b>3,410</b>
2/16/09	41.98	3573.94	833	6.91	Deep	<b>2,350</b>	<b>5,100</b>
5/26/09	42.04	3573.88	896	6.60	Deep	<b>2,390</b>	<b>5,300</b>
8/20/09	42.08	3573.84	959	8.23	Deep	<b>2,640</b>	<b>4,220</b>
11/3/09	42.15	3573.77	1,022	8.28	Deep	<b>2,750</b>	<b>5,220</b>
<b>MW-3s Casing Elev.=</b>		<b>3616.80</b>					
6/13/07	42.57	3574.23	148	8.77	Shallow	<b>4,480</b>	<b>10,600</b>
7/18/07	42.58	3574.22	--	--	--	--	--
8/9/07	42.62	3574.18	201	7.67	Shallow	<b>2,710</b>	<b>6,330</b>
12/6/07	42.68	3574.12	236	7.58	Shallow	<b>2,800</b>	<b>5,550</b>
4/3/08	42.75	3574.05	236	--	--	--	--
5/12/08	42.97	3573.83	266	5.43	Shallow	<b>2,021</b>	<b>3,470</b>
8/19/08	42.96	3573.84	294	3.88	Shallow	<b>1,330</b>	<b>2,870</b>
11/20/08	43.02	3573.78	322	5.31	Shallow	<b>1,755</b>	<b>3,230</b>
2/16/09	43.08	3573.72	346	5.77	Shallow	<b>1,820</b>	<b>3,220</b>
5/26/09	43.13	3573.67	378	6.07	Shallow	<b>1,990</b>	<b>4,280</b>
8/20/09	43.18	3573.62	402	7.80	Shallow	<b>2,140</b>	<b>4,000</b>
11/3/09	43.25	3573.55	426	7.97	Shallow	<b>2,390</b>	<b>5,220</b>
<b>MW-3d Casing Elev.=</b>		<b>3616.70</b>					
6/13/07	42.55	3574.15	97	16.65	Deep	<b>6,670</b>	<b>24,100</b>
7/18/07	42.53	3574.17	--	--	--	--	--
8/9/07	42.62	3574.08	242	>20.00	Deep	<b>11,000</b>	<b>27,400</b>
12/6/07	42.64	3574.06	294	>20.00	Deep	<b>10,000</b>	<b>14,200</b>
4/3/08	42.81	3573.89	294	--	--	--	--
5/12/08	63.00	3553.70	5,775	26.0	Deep	<b>10,850</b>	<b>17,200</b>
7/18/08	--	--	112,875	23.8	Deep	<b>10,100</b>	<b>17,600</b>
8/19/08	43.00	3573.70	112,925	19.2	Deep	<b>10,700</b>	<b>17,200</b>
11/20/08	43.03	3573.67	112,979	20.0	Deep	<b>10,740</b>	<b>14,900</b>
2/16/09	43.11	3573.59	113,033	20.0	Deep	<b>11,000</b>	<b>15,100</b>
5/26/09	43.16	3573.54	113,087	16.9	Deep	<b>9,270</b>	<b>16,700</b>
8/20/09	43.21	3573.49	113,138	20.0	Deep	<b>10,500</b>	<b>14,800</b>
11/3/09	43.29	3573.41	113,188	20.0	Deep	<b>10,400</b>	<b>15,900</b>

Table 1  
Laboratory Results Summary - Groundwater Samples

Sample Date Location	DTW (csg)	GW Elevation (ft)	Recv. Vol (gal)	Field Cond.	Sample Depth	Chloride (mg/L)	TDS (mg/L)
<b>MW-4s Casing Elev.=</b>		<b>3616.89</b>					
8/9/07	42.85	3574.04	18	0.72	Shallow	21.7	434
12/6/07	42.93	3573.96	25	0.66	Shallow	21.0	<b>1,060</b>
4/3/08	43.00	3573.89	29	0.69	Shallow	18.7	450
8/19/08	43.21	3573.68	33	0.70	Shallow	13.0	472
11/20/08	43.28	3573.61	37	0.72	Shallow	37.2	444
2/16/09	43.33	3573.56	42	0.85	Shallow	21.3	474
5/26/09	43.37	3573.52	46	0.61	Shallow	18.4	414
8/20/09	43.45	3573.44	50	0.70	Shallow	19.3	432
11/3/09	43.51	3573.38	56	0.70	Shallow	23.6	402
<b>MW-4d Casing Elev.=</b>		<b>3617.13</b>					
8/9/07	47.12	3570.01	12	0.92	Deep	88.2	576
12/6/07	43.17	3573.96	32	0.92	Deep	92.3	906
4/3/08	43.25	3573.88	53	0.95	Deep	83.4	590
8/19/08	43.44	3573.69	74	0.99	Deep	75.9	616
11/20/08	43.52	3573.61	95	0.99	Deep	106	544
2/16/09	43.58	3573.55	116	1.16	Deep	73.7	544
5/26/09	43.62	3573.51	137	0.87	Deep	79.5	552
8/20/09	43.68	3573.45	158	0.99	Deep	78.0	442
11/3/09	43.73	3573.40	179	0.98	Deep	86.8	528
<b>MW-5s Casing Elev.=</b>		<b>3616.43</b>					
8/9/07	42.10	3574.33	22	0.69	Shallow	43.0	470
12/6/07	42.18	3574.25	27	0.82	Shallow	35.8	982
4/3/08	42.26	3574.17	27	--	--	--	--
5/12/08	42.30	3574.13	32	0.85	Shallow	58.5	382
8/19/08	42.49	3573.94	37	0.72	Shallow	12.4	488
11/20/08	42.55	3573.88	43	0.74	Shallow	42.5	426
2/16/09	42.60	3573.83	48	0.85	Shallow	21.1	550
5/26/09	42.65	3573.78	53	0.62	Shallow	18.5	486
8/20/09	42.70	3573.73	58	0.72	Shallow	17.0	560
11/3/09	42.77	3573.66	63	0.69	Shallow	18.9	662
<b>MW-5d Casing Elev.=</b>		<b>3616.19</b>					
8/9/07	41.85	3574.34	96	0.80	Deep	112	502
12/6/07	41.93	3574.26	78	0.82	Deep	94.6	712
4/3/08	42.01	3574.18	78	--	--	--	--
5/12/08	42.05	3574.14	96	1.03	Deep	117	460
8/19/08	42.25	3573.94	117	0.97	Deep	113	476
11/20/08	42.30	3573.89	135	1.03	Deep	149	530
2/16/09	42.35	3573.84	153	1.24	Deep	155	548
5/26/09	42.40	3573.79	171	1.02	Deep	156	606
8/20/09	42.46	3573.73	189	1.27	Deep	203	832
11/3/09	42.52	3573.67	207	1.38	Deep	246	662
<b>N. Windmill Csg. Elev.=</b>		<b>3609.13</b>					
3/30/06	--	--	NA	--	--	33.6	644
6/27/06	34.25	3574.88	--	--	--	--	--
6/13/07	33.65	3575.48	NA	0.89	Unkn	62.8	500
<b>Water Well Csg. Elev.=</b>		<b>3615.58</b>					
6/27/06	40.40	3575.18	--	--	--	--	--
6/13/07	40.73	3574.85	--	--	--	--	--
<b>NMWQCC Standards</b>						<b>250</b>	<b>1,000</b>

\* Bold text indicates values exceed NMWQCC Standards



# **Appendix B**

## **Ground Water Monitoring Laboratory Reports**

**R.T. Hicks Consultants, Ltd.**

901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

# Analytical Report 350775

for

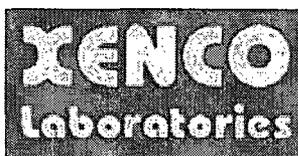
**R.T. Hicks Consultants, LTD**

**Project Manager: Dale Littlejohn**

**Samson Livestock 30**

**L-124-1109**

**09-NOV-09**



**12600 West I-20 East Odessa, Texas 79765**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAO00308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)  
Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)  
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)  
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)  
Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)  
Xenco-Boca Raton (EPA Lab Code: FL00449): Florida(E86240),  
South Carolina(96031001), Louisiana(04154), Georgia(917)



09-NOV-09

Project Manager: **Dale Littlejohn**  
**R.T. Hicks Consultants, LTD**  
901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Reference: XENCO Report No: **350775**  
**Samson Livestock 30**  
Project Address: Lea Co., NM

**Dale Littlejohn:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 350775. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 350775 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

**Brent Barron, II**

Odessa Laboratory Manager

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**Sample Cross Reference 350775**



**R.T. Hicks Consultants, LTD, Albuquerque, NM**  
Samson Livestock 30

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
MW-1 (S)	W	Nov-03-09 09:53		350775-001
MW-1 (D)	W	Nov-03-09 09:48		350775-002
MW-2 (S)	W	Nov-03-09 10:40		350775-003
MW-2 (D)	W	Nov-03-09 10:49		350775-004
MW-3 (S)	W	Nov-03-09 08:54		350775-005
MW-3 (D)	W	Nov-03-09 08:33		350775-006
MW-4 (S)	W	Nov-03-09 11:31		350775-007
MW-4 (D)	W	Nov-03-09 11:34		350775-008
MW-5 (S)	W	Nov-03-09 12:21		350775-009
MW-5 (D)	W	Nov-03-09 12:10		350775-010

## CASE NARRATIVE



*Client Name: R.T. Hicks Consultants, LTD*

*Project Name: Samson Livestock 30*

*Project ID: L-124-1109*

*Work Order Number: 350775*

*Report Date: 09-NOV-09*

*Date Received: 11/03/2009*

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**Sample receipt non conformances and Comments:**

*None*

---

**Sample receipt Non Conformances and Comments per Sample:**

*None*

**Analytical Non Conformances and Comments:**

*Batch: LBA-780328 Inorganic Anions by EPA 300*

*None*

*Batch: LBA-780417 TDS by SM2540C*

*None*





# Certificate of Analysis Summary 350775

## R.T. Hicks Consultants, LTD, Albuquerque, NM



Project Id: L-124-1109  
 Contact: Dale Littlejohn  
 Project Location: Lea Co., NM

Date Received in Lab: Tue Nov-03-09 04:03 pm  
 Report Date: 09-NOV-09  
 Project Manager: Brent Barron, II

Project Name: Samson Livestock 30

Lab Id:	350775-007	350775-008	350775-009	350775-010
<i>Field Id:</i>	MW-4 (S)	MW-4 (D)	MW-5 (S)	MW-5 (D)
<i>Depth:</i>				
<i>Matrix:</i>	WATER	WATER	WATER	WATER
<i>Sampled:</i>	Nov-03-09 11:31	Nov-03-09 11:34	Nov-03-09 12:21	Nov-03-09 12:10
<i>Extracted:</i>				
<i>Analyzed:</i>	Nov-04-09 22:36	Nov-04-09 22:36	Nov-04-09 22:36	Nov-04-09 22:36
<i>Units/RL:</i>	mg/L RL 23.6 5.00	mg/L RL 86.8 5.00	mg/L RL 18.9 5.00	mg/L RL 246 5.00
Chloride				
<i>Extracted:</i>				
<i>Analyzed:</i>	Nov-04-09 15:42	Nov-04-09 15:42	Nov-04-09 15:42	Nov-04-09 15:42
<i>Units/RL:</i>	mg/L RL 402 5.00	mg/L RL 528 5.00	mg/L RL 378 5.00	mg/L RL 662 5.00
Total dissolved solids				

**Analysis Requested**

**Anions by E300**

**TDS by SM2540C**

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Brent Barron, II  
 Odessa Laboratory Manager



# Flagging Criteria



- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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9701 Harry Hines Blvd , Dallas, TX 75220	(214) 902 0300	(214) 351-9139
5332 Blackberry Drive, San Antonio TX 78238	(210) 509-3334	(210) 509-3335
2505 North Falkenburg Rd, Tampa, FL 33619	(813) 620-2000	(813) 620-2033
5757 NW 158th St, Miami Lakes, FL 33014	(305) 823-8500	(305) 823-8555
12600 West I-20 East, Odessa, TX 79765	(432) 563-1800	(432) 563-1713
842 Cantwell Lane, Corpus Christi, TX 78408	(361) 884-0371	(361) 884-9116



# Blank Spike Recovery



Project Name: Samson Livestock 30

Work Order #: 350775

Project ID:

L-124-1109

Lab Batch #: 780328

Sample: 780328-1-BKS

Matrix: Water

Date Analyzed: 11/04/2009

Date Prepared: 11/04/2009

Analyst: LATCOR

Reporting Units: mg/L

Batch #: 1

## BLANK /BLANK SPIKE RECOVERY STUDY

Anions by E300  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Chloride	ND	10.0	10.5	105	90-110	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



# BS / BSD Recoveries



Project Name: Samson Livestock 30

Work Order #: 350775

Analyst: WRU

Lab Batch ID: 780417

Sample: 780417-1-BKS

Date Prepared: 11/04/2009

Batch #: 1

Project ID: L-124-1109

Date Analyzed: 11/04/2009

Matrix: Water

Units: mg/L

BLANK / BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
TDS by SM2540C	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes	ND	1000	900	90	1000	914	91	2	80-120	30	
Total dissolved solids											

Relative Percent Difference RPD =  $200 * (C - F) / (C + F)$

Blank Spike Recovery [D] =  $100 * (C) / [B]$

Blank Spike Duplicate Recovery [G] =  $100 * (F) / [E]$

All results are based on MDL and Validated for QC Purposes



# Form 3 - MS Recoveries



Project Name: Samson Livestock 30

Work Order #: 350775

Lab Batch #: 780328

Project ID: L-124-1109

Date Analyzed: 11/04/2009

Date Prepared: 11/04/2009

Analyst: LATCOR

QC- Sample ID: 350773-001 S

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

Inorganic Anions by EPA 300	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Chloride	82.5	100	183	101	90-110	

Matrix Spike Percent Recovery [D] = 100\*(C-A)/B

Relative Percent Difference [E] = 200\*(C-A)/(C+B)

All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Sample Duplicate Recovery



Project Name: Samson Livestock 30

Work Order #: 350775

Lab Batch #: 780328

Project ID: L-124-1109

Date Analyzed: 11/04/2009

Date Prepared: 11/04/2009

Analyst: LATCOR

QC- Sample ID: 350773-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Anions by E300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Chloride	82.5	75.7	9	20	

Lab Batch #: 780417

Date Analyzed: 11/04/2009

Date Prepared: 11/04/2009

Analyst: WRU

QC- Sample ID: 350773-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

SAMPLE / SAMPLE DUPLICATE RECOVERY					
TDS by SM2540C	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total dissolved solids	540	584	8	30	

Spike Relative Difference RPD 200 \* |(B-A)/(B+A)|  
 All Results are based on MDL and validated for QC purposes.  
 BRL - Below Reporting Limit



## Environmental Lab of Texas

### Variance/ Corrective Action Report- Sample Log-In

Client: R.T. Hicks  
 Date/ Time: 11.3.09 16:03  
 Lab ID #: 350715  
 Initials: AL

#### Sample Receipt Checklist

				Client Initials
#1 Temperature of container/ cooler?	(Yes)	No	.1 °C	
#2 Shipping container in good condition?	(Yes)	No		
#3 Custody Seals intact on shipping container/ cooler?	Yes	No	(Not Present)	
#4 Custody Seals intact on sample bottles/ container?	Yes	No	(Not Present)	
#5 Chain of Custody present?	(Yes)	No		
#6 Sample instructions complete of Chain of Custody?	(Yes)	No		
#7 Chain of Custody signed when relinquished/ received?	(Yes)	No		
#8 Chain of Custody agrees with sample label(s)?	(Yes)	No	ID written on Cont./ Lid	
#9 Container label(s) legible and intact?	(Yes)	No	Not Applicable	
#10 Sample matrix/ properties agree with Chain of Custody?	(Yes)	No		
#11 Containers supplied by ELOT?	(Yes)	No		
#12 Samples in proper container/ bottle?	(Yes)	No	See Below	
#13 Samples properly preserved?	(Yes)	No	See Below	
#14 Sample bottles intact?	(Yes)	No		
#15 Preservations documented on Chain of Custody?	(Yes)	No		
#16 Containers documented on Chain of Custody?	(Yes)	No		
#17 Sufficient sample amount for indicated test(s)?	(Yes)	No	See Below	
#18 All samples received within sufficient hold time?	(Yes)	No	See Below	
#19 Subcontract of sample(s)?	Yes	No	(Not Applicable)	
#20 VOC samples have zero headspace?	Yes	No	(Not Applicable)	

#### Variance Documentation

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/ Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

- Check all that Apply:
- See attached e-mail/ fax
  - Client understands and would like to proceed with analysis
  - Cooling process had begun shortly after sampling event

# Analytical Report 341698

for

**R.T. Hicks Consultants, LTD**

**Project Manager: Dale Littlejohn**

**Samson Livestock 30**

**L-124-0809**

**31-AUG-09**



**12600 West I-20 East Odessa, Texas 79765**

Xenco-Houston (EPA Lab code: TX00122):

Texas (T104704215-08-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)  
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)  
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)  
Rhode Island (LAA000308), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):

Florida (E87428), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)  
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)

Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)

Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-08-TX)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-08-TX)

Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370-08-TX)

Xenco-Boca Raton (EPA Lab Code: FL00449): Florida(E86240),

South Carolina(96031001), Louisiana(04154), Georgia(917)



31-AUG-09

Project Manager: **Dale Littlejohn**  
**R.T. Hicks Consultants, LTD**  
901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Reference: XENCO Report No: **341698**  
**Samson Livestock 30**  
Project Address: Lea Co., NM

**Dale Littlejohn:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 341698. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 341698 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

**Brent Barron, II**

Odessa Laboratory Manager

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**Sample Cross Reference 341698**



**R.T. Hicks Consultants, LTD, Albuquerque, NM**  
Samson Livestock 30

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
MW-1 (S)	W	Aug-20-09 09:05		341698-001
MW-1 (D)	W	Aug-20-09 08:57		341698-002
MW-2 (S)	W	Aug-20-09 09:44		341698-003
MW-2 (D)	W	Aug-20-09 09:50		341698-004
MW-3 (S)	W	Aug-20-09 07:58		341698-005
MW-3 (D)	W	Aug-20-09 07:40		341698-006
MW-4 (S)	W	Aug-20-09 10:32		341698-007
MW-4 (D)	W	Aug-20-09 10:50		341698-008
MW-5 (S)	W	Aug-20-09 11:27		341698-009
MW-5 (D)	W	Aug-20-09 11:24		341698-010

## CASE NARRATIVE



*Client Name: R.T. Hicks Consultants, LTD*

*Project Name: Samson Livestock 30*

*Project ID: L-124-0809*

*Report Date: 31-AUG-09*

*Work Order Number: 341698*

*Date Received: 08/20/2009*

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**Sample receipt non conformances and Comments:**

*None*

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**Sample receipt Non Conformances and Comments per Sample:**

*None*

**Analytical Non Conformances and Comments:**

*Batch: LBA-769442 Inorganic Anions by EPA 300*

*None*

*Batch: LBA-769774 TDS by SM2540C*

*None*





# Certificate of Analysis Summary 341698

## R.T. Hicks Consultants, LTD, Albuquerque, NM



Project Id: L-124-0809  
 Contact: Dale Littlejohn  
 Project Location: Lea Co., NM

Date Received in Lab: Thu Aug-20-09 03:17 pm  
 Report Date: 31-AUG-09  
 Project Manager: Brent Barron, II

Project Name: Samson Livestock 30

Analysis Requested	Lab Id:	341698-007	341698-008	341698-009	341698-010
	<i>Field Id:</i>	MW-4 (S)	MW-4 (D)	MW-5 (S)	MW-5 (D)
	<i>Depth:</i>				
	<i>Matrix:</i>	WATER	WATER	WATER	WATER
	<i>Sampled:</i>	Aug-20-09 10:32	Aug-20-09 10:50	Aug-20-09 11:27	Aug-20-09 11:24
<b>Anions by EPA 300</b>	<i>Extracted:</i>				
	<i>Analyzed:</i>	Aug-21-09 17:10	Aug-21-09 17:33	Aug-21-09 17:56	Aug-21-09 18:19
	<i>Units/RL:</i>	mg/L RL 19.3 5.00	mg/L RL 78.0 5.00	mg/L RL 17.0 5.00	mg/L RL 203 5.00
<b>TDS by SM2540C</b>	<i>Extracted:</i>				
	<i>Analyzed:</i>	Aug-24-09 14:30	Aug-24-09 14:30	Aug-24-09 14:30	Aug-24-09 14:30
	<i>Units/RL:</i>	mg/L RL 432 5.00	mg/L RL 442 5.00	mg/L RL 560 5.00	mg/L RL 832 5.00
Total dissolved solids					

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Brent Barron, II  
 Odessa Laboratory Manager



# Flagging Criteria



- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL** Below Reporting Limit.
- RL** Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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 5332 Blackberry Drive, San Antonio TX 78238  
 2505 North Falkenburg Rd, Tampa, FL 33619  
 5757 NW 158th St, Miami Lakes, FL 33014  
 12600 West I-20 East, Odessa, TX 79765  
 842 Cantwell Lane, Corpus Christi, TX 78408

Phone	Fax
(281) 240-4200	(281) 240-4280
(214) 902 0300	(214) 351-9139
(210) 509-3334	(210) 509-3335
(813) 620-2000	(813) 620-2033
(305) 823-8500	(305) 823-8555
(432) 563-1800	(432) 563-1713
(361) 884-0371	(361) 884-9116



# Blank Spike Recovery



Project Name: Samson Livestock 30

Work Order #: 341698

Project ID:

L-124-0809

Lab Batch #: 769442

Sample: 769442-1-BKS

Matrix: Water

Date Analyzed: 08/21/2009

Date Prepared: 08/21/2009

Analyst: LATCOR

Reporting Units: mg/L

Batch #: 1

### BLANK /BLANK SPIKE RECOVERY STUDY

Anions by EPA 300 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Chloride	ND	10.0	10.6	106	80-120	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



# BS / BSD Recoveries



Project Name: Samson Livestock 30

Work Order #: 341698

Analyst: WRU

Lab Batch ID: 769774

Sample: 769774-1-BKS

Batch #: 1

Date Prepared: 08/24/2009

Project ID: L-124-0809

Date Analyzed: 08/24/2009

Matrix: Water

Units: mg/L

BLANK / BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
<b>TDS by SM2540C</b>	ND	1000	854	85	1000	920	92	7	80-120	30	
<b>Analytes</b>											
Total dissolved solids											

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$   
 Blank Spike Recovery [D] =  $100 * (C)/[B]$   
 Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$   
 All results are based on MDL and Validated for QC Purposes



# Form 3 - MS Recoveries



Project Name: Samson Livestock 30

Work Order #: 341698

Lab Batch #: 769442

Project ID: L-124-0809

Date Analyzed: 08/21/2009

Date Prepared: 08/21/2009

Analyst: LATCOR

QC- Sample ID: 341725-001 S

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

Inorganic Anions by EPA 300	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Chloride	477	200	691	107	80-120	

Matrix Spike Percent Recovery [D] =  $100 \cdot (C-A) / B$   
 Relative Percent Difference [E] =  $200 \cdot (C-A) / (C+B)$   
 All Results are based on MDL and Validated for QC Purposes  
 BRL - Below Reporting Limit



# Sample Duplicate Recovery



Project Name: Samson Livestock 30

Work Order #: 341698

Lab Batch #: 769442

Project ID: L-124-0809

Date Analyzed: 08/21/2009

Date Prepared: 08/21/2009

Analyst: LATCOR

QC- Sample ID: 341725-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Anions by EPA 300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Chloride	477	467	2	20	

Lab Batch #: 769774

Date Analyzed: 08/24/2009

Date Prepared: 08/24/2009

Analyst: WRU

QC- Sample ID: 341698-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

SAMPLE / SAMPLE DUPLICATE RECOVERY					
TDS by SM2540C	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total dissolved solids	1280	1330	4	30	

Spike Relative Difference  $RPD = 200 * |(B-A)/(B+A)|$

All Results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



**Environmental Lab of Texas**  
**Variance/Corrective Action Report - Sample Log-In**

Client: RT Hicks  
 Date/Time: 8-20-09 15:17  
 Lab ID #: 341698  
 Initials: al

**Sample Receipt Checklist**

	Yes	No	Client Initials
#1: Temperature of container/cooler?	(Yes)	No	
#2: Shipping container in good condition?	(Yes)	No	
#3: Custody Seals intact on shipping container/cooler?	Yes	No	Not Present
#4: Custody Seals intact on sample bottles/container?	Yes	No	Not Present
#5: Chain of Custody present?	(Yes)	No	
#6: Sample instructions complete of Chain of Custody?	(Yes)	No	
#7: Chain of Custody signed when relinquished/received?	(Yes)	No	
#8: Chain of Custody agrees with sample label(s)?	(Yes)	No	ID written on Cont./Lid
#9: Container label(s) legible and intact?	(Yes)	No	Not Applicable
#10: Sample matrix/properties agree with Chain of Custody?	(Yes)	No	
#11: Containers supplied by ELOT?	(Yes)	No	
#12: Samples in proper container/bottle?	(Yes)	No	See Below
#13: Samples properly preserved?	(Yes)	No	See Below
#14: Sample bottles intact?	(Yes)	No	
#15: Preservations documented on Chain of Custody?	(Yes)	No	
#16: Containers documented on Chain of Custody?	(Yes)	No	
#17: Sufficient sample amount for indicated test(s)?	(Yes)	No	See Below
#18: All samples received within sufficient hold time?	(Yes)	No	See Below
#19: Subcontract of sample(s)?	Yes	No	Not Applicable
#20: VOC samples have zero headspace?	Yes	No	Not Applicable

**Variance Documentation**

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

- Check all that Apply:
- See attached e-mail/fax.
  - Client understands and would like to proceed with analysis.
  - Cooling process had begun shortly after sampling event.

# Analytical Report 333728

for

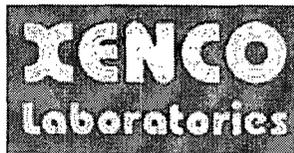
**R.T. Hicks Consultants, LTD**

**Project Manager: Dale Littlejohn**

**Samson Livestock 30**

**L-124-0509**

**28-MAY-09**



**12600 West I-20 East Odessa, Texas 79765**

Texas certification numbers:

Houston, TX T104704215-08B-TX - Odessa/Midland, TX T104704400-08-TX  
Corpus Christi, TX T104704370-08-TX - Dallas, TX T104704295-08-TX

Florida certification numbers:

Houston, TX E871002 - Miami, FL E86678 - Tampa, FL E86675  
Miramar, FL E86349  
Norcross(Atlanta), GA E87429

South Carolina certification numbers:

Norcross(Atlanta), GA 98015

North Carolina certification numbers:

Norcross(Atlanta), GA 483

Houston - Dallas - San Antonio - Tampa - Miami - Latin America  
Midland - Corpus Christi - Atlanta



28-MAY-09

Project Manager: **Dale Littlejohn**  
**R.T. Hicks Consultants, LTD**  
901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Reference: XENCO Report No: **333728**  
**Samson Livestock 30**  
Project Address: Lea Co., NM

**Dale Littlejohn:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 333728. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 333728 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

---

**Brent Barron, II**  
Odessa Laboratory Manager

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**Sample Cross Reference 333728**



**R.T. Hicks Consultants, LTD, Albuquerque, NM**  
Samson Livestock 30

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
MW-1 (s)	W	May-26-09 08:46		333728-001
MW-1 (d)	W	May-26-09 08:51		333728-002
MW-2 (s)	W	May-26-09 09:40		333728-003
MW-2 (d)	W	May-26-09 09:47		333728-004
MW-3 (s)	W	May-26-09 07:57		333728-005
MW-3 (d)	W	May-26-09 07:28		333728-006
MW-4 (s)	W	May-26-09 10:25		333728-007
MW-4 (d)	W	May-26-09 10:33		333728-008
MW-5 (s)	W	May-26-09 11:15		333728-009
MW-5 (d)	W	May-26-09 11:09		333728-010





# Certificate of Analysis Summary 333728

## R.T. Hicks Consultants, LTD, Albuquerque, NM



Project Id: L-124-0509  
 Contact: Dale Littlejohn  
 Project Location: Lea Co., NM

Date Received in Lab: Wed May-27-09 08:42 am  
 Report Date: 28-MAY-09  
 Project Manager: Brent Barron, II

Project Name: Samson Livestock 30

Lab Id:	Field Id:	Depth:	Matrix:	Sampled:	Extracted:	Analyzed:	Units/RL:
333728-007	MW-4 (s)		WATER	May-26-09 10:25	May-27-09 13:50	May-27-09 16:00	mg/L RL 5.00
333728-008	MW-4 (d)		WATER	May-26-09 10:33	May-27-09 13:50	May-27-09 16:00	mg/L RL 5.00
333728-009	MW-5 (s)		WATER	May-26-09 11:15	May-27-09 13:50	May-27-09 16:00	mg/L RL 5.00
333728-010	MW-5 (d)		WATER	May-26-09 11:09	May-27-09 13:50	May-27-09 16:00	mg/L RL 5.00
<b>Analysis Requested</b>							
<b>Anions by EPA 300</b>							
Chloride *							
<b>TDS by SM2540C</b>							
Total dissolved solids							

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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 Brent Barron  
 Odessa Laboratory Director



# Flagging Criteria



- X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F RPD exceeded lab control limits.
- J The target analyte was positively identified below the MQL and above the SQL.
- U Analyte was not detected.
- L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K Sample analyzed outside of recommended hold time.
- JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- BRL Below Reporting Limit.
- RL Reporting Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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5332 Blackberry Drive, San Antonio TX 78238	(210) 509-3334	(210) 509-3335
2505 North Falkenburg Rd. Tampa, FL 33619	(813) 620-2000	(813) 620-2033
5757 NW 158th St. Miami Lakes, FL 33014	(305) 823-8500	(305) 823-8555
12600 West I-20 East, Odessa, TX 79765	(432) 563-1800	(432) 563-1713
842 Cantwell Lane, Corpus Christi, TX 78408	(361) 884-0371	(361) 884-9116



# Blank Spike Recovery



**Project Name: Samson Livestock 30**

**Work Order #: 333728**

**Project ID:**

L-124-0509

**Lab Batch #: 760251**

**Sample: 760251-1-BKS**

**Matrix: Water**

**Date Analyzed: 05/27/2009**

**Date Prepared: 05/27/2009**

**Analyst: LATCOR**

**Reporting Units: mg/L**

**Batch #: 1**

### BLANK /BLANK SPIKE RECOVERY STUDY

Anions by EPA 300  Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Chloride	ND	10.0	9.68	97	90-110	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.

BRL - Below Reporting Limit



Project Name: Samson Livestock 30

Work Order #: 333728

Analyst: WRU

Lab Batch ID: 760281

Sample: 760281-1-BKS

Date Prepared: 05/27/2009

Batch #: 1

Project ID: L-124-0509

Date Analyzed: 05/27/2009

Matrix: Water

Units: mg/L

BLANK / BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TDS by SM2540C	ND	1000	924	92	1000	972	97	5	80-120	30	
Analytes											
Total dissolved solids											

Relative Percent Difference RPD =  $200 * |(C-F)/(C+F)|$   
 Blank Spike Recovery [D] =  $100 * (C)/[B]$   
 Blank Spike Duplicate Recovery [G] =  $100 * (F)/[E]$   
 All results are based on MDL and Validated for QC Purposes



# Form 3 - MS Recoveries



Project Name: Samson Livestock 30

Work Order #: 333728

Lab Batch #: 760251

Project ID: L-124-0509

Date Analyzed: 05/27/2009

Date Prepared: 05/27/2009

Analyst: LATCOR

QC- Sample ID: 333690-001 S

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

Inorganic Anions by EPA 300	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Chloride	52.0	100	150	98	80-120	

Matrix Spike Percent Recovery [D] =  $100 \cdot (C-A)/B$   
 Relative Percent Difference [E] =  $200 \cdot (C-A)/(C+B)$   
 All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit



# Sample Duplicate Recovery



Project Name: Samson Livestock 30

Work Order #: 333728

Lab Batch #: 760251

Date Analyzed: 05/27/2009

QC- Sample ID: 333690-001 D

Reporting Units: mg/L

Project ID: L-124-0509

Analyst: LATCOR

Matrix: Water

Date Prepared: 05/27/2009

Batch #: 1

### SAMPLE / SAMPLE DUPLICATE RECOVERY

Anions by EPA 300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Chloride	52.0	52.7	1	20	

Lab Batch #: 760281

Date Analyzed: 05/27/2009

QC- Sample ID: 333727-001 D

Reporting Units: mg/L

Date Prepared: 05/27/2009

Analyst: WRU

Matrix: Water

Batch #: 1

### SAMPLE / SAMPLE DUPLICATE RECOVERY

TDS by SM2540C	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total dissolved solids	554	564	2	30	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$   
 All Results are based on MDL and validated for QC purposes.  
 BRL - Below Reporting Limit



**Environmental Lab of Texas**  
**Variance/ Corrective Action Report- Sample Log-In**

Client: RT Hicks  
 Date/Time: 5/27/09 8:42  
 Lab ID #: 333728  
 Initials: AL

**Sample Receipt Checklist**

	Yes	No	Client Initials
#1 Temperature of container/ cooler?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
#2 Shipping container in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#3 Custody Seals intact on shipping container/ cooler?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<Not Present>
#4 Custody Seals intact on sample bottles/ container?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<Not Present>
#5 Chain of Custody present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#6 Sample instructions complete of Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#7 Chain of Custody signed when relinquished/ received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#8 Chain of Custody agrees with sample label(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID written on Cont./ Lid.
#9 Container label(s) legible and intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not Applicable
#10 Sample matrix/ properties agree with Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#11 Containers supplied by ELOT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#12 Samples in proper container/ bottle?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Below
#13 Samples properly preserved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Below
#14 Sample bottles intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#15 Preservations documented on Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#16 Containers documented on Chain of Custody?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
#17 Sufficient sample amount for indicated test(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Below
#18 All samples received within sufficient hold time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Below
#19 Subcontract of sample(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not Applicable
#20 VOC samples have zero headspace?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<Not Applicable>

**Variance Documentation**

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_

- Check all that Apply
- See attached e-mail/ fax
  - Client understands and would like to proceed with analysis
  - Cooling process had begun shortly after sampling event

# Analytical Report 325217

for

**R.T. Hicks Consultants, LTD**

**Project Manager: Dale Littlejohn**

**Samson Livestock 30**

**L-124-0209**

**19-FEB-09**



**12600 West I-20 East Odessa, Texas 79765**

Texas certification numbers:

Houston, TX T104704215-08B-TX - Odessa/Midland, TX T104704400-08-TX

Florida certification numbers:

Houston, TX E871002 - Miami, FL E86678 - Tampa, FL E86675

Norcross(Atlanta), GA E87429

South Carolina certification numbers:

Norcross(Atlanta), GA 98015

North Carolina certification numbers:

Norcross(Atlanta), GA 483

Houston - Dallas - San Antonio - Tampa - Miami - Latin America

Midland - Corpus Christi - Atlanta



19-FEB-09

Project Manager: **Dale Littlejohn**  
**R.T. Hicks Consultants, LTD**  
901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Reference: XENCO Report No: **325217**  
**Samson Livestock 30**  
Project Address: Lea Co., NM

**Dale Littlejohn:**

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 325217. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 325217 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

**Brent Barron, II**

Odessa Laboratory Manager

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**Sample Cross Reference 325217**



**R.T. Hicks Consultants, LTD, Albuquerque, NM**  
Samson Livestock 30

<b>Sample Id</b>	<b>Matrix</b>	<b>Date Collected</b>	<b>Sample Depth</b>	<b>Lab Sample Id</b>
MW-1(s)	W	Feb-16-09 09:32		325217-001
MW-1 (d)	W	Feb-16-09 09:40		325217-002
MW-2 (s)	W	Feb-16-09 10:20		325217-003
MW-2 (d)	W	Feb-16-09 10:38		325217-004
MW-3 (s)	W	Feb-16-09 08:38		325217-005
MW-3 (d)	W	Feb-16-09 08:03		325217-006
MW-4 (s)	W	Feb-16-09 11:18		325217-007
MW-4 (d)	W	Feb-16-09 11:23		325217-008
MW-5 (s)	W	Feb-16-09 11:57		325217-009
MW-5 (d)	W	Feb-16-09 12:00		325217-010



# Certificate of Analysis Summary 325217

R.T. Hicks Consultants, LTD, Albuquerque, NM  
Project Name: Samson Livestock 30



Project Id: L-124-0209  
Contact: Dale Littlejohn  
Project Location: Lea Co., NM

Date Received in Lab: Tue Feb-17-09 03:30 pm  
Report Date: 19-FEB-09  
Project Manager: Brent Barron, II

Lab Id:	Field Id:	Depth:	Matrix:	Sampled:	Extracted:	Analyzed:	Units/RL:
325217-001	MW-1(s)		WATER	Feb-16-09 09:32	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 12.5
325217-002	MW-1 (d)		WATER	Feb-16-09 09:40	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 3850 50.0
325217-003	MW-2 (s)		WATER	Feb-16-09 10:20	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 17.7 5.00
325217-004	MW-2 (d)		WATER	Feb-16-09 10:38	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 2350 50.0
325217-005	MW-3 (s)		WATER	Feb-16-09 08:38	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 1820 50.0
325217-006	MW-3 (d)		WATER	Feb-16-09 08:03	Feb-19-09 01:00	Feb-18-09 15:41	mg/L RL 11000 250
<b>Anions by EPA 300</b>							
Chloride							
<b>TDS by SM2540C</b>							
Total dissolved solids							

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Brent Barron  
Odessa Laboratory Director



# Certificate of Analysis Summary 325217

## R.T. Hicks Consultants, LTD, Albuquerque, NM



Project Id: L-124-0209  
 Contact: Dale Littlejohn  
 Project Location: Lea Co., NM

Date Received in Lab: Tue Feb-17-09 03:30 pm  
 Report Date: 19-FEB-09  
 Project Manager: Brent Barron, II

Project Name: Samson Livestock 30

Lab Id:	325217-007	325217-008	325217-009	325217-010
<b>Field Id:</b>	MW-4 (s)	MW-4 (d)	MW-5 (s)	MW-5 (d)
<b>Depth:</b>				
<b>Matrix:</b>	WATER	WATER	WATER	WATER
<b>Sampled:</b>	Feb-16-09 11:18	Feb-16-09 11:23	Feb-16-09 11:57	Feb-16-09 12:00
<b>Extracted:</b>				
<b>Analyzed:</b>	Feb-19-09 01:00	Feb-19-09 01:00	Feb-19-09 01:00	Feb-19-09 01:00
<b>Units/RL:</b>	mg/L RL 21.3 5.00	mg/L RL 73.7 5.00	mg/L RL 21.1 5.00	mg/L RL 155 5.00
<b>Extracted:</b>				
<b>Analyzed:</b>	Feb-18-09 15:41	Feb-18-09 15:41	Feb-18-09 15:41	Feb-18-09 15:41
<b>Units/RL:</b>	mg/L RL 474 5.00	mg/L RL 544 5.00	mg/L RL 550 5.00	mg/L RL 548 5.00
<b>Total dissolved solids</b>				

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 Brent Barron  
 Odessa Laboratory Director



# Flagging Criteria



- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the MQL and above the SQL.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

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5332 Blackberry Drive, San Antonio TX 78238	(210) 509-3334	(210) 509-3335
2505 North Falkenburg Rd, Tampa, FL 33619	(813) 620-2000	(813) 620-2033
5757 NW 158th St, Miami Lakes, FL 33014	(305) 823-8500	(305) 823-8555
12600 West I-20 East, Odessa, TX 79765	(432) 563-1800	(432) 563-1713
842 Cantwell Lane, Corpus Christi, TX 78408	(361) 884-0371	(361) 884-9116



# Blank Spike Recovery



Project Name: Samson Livestock 30

Work Order #: 325217

Project ID:

L-124-0209

Lab Batch #: 750052

Sample: 750052-1-BKS

Matrix: Water

Date Analyzed: 02/19/2009

Date Prepared: 02/19/2009

Analyst: LATCOR

Reporting Units: mg/L

Batch #: 1

## BLANK /BLANK SPIKE RECOVERY STUDY

Anions by EPA 300 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Chloride	ND	10.0	10.3	103	90-110	

Blank Spike Recovery [D] = 100\*[C]/[B]

All results are based on MDL and validated for QC purposes.



# Form 3 - MS Recoveries



Project Name: Samson Livestock 30

Work Order #: 325217

Lab Batch #: 750052

Project ID: L-124-0209

Date Analyzed: 02/19/2009

Date Prepared: 02/19/2009

Analyst: LATCOR

QC- Sample ID: 325202-001 S

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## MATRIX / MATRIX SPIKE RECOVERY STUDY

Inorganic Anions by EPA 300	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Analytes						
Chloride	66.6	100	173	106	80-120	

Matrix Spike Percent Recovery [D] =  $100 \cdot (C-A)/B$   
 Relative Percent Difference [E] =  $200 \cdot (C-A)/(C+B)$   
 All Results are based on MDL and Validated for QC Purposes



# Sample Duplicate Recovery



Project Name: Samson Livestock 30

Work Order #: 325217

Lab Batch #: 750052

Project ID: L-124-0209

Date Analyzed: 02/19/2009

Date Prepared: 02/19/2009

Analyst: LATCOR

QC- Sample ID: 325202-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## SAMPLE / SAMPLE DUPLICATE RECOVERY

Anions by EPA 300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Chloride	66.6	64.9	3	20	

Lab Batch #: 750117

Date Analyzed: 02/18/2009

Date Prepared: 02/18/2009

Analyst: WRU

QC- Sample ID: 325202-001 D

Batch #: 1

Matrix: Water

Reporting Units: mg/L

## SAMPLE / SAMPLE DUPLICATE RECOVERY

TDS by SM2540C	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total dissolved solids	760	812	7	30	

Spike Relative Difference RPD  $200 * |(B-A)/(B+A)|$   
 All Results are based on MDL and validated for QC purposes.



**Environmental Lab of Texas**

Variance/ Corrective Action Report- Sample Log-In

Client: RT Hicks  
 Date/ Time: 2-17-09 15:30  
 Lab ID #: 325217  
 Initials: GL

**Sample Receipt Checklist**

Client Initials

	Yes	No		
#1 Temperature of container/ cooler?	Yes	No	40 °C	
#2 Shipping container in good condition?	Yes	No		
#3 Custody Seals intact on shipping container/ cooler?	Yes	No	Not Present	
#4 Custody Seals intact on sample bottles/ container?	Yes	No	Not Present	
#5 Chain of Custody present?	Yes	No		
#6 Sample instructions complete of Chain of Custody?	Yes	No		
#7 Chain of Custody signed when relinquished/ received?	Yes	No		
#8 Chain of Custody agrees with sample label(s)?	Yes	No	ID written on Cont./ Lid	
#9 Container label(s) legible and intact?	Yes	No	Not Applicable	
#10 Sample matrix/ properties agree with Chain of Custody?	Yes	No		
#11 Containers supplied by ELOT?	Yes	No		
#12 Samples in proper container/ bottle?	Yes	No	See Below	
#13 Samples properly preserved?	Yes	No	See Below	
#14 Sample bottles intact?	Yes	No		
#15 Preservations documented on Chain of Custody?	Yes	No		
#16 Containers documented on Chain of Custody?	Yes	No		
#17 Sufficient sample amount for indicated test(s)?	Yes	No	See Below	
#18 All samples received within sufficient hold time?	Yes	No	See Below	
#19 Subcontract of sample(s)?	Yes	No	Not Applicable	
#20 VOC samples have zero headspace?	Yes	No	Not Applicable	

**Variance Documentation**

Contact: \_\_\_\_\_ Contacted by: \_\_\_\_\_ Date/ Time: \_\_\_\_\_

Regarding: \_\_\_\_\_

Corrective Action Taken: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- Check all that Apply:
- See attached e-mail/ fax
  - Client understands and would like to proceed with analysis
  - Cooling process had begun shortly after sampling event



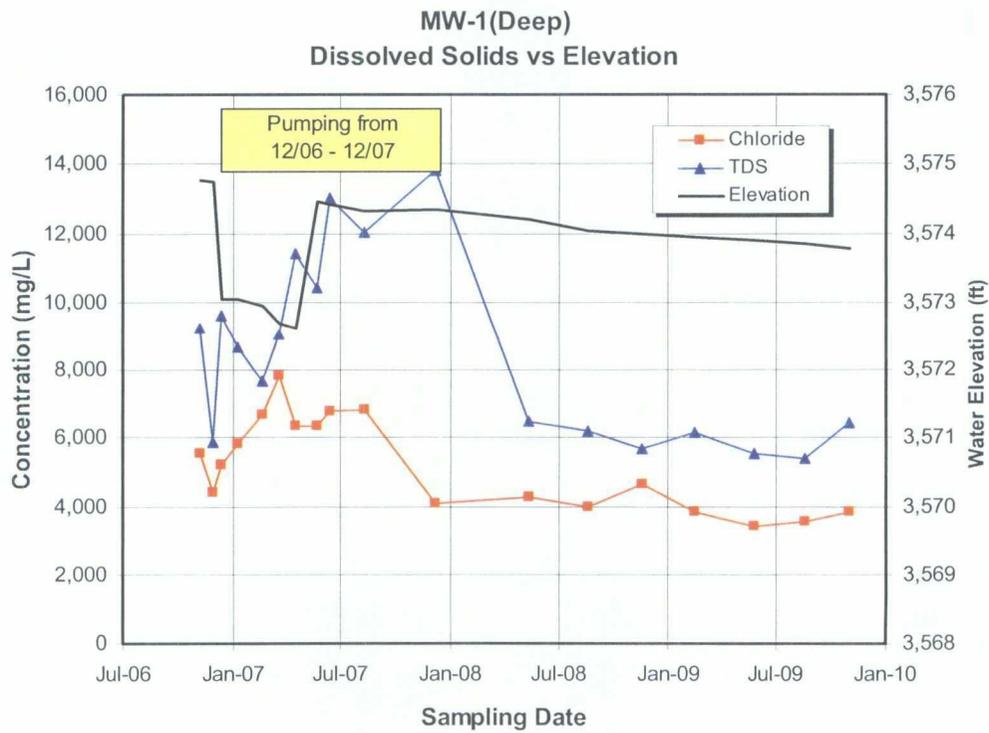
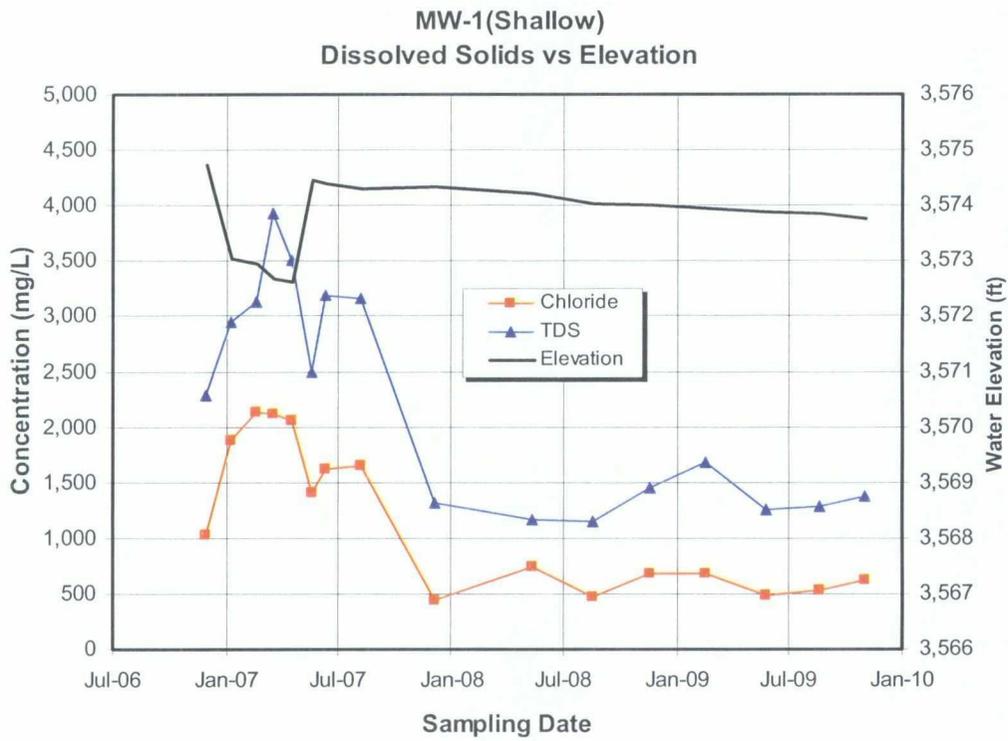
# Appendix C

## Graphs - Historic Ground Water Data

**R.T. Hicks Consultants, Ltd.**

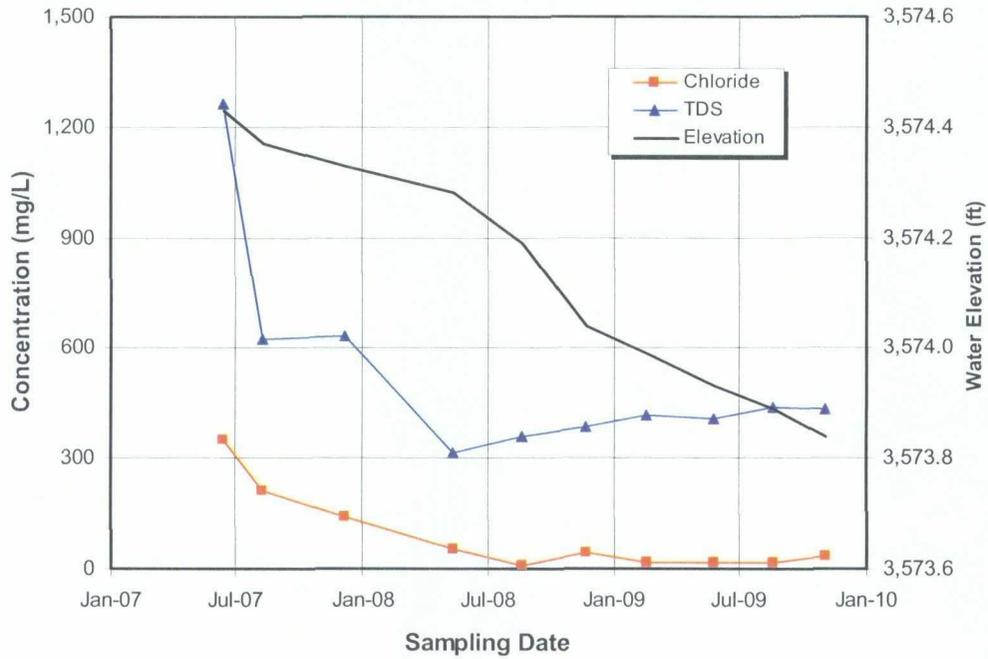
901 Rio Grande Blvd. NW, Suite F-142  
Albuquerque, NM 87104

Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

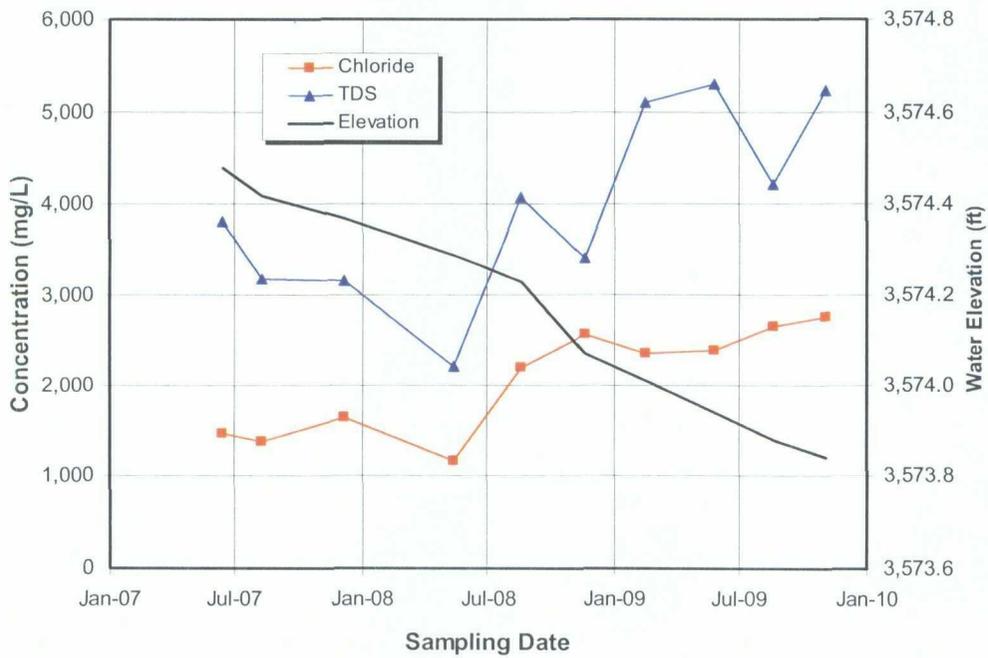


Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

MW-2 (Shallow)  
Dissolved Solids vs Elevation

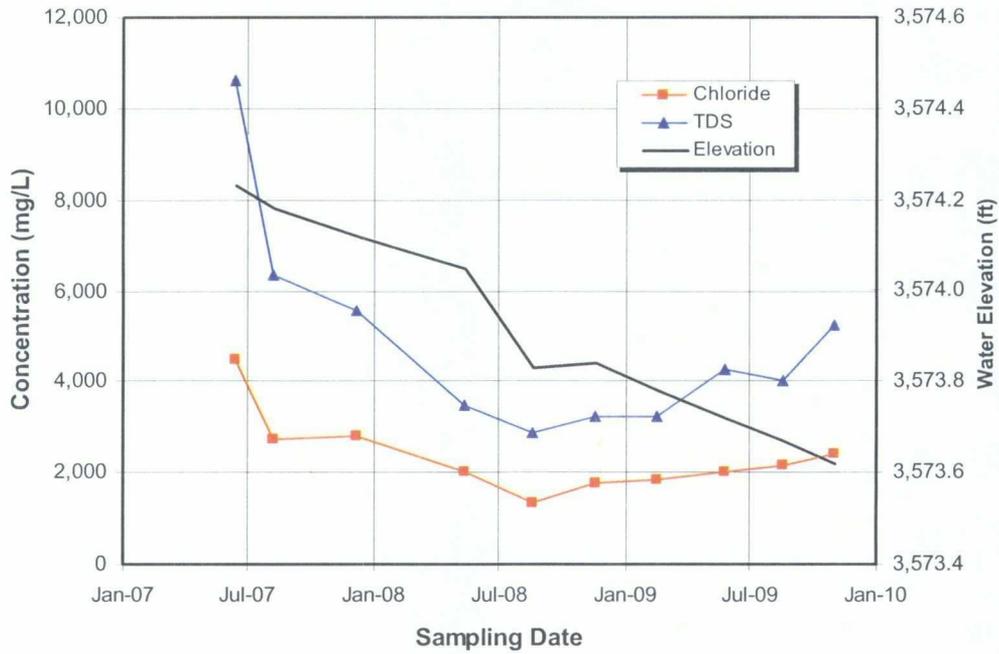


MW-2 (Deep)  
Dissolved Solids vs Elevation

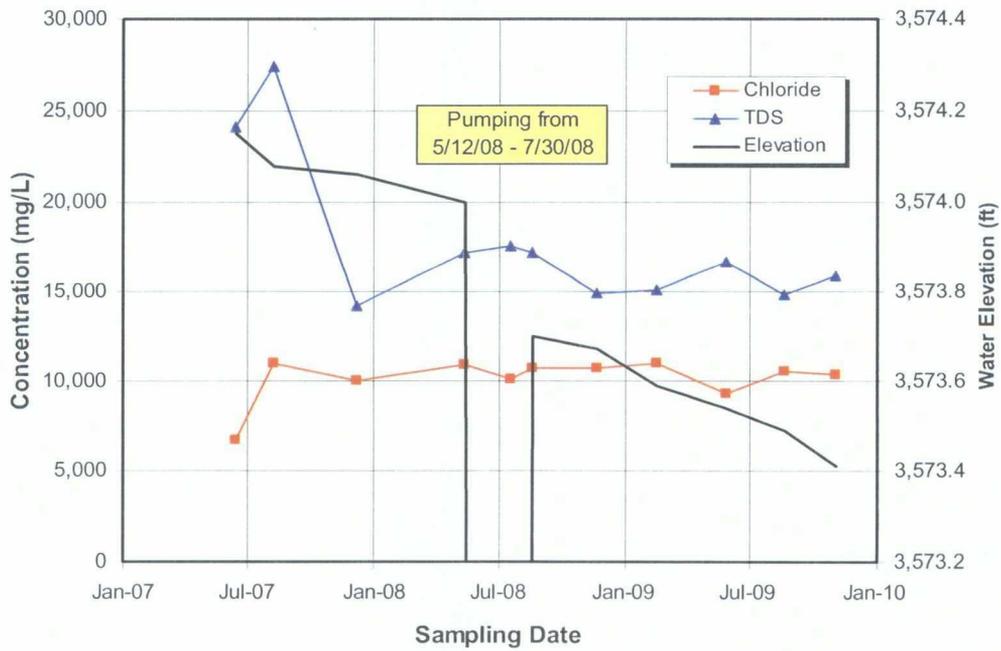


Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

MW-3 (Shallow)  
Dissolved Solids vs Elevation

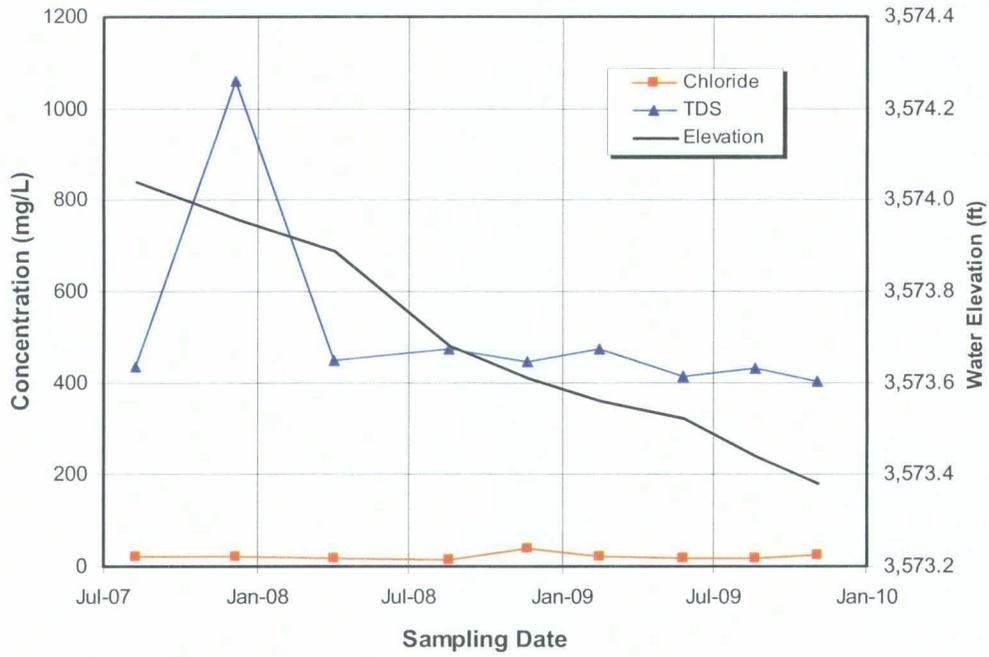


MW-3 (Deep)  
Dissolved Solids vs Elevation

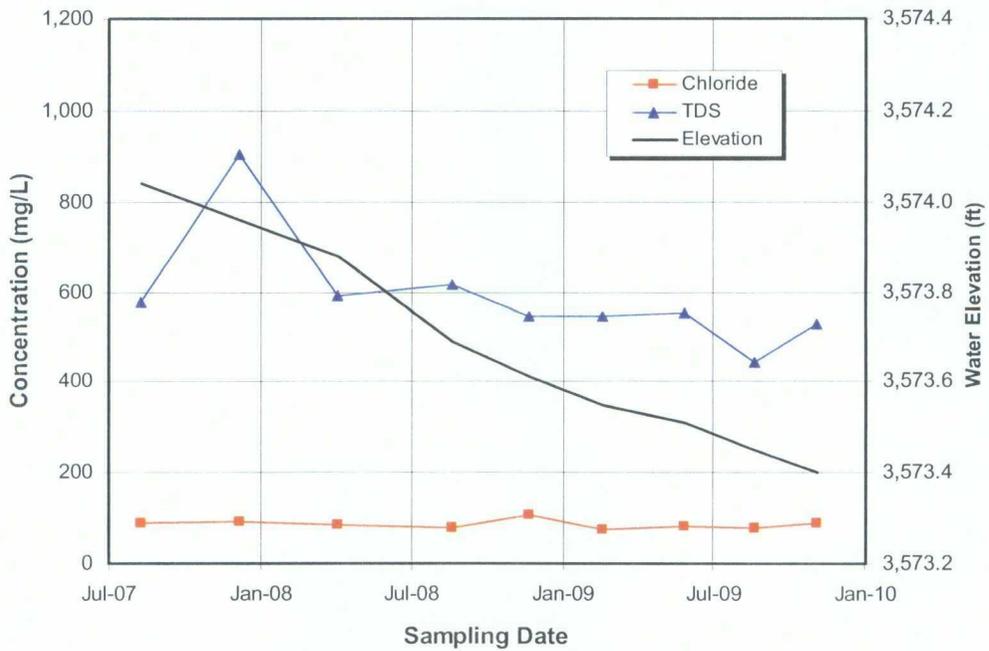


Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

MW-4 (Shallow)  
Dissolved Solids vs Elevation

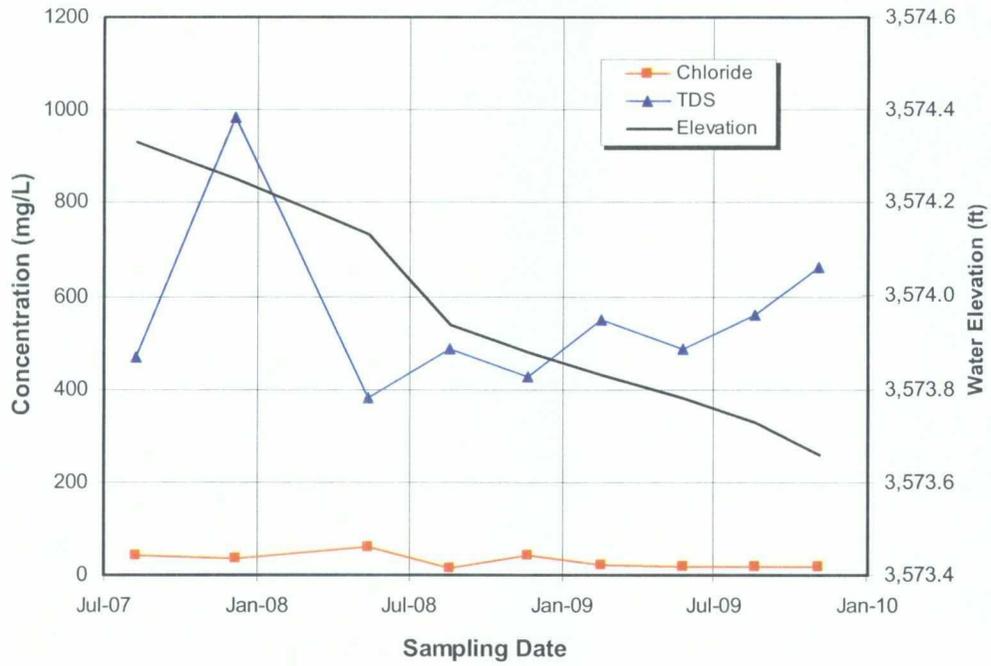


MW-4 (Deep)  
Dissolved Solids vs Elevation

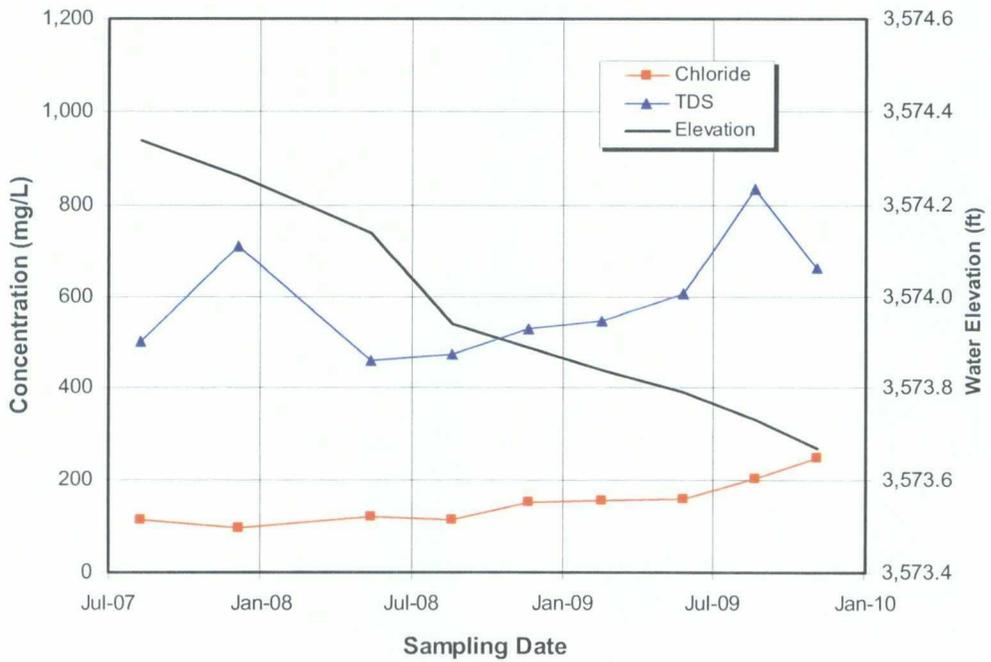


Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

MW-5 (Shallow)  
Dissolved Solids vs Elevation

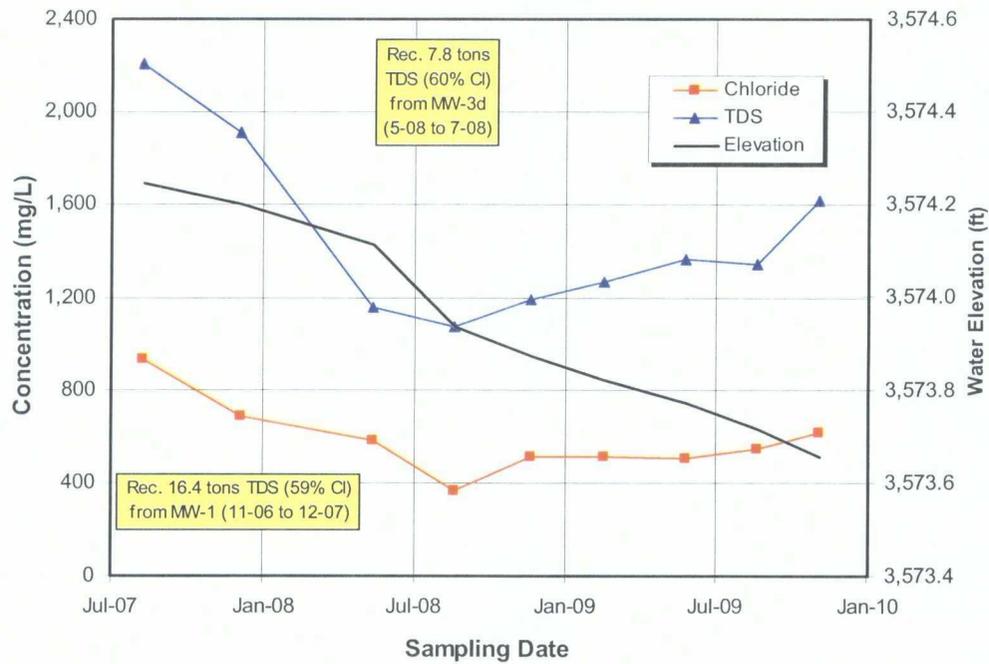


MW-5 (Deep)  
Dissolved Solids vs Elevation



Samson Livestock "30" Reserve Pit  
Appendix C – Historic Well Graphs

Average Values of Shallow Wells  
Dissolved Solids vs Elevation



Average Values of Deep Wells  
Dissolved Solids vs Elevation

