

AP-62 Samson Livestock 30-1 Lea County

Sept 2003 - form C-103 submitted

Dec 2003 - well completed

year of 2004 - pit left open "to dry", large rainfall event may have damaged liner; up to 4 ft standing water in pit

Feb 2005 - pit registration form V-144 submitted shows 20 mil plastic liner

May 2005 - soil samples below pit (highest values at center of pit) range 4000-8000 mg/kg Cl

July 2005 - site delineation plan

Sept 2005 - nine soil boring/auger holes drilled - TMW1 installed in the center of pit

October 4, 2005 - notified Santa Fe office of groundwater impact

June 12, 2006 - Corrective Action Plan submitted (use an evapotranspiration cover)

June 26, 2006 - depth to groundwater measured to determine groundwater flow direction

August 2006 - agency request submit Stage 1 and 2 Abatement Plans at meeting

September 2006 - Stage 1 and 2 Abatement Plans submitted (create a capillary barrier - no synthetic liner)

Oct 2006 - pit closed cause no one downgradient using the groundwater

August 2007 - progress report regarding groundwater flow direction and extent of impact; continue to pump and dispose of contaminated groundwater. propose drilling MW2 deep well and MW3 deep well

Nov 2007 - final Abatement Plan submitted

Sept 2005 - initial TMW1 sample 3999 mg/l Cl (monitoring well located at center of pit)

Mar 2006 - overpurged well - 2230 mg/l Cl and 4520 mg/l TDS

May 2006 - average 2416 mg/l Cl after removing 400 gallons in purge

June 2006 - 1930 mg/l Cl after removing 5600 gallons in purge

June 2007 - shallow water sample 1620 mg/l Cl; deep water sample 6770 mg/l Cl and 13,000 mg/l TDS  
soil sample at 25 ft bgs - avg 4370 mg/kg Cl

diesel range organics detected at 529 mg/kg at base of excavated pit

shallow groundwater at 40 feet bgs with background water quality of 30 mg/l Cl and 650 mg/l TDS

saturated hydraulic conductivity of subsurface materials/aquifer range 50-100 ft/day

used monitoring well clusters to provide a shallow sample and a deep sample (MW1 at center of pit, MW2 east of pit, and MW3 south of pit)

60F

**AP - 062**

**2010 AGWMR**

**09/08/2011**

**R. T. HICKS CONSULTANTS, LTD.**

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266-5004 ▲ Fax: 505.266-0745

AP-062

September 8, 2011

RECEIVED  
2011 SEP 12 P 11: 52

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

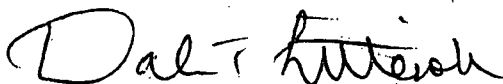
RE: Samson Livestock "30" Reserve Pit, T21S, R35E, Section 30, Unit P;  
NMOCD Case # AP-62

Dear Mr. Von Gonten:

Attached is the 2010 Annual Report for the above-referenced site. Please contact me if you have any questions or require additional information.

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

Sincerely,  
R.T. Hicks Consultants, Ltd.



Dale T Littlejohn  
Geologist

Copy: Samson Investment Company

**AP - 062**

**2010 AGWMR**

**09/08/2011**

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 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 2010 Annual Monitoring Report permits us to conclude:

- The extent and magnitude of ground water impairment is stable with respect to the average chloride concentration. Changes in the TDS concentrations appear to be associated with water of higher salinity at the bottom of the aquifer with 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 may not be achieved even with 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.
- Based on the rate of ground water level decline identified since 2007 at the site (0.26 ft/yr) RT Hicks Consultants (Hicks Consultants) believes that the 24-foot thick shallow aquifer could decrease to less than 10-feet of saturation within 60 years. However, pre-1996 USGS water level data indicates that the declines observed at the site are not necessarily regional or historic.
- We believe that area where the shallow aquifer is currently impaired and a large area down gradient from the site is not "a place of withdrawal for present or reasonably foreseeable future use". Our rationale for this conclusion includes:
  - the area is not attractive for residential development due to the nearby oil production equipment
  - The area is not conducive for development of permanent water supplies due to the potential for flash flooding (see Appendix A).
  - The future saturated thickness of the shallow aquifer at the site may not be sufficient to develop for a water supply
  - The windmill located less than ½ mile west (up gradient) from the site will supply water for stock and
  - Wells located less than ½ mile south of the site draw water from the underlying (and confined) Chinle Formation, and provide water for oilfield purposes

Because the ground water impact does not pose a threat to human health and there does not appear to be an engineered method for improving the water quality more efficiently than natural restoration, Samson respectfully requests that the regulatory file at this site be

**Samson Livestock "30" Reserve Pit  
2010 Annual Monitoring Report  
NMOCD Case #AP-62**

considered for closure with no further corrective action. Monitoring and reporting have been conducted at the site for the past six years, however the NMOCD has not responded to any of the recommendations provided since May of 2008. Until further notice Samson will discontinue reporting on all activities associated with the former reserve pit but will continue ground water monitoring 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, the 2008 Annual Ground Water Monitoring Report, and the 2009 Annual Ground Water Monitoring Report.

## **2 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 2009, site activities included the annual ground water sampling of the shallow and deep monitoring wells, and monitoring of the soil moisture below the ET Barrier.

## **3 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. The adjacent table 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.

As discussed below, ground water monitoring results also demonstrate that

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
11/18/10	0	0	0

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solids are settling into the lower (less permeable) portion of the aquifer. This may have been enhanced by reducing the sampling frequency from quarterly to annually in 2010.

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 since much of the removed mass would have likely settled to the base of the aquifer and become isolated from natural migration.

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

In the upper portion of the aquifer, chloride concentrations are essentially unchanged over the past three years. Chloride concentrations in the MW-1s have increased more than the other wells but this is likely a function of the dual completion attempted at this location which probably did not fully isolate the upper zone from the more impacted lower zone.

In the lower portion of the aquifer, MW-1d, MW-3d and MW-4d have exhibited stable chloride concentrations since January 2008. The increase in chloride concentrations in MW-2d and MW-5d are believed to be the result of molecular dispersion or a migration of high density water from the higher concentration area to the northeast. If chloride plume migration were occurring it is expected that an increase in chloride concentration greater than what was observed in MW-2d and MW-5d would be detected in MW-4d (down gradient well), but this has not occurred.

### ***3.5 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 the shallow aquifer at and down gradient of the Livestock site is not a place of withdrawal for present or reasonably foreseeable future use.
2. Continued monitoring for the next 60 years when water level decline renders the water zone effectively useless.

## **4 Recommendations**

- Obtain a response from NMOCD regarding closure options.
- Continue to collect and analyze ground water samples on annual basis for chloride, TDS and field specific conductance.
- Submit ground water monitoring results to the NMOCD if requested.



# Plates

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

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# **Appendix A**

## **Chronology of Events**

### **Table of Historic Data**

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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 the 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 at 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: Replaced Abyss No. 1 with Abyss No. 2 in MW-1. Abyss No. 1 ran for approximately 3,600 hours.
- 05-21-07: Direct wired the MW-1 pump 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: Replaced Abyss No. 2 pump 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 clean 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. Removed Abyss No. 1R pump 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: Installed 110-volt electric pump in MW-3(d), however the transformer for the on-site electric supply was too small to operate the 11.9-amp pump. Electrician installed new transformer and started pump at 1.5 gpm on 5/7/08.
- 05-12-08: Arrived on site and found pump in MW-3(d) 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.
- 06-02-08: 650 bbls of water from MW-3(d) was transported by Lobo Trucking to the Samson Osudo 33 State Com. No. 1 well for use in the drilling reserve pit.

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

- 06-04-08: 110 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 06-19-08: 120 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 07-03-08: 240 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 07-15-/08: 220 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 07-18-08: Arrived on site and found pump in MW-3(d) 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: 220 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 07-30-08: 330 bbls of water from MW-3(d) was transported by Key Energy to the Atha SWD for disposal.
- 07-31-08: The pump in MW-3(d) was turned off, but left in the well. 660 bbls of water was transported by Key Energy 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.
- 11/18/10: Each of the monitoring wells were gauged and sampled to determine the concentrations of chloride and total dissolved solids.
- 04/12/10: RT Hicks Consultants submitted the 2009 Annual Monitoring Report to the NMOCD on behalf of Samson.

**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 is 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)

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

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 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 of 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***

On November 18, 2010, a ground water monitoring event was 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
11/18/10	42.48	3573.58	387,375	3.12	Shallow	809	1,690
				11	Deep	3,630	6,170
<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
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

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)
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
11/18/10	42.68	3573.58	175	0.73	Shallow	24.5	632
<b>MW-2d Casing Elev.=</b>		<b>3615.92</b>					
6/13/07	41.44	3574.48	320	4.59	Deep	1,460	3,810
7/18/07	41.46	3574.46	--	--	--	--	--
8/9/07	41.50	3574.42	405	3.63	Deep	1,380	3,180
12/6/07	41.55	3574.37	511	4.41	Deep	1,640	3,160
4/3/08	41.63	3574.29	511	--	--	--	--
5/12/08	41.69	3574.23	616	5.65	Deep	1,170	2,200
8/19/08	41.85	3574.07	704	5.48	Deep	2,190	4,080
11/20/08	41.91	3574.01	770	5.70	Deep	2,552	3,410
2/16/09	41.98	3573.94	833	6.91	Deep	2,350	5,100
5/26/09	42.04	3573.88	896	6.60	Deep	2,390	5,300
8/20/09	42.08	3573.84	959	8.23	Deep	2,640	4,220
11/3/09	42.15	3573.77	1,022	8.28	Deep	2,750	5,220
11/18/10	42.35	3573.57	1,082	8.56	Deep	3,520	7,850
<b>MW-3s Casing Elev.=</b>		<b>3616.80</b>					
6/13/07	42.57	3574.23	148	8.77	Shallow	4,480	10,600
7/18/07	42.58	3574.22	--	--	--	--	--
8/9/07	42.62	3574.18	201	7.67	Shallow	2,710	6,330
12/6/07	42.68	3574.12	236	7.58	Shallow	2,800	5,550
4/3/08	42.75	3574.05	236	--	--	--	--
5/12/08	42.97	3573.83	266	5.43	Shallow	2,021	3,470
8/19/08	42.96	3573.84	294	3.88	Shallow	1,330	2,870
11/20/08	43.02	3573.78	322	5.31	Shallow	1,755	3,230
2/16/09	43.08	3573.72	346	5.77	Shallow	1,820	3,220
5/26/09	43.13	3573.67	378	6.07	Shallow	1,990	4,280
8/20/09	43.18	3573.62	402	7.80	Shallow	2,140	4,000
11/3/09	43.25	3573.55	426	7.97	Shallow	2,390	5,220
11/18/10	43.44	3573.36	450	7.16	Shallow	2,080	4,060
<b>MW-3d Casing Elev.=</b>		<b>3616.70</b>					
6/13/07	42.55	3574.15	97	16.65	Deep	6,670	24,100
7/18/07	42.53	3574.17	--	--	--	--	--
8/9/07	42.62	3574.08	242	>20.00	Deep	11,000	27,400
12/6/07	42.64	3574.06	294	>20.00	Deep	10,000	14,200
4/3/08	42.81	3573.89	294	--	--	--	--
5/12/08	63.00	3553.70	5,775	26.0	Deep	10,850	17,200
7/18/08	--	--	112,875	23.8	Deep	10,100	17,600
8/19/08	43.00	3573.70	112,925	19.2	Deep	10,700	17,200
11/20/08	43.03	3573.67	112,979	20.0	Deep	10,740	14,900
2/16/09	43.11	3573.59	113,033	20.0	Deep	11,000	15,100
5/26/09	43.16	3573.54	113,087	16.9	Deep	9,270	16,700
8/20/09	43.21	3573.49	113,138	20.0	Deep	10,500	14,800
11/3/09	43.29	3573.41	113,188	20.0	Deep	10,400	15,900
11/18/10	43.48	3573.22	113,238	20.0	Deep	9,950	18,400
<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	1,060
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

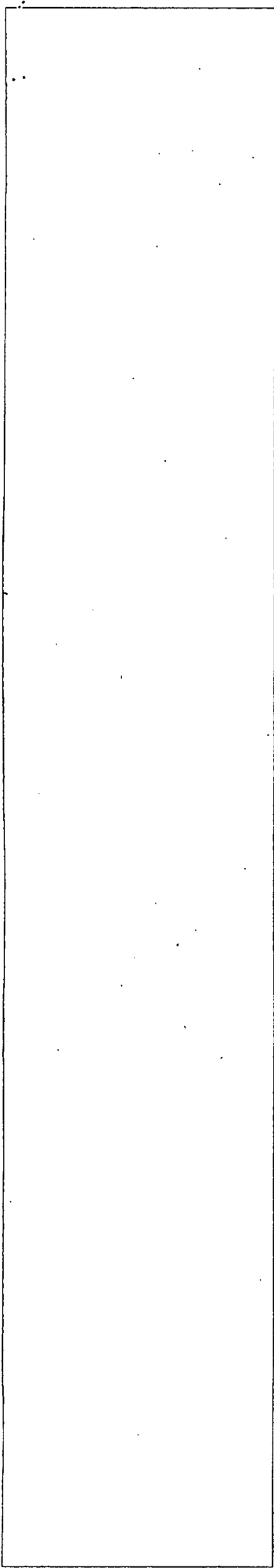
Table 1  
Laboratory Results Summary - Groundwater Samples

Sample Date Location	DTW (csg)	GW Elevation (ft)	Recv. Vol (gal)	Field Cond.	Sample Depth	Chloride (mg/L)	TDS (mg/L)
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
11/18/10	43.71	3573.18	62	0.71	Shallow	37.1	540
<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
11/18/10	43.94	3573.19	200	1.12	Deep	149	620
<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
11/18/10	42.97	3573.46	69	0.67	Shallow	12.1	448
<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
11/18/10	42.71	3573.48	225	2.23	Deep	<b>556</b>	<b>1,520</b>
<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

c:\Samson\Livestock 30\Project Data





# **Appendix B**

## **Groundwater Monitoring Laboratory Reports**

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

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

**Analytical Report 397852**  
**for**  
**RT Hicks Consultants Ltd. (Midland)**

**Project Manager: Dale Littlejohn**

**Samson Livestock 30**

**L-124-1110**

**23-NOV-10**



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

**Xenco-Houston (EPA Lab code: TX00122):**

**Texas (T104704215-10-6-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 (LAO00312), USDA (S-44102)**

**Xenco-Atlanta (EPA Lab Code: GA00046):**

**Florida (E87429), 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-TX)**

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

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

**Xenco-Boca Raton (EPA Lab Code: FL01273):**

**Florida(E86240),South Carolina(96031001), Louisiana(04154), Georgia(917)**  
**North Carolina(444), Texas(T104704468-TX), Illinois(002295), Florida(E86349)**

**Xenco Phoenix (EPA Lab Code: AZ00901):**

**Arizona(AZ0757), California(06244CA), Texas(104704435-10-2), Nevada(NAC-445A), DoD(65816)**

**Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)**

**Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)**



23-NOV-10

Project Manager: **Dale Littlejohn**  
**RT Hicks Consultants Ltd. (Midland)**  
P.O. Box 7624

Midland, TX 79708

Reference: XENCO Report No: **397852**  
**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 397852. 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. 397852 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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*Certified and approved by numerous States and Agencies.*

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## Sample Cross Reference 397852



RT Hicks Consultants Ltd. (Midland), Midland, TX

Samson Livestock 30

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1(s)	W	Nov-18-10 09:40		397852-001
MW-1(d)	W	Nov-18-10 09:35		397852-002
MW-2(s)	W	Nov-18-10 10:45		397852-003
MW-2(d)	W	Nov-18-10 10:38		397852-004
MW-3(s)	W	Nov-18-10 08:40		397852-005
MW-3(d)	W	Nov-18-10 08:18		397852-006
MW-4(s)	W	Nov-18-10 11:28		397852-007
MW-4(d)	W	Nov-18-10 11:31		397852-008
MW-5(s)	W	Nov-18-10 12:25		397852-009
MW-5(d)	W	Nov-18-10 12:18		397852-010



## CASE NARRATIVE

*Client Name: RT Hicks Consultants Ltd. (Midland)*

*Project Name: Samson Livestock 30*



*Project ID: L-124-1110*

*Work Order Number: 397852*

*Report Date: 23-NOV-10*

*Date Received: 11/19/2010*

---

**Sample receipt non conformances and Comments:**

None

---

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

None



# Certificate of Analysis Summary 397852

RT Hicks Consultants Ltd. (Midland), Midland, TX

Project Name: Samson Livestock 30



Project Id: L-124-1110

Contact: Dale Littlejohn

Project Location: Lea Co., NM

Date Received in Lab: Fri Nov-19-10 08:39 am


Report Date: 23-NOV-10

Project Manager: Brent Barron, II

<i>Analysis Requested</i>	<i>Lab Id:</i>	397852-001	397852-002	397852-003	397852-004	397852-005	397852-006
	<i>Field Id:</i>	MW-1(s)	MW-1(d)	MW-2(s)	MW-2(d)	MW-3(s)	MW-3(d)
	<i>Depth:</i>						
	<i>Matrix:</i>	WATER	WATER	WATER	WATER	WATER	WATER
	<i>Sampled:</i>	Nov-18-10 09:40	Nov-18-10 09:35	Nov-18-10 10:45	Nov-18-10 10:38	Nov-18-10 08:40	Nov-18-10 08:18
<b>Anions by E300</b>	<i>Extracted:</i>						
	<i>Analyzed:</i>	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13
	<i>Units/RL:</i>	mg/L RL	mg/L RL	mg/L RL	mg/L RL	mg/L RL	mg/L RL
Chloride		809 12.5	3630 100	24.5 5.00	3520 50.0	2080 25.0	9950 250
<b>TDS by SM2540C</b>	<i>Extracted:</i>						
	<i>Analyzed:</i>	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00
	<i>Units/RL:</i>	mg/L RL	mg/L RL	mg/L RL	mg/L RL	mg/L RL	mg/L RL
Total dissolved solids		1690 5.00	6170 5.00	632 5.00	7850 5.00	4060 5.00	18400 5.00

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



# Certificate of Analysis Summary 397852

RT Hicks Consultants Ltd. (Midland), Midland, TX

Project Name: Samson Livestock 30



Project Id: L-124-1110

Contact: Dale Littlejohn

Project Location: Lea Co., NM

Date Received in Lab: Fri Nov-19-10 08:39 am


Report Date: 23-NOV-10

Project Manager: Brent Barron, II

<b>Analysis Requested.</b>	<b>Lab Id:</b>	397852-007	397852-008	397852-009	397852-010		
	<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>	Nov-18-10 11:28	Nov-18-10 11:31	Nov-18-10 12:25	Nov-18-10 12:18		
<b>Anions by E300</b>	<b>Extracted:</b>						
	<b>Analyzed:</b>	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13	Nov-22-10 09:13		
	<b>Units/RL:</b>	mg/L RL	mg/L RL	mg/L RL	mg/L RL		
Chloride		37.1 5.00	149 5.00	12.1 5.00	556 10.0		
<b>TDS by SM2540C</b>	<b>Extracted:</b>						
	<b>Analyzed:</b>	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00	Nov-22-10 16:00		
	<b>Units/RL:</b>	mg/L RL	mg/L RL	mg/L RL	mg/L RL		
Total dissolved solids		540 5.00	620 5.00	448 5.00	1520 5.00		

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
- MDL** Method Detection Limit
- PQL** Practical Quantitation Limit
- \* Outside XENCO's scope of NELAC Accreditation.

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 12600 West I-20 East, Odessa, TX 79765  
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(305) 823-8500	(305) 823-8555
(432) 563-1800	(432) 563-1713
(361) 884-0371	(361) 884-9116





## BS / BSD Recoveries



Project Name: Samson Livestock 30

Work Order #: 397852

Analyst: LATCOR

Date Prepared: 11/22/2010

Project ID: L-124-1110

Date Analyzed: 11/22/2010

Lab Batch ID: 833007

Sample: 833007-1-BKS

Batch #: 1

Matrix: Water

Units: mg/L

### BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Anions by E300	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
Chloride	ND	10.0	9.24	92	10	10.6	106	14	80-120	20	

Analyst: WRU

Date Prepared: 11/22/2010

Date Analyzed: 11/22/2010

Lab Batch ID: 833176

Sample: 833176-1-BKS

Batch #: 1

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
Total dissolved solids	ND	1000	990	99	1000	1010	101	2	80-120	30	

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 #: 397852

Lab Batch #: 833007

Date Analyzed: 11/22/2010

QC- Sample ID: 397626-001 S

Reporting Units: mg/L

Date Prepared: 11/22/2010

Batch #: 1

Project ID: L-124-1110

Analyst: LATCOR

Matrix: Water

### 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	18700	10000	29400	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 #: 397852

Lab Batch #: 833007

Date Analyzed: 11/22/2010

QC- Sample ID: 397626-001 D

Reporting Units: mg/L

Date Prepared: 11/22/2010

Batch #: 1

Project ID: L-124-1110

Analyst: LATCOR

Matrix: Water

SAMPLE / SAMPLE DUPLICATE RECOVERY					
Anions by E300	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Chloride	18700	19000	2	20	

Lab Batch #: 833176

Date Analyzed: 11/22/2010

QC- Sample ID: 397852-001 D

Reporting Units: mg/L

Date Prepared: 11/22/2010

Batch #: 1

Analyst: WRU

Matrix: Water

SAMPLE / SAMPLE DUPLICATE RECOVERY					
TDS by SM2540C	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Analyte					
Total dissolved solids	1690	1810	7	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

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

**Phone: 432-563-1800**  
**Fax: 432-563-1713**

## Project Name: Samson Livestock 30

**Project #:** L-124-1110

Project Loc: Lea Co., NM

**PO #:**

**Project Manager: Dale Littlejohn**

Company Name RT Hicks Consultants Ltd

**Company Address:** P.O. Box 7624

City/State/Zip: Midland, Texas 79708

**Telephone No: (432) 528-3878**

**Fax No: (432) 689-4578 (Fax)**

**Sampler Signature:**

LAB # (lab use only)		FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative						Matrix				Analyze For:										RUSH TAT (Pre-Schedule Standard TAT)					
						Ice	HNO <sub>3</sub>	HCl	NaOH	H <sub>2</sub> SO <sub>4</sub>	None	Other (Specify)	Water	Sludge	Soil	Other (specify):	TPH: 418.1 8015M 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO <sub>4</sub> , CO <sub>3</sub> , HCO <sub>3</sub> )	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B5030 or BTEX 8260	PCI	N.O.R.M.	Chloride	Bromide	Total Dissolved Solids		
																TCLP:	TOTAL:														
397852		MW-1(s)	11/18/10	0940	1	X					X		X														X	X			
		MW-1(d)	11/18/10	0935	1	X					X		X														X	X			
		MW-2(s)	11/18/10	1045	1	X					X		X														X	X			
		MW-2(d)	11/18/10	1038	1	X					X		X														X	X			
		MW-3(s)	11/18/10	0840	1	X					X		X														X	X			
		MW-3(d)	11/18/10	0818	1	X					X		X														X	X			
		MW-4(s)	11/18/10	1128	1	X					X		X														X	X			
		MW-4(d)	11/18/10	1131	1	X					X		X														X	X			
		MW-5(s)	11/18/10	1225	1	X					X		X														X	X			
		MW-5(d)	11/18/10	1218	1	X					X		X														X	X			
Special Instructions: Send Invoice to RT Hicks Consult. 901 Rio Grande Blvd. NW, Suite F-142, Albuquerque, NM 87104; Send results to Dale Littlejohn at the address above.																	Sample Containers Intact? <u>Y</u> N														
																	Temperature Upon Receipt: <u>-2.1</u>														
																	Laboratory Comments: <u>1L plastic</u>														
Relinquished by: <u>Lake T Littlejohn</u>		Date: <u>11/19/10</u>	Time: <u>839</u>	Received by:		Date		Time																							
Relinquished by:		Date	Time	Received by: <u>Lisa Murdock</u>		Date: <u>11-19-10</u>		Time: <u>8:39</u>																							



**XENCO Laboratories**  
Atlanta, Boca Raton, Corpus Christi, Dallas  
Houston, Miami, Odessa, Philadelphia  
Phoenix, San Antonio, Tampa

Document Title: Sample Receipt Checklist  
Document No.: SYS-SRC  
Revision/Date: No. 01, 5/27/2010  
Effective Date: 6/1/2010 Page 1 of 1

### Prelogin / Nonconformance Report - Sample Log-In

Client: RT Hicks Consultants Ltd  
Date/Time: 11-19-10 8:39  
Lab ID #: 397852  
Initials: Xm

#### Sample Receipt Checklist

1. Samples on ice?	Blue	<u>Water</u>	No	
2. Shipping container in good condition?	<u>Yes</u>	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	Yes	No	<u>N/A</u>	
4. Chain of Custody present?	<u>Yes</u>	No		
5. Sample instructions complete on chain of custody?	<u>Yes</u>	No		
6. Any missing / extra samples?	Yes	<u>No</u>		
7. Chain of custody signed when relinquished / received?	<u>Yes</u>	No		
8. Chain of custody agrees with sample label(s)?	<u>Yes</u>	No		
9. Container labels legible and intact?	<u>Yes</u>	No		
10. Sample matrix / properties agree with chain of custody?	<u>Yes</u>	No		
11. Samples in proper container / bottle?	<u>Yes</u>	No		
12. Samples properly preserved?	<u>Yes</u>	No	N/A	
13. Sample container intact?	<u>Yes</u>	No		
14. Sufficient sample amount for indicated test(s)?	<u>Yes</u>	No		
15. All samples received within sufficient hold time?	<u>Yes</u>	No		
16. Subcontract of sample(s)?	Yes	<u>No</u>	N/A	
17. VOC sample have zero head space?	Yes	<u>No</u>	N/A	
18. Cooler 1 No.	Cooler 2 No.	Cooler 3 No.	Cooler 4 No.	Cooler 5 No.
lbs <u>-21</u> °C	lbs °C	lbs °C	lbs °C	lbs °C

#### Nonconformance Documentation

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

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

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

- Check all that apply:
- ☐ Cooling process has begun shortly after sampling event and out of temperature condition acceptable by NELAC 5.5.8.3.1.a.1.
  - ☐ Initial and Backup Temperature confirm out of temperature conditions
  - ☐ Client understands and would like to proceed with analysis

# **Appendix C**

## **Graphs – Historic Groundwater Data**

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

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

**AP - 062**

**2010 AGWMR**

**09/08/2011**

**AP - 062**

**2010 AGWMR**

**09/08/2011**



**AP - 062**

**2010 AGWMR**

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**2010 AGWMR**

**09/08/2011**

**AP - 062**

**2010 AGWMR**

**09/08/2011**

# R. T. HICKS CONSULTANTS, LTD.

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

September 8, 2011

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

RE: Samson State BD No. 4 Reserve Pit, T12S, R33E, Section 2, Unit H;  
NMOCD Case # 1RP-474-0

Dear Mr. Von Gonten:

Attached is the 2010 Annual Report for the above-referenced site. Please contact me if you have any questions or require additional information.

Samson will continue to monitor groundwater in selected wells on an annual basis until directed otherwise.

Sincerely,  
R.T. Hicks Consultants, Ltd.



Dale T Littlejohn  
Geologist

Copy: Samson Investment Company