1R - 426-98

WORKPLANS

Date:
12-22-10

Texerra

75 Wuthering Hts Drive Colorado Springs, CO 80921
Tel: 719-339-6791 E-mail: lpg@texerra.com

December 22nd, 2010

RECEIVED OCD
2011 JAN -3 P 1:20

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

RE: Corrective Action Plan (CAP)
Rice Operating Company – BD SWD System
BD O-23-1 Junction Box (Vent) UL O, Sect 23, Township 21S, Range 37E
NMOCD Case Number 1R426-98

Sent via Email and U.S. Certified Mail Return Receipt No. 7008 1140 0001 3068 8715

Mr. Hansen,

This report presents the results of additional groundwater sampling and analysis as specified in the Notification of Groundwater Impact for the BD O-23-1 Jct site (location given in Figure 1), submitted to NMOCD on September 13th of this year, and proposes a Corrective Action Plan (CAP) to restore the ground surface at the site and to protect groundwater quality.

Groundwater chloride concentrations were found on October 13th to measure 2,350 mg/l from (a more recently installed) up-gradient monitor well (MW-2) and to measure 4,850 mg/l from the original near-source/down-gradient monitor well (MW-1) on the same date. Monitor well locations are shown in Figure 2 and groundwater laboratory data are given in Figures 3 & 4. It is apparent that although the up-gradient groundwater quality is impaired before it moves across the location it has also been affected by the downward migration of residual soil chlorides from the site. This is supported by the elevated levels of residual soil chlorides measured across the site during a soils evaluation conducted on February 24th, 2010(Figure 5). We estimate the residual mass of contributed chlorides to be approximately 1,121 lbs from the bottom 10 ft interval of the unsaturated zone and approximately 469 lbs in the affected groundwater beneath the site, based on the attached chloride mass calculations (Table 1).

Texerra recommends and proposes the following **Corrective Action Plan** to protect groundwater and to move this project toward "remediation termination" status:

1) Remove the upper (approximately) four feet of chloride impacted soils across the area affected, approximately 48x50 ft, by past operations of the BD O-23-1 junction box and analyze these for use as backfill.
2) Install and properly seat a 20-mil plastic infiltration barrier at this depth encompassing the area impacted by the former junction box (as shown in Figure 6), and backfill with clean fill dirt with a chloride concentration below 500 mg/kg and a PID (field) reading below 100 ppm.
3) Prepare the surface soils over and surrounding the site and seed to a native vegetation mix.
4) Install a 4-inch diameter near-source "pumping well" and withdraw a volume of groundwater sufficient to remove the total estimated contributed chloride mass of 1,590 lbs (Table 1).

Removed groundwater will be utilized for pipeline and well maintenence and possibly treated and used to promote vegetation. The Office of the State Engineer (OSE) will be pre-notified of this pumping activity.

The re-establishment of natural vegetation will remove most precipitation through evapotranspiration and the installation of the synthetic liner installed below the root zone will virtually stop the downward migration of water that the plants are unable to capture during wet periods. The net effect of this "evaporation/infiltration barrier" will be to first diminish and then to eventually stop the downward migration of residual soil chlorides into the groundwater. Taken together, these measures will protect groundwater quality beneath and down-gradient from the subject location.

We will sample groundwater on a quarterly basis from the up-gradient monitor well and the (to be constructed) near-source pumping well, and analyze this in the laboratory for chlorides, sulfate, TDS and BTEX. We will additionally measure the volume of groundwater removed from the pumping well over time and monitor chlorides in this water using field titration methods on a more frequent basis.

Upon the removal of the 1,590 lbs of chloride and approximately 721 barrels of groundwater we anticipate submitting to NMOCD a final remediation progress report and request for project termination.

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 do not hesitate to contact either myself or Rice Operating Company if you have any questions or need additional information.

Sincerely,

L. Peter Galusky, Jr. Ph.D.,P.G.

Attachments: Figures and Tables
Copy: Rice Operating Company

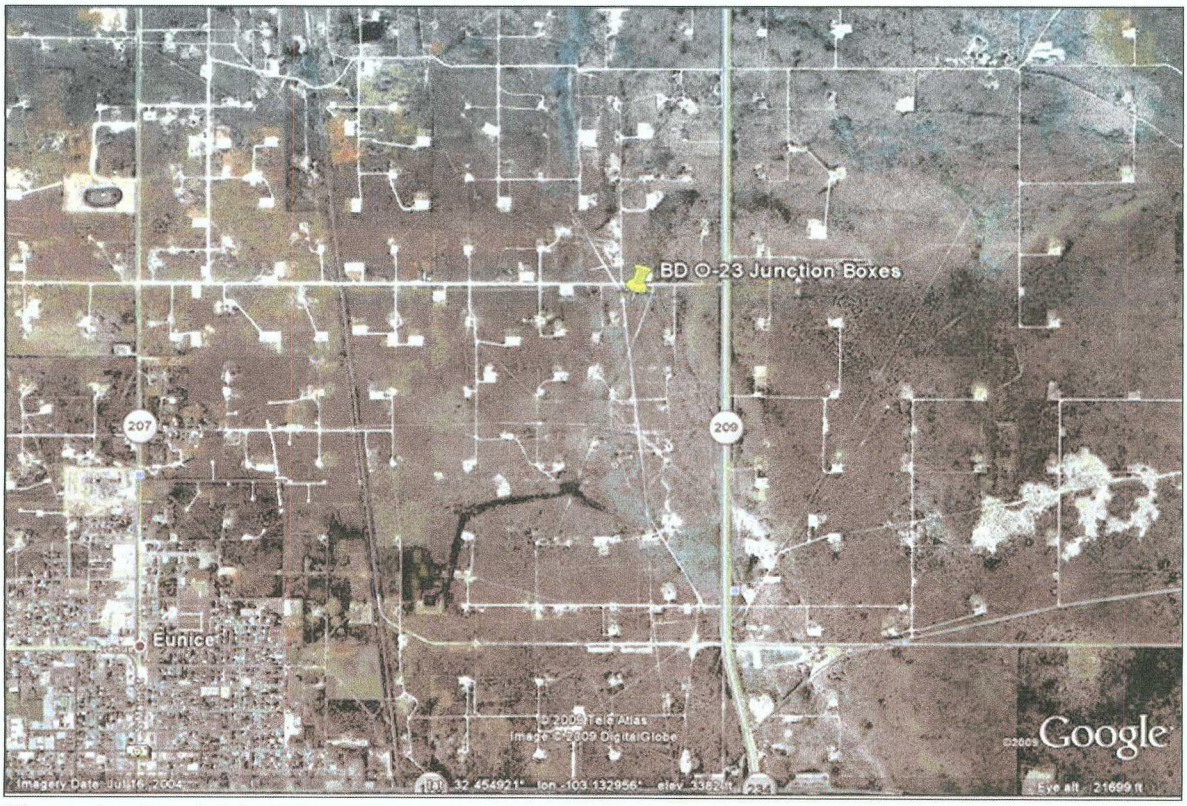


Figure 1 – BD O-23-1 Jct (vent) location.

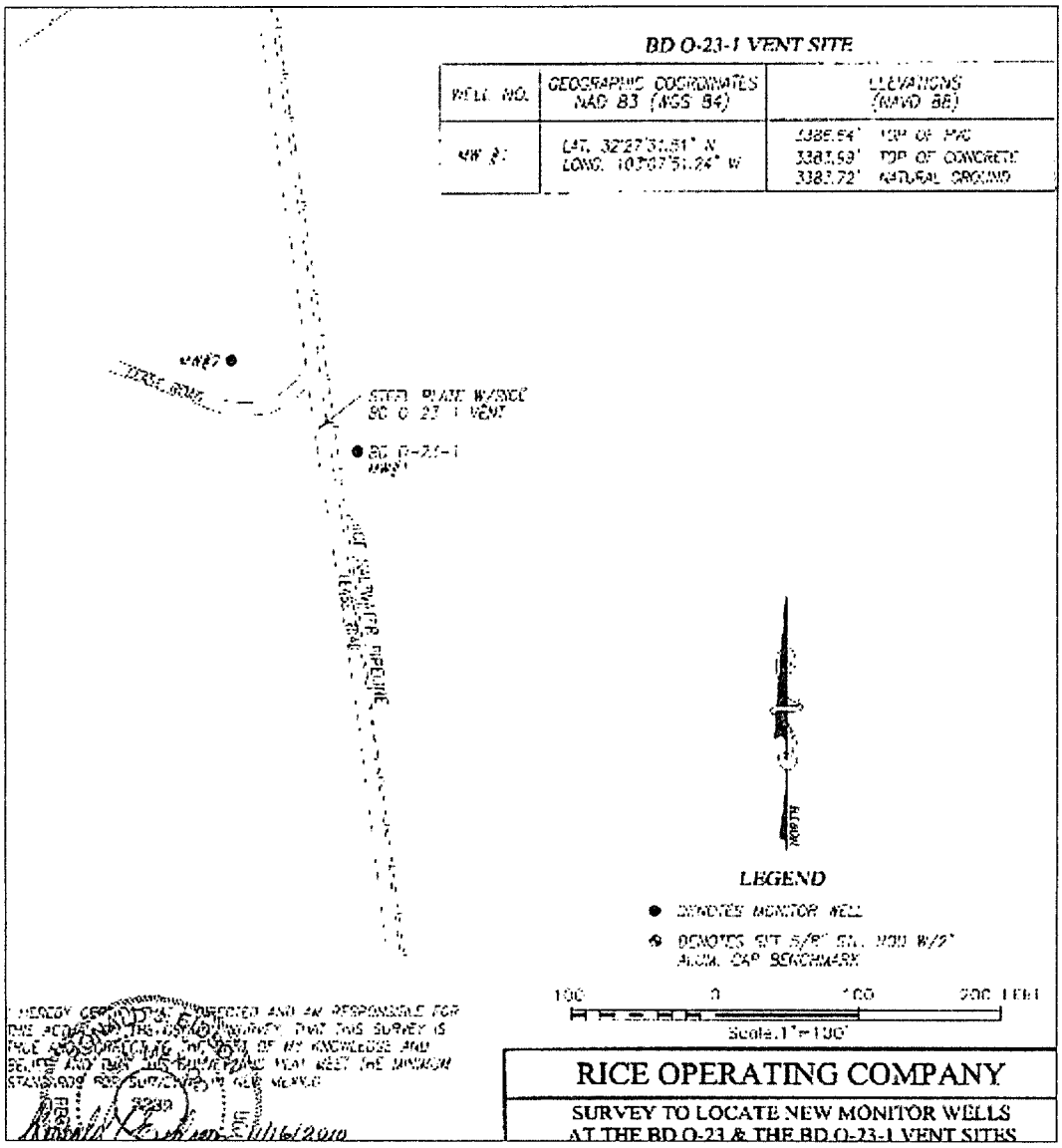
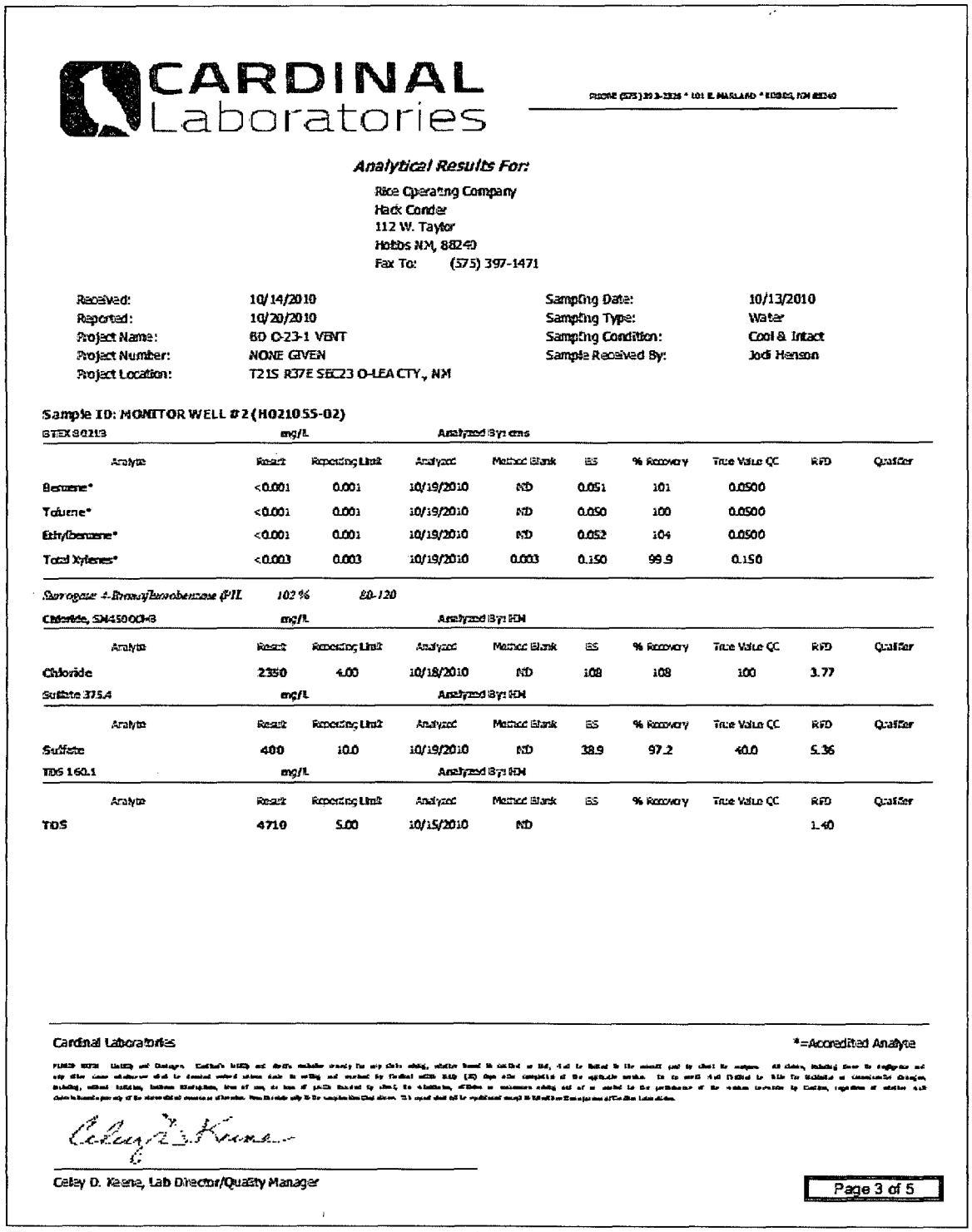


Figure 2 – BD O-23-1 Vent surveyed monitor well locations.



CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	10/14/2010	Sampling Date:	10/13/2010
Reported:	10/20/2010	Sampling Type:	Water
Project Name:	BD O-23-1 VENT	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T21S R37E SEC23 O-LEA CTY., NM		

Sample ID: MONITOR WELL #2 (H021055-02)

BTEX 8021B — mg/L — Analyzed By: ams

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	10/19/2010	ND	0.051	101	0.0500		
Toluene*	<0.001	0.001	10/19/2010	ND	0.050	100	0.0500		
Ethylbenzene*	<0.001	0.001	10/19/2010	ND	0.052	104	0.0500		
Total Xylenes*	<0.003	0.003	10/19/2010	0.003	0.150	99.9	0.150		
Surrogate: 4-Bromofluorobenzene (PIL	*102 %*	*80-120*							

Chloride, SM4500Cl-B — mg/L — Analyzed By: RM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	2350	4.00	10/18/2010	ND	108	108	100	3.77	

Sulfate 375.4 — mg/L — Analyzed By: RM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate	400	10.0	10/19/2010	ND	38.9	97.2	40.0	5.36	

TDS 160.1 — mg/L — Analyzed By: RM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS	4710	5.00	10/15/2010	ND				1.40	

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Celey D. Keene, Lab Director/Quality Manager

Figure 3 – Up-gradient monitor well (MW-2) laboratory results, as sampled on 10.13.10.

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Received:	10/14/2010	Sampling Date:	10/13/2010
Reported:	10/20/2010	Sampling Type:	Water
Project Name:	BD O-23-1 VENT	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T21S R37E SEC23 O-LEA CTY., NM		

Sample ID: MONITOR WELL #1 (H021055-01)

BTEX 8021B mg/L Analyzed By: ems

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	10/19/2010	ND	0.051	101	0.0500		
Toluene*	<0.001	0.001	10/19/2010	ND	0.050	100	0.0500		
Ethylbenzene*	<0.001	0.001	10/19/2010	ND	0.052	104	0.0500		
Total Xylenes*	<0.003	0.003	10/19/2010	0.003	0.150	99.9	0.150		
Surrogate: 4-Bromofluorobenzene (PID	*104 %*	*80-120*							

Chloride, SM4500Cl-B mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	4850	4.00	10/18/2010	ND	108	108	100	3.77	

Sulfate 375.4 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate	240	10.0	10/19/2010	ND	38.9	97.2	40.0	5.36	

TDS 160.1 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS	8580	5.00	10/15/2010	ND				1.40	

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Celey D. Keene, Lab Director/Quality Manager

Figure 4 – Near-source monitor well (MW-1) laboratory results, as sampled on 10.13.10

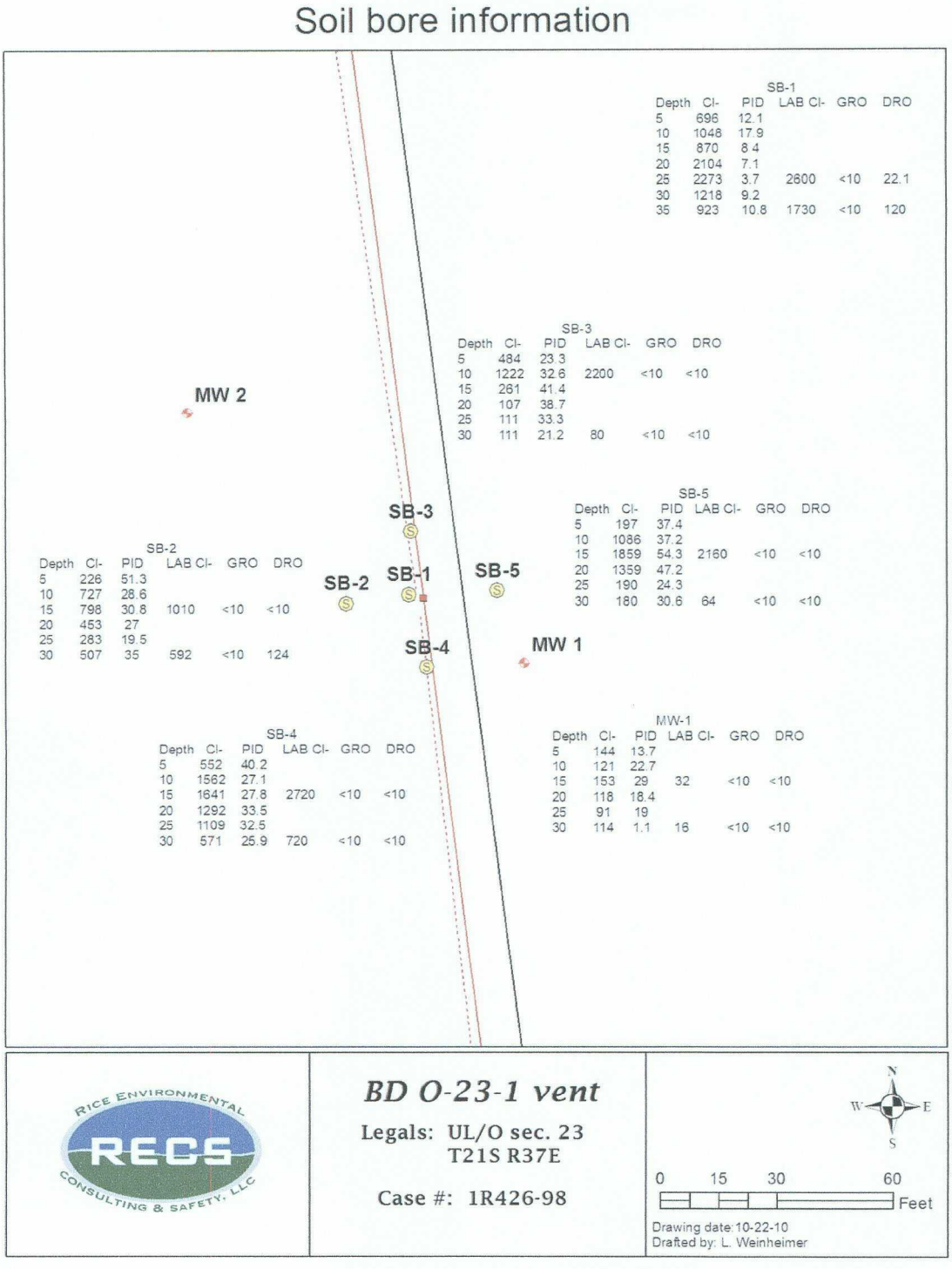

Figure 5 – Soil chloride concentrations as measured in the field (and confirmed in the laboratory) on February 24th, 2010.

Soil & Groundwater Chloride Calculator
Estimated Mass of Contributed, Residual Chloride
from unsaturated zone soil and saturated zone groundwater

Site:	**BD O-23-1 Vent**
This estimate prepared by:	L. Peter Galusky, Jr.
Date:	12/16/2010

Model Inputs			Notes
length of affected area (ft)		50	measured/estimated
width of affected area (ft)		50	measured/estimated
depth to water table (ft)		40	measured
unsat zone affected depth (ft)		10	bottom 10 ft of unsat zone
sat zone affected thickness (ft)		10	prescribed by NMOCD
unsat zone avg Cl- conc of affected soil (ppm)		655	measured/estimated
unsat zone est. natural background Cl- conc (ppm)		141	lowest reading found
unsat zone mass density (lbs/cu yd)		3,000	estimated
Cl- conc of affected groundwater (ppm)		4,850	measured
Cl- conc of up-gradient groundwater (ppm)		2,350	measured
sat zone mass density (lbs/cu yd)		3,000	estimated
Cl- conc of recovery well (ppm)	MW-1	7,000	measured/estimated
avg daily pumping rate of recover well (gpm)		0.5	anticipated

Intermediate (calculated) Parameters		
affected area (sq ft)	1,963	calculated
unsat zone Cl- conc attributed to source (ppm)	514	calculated
unsat zone volume of affected soil (cu yds)	727	calculated
unsat zone total mass of affected soils (lbs)	2,180,556	calculated
unsat zone mass of contributed residual soil chloride (lbs)	1,121	calculated
volume of affected groundwater (cu ft)	25,000	calculated
mass of affected groundwater (lbs)	187,500	calculated
mass of contributed Cl- in affected groundwater	469	calculated
avg daily pumping rate of recovery well (bbls/day)	17.1	calculated
Cl- conc of recovery well (lbs/bbl)	2.2	calculated

Estimated Contributed Cl- Mass and Equivalent Pumping Volume & Time		
Max potential chlorides from unsaturated zone (soils)	1,121	calculated
Maximum potential chlorides from affected groundwater	469	calculated
Total mass of contributed chlorides (lbs)	**1,590**	**calculated**
# bbls to remove contributed Cl- from unsat zone	721	calculated
days pumping required to remove contributed Cl-	**42**	**calculated**

Note: It is assumed that only the lower 10 ft of soils in the affected unsaturated zone will potentially contribute chlorides to groundwater following the installation of an infiltration barrier. Therefore, in estimating the mass of contributed chlorides from the unsaturated zone only the lower ten feet were considered in the calculations.

Table 1 – BD O-23-1 Vent residual chloride mass calculations.

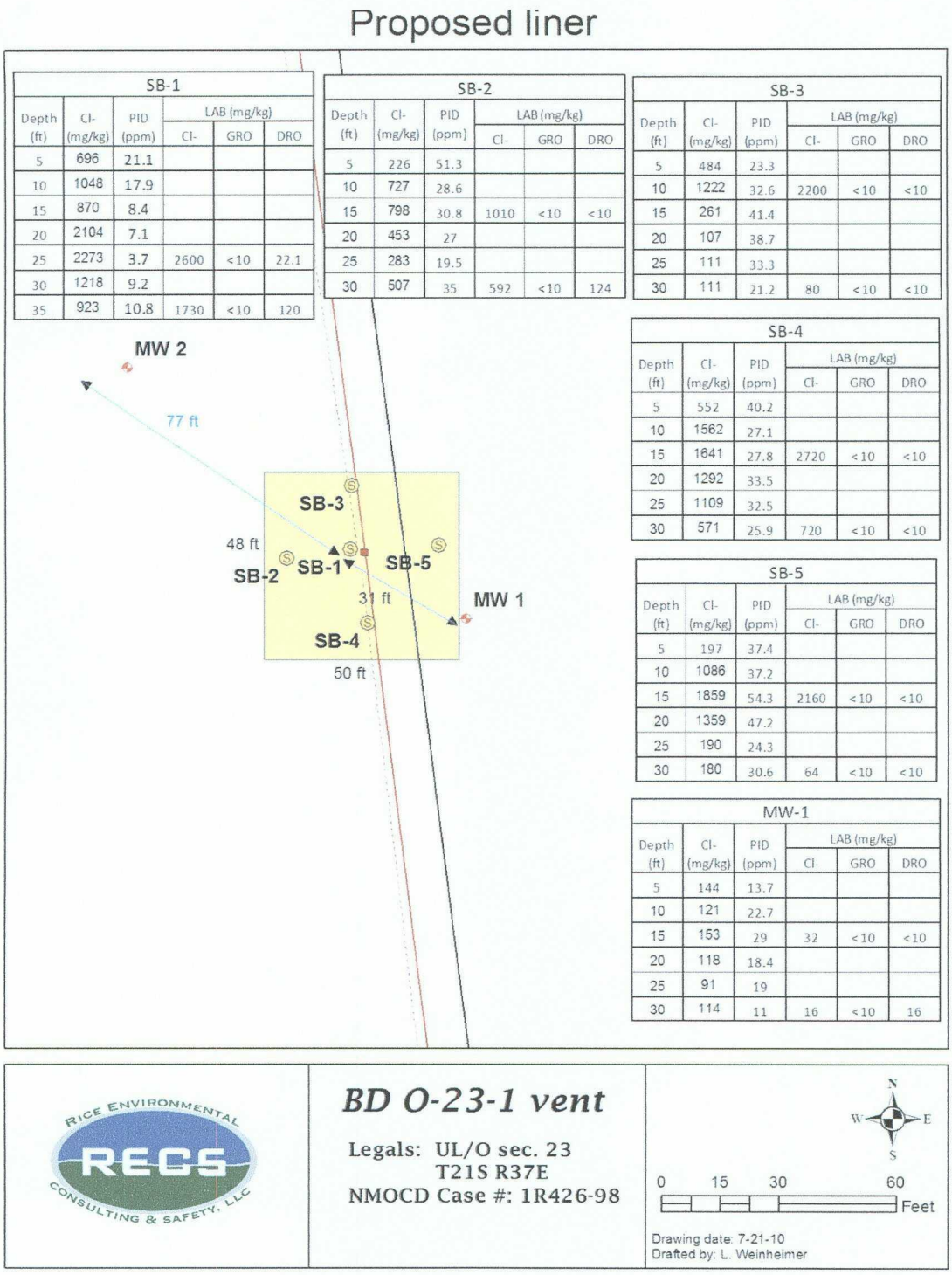

Figure 6 – Schematic diagram of proposed sub-surface soil liner (yellow shaded area) superimposed over soil boring data map (Figure 5).