1R-426-169

REPORTS

Work Plan

DATE:

9-21-10

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

September 21, 2010

RECEIVED

SEP 23 2010

Environmental Bureau
Oil Conservation Division

Edward J. Hansen
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: **Investigation and Characterization Report**
BD-B29 Site: NMOCD CASE #: 1R426-169
Township 21S, Range 37E, Section 29, Unit B

Mr. Hansen:

On behalf of Rice Operating Company (ROC), R.T. Hicks Consultants, Ltd. is submitting this Investigation and Characterization Report for the BD B-29 Site file. This letter presents characterization findings and proposes further delineation in the form of an up-gradient well. Based on findings in the proposed up gradient well, we will design and propose corrective action to address chloride impact in the vadose zone that may include removing selected soils for disposal, installing a liner over certain portions of the site, and contouring to the surrounding area so as to encourage vegetation on the former release footprint.

Background

The B-29 site is located about 1.5 miles northwest of the intersection of State Routes 8/176 and Loop 18, near Eunice, New Mexico (see Plate 1). The Amended Investigation Characterization Plan (ICP), dated October 26, 2007 gave background information and the results of borings and proposed two monitoring wells. MW-1 and MW-2 were drilled in late 2007 and have been sampled quarterly since that time. A status report dated May 22, 2008 presented ground water data for the site.

Soil Borings

Plate 2 shows the outline of a release that occurred at the site in 2002 as well as the locations of all borings and proposed borings at the site. Plate 3 presents the chloride concentration data from the two drilling events, SB series, (September 2002) and the ESB series, (December 2006). The boring logs are included in Appendix A. The borings are presented in their relative spatial order from northwest to southeast on the release footprint as shown on Plate 2.

The principal findings of the boring characterization program are:

- ESB-1 encountered the capillary fringe at the total depth of 95 feet.
- Soil chloride concentrations exceed 1,000 mg/kg at total depth in five of the seven ESB borings (50-94 feet below land surface).
- The highest chloride loads (mass/unit area from ground surface to ground water) exist near the junction box, the origin of the 2002 release.
- The lowest chloride loads exist at the greatest distance from the junction box. ESB-5 and SB East have chloride concentrations less than 1,000 mg/kg in the upper15 feet in contrast with all of the other borings. All other borings have chloride concentrations above 2,500 mg/kg in this depth interval.

Ground Water

Based upon the data from these borings, Rice Operating Company installed two four-inch monitoring wells in December, 2007 (Plate 2).

a) The first well (MW-1) is located about 100 feet southeast of the junction box in an area outside of the release footprint on a down gradient edge of the release.

b) The second well (MW-2) is located about 5-feet west of SB-1 within the release area and down gradient from borings with highest chloride mass (see Plates 2, 3, and 4).

The wells were completed with a 20-foot screen: 5 feet of screen was placed above the water table and 15 feet below. Appendix A includes the drilling logs and completion diagrams of the wells. Both wells were developed and sampled for chloride, TDS, and BTEX. No detection of BTEX has occurred in any sample. Chloride and TDS concentrations are presented in Figures 1 and 2 below.

Figure 1 Chloride Concentrations in Ground Water at B-29, 2007 to Present

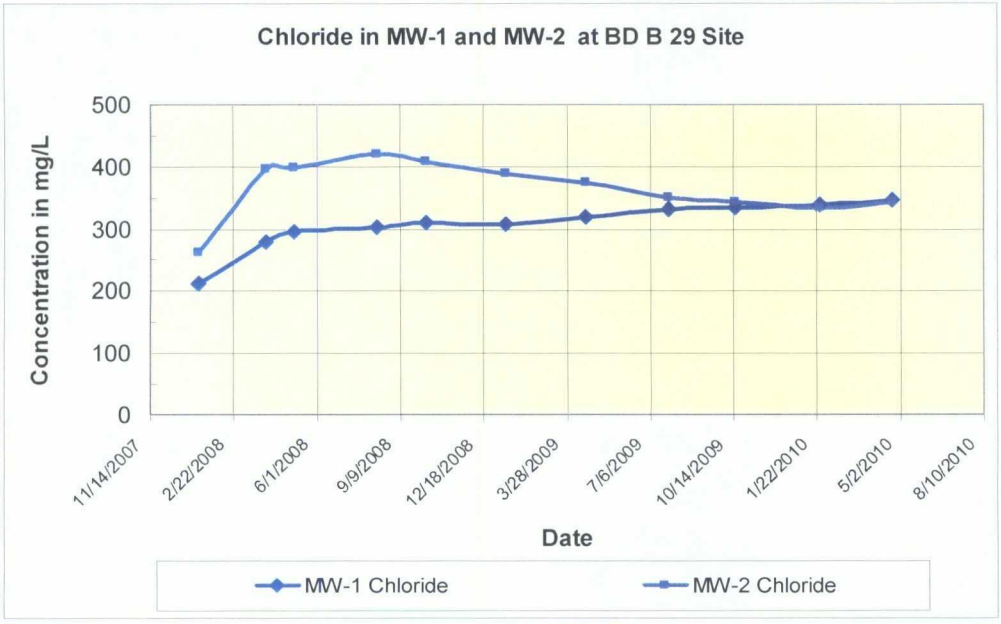
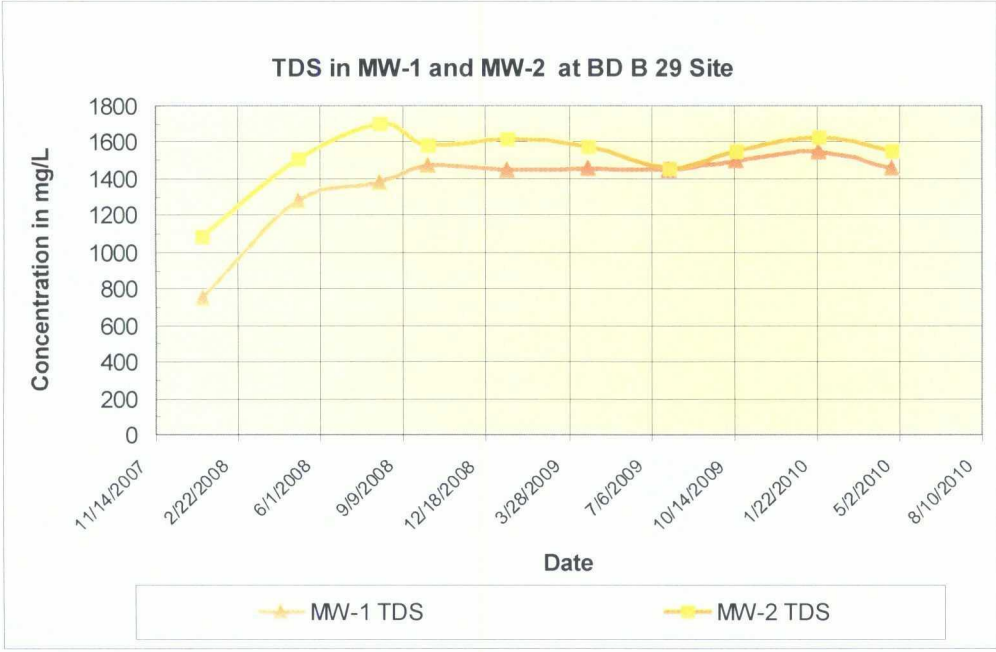


Figure 2 TDS Concentrations in Ground Water at B-29, 2007 to Present



Observations

The completion of the boreholes for both wells required the use of water and polymer. The change from increasing chloride and TDS concentrations (January to May 2008) to relatively constant chloride and TDS concentrations (May 2008 to present) suggests that the dilution of ground water by water used in drilling took about 5 months to disperse.

a) Since May of 2008, all samples from both wells have exceeded the WQCC standard for chloride, 250 mg/L, and the standard for TDS, 1,000 mg/L.

b) From the first sampling event (January 2008) until the third quarter of 2009, concentrations of chloride and TDS have been higher in MW-2 than in MW-1.

c) Since the third quarter of 2009, chloride concentration has decreased at MW-2 and increased at MW-1. Concentration is now about the same in both wells (340 mg/L).

d) TDS concentrations were about the same in both wells in July 2009 and both have increased some since then (6% to 10%) with MW-2 being higher. Differences between the wells are generally less than in the earlier period of May 2008 to July 2009.

Differences in chloride and TDS concentrations in the two wells would be expected due to site variation, natural variation in ground water and the well locations. The similarity of water chemistry in the monitoring wells suggests that the results may be primarily due to area wide ground water quality rather than effects to ground water from the site.

Proposed Characterization and Remedy

We propose an up gradient monitoring well to allow a determination as to if exceedance of WQCC standards in ground water at the site is due to the site or from other sources up-gradient.

Plate 2 shows the proposed monitoring well location approximately 100 feet north of the release footprint.

Upon completion of an up gradient monitoring well and sufficient quarters of sampling to establish the up-gradient water quality, we will submit a report documenting work and presenting Corrective Actions based upon these results as necessary. Corrective action to address chloride impact in the vadose zone may include removing selected soils for disposal, installing a liner over certain portions of the site, and reshaping the area to encourage run-off of storm water away from the former release footprint.

ROC is the service provider (agent) for the BD Salt Water Disposal System and has no ownership of any portion of pipeline, well or facility. The BD SWD System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

Please contact Hack Conder of ROC at 575-393-9174 if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely,
R.T Hicks Consultants, Ltd.

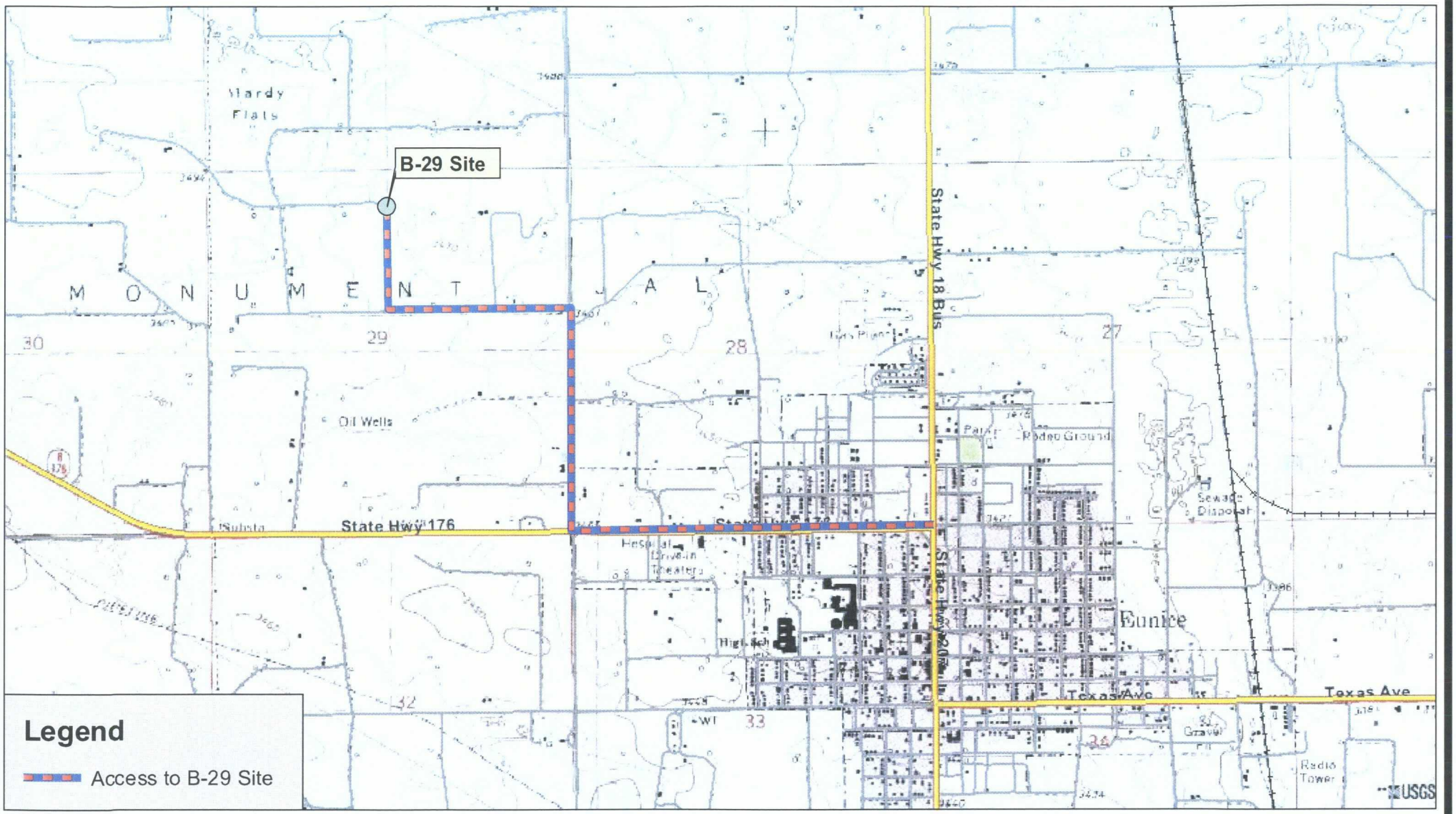
David J. Hamilton

David Hamilton
Project Hydrologist

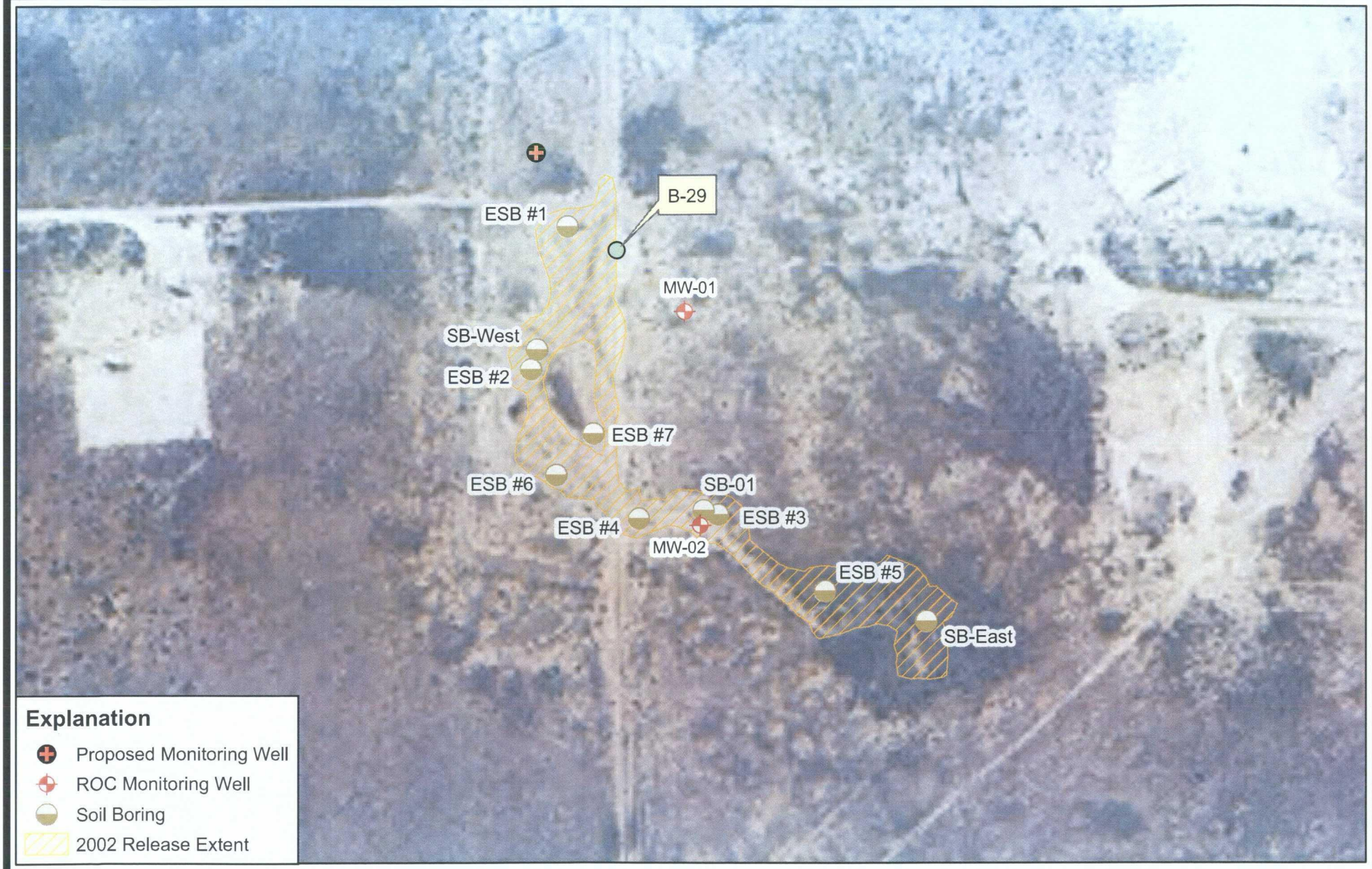
Copy: Hack Conder, Rice Operating Company

PLATES

To access the site, from the intersection of State Highway 176 and 207, Eunice, New Mexico, proceed west on State Highway 176 for 1 mile. Turn north on County Rd 33. Proceed north for 0.6 miles. At 0.6 miles, turn west on an unnamed dirt road. Proceed on the dirt road for 0.2 miles. At 0.2 miles, turn north. Proceed north 0.2 miles to the site.



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	7.5 USGS Topo and access to the site	Plate 1
	Rice Operating Company: B-29 Site (BD System)	August 2010



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Proposed Upgradient Monitoirng Well Location Relative to Existing Soil Borings and Monitoring Wells	Plate 2
	Rice Operating System: BD B-29	August 2010

S:/PROJECTS/ROC/B29_BD/PLATES/ICP_JULY2010/PROPOSED_MWLOCATIONS.MXD

7/28/2010

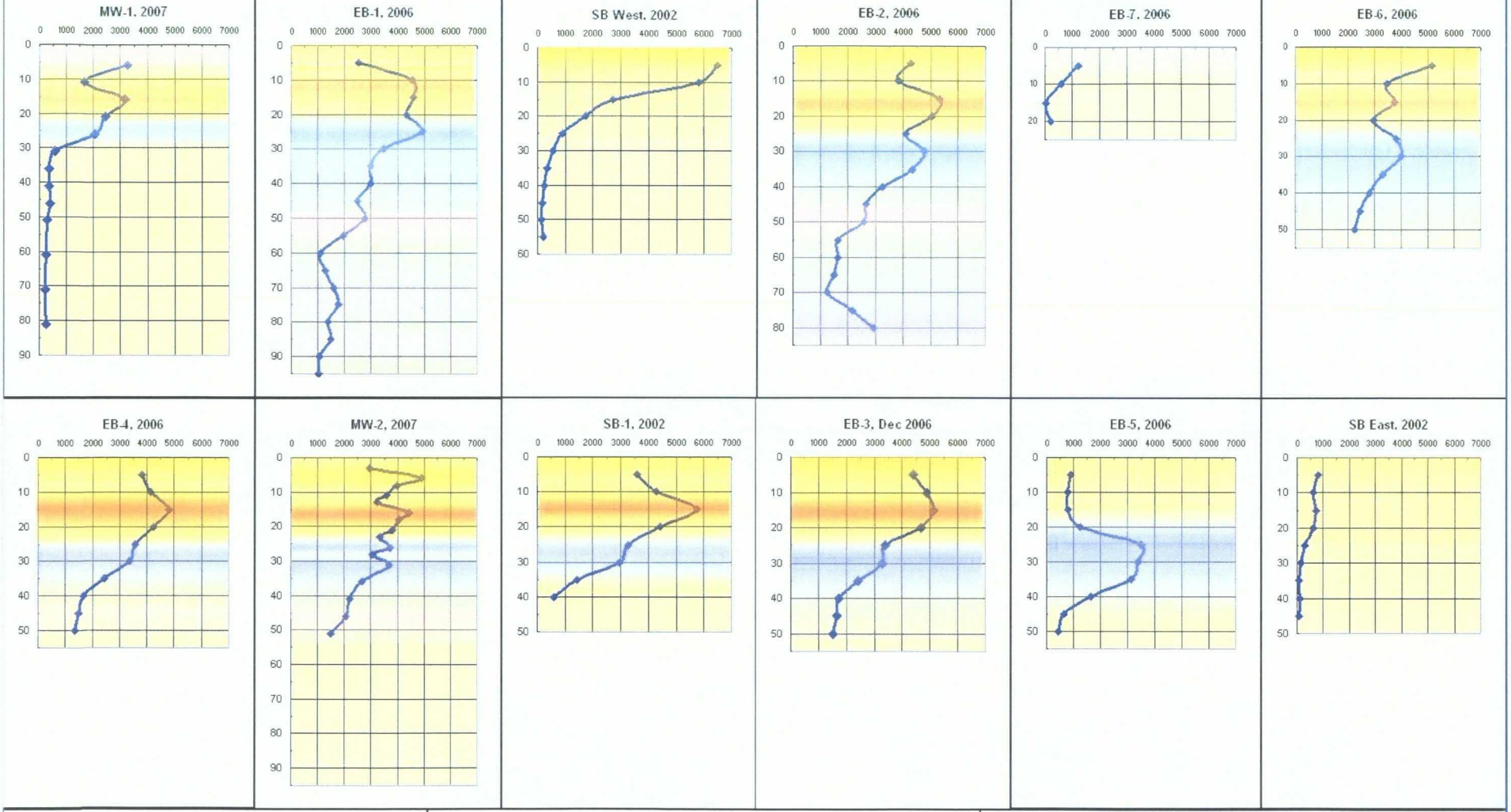
Chloride Profiles are Arranged by Relative Distance from the B-29 Junction Box. MW-1 is closest to the Junction Box. SB East is furthest from the Junction Box. MW-1 and EB-7 are not within the 2002 release footprint.

Marks chloride concentrations from 2002 release

Marks Common Depth of High Chloride Concentrations

Marks Common Depths of High Chloride Concentrations

Marks Common Depth of High Chloride Concentrations



R.T. Hicks Consultants, Ltd
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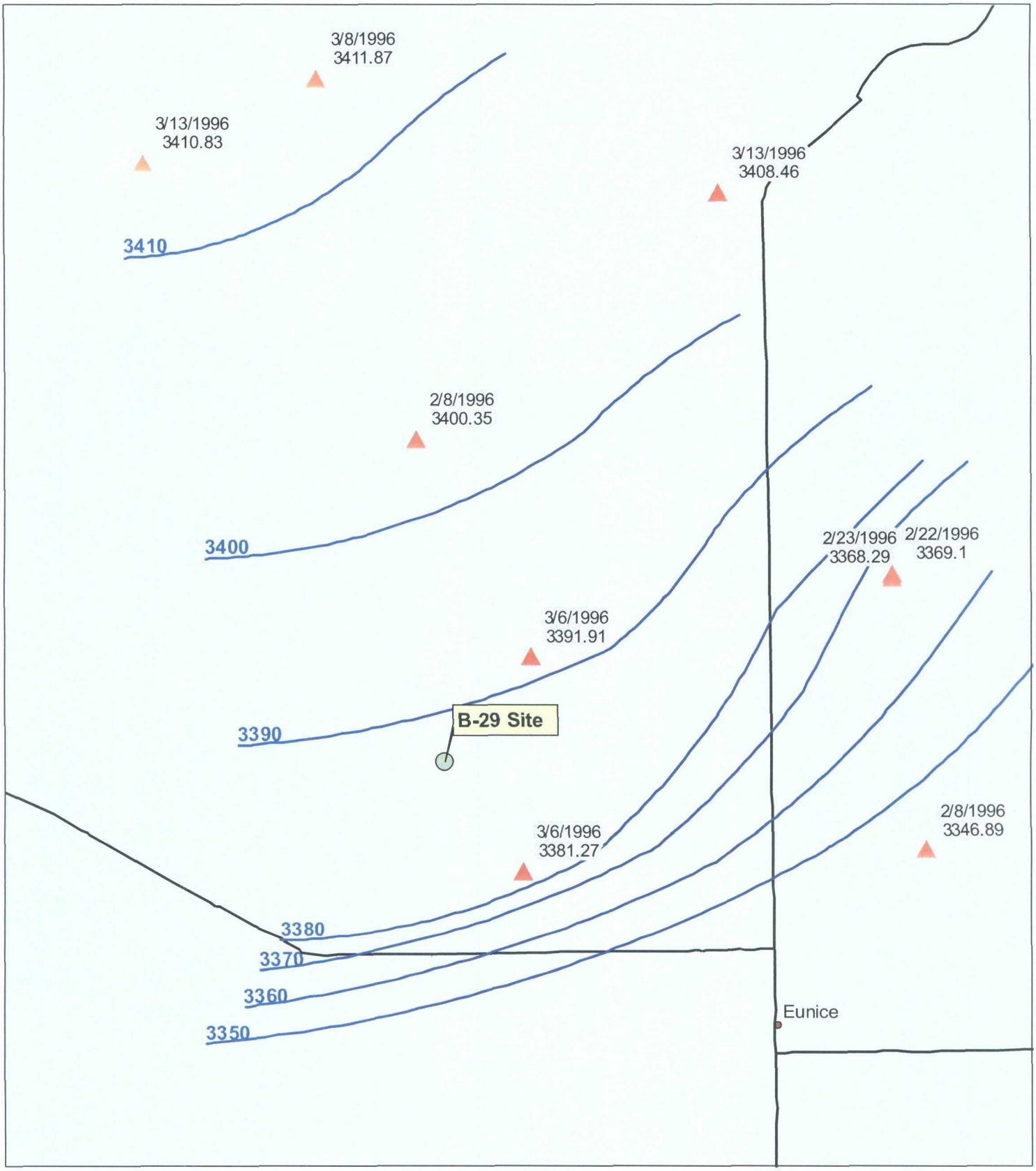
Albuquerque, NM 87104
505-266-5004

ROC B-29 Site

Chloride Concentration Profiles from the SB (2002) and EB (2006) Series and MW-1, MW-2 (2007)

Plate 3

August, 2010



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Regional Potentiometric Surface Map (USGS, 1996)	Plate 4
	Rice Operating Company: B-29 Site (BD System)	August 2010

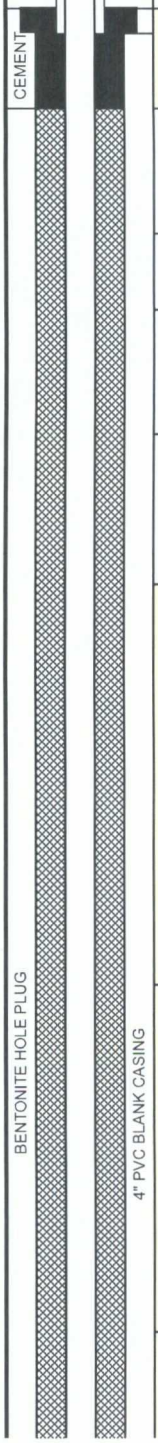
APPENDIX A

LITHOLOGIC LOG (MONITORING WELL)

R T Hicks Consultants Ltd

P O Box 7624
Midland, TX 79708
(432) 528-3878

MONITOR WELL NO.:	MW-1	TOTAL DEPTH:	110 Ft
SITE ID:	BD System B-29 Line Leak	CLIENT:	Rice Operating Company
SURFACE ELEVATION:	3475 Feet (MSL)	COUNTY:	Lea County
CONTRACTOR:	Harrison & Cooper, Inc.	STATE:	New Mexico
DRILLING METHOD:	Air-Rotary	LOCATION:	T-21-S, R-37-E, Sec. 29 (B)
INSTALLATION DATE:	12/17 to 12/18/07	FIELD REP.:	Dale Littlejohn
WELL PLACEMENT:	68 ft South-southeast of line leak	FILE NAME:	\BD System\B-29\Lithlogs 12-07
COMMENTS:	Lat. 32° 27' 19.2" North, Long. 103° 11' 6.2" West		



Depth	Samples Type	Samples Cl (fld)	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOL., DIST. DEATURES
			SAND AND CLAY Red to reddish brown, medium grain, well sorted, angular sand in red clay matrix.
5	cut	3,273	CALICHE AND SILT Grayish brown, with solid caliche layer from 7 to 9 feet.
10	spoon	1,655	CALICHE AND SILT Grayish brown, Split spoon at 10-12 feet (2,580 mg/kg Cl)
15	cut	3,156	CALICHE Grayish white (hard drilling).
20	cut	2,437	CALICHE AND SILT Gray to light brown with some (5%) very fine grain, sub-angular, poorly sorted sand.
25	cut	2,049	SAND AND SILT Light grayish brown, very fine grain, well sorted, angular.
30	cut	581	
35	cut	350	
40	cut	357	SAND Light brown (with very little silt) very fine grain, well sorted, sub-rounded, with some thin-bedded caliche at 42 feet.
45	cut	377	
50	spoon	274	Split spoon at 50 - 52 feet (6.8 mg/kg Cl).
55			SAND Brown fine grain, well sorted, sub-rounded to rounded.

Continued on next page

LITHOLOGIC LOG (MONITORING WELL)

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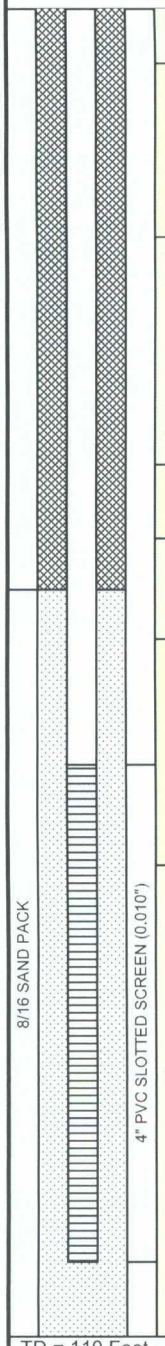
P O Box 7624
Midland, TX 79708
(432) 528-3878

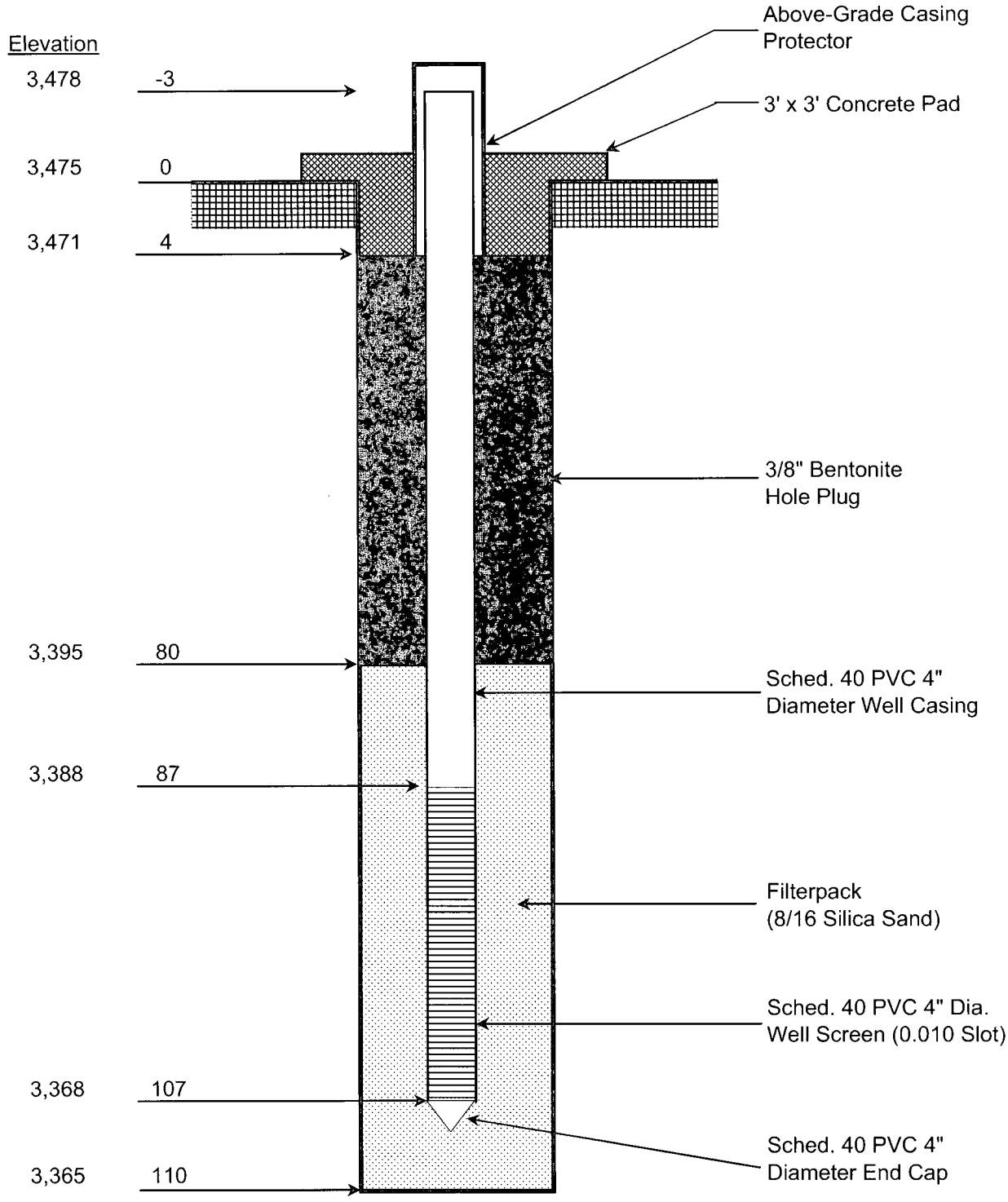
MONITOR WELL NO.:	MW-1	TOTAL DEPTH:	110 Ft
SITE ID:	BD System B-29 Line Leak	CLIENT:	Rice Operating Company
SURFACE ELEVATION:	3475 Feet (MSL)	COUNTY:	Lea County
CONTRACTOR:	Harrison & Cooper, Inc.	STATE:	New Mexico
DRILLING METHOD:	Air-Rotary	LOCATION:	T-21-S, R-37-E, Sec. 29 (B)
INSTALLATION DATE:	12/17 to 12/18/07	FIELD REP.:	Dale Littlejohn
WELL PLACEMENT:	68 ft South-southeast of line leak	FILE NAME:	\BD System\B-29\Lithlogs 12-07
COMMENTS:	Lat. 32° 27' 19.2" North, Long. 103° 11' 6.2" West		



				Continued from previous page
	60	cut	240	SANDSTONE Brown, fine grain, well sorted, subangular, well cemented (not crystalline) and hard to drill.
	65			
	70	cut	225	SAND Brown to reddish brown, fine grain, medium sorted, rounded, subject to caving.
	75			
				QUARTZITE, Reddish brown, fine crystalline, very hard drilling (2-ft/hour).
	80	cut	255	SAND Brown, fine to medium grain, medium sorted, sub-rounded, with interbedded thin sandstone and quartzite.
	85			QUARTZITE, Reddish brown, fine crystalline, very hard drilling (2-ft/hour) with some interbedded hard sandstone.
	90			
very few cuttings to surface	95			SAND (aquifer) Reddish brown, fine grain, moderately sorted, rounded quartz.
	100			Great difficulty encountered during the completion of the well due to caving. Required approx. 15,000 gallons of water with polymer to control caving and clean out well sufficiently to install casing.
	105			
	110			

TD = 110 Feet

MONITORING WELL CONSTRUCTION DIAGRAM



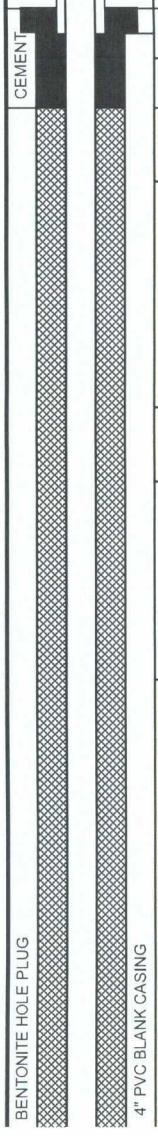
R T Hicks Consultants Ltd	SITE: BD System B-29 Line Leak		**Monitoring Well No. MW-1**
	DATE: #########	REV. NO.: 1	
	AUTHOR: DTL	TECH: DTL	
	DRILLER: H & C, Inc	FILE: Lithlogs	

LITHOLOGIC LOG (MONITORING WELL)

R T Hicks Consultants Ltd

P O Box 7624
Midland, TX 79708
(432) 528-3878

MONITOR WELL NO.:	MW-2	TOTAL DEPTH:	101 Ft
SITE ID:	BD System B-29 Line Leak	CLIENT:	Rice Operating Company
SURFACE ELEVATION:	3474 Feet (MSL)	COUNTY:	Lea County
CONTRACTOR:	Harrison & Cooper, Inc.	STATE:	New Mexico
DRILLING METHOD:	Air-Rotary	LOCATION:	T-21-S, R-37-E, Sec. 29 (B)
INSTALLATION DATE:	12/18 to 12/19/07	FIELD REP.:	Dale Littlejohn
WELL PLACEMENT:	318 feet South of MW-1	FILE NAME:	\BD System\B-29\Lithlogs 12-07
COMMENTS:	Lat. 32° 27' 16.1" North, Long. 103° 11' 6.0" West		



Depth	Samples Type	Samples Cl (fld)	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOL., DIST. DEATURES
			SILTY CLAY Red to reddish brown.
	cut	2,941	CALICHE Gray with some silt.
5	cut	4,886	SILT Brownish gray
	cut	3,981	SILT Pinkish brown, with some (5%) very fine grain sand and caliche (5%)>
10	cut	3,577	
	cut	3,217	
15	spoon	4,453	Split spoon 15 -17 feet (5,190 mg/kg Cl)
	cut	4,042	SAND Light brown, very fine grain, well sorted, angular.
20	cut	3,807	CALICHE Grayish brown with some silt and very fine grain, well sorted sand
	cut	3,348	
25	spoon	3,736	Split spoon 25 -27 feet (4,100 mg/kg Cl)
	cut	3,045	SAND Light brown with 30% silt) very fine grain, well sorted, rounded sand.
30	cut	3,704	
35	cut	2,664	
40	cut	2,205	
45			

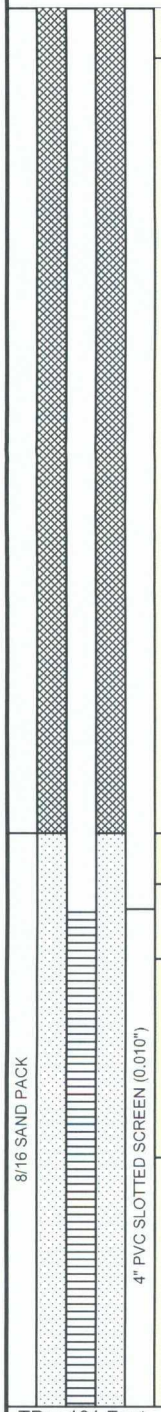
Continued on next page

LITHOLOGIC LOG (MONITORING WELL)

R T Hicks Consultants Ltd

P O Box 7624
Midland, TX 79708
(432) 528-3878

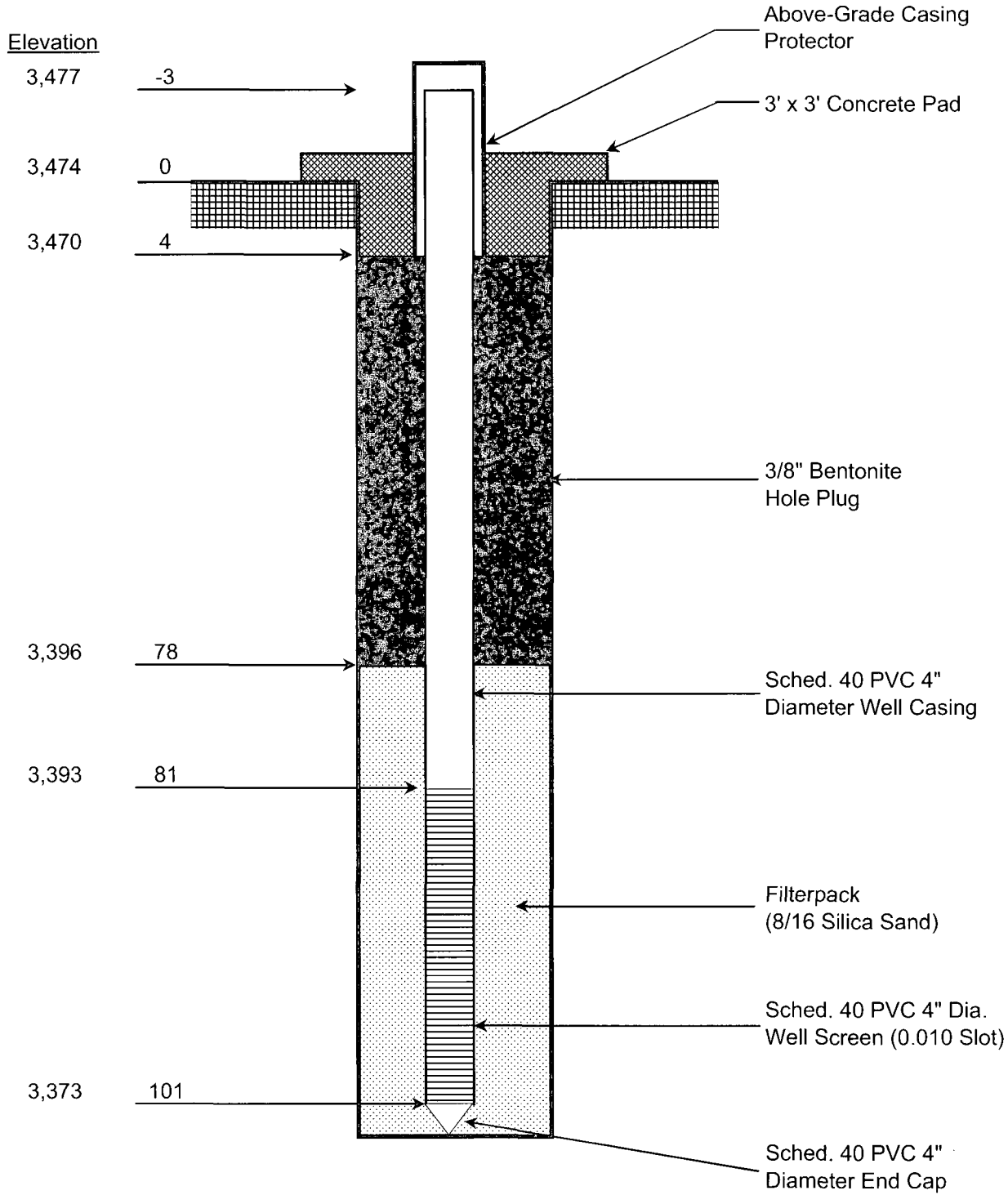
MONITOR WELL NO.:	MW-2	TOTAL DEPTH:	101 Ft
SITE ID:	BD System B-29 Line Leak	CLIENT:	Rice Operating Company
SURFACE ELEVATION:	3474 Feet (MSL)	COUNTY:	Lea County
CONTRACTOR:	Harrison & Cooper, Inc.	STATE:	New Mexico
DRILLING METHOD:	Air-Rotary	LOCATION:	T-21-S, R-37-E, Sec. 29 (B)
INSTALLATION DATE:	12/18 to 12/19/07	FIELD REP.:	Dale Littlejohn
WELL PLACEMENT:	318 feet South of MW-1	FILE NAME:	\BD System\B-29\Lithlogs 12-07
COMMENTS:	Lat. 32° 27' 16.1" North, Long. 103° 11' 6.0" West		



	cut	2,044	*Continued from previous page*
No trackable cuttings below 50 Ft Descrip. based on MW-1 and drilling rate	50	spoon	1,478	SAND Brown (no silt) fine to medium grain, moderately sorted, sub-rounded. Split spoon at 50 - 52 feet (1,280 mg/kg Cl). Shut down drilling to add water and polymer (less than 2,500 gallons).
	80			QUARTZITE, Reddish brown, fine crystalline, very hard drilling (2-ft/hour).
				SAND Brown, fine to medium grain, medium sorted, sub-rounded, with interbedded thin sandstone and quartzite.
	85			QUARTZITE, Reddish brown, fine crystalline, very hard drilling (2-ft/hour).
	95			SAND (aquifer) Reddish brown, fine grain, moderately sorted, rounded quartz.
	100			

TD = 101 Feet

MONITORING WELL CONSTRUCTION DIAGRAM



R T Hicks Consultants Ltd	SITE: BD System B-29 Line Leak		**Monitoring Well No. MW-2**
	DATE: ########	REV. NO.: 1	
	AUTHOR: DTL	TECH: DTL	
	DRILLER: H & C, Inc	FILE: Lithlogs	

DRILLING LOG	Site Name/Location	BORING/WELL INFORMATION			Logged by: Eades
RICE *Operarting Company*	**B-29**	Well No.SB-West	Date Drilled: 9/9/02	Driller: Eades	Completion:
122 West Taylor	**29-T21S-R37E**	Well Depth:	Boring Depth: 60'	Well Material:	Plugged
Hobbs, New Mexico 88240	**BD SWD System**	Casing Length	Boring Diameter: 4.75"	Casing Size:	with bentonite
(505) 393-9174	**Lea County, NM**	Screen Length:	Drilling Method: Air Rotary	Slot Size:	& cuttings.

DEPTH	SUBSURFACE LITHOLOGY	SAMPLE TYPE	Test Results (ppm) Cl^-	TPH	REMARKS	Boring
0	Ground surface		Titrate	EPA 418.1		
	Topsoil					
5		Grab	6483			
10	Caliche	Grab	5807		cuttings	→
15		Grab	2728			
20		Grab	1755			
25		Grab	899			
30		Grab	572			
35		Grab	344			
40		Grab	236			
45		Grab	160			
					bentonite	
50		Grab	152			
55		Grab	196			
60	Sand and Sandstone Stringers	Grab				
65						

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
505-266-5004

B-29 Site

Soil Borings, SB-West

Plate B-1

November, 2007

DRILLING LOG	Site Name/Location	BORING/WELL INFORMATION			Logged by: Eades
RICE *Operarting Company*	**B-29**	Well No. MD SB 1	Date Drilled: 06-25-02	Driller: Eades	Completion:
122 West Taylor	**29-T21S-R37E**	Well Depth:	Boring Depth: 40'	Well Material:	Plugged
Hobbs, New Mexico 88240	**BD SWD System**	Casing Length	Boring Diameter: 4.75"	Casing Size:	with bentonite
(505) 393-9174	**Lea County, NM**	Screen Length:	Drilling Method: Air Rotary	Slot Size:	& cuttings.

DEPTH	SUBSURFACE LITHOLOGY	SAMPLE TYPE	Test Results (ppm) Cl^-	TPH	REMARKS	Boring
0	Ground surface		Titrate	EPA 418.1		
1	Topsoil					
2						
3						
4					cuttings	
5		Grab	3599			
6						
7						
8	Sandy Brown Clay					
9						
10		Grab	4279			
11						
12						
13						
14	Caliche and Light Tan Sand					
15		Grab	5758			
16						
17						
18						
19						
20		Grab	4439			
21						
22						
23						
24						
25		Grab	3279			
26						
27					bentonite	
28						
29						
30		Grab	2959			
31						
32						
33						
34						
35		Grab	1440			
36						
37						
38	Caliche					
39						
40	Sand	Grab	592			

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**B-29 Site**	**Plate B-2**
	Soil Borings, SB-1	**November, 2007**

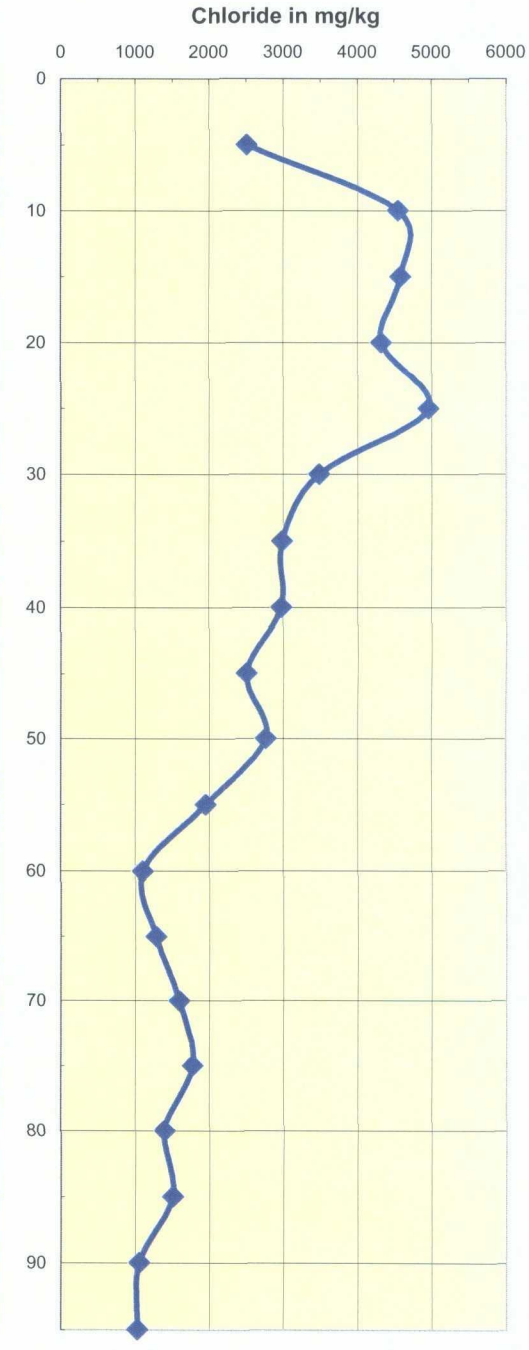
DRILLING LOG	Site Name/Location	BORING/WELL INFORMATION			Logged by: Eades
RICE *Operarting Company*	**B-29**	Well No. SB-East	Date Drilled: 9/9/02	Driller: Eades	Completion:
122 West Taylor	**29-T21S-R37E**	Well Depth:	Boring Depth: 45'	Well Material:	Plugged
Hobbs, New Mexico 88240	**BD SWD System**	Casing Length	Boring Diameter: 4.75"	Casing Size:	with bentonite
(505) 393-9174	**Lea County, NM**	Screen Length:	Drilling Method: Air Rotary	Slot Size:	& cuttings.

DEPTH	SUBSURFACE LITHOLOGY	SAMPLE TYPE	Test Results (ppm) Cl^-	TPH	REMARKS	Boring
0	Ground surface		Titrate	EPA 418.1		
	Topsoil					
5		Grab	800			
10		Grab	632		cuttings	
15	Caliche	Grab	745			
20		Grab	603			
25		Grab	274			
30		Grab	152			
35		Grab	83		bentonite	
40		Grab	108			
45	Sand and Sandstone Stringers	Grab	76			
50						
55						
60						
65						

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**B-29 Site**	**Plate B-3**
	Soil Borings, SB-East	**November, 2007**

Driller:	Harrison Cooper Drilling	Client:	Boring ID:
Logger:	David Hamilton	Rice Operating Company	ESB-1
Drilling Method:	Air Rotary	Project Name:	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	Location:	
Latitude:	32 27.330	T21S R37E	
Longitude:	103 11.097	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 3 feet	
2.0	Very fine grained sand, silt, caliche, 3-16 feet	
4.0		
6.0		
8.0		
10.0		
12.0		
14.0		
16.0	Fine grained sand, silt, some caliche, 16-24 feet	
18.0		
20.0		
22.0		
24.0	Vf sand, silt, hard caliche, 24-26 fee	
26.0	Very fine gained sand, silt, 26 -30 feet	
28.0		
30.0	Caliche, vf sand, siltt, 30-31 fee	
32.0	Vf sand, silt, 31-36 feet	
34.0		
36.0	Caliche, sand, silt, 36-37 fee	
38.0	Very fine sand, silt, 37-52 feet	
40.0		
42.0		
44.0		
46.0		
48.0		
50.0		
52.0	Vf grained sand, silt, some clay, some caliche, 52 58 feet	
54.0		
56.0		
58.0	Vf grained sand, silt, some clay, 58-66 feet	
60.0		
62.0		
64.0		
66.0	Silt, vf grained sand, some clay, some caliche, 66 72 feet	
68.0		
70.0		
72.0	Vf grained sand, silt, occasional thin caliche, 72 77 feet	
74.0		
76.0	Fine grained sand, some silt, occasional thin caliche, 77-95 feet	
78.0		
80.0		
82.0		
84.0		
86.0		
88.0		
90.0		
92.0		
94.0		
96.0		



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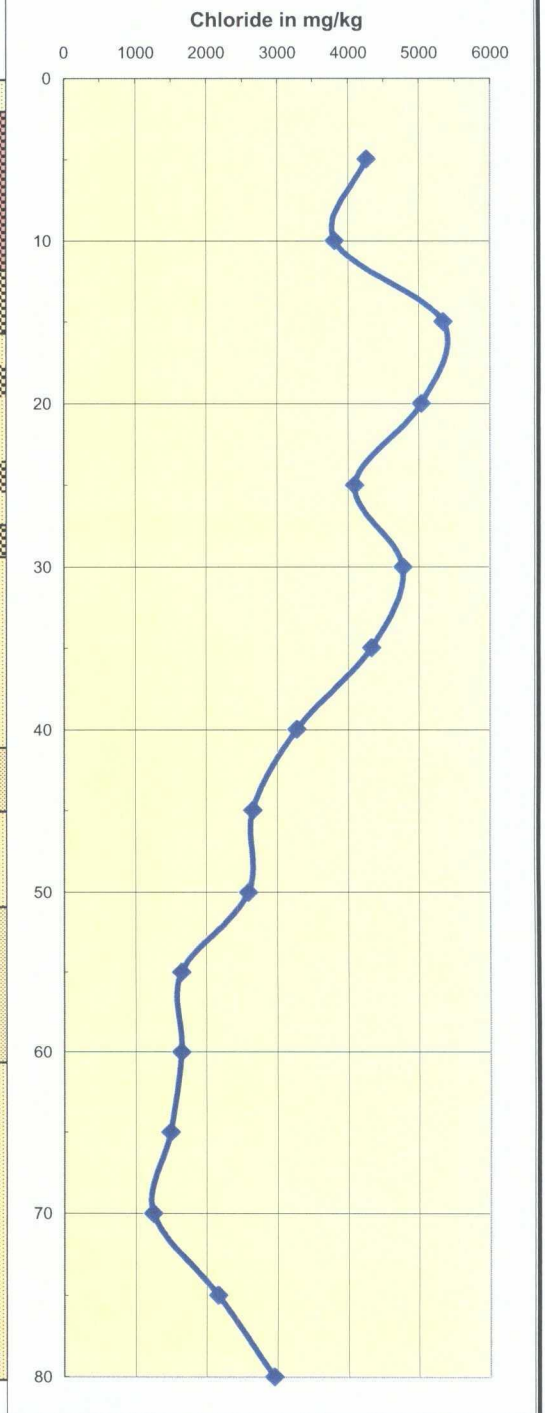
B-29 Site	Plate B-4
Exploratory Soil Boring	November, 2007

Driller:	Harrison Cooper Drilling	Client:	Boring ID:
Logger:	David Hamilton	Rice Operating Company	ESB-2
Drilling Method:	Air Rotary	Project Name:	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	Location:	
Latitude:	32 27.295	T21S R37E	
Longitude:	103 11.108	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 2 feet	
2.0	Very fine grained sand, silt, some clay, some caliche, 2-13 feet, tan-red	
4.0		
6.0		
8.0		
10.0		
12.0	Vf grained sand, silt, caliche, 13-17 feet	
14.0		
16.0	Very fine grained sand, silt, some caliche, 17-28 feet	
18.0		
20.0		
22.0		
24.0		
26.0		
28.0	Very fine grained sand, silt, caliche, 28 -31 feet	
30.0	Very fine grained sand, silt, 31-42 feet	
32.0		
34.0		
36.0		
38.0		
40.0		
42.0	Silt, very fine grained sand, 42-47 feet	
44.0		
46.0	Very fine grained sand, silt, 47-52 feet	
48.0		
50.0		
52.0	Silt, very fine grained sand, 52-63 feet	
54.0		
56.0		
58.0		
60.0		
62.0	Very fine grained sand, silt, 62-80 feet	
64.0		
66.0		
68.0		
70.0		
72.0		
74.0		
76.0		
78.0		
80.0		



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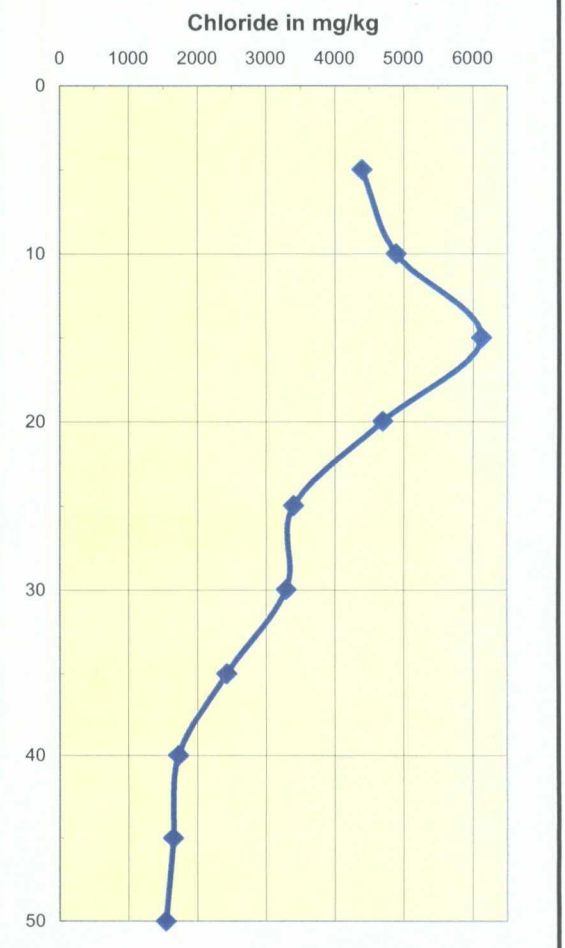
B-29 Site	Plate B-5
Exploratory Soil Boring	November, 2007

Driller:	Harrison Cooper Drilling	**Client:**	**Boring ID:**
Logger:	David Hamilton	Rice Operating Company	**ESB-3**
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	**Location:**	
Latitude:	32 27.235	T21S R37E	
Longitude:	103 11.055	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 1 feet	
2.0	Fine grained sand, some silt, some caliche, 1-7 feet	
4.0		
6.0	Vf grained sand, silt,caliche, 7-14 feet	
8.0		
10.0		
12.0		
14.0	Silt, very fine grained sand, some caliche,14-18 feet	
16.0		
18.0	Very fine grained sand, silt, caliche, 18-23 feet	
20.0		
22.0	Silt, very fine grained sand, some caliche, 23-28 feet	
24.0		
26.0		
28.0	Fine grained sand, silt, some caliche layers, 28-37 feet	
30.0		
32.0		
34.0		
36.0	Silt, very fine sand, some thin caliche layers, 37-50 feet	
38.0		
40.0		
42.0		
44.0		
46.0		
48.0		
50.0		



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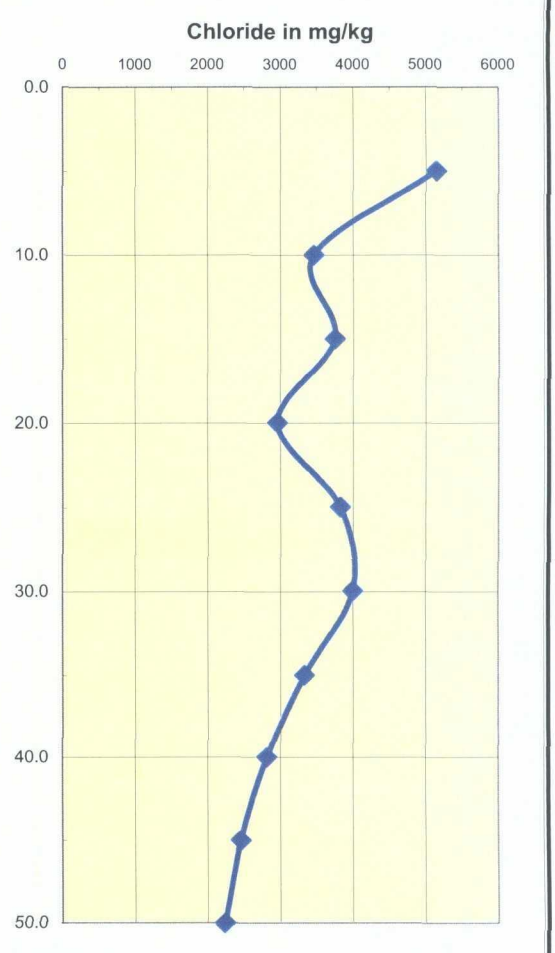
B-29 Site	**Plate B-6**
Exploratory Soil Boring	**November, 2007**

Driller:	Harrison Cooper Drilling	**Client:**	**Boring ID:**
Logger:	David Hamilton	Rice Operating Company	**ESB-4**
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	**Location:**	
Latitude:	32 27.258	T21S R37E	
Longitude:	103 11.077	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 2 feet	
2.0	Very fine grained sand, silt, 2-3.5 feet	
4.0	Vf grained sand, silt, hard caliche, 3.5-7 feet	
6.0	Very fine grained sand, silt, some caliche, 7-20 feet	
8.0		
10.0		
12.0		
14.0		
16.0		
18.0		
20.0	Hard caliche, 20 -22 feet	
22.0	Very fine grained sand, silt, some caliche layers, 22-30 feet	
24.0		
26.0		
28.0	Silt, very fine grained sand, some caliche layers, 30-50 feet	
30.0		
32.0		
34.0		
36.0		
38.0		
40.0		
42.0		
44.0		
46.0		
48.0		
50.0		



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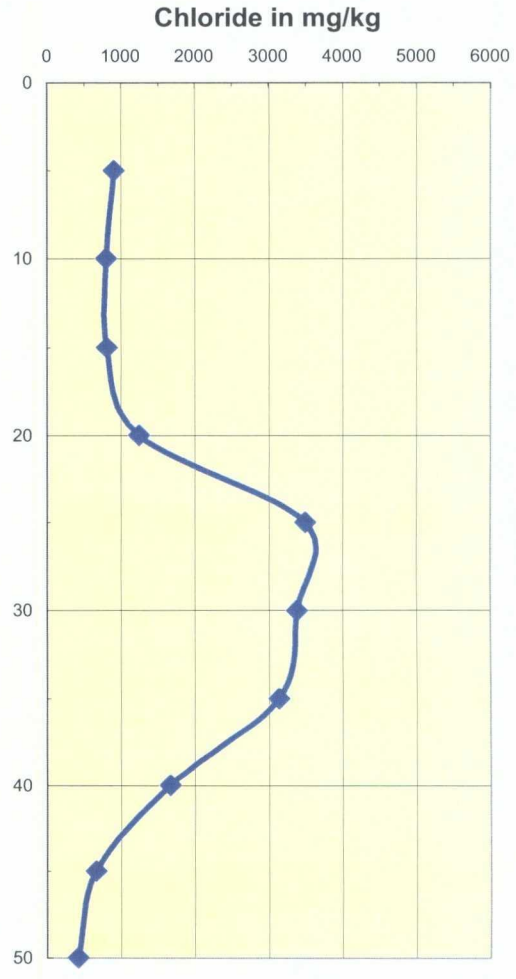
B-29 Site	**Plate B-7**
Exploratory Soil Boring	**November, 2007**

Driller:	Harrison Cooper Drilling	**Client:**	**Boring ID:**
Logger:	David Hamilton	Rice Operating Company	**ESB-5**
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	**Location:**	
Latitude:	32 27.233	T21S R37E	
Longitude:	103 11.017	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 1.5 feet	
2.0	Silt, very fine grained sand, some clay, some caliche, 1.5-6 feet	
4.0		
6.0		
8.0	Vf grained sand, silt, some clay, 8-11 feet	
10.0	Sand, silt, some clay, some caliche, 11-18 feet	
12.0		
14.0		
16.0		
18.0	Sand, silt, caliche, 18 -22 feet	
20.0		
22.0	Caliche, sand, silt, 22-24 feet	
24.0	Vf grained sand, silt, 24-27 feet, tan	
26.0	Very fined grained sand, silt, caliche layers 27-30 feet	
28.0		
30.0	Vf grained sand, silt, caliche, 30-33 feet	
32.0	Fine grained sand, silt, 33 - 42 feet	
34.0		
36.0		
38.0		
40.0		
42.0	Fine grained sand, silt, thin caliche layers, 42-50 feet	
44.0		
46.0		
48.0		
50.0		



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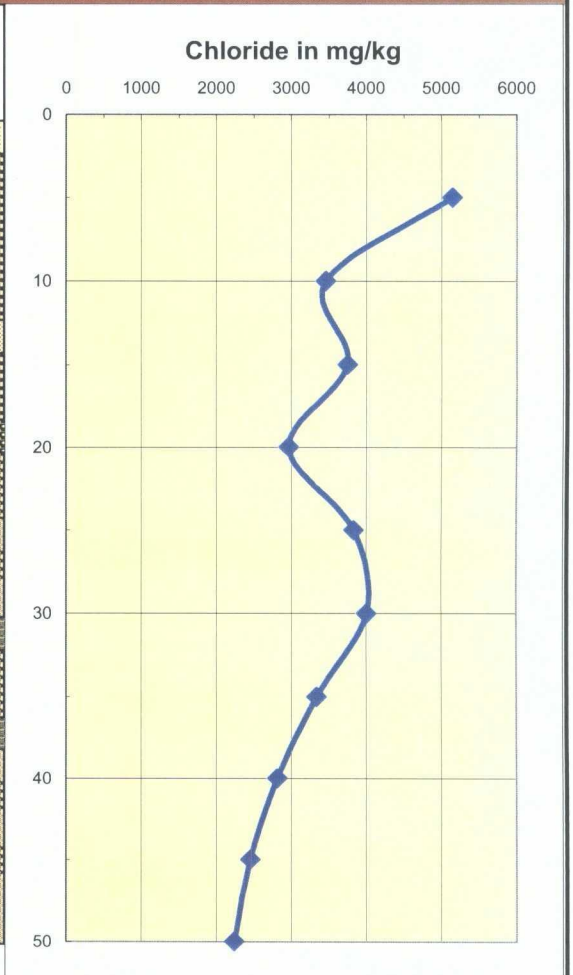
B-29 Site	**Plate B-8**
Exploratory Soil Boring	**November, 2007**

Driller:	Harrison Cooper Drilling	Client:	Boring ID:
Logger:	David Hamilton	Rice Operating Company	ESB-6
Drilling Method:	Air Rotary	Project Name:	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	Location:	
Latitude:	32 27.269	T21S R37E	
Longitude:	103 11.101	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 2 feet	
2.0	Very fine grained sand, silt, some caliche, 2-12 feet, light tan	
4.0		
6.0		
8.0		
10.0		
12.0	Vf grained sand, silt, 12-14 feet, light tan	
14.0	Very fine grained sand, silt, some caliche, 14-18 feet, light tan	
16.0		
18.0	Vf grained sand, silt, hard caliche, 18 -20 feet	
20.0	Silt, very fine grained sand, some caliche, 20-23 feet, light tan	
22.0		
24.0	Silt, very fine grained sand, some caliche, 23-30 feet, tan	
26.0		
28.0		
30.0	Silt, vf grained sand, hard caliche, 30-32 feet	
32.0	Silt, vf grained sand, caliche layers, 32-36 feet, tan	
34.0		
36.0	Silt, vf grained sand, hard caliche, 36-37 feet	
38.0	Silt, very fine grained sand, some caliche, 37 - 50 feet	
40.0		
42.0		
44.0		
46.0		
48.0		
50.0		



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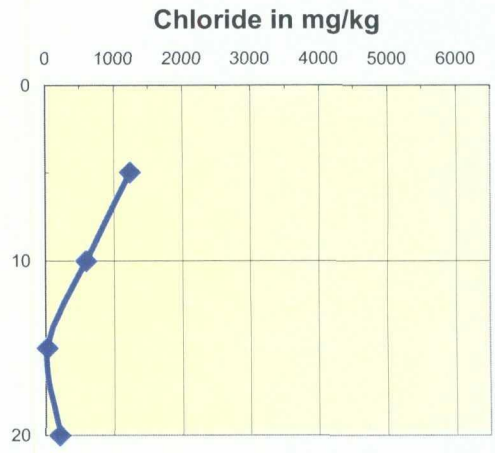
B-29 Site	Plate B-9
Exploratory Soil Boring	November, 2007

Driller:	Harrison Cooper Drilling	**Client:**	**Boring ID:**
Logger:	David Hamilton	Rice Operating Company	**ESB-7**
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	12/14/2006	B-29 Site	
End Date:	12/14/2006	**Location:**	
Latitude:	32 27.279	T21S R37E	
Longitude:	103 11.090	Section 29	

Depth (feet)	Description	Lithology
0.0	Surface, 0 - 1.5 feet	
2.0	Very fine grained sand, silt, some caliche, 1.5-12 feet	
4.0		
6.0		
8.0		
10.0		
12.0	Vf grained sand, silt, caliche, 12-20 feet	
14.0		
16.0		
18.0		
20.0		



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B-29 Site	**Plate B-10**
Exploratory Soil Boring	**November, 2007**