

1R - 426-110

REPORTS

DATE:

8-12-09



Infrastructure, buildings, environment, communications

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Ed Hansen
New Mexico Oil Conservation Division
1220 So. Saint Francis Drive
Santa Fe, New Mexico 87505

Certified Mail Receipt No. 7002 2410 0001 5813 9763

Subject:

Investigation and Characterization Plan Report
Blinebry-Drinkard (BD) Junction F-35, NMOCD Case #1R426-110
T21S, R37E, Section 35, Unit F, Eunice, Lea County, New Mexico

Dear Mr. Hansen,

RICE Operating Company (ROC) has retained ARCADIS U.S., Inc. (ARCADIS) to address potential environmental concerns at the above-referenced site. ROC is the service provider (agent) for the Blinebry-Drinkard (BD) SWD System and has no ownership of any portion of the pipeline, well, or facility. The System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis. Environmental projects of this magnitude require System Partner AFE approval and work begins as funds are received. In general, project funding is not forthcoming until NMOCD approves the work plan. Therefore, your timely review of this submission is requested.

On behalf of ROC, ARCADIS respectfully submits this Investigation Characterization Plan (ICP) Report and recommendations for the above-referenced site.

SITE HISTORY AND BACKGROUND

The site is located east of the town of Eunice, New Mexico (Figure 1). Elevated chlorides in this area have been reported since as early as 1952 (Ground-Water Report 6, Geology and Ground-Water Conditions in Southern Lea County, Alexander Nicholson, Jr. and Alfred Clebsch, Jr.). The expected depth to groundwater at this site is approximately 44 feet below ground surface (bgs).

The junction was eliminated and replaced with a new junction box located 30 feet west of the former junction box location (Figure 2). Initial delineation began on April 27, 2005 and was completed on April 28, 2005. A delineation trench was excavated at the former junction box location using a backhoe. A backhoe was used to collect soil samples at one-foot intervals to a depth of 12 feet bgs at the removed junction box location. Soil samples were analyzed in the field for chlorides using field-adapted Method 9253 and screened in the field using a photoionization detector (PID).

Part of a bigger picture

Date:
August 12, 2009

Contact:
Sharon Hall

Phone:
432 687-5400

Email:
shall@arcadis-us.com

A grab sample was collected from the bottom of the excavation and submitted to Environmental Lab of Texas and analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX), gasoline range organics (GRO), diesel range organics (DRO) and chloride analysis. BTEX was detected at very low concentrations. DRO was detected at a concentration of 2120 milligrams per kilogram (mg/kg). GRO was detected at a concentration of 616 mg/kg. Elevated PID readings were observed in the samples collected from a depth of 5 feet bgs to 12 feet bgs. Field chloride concentrations were low (131 mg/kg or less). The chloride concentration of the 12 foot bgs sample submitted to the lab was 32.2 mg/kg.

Based on the results of the soil sampling analytical results elevated hydrocarbon (DRO) concentrations are present at the subject site (Figure 2).

The excavation was backfilled with imported clean soil and the surface graded and seeded. An identification plate was placed on the surface to identify the former junction box location and for possible future environmental considerations.

ROC disclosed potential groundwater impact at the site to NMOCD in a Disclosure Report dated 5/16/2005. A disclosure report was submitted to NMOCD with all of the ROC 2005 Junction Box Reports in March 2006 per the ROC Junction Box Upgrade Work Plan.

On behalf of ROC, ARCADIS submitted an ICP to NMOCD on June 16, 2008. The plan proposed three tasks as follows:

Collect Regional Hydrogeologic Data

A one-half mile radius water well inventory that would include a review of water well records listed on the New Mexico State Engineer Office and United States Geological Survey (USGS) websites and windmills indicated on applicable USGS topographic maps.

Chloride impacted regional groundwater has been reported in this area near the towns of Eunice and Monument since as early as 1952 (Ground-Water Report 6, Geology and Ground-Water Conditions in Southern Lea County, Nicholson and Clebsch, United States Geological Survey).

Evaluate Concentrations of Constituents of Concern in Soil and Groundwater

Installation of one monitoring well. If analytical results indicated that chloride and/or BTEX concentrations in groundwater exceed New Mexico Water Quality Control Commission

standards, additional monitoring wells may be installed as warranted by the results of the investigation.

Additional soil borings were proposed approximately north, south, east and west of the former junction box location.

Evaluate Potential Flux from the Vadose Zone to Ground Water

As proposed in the ICP, the information gathered from Tasks 1 and 2 would be evaluated and utilized to design a groundwater remedy if needed. The groundwater remedy that offers the greatest environmental benefit while causing the least environmental impairment would be selected. If the evaluation demonstrated that residual constituents posed no threat to groundwater quality, only a surface restoration plan protective of groundwater would be proposed. Such recommendations and findings would be presented to NMOCD in a subsequent Corrective Action Plan (CAP).

The proposed ICP was approved by NMOCD on July 17, 2008.

ICP INVESTIGATION RESULTS

Four soil borings (SB 1 through SB 4) were drilled at the site on March 4, 2009 (Figure 2). The soil borings were drilled to depths of 40 to 45 feet. Soil samples were collected every five-feet and analyzed in the field for chlorides using field- adapted Method 9253 and screened in the field using a PID. Representative soil samples were submitted to Cardinal Laboratories and analyzed for chlorides, GRO, DRO, and BTEX. Field sampling and analytical results are shown in attached Tables 1 and 2 and Figures 3 and 4. Soil boring logs and the laboratory report are also attached. None of the soil borings were converted to a monitoring well as the landowner would not grant ROC permission to drill a monitoring well.

RECOMMENDATIONS

Based on the fact that elevated chloride concentrations in groundwater have been reported in the area since the early 1950s, we propose drilling one near source, one upgradient and one downgradient monitoring well at the site to assess groundwater quality. Groundwater samples will be collected and analyzed for chlorides and TDS. Based on the results of groundwater analysis, additional monitor wells and/or soil borings may be installed to delineate impacts at the site.

ARCADIS

Ed Hansen
August 12, 2009

Your approval to drill three monitoring wells (pending landowner approval) in the approximate locations shown on Figure 5 is requested. If you have any questions or need additional information please contact Hack Conder at (575) 393-9174 or me.

Very truly yours,

ARCADIS U.S, Inc.

Sharon E. Hall

Sharon E. Hall
Associate Vice President

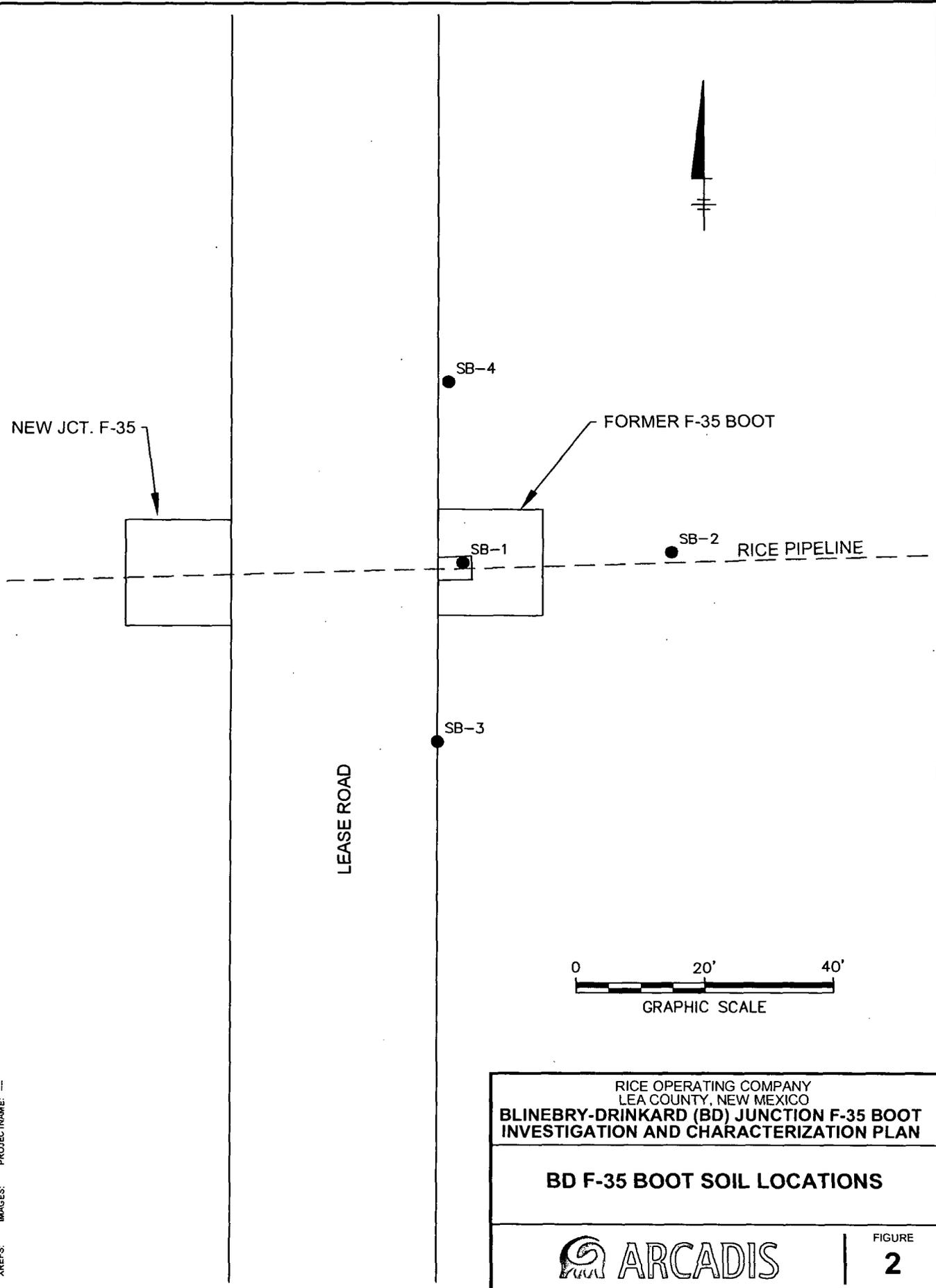
Copies:

Marvin Burrows- Rice Operating Company
Brad Jones- NMOCD

Attachment:

Figures 1 through 5
Tables 1 and 2
Boring logs
Laboratory results

CITY: Syracuse GROUP: ENV-141 DB: P.Lister A.Schilling TR: S.Hall LYRON: OFF-REF (FRZ)
G:\ENV\CAD\SYRACUSE\ACT\T010140001\DWG\01014B01.dwg LAYOUT: 23-AVED: 7/30/2009 10:16 AM ACADVER: 17.05 (LMS TECH) PAGES: 17
XREFS: IMAGES: PROJECTNAME: ---



RICE OPERATING COMPANY
LEA COUNTY, NEW MEXICO
**BLINEBRY-DRINKARD (BD) JUNCTION F-35 BOOT
INVESTIGATION AND CHARACTERIZATION PLAN**

BD F-35 BOOT SOIL LOCATIONS

 **ARCADIS** | **FIGURE 2**

CITY: Syracuse GROUP: ENV.141 DB: P.Lester A.Schilling TR: S.Haji LYRON+ OFF-REF (FRZ)
 G:\ENV\CADSYRACUSE\ACT\MIT001\0140001\DWG\01014802.dwg LAYOUT: _SSAVED: 8/7/2008 1:52 PM ACAD/VER: 17.05 (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: PLT\FULLCTB.PLOTED: 8/7/2008 1:52 PM BY: SCHILLING, ADAM
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NEW JCT. F-35

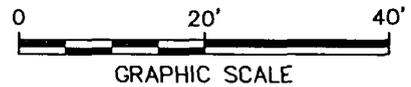
SB-1		
Depth Feet	PID Reading	Chloride mg/kg
15	2,085	149
20	1,495	181
25	337	508
30	54	848
35	696	3,429
40	3	1,050

SB-4		
Depth Feet	PID Reading	Chloride mg/kg
5	0.3	177
10	0.4	215
15	0.4	178
20	0.4	594
25	0	969
30	0	456
35	0	387
40	0	427

SB-2		
Depth Feet	PID Reading	Chloride mg/kg
5	1.1	380
10	1.9	209
12	2.2	1,210
15	1.8	655
20	0	1,859
25	0	1,988
30	0	969
35	0	364

LEASE ROAD

SB-3		
Depth Feet	PID Reading	Chloride mg/kg
5	0.5	334
10	0.4	332
15	0.6	151
20	0.5	542
25	0	1,835
30	0	2,210
35	0	2,362
40	0	996



RICE OPERATING COMPANY
 LEA COUNTY, NEW MEXICO
BLINEBRY-DRINKARD (BD) JUNCTION F-35 BOOT
 INVESTIGATION AND CHARACTERIZATION PLAN

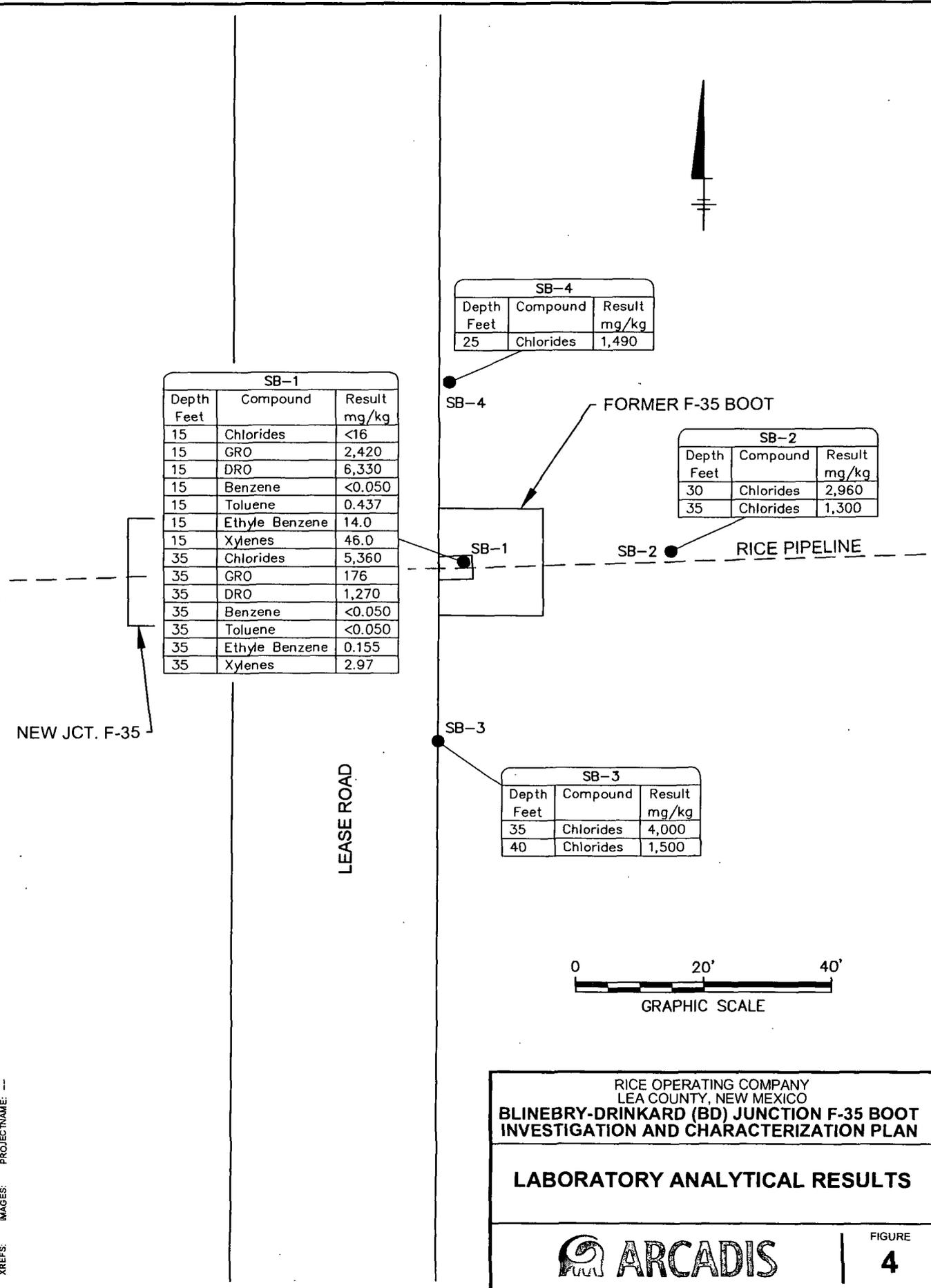
FIELD CHLORIDE AND PID RESULTS



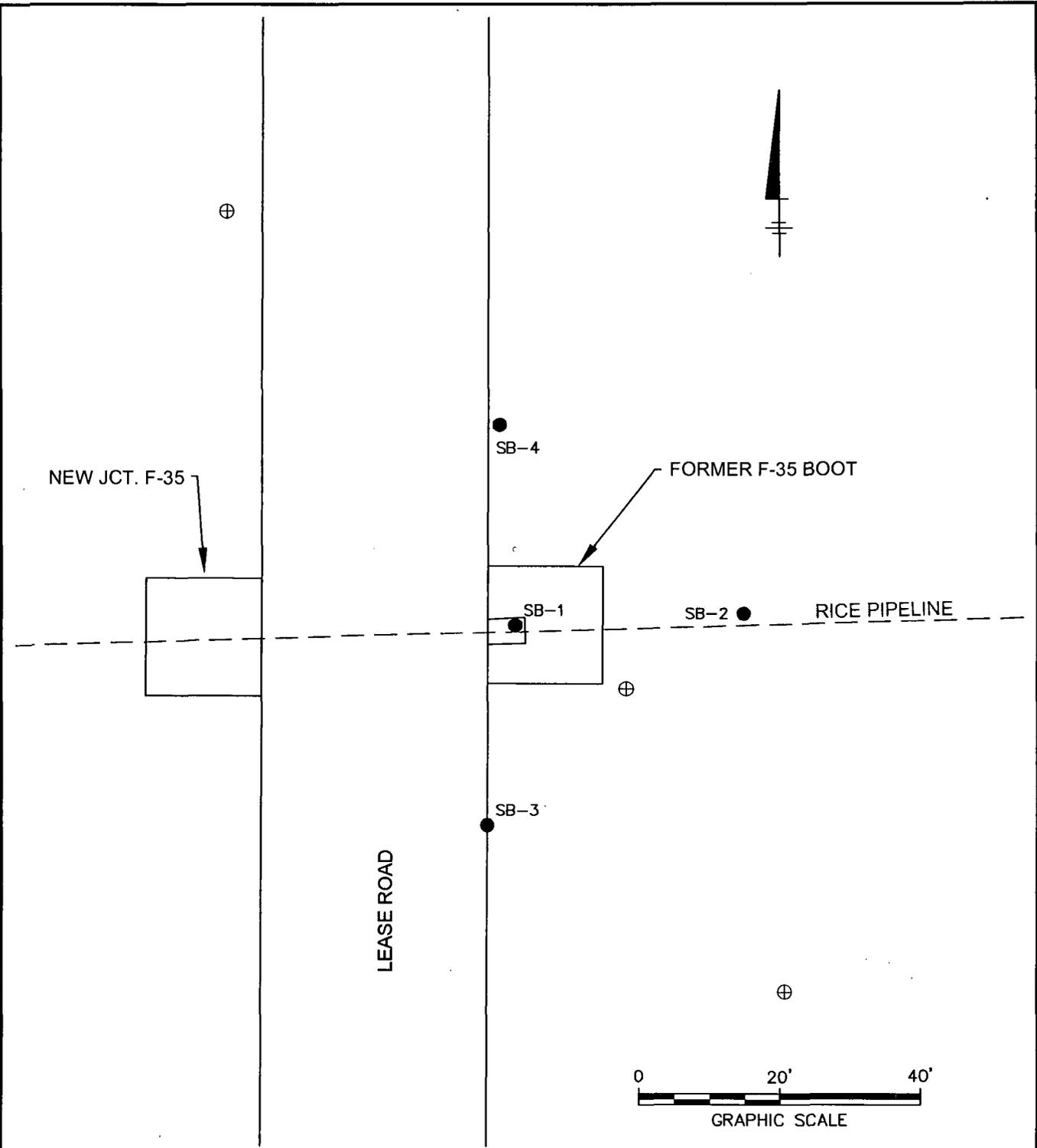
FIGURE

3

CITY: Syracuse GROUP: ENV.141 DB: P.Liter A.Schilling TR: S.Haj LYRON+OFF+REF (FRZ)
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CITY: Syracuse GROUP: ENV-141 DB: P.Liter A.Schilling TR: S.Hall LYRONH-OFF-REF. (FRZ)
 C:\ENV\CAD\SYRACUSE\ACT\MT001\0140001\00001\DWG\0141804.dwg LAYOUT: 5SAVED: 7/30/2009 10:28 AM ACADVER: 17.05 (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: PLTFULLCTB PLOTTED: 8/6/2009 1:13 PM BY: SCHILLING, ADAM
 XREFS: IMAGES: PROJECTNAME: ---



LEGEND:

- SOIL BORING
- ⊕ PROPOSED MONITOR WELL

RICE OPERATING COMPANY
 LEA COUNTY, NEW MEXICO
**BLINEBRY-DRINKARD (BD) JUNCTION F-35 BOOT
 INVESTIGATION AND CHARACTERIZATION PLAN**

PROPOSED MONITOR WELL LOCATIONS



Table 1

BD F-35 BOOT

Field Sampling Results

Soil Sample	PID Reading	Field Chloride Result (mg/kg)
SB-1 15'	2,085	149
SB-1 20'	1,495	181
SB-1 25'	337	508
SB-1 30'	54	848
SB-1 35'	696	3,429
SB-1 40'	3	1,050
SB-2 5'	1.1	380
SB-2 10'	1.9	209
SB-2 12'	2.2	1,210
SB-2 15'	1.8	655
SB-2 20'	0	1,859
SB-2 25"	0	1,988
SB-2 30'	0	969
SB-2 35'	0	364
SB-3 5'	0.5	334
SB-3 10'	0.4	332
SB-3 15'	0.6	151
SB-3 20'	0.5	542
SB-3 25'	0	1,835
SB-3 30'	0	2,210
SB-3 35'	0	2,362
SB-3 40'	0	996
SB-4 5'	0.3	117
SB-4 10'	0.4	215
SB-4 15'	0.4	178
SB-4 20'	0.4	594
SB-4 25'	0	969
SB-4 30'	0	456
SB-4 35'	0	387
SB-4 40'	0	427

Table 2

BD F-35 BOOT

Laboratory Analytical Results

Soil Sample ID	Compound	Result (mg/kg)
SB#1@15'	Chlorides	<16
SB#1@15'	GRO	2,420
SB#1@15'	DRO	6,330
SB#1@15'	Benzene	<0.050
SB#1@15'	Toluene	0.437
SB#1@15'	Ethylbenzene	14.0
SB#1@15'	Total Xylenes	46.0
SB#1@35'	Chlorides	5,360
SB#1@35'	GRO	176
SB#1@35'	DRO	1,270
SB#1@35'	Benzene	<0.050
SB#1@35'	Toluene	<0.050
SB#1@35'	Ethylbenzene	0.155
SB#1@35'	Total Xylenes	2.97
SB#2@30'	Chlorides	2,960
SB#2@35'	Chlorides	1,300
SB#3@35'	Chlorides	4,000
SB#3@40'	Chlorides	1,500
SB#4@25'	Chlorides	1,490

mg/kg= Milligrams per kilogram



ARCADIS

BORING LOG

BORING NO.

SB-1

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383

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Page 1 of 1

PROJECT NUMBER:	MT001014.0001.00001	DRILLING CO:	HARRISON-COOPER
CLIENT NAME:	RICE OPERATING COMPANY	DRILLING METHOD:	AIR ROTARY
PROJECT NAME:	INVESTIGATION AND CHARACTERIZATION PLAN	DRILLER:	KEN HARRISON
SITE LOCATION:	BLINEBRY-DRINKARD (BD) JUNCTION F-35 LEA COUNTY, NEW MEXICO	LOGGER:	R. LANG
UNIQUE NUMBER:	31-014-00919	DATE BEGUN:	3/4/09
		DATE COMPLETED:	3/4/09
		FILE NAME	SB-1.DAT

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVN READING	CHLORIDES	LITHOLOGY	DESCRIPTION
0									BACKFILL fill dirt.
-5									
-10									
-15		SS			2.0'	2.085	149 LAB <16		SANDSTONE GLEY 1 4/1 5G dark greenish gray, medium grained sand, well rounded to subrounded, poorly sorted, friable, dry, odor; becoming 5YR 6/6 reddish yellow at -18.0'.
-20		SS			1.5'	1.495	181		
-25		SS			1.5'	337	508		
-30		SS			2.0'	54	848		SANDSTONE/CALICHE 50% 5YR 6/6 reddish yellow, medium to fine grained sand, well rounded to subrounded, poorly sorted; 50% CALICHE GLEY 1 8/N white, firm, nodular. Note: Becoming moist at -38.0'. Became wet at -45.0'. Water level after one hour — -40.7'.
-35		SS			2.0'	696	3,429 LAB 5,360		
-40		SS			2.0'	3.0	1,050		
-45									



ARCADIS

BORING LOG

BORING NO.

SB-2

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383

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Page 1 of 1

PROJECT NUMBER:	MT001014.0001.00001	DRILLING CO:	HARRISON-COOPER
CLIENT NAME:	RICE OPERATING COMPANY	DRILLING METHOD:	AIR ROTARY
PROJECT NAME:	INVESTIGATION AND CHARACTERIZATION PLAN	DRILLER:	KEN HARRISON
SITE LOCATION:	BLINEBRY-DRINKARD (BD) JUNCTION F-35 LEA COUNTY, NEW MEXICO	LOGGER:	R. LANG
UNIQUE NUMBER:	31-014-00920	DATE BEGUN:	3/4/09
		DATE COMPLETED:	3/4/09
		FILE NAME	SB-2.DAT

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	CHLORIDES	LITHOLOGY	DESCRIPTION
0									SANDSTONE 5YR 8/4 pink, medium grained, subrounded to subangular, well sorted, very soft, moist from 0 to -5.0', dry below.
-5		Shovel			2.0'	1.1	380		
		SS							
-10		Shovel				1.9	209		CALICHE 10R 8/1 white, hard, indurated.
-15		Shovel				2.2	1,210		
-20		Shovel				1.8	655		
-25		Shovel					1,859		SANDSTONE/CALICHE 70% SANDSTONE 10R 8/4 pink, medium grained, well sorted, loose, dry, 30% CALICHE 10R 8/1 white. Note: From -35.0' to -40.0' well became moist.
-30							1,988 LAB 2,960		
-35							969 LAB 1,300		
-40							364		



BORING LOG

BORING NO.

SB-3

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383

Tel: 432/687-5400 Fax: 432/687-5401

Page 1 of 1

PROJECT NUMBER:	MT001014.0001.00001	DRILLING CO:	HARRISON-COOPER
CLIENT NAME:	RICE OPERATING COMPANY	DRILLING METHOD:	AIR ROTARY
PROJECT NAME:	INVESTIGATION AND CHARACTERIZATION PLAN	DRILLER:	KEN HARRISON
SITE LOCATION:	BLINEBRY-DRINKARD (BD) JUNCTION F-35 LEA COUNTY, NEW MEXICO	LOGGER:	R. LANG
UNIQUE NUMBER:	31-014-00921	DATE BEGUN:	3/4/09
		DATE COMPLETED:	3/4/09
		FILE NAME	SB-3.DAT

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	CHLORIDES	LITHOLOGY	DESCRIPTION
0									SANDSTONE 2.5YR 5/8 red, fine to medium grained sand, subrounded to subangular, well sorted, moist.
-5		Shovel			2.0'	0.5	334		
-10		SS			2.0'	0.4	332		
-15		Shovel				0.6	151		
-20		Shovel				0.5	542		SANDSTONE/CALICHE 60% SANDSTONE 2.5YR 5/8 red, fine to medium grained sand, subrounded to subangular, well sorted, moist; 40% CALICHE 10R 8/1 white. Note: From -35.0' to -40.0' well became moist.
-25		Shovel					1,835		
-30		Shovel					2,210		
-35		Shovel					2,362 LAB 4,000		
-40		Shovel					996 LAB 1,500		



BORING LOG

BORING NO.

SB-4

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383

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Page 1 of 1

PROJECT NUMBER:	MT001014.0001.00001	DRILLING CO:	HARRISON-COOPER
CLIENT NAME:	RICE OPERATING COMPANY	DRILLING METHOD:	AIR ROTARY
PROJECT NAME:	INVESTIGATION AND CHARACTERIZATION PLAN	DRILLER:	KEN HARRISON
SITE LOCATION:	BLINEBRY-DRINKARD (BD) JUNCTION F-35 LEA COUNTY, NEW MEXICO	LOGGER:	R. LANG
UNIQUE NUMBER:	31-014-00922	DATE BEGUN:	3/4/09
		DATE COMPLETED:	3/4/09
		FILE NAME	SB-4.DAT

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	CHLORIDES	LITHOLOGY	DESCRIPTION
0		Shovel							SANDSTONE 5YR 6/6 reddish yellow, coarse to fine grained sand, subrounded to well rounded, moderately sorted, very soft to loose, dry.
-5		SS		2.0		0.3	117		
-10		SS				0.4	215		SANDSTONE 7.5YR 8/2 pinkish white, coarse to fine grained sand, subrounded to well rounded, moderately sorted, very soft to loose, dry, friable, caliche cement.
-15		Shovel				0.4	178		SANDSTONE/CALICHE 60% SANDSTONE 5YR 6/6 reddish yellow, coarse to fine grained sand, subrounded to well rounded, moderately sorted, very soft to loose, dry; 40% CALICHE 10R 8/1 white, firm to hard, nodular, amount of caliche in sample varies. Note: Became wet at -40.0'
-20		Shovel				0.4	594		
-25		Shovel					969 LAB 1,490		
-30		Shovel					456		
-35		Shovel					387		
-40		Shovel					427		
-45		Shovel							

