



PO Box 2948 | Hobbs, NM 88241 | Phone 575.393.2967

May 4th, 2015

Dr. Tomas Oberding

New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

RE: **Investigation and Characterization Plan (ICP)**
Rice Operating Company – BD SWD System
BD Jct. C-4-2 (1R426-202): UL/C, Sec. 4, T22S, R37E

Dr. Oberding:

RICE Operating Company (ROC) has retained Basin Environmental Service Technologies (Basin) to address potential environmental concerns at the above-referenced site in the BD Salt Water Disposal (SWD) system.

ROC is the service provider (agent) for the 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.

For all such environmental projects, ROC will choose the path forward that:

- Protects public health,
- Provides the greatest net environmental benefit,
- Complies with NMOCD Rules, and
- Is supported by good science.

Each site shall generally have three submissions:

1. This Investigation and Characterization Plan (ICP) is proposed for gathering data and site characterization and assessment.
2. Upon evaluating the data and results from the ICP, a recommended remedy will be submitted in a Corrective Action Plan (CAP), if warranted.
3. Finally, after implementing the remedy, a Termination Request with final documentation will be submitted.

Background and Previous Work

The site is located approximately 1 mile southwest of Eunice, New Mexico at UL/C, Sec. 4, T22S, R37E as shown on the Geographical Location Map (Figure 1) and Area Map (Figure 2).

An updated study of NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 83 +/- feet.

In 2007, ROC initiated work on the former C-4-2 junction box. The site was delineated using a backhoe to form a 30 ft x 30 ft x 12 ft deep excavation and soil samples were screened at regular intervals for both hydrocarbons and chlorides. Representative composite samples were sent to a commercial laboratory for analysis of chloride and TPH. Laboratory tests of the 4-wall composite showed a chloride reading of 1,620 mg/kg and a diesel range organics (DRO) reading of 33.6 mg/kg. The bottom composite resulted in a chloride reading of 2,290 mg/kg and a DRO reading of 34.8 mg/kg. Both the bottom and 4-wall composites showed a non-detectable GRO reading. The excavated soil was blended on site and a representative composite sample of the blended backfill was sent to a commercial laboratory for analysis, resulting in a chloride concentration of 1,280 mg/kg, a GRO reading of 26.9 mg/kg and a DRO reading of 30.4 mg/kg. The excavation was backfilled with blended backfill up to 6 ft below ground surface (bgs). At 6 – 5 ft bgs, a 1 ft thick clay barrier was installed. The clay layer will provide a barrier that will inhibit the downward migration of chlorides to groundwater. The remaining backfill was returned to the excavation and clean, imported soil was used as a top cap to contour to the surrounding area. An identification plate was placed on the surface above the former junction box to mark the presence of the clay below. On June 18th, 2007, the site was seeded with a blend of native vegetation.

To further investigate the presence of chloride, four soil bores were installed on October 31st and November 1st, 2007 (Figure 3). Soil borings # 1 and #2 were advanced to a depth of 85 ft bgs, soil boring #3 was advanced to a depth of 60 ft bgs, and soil boring #4 was advanced to a depth of 50 ft bgs. Soil samples were collected at regular intervals, and each sample was field titrated for chlorides. The deepest sample from each boring was sent to a commercial laboratory for analysis of chlorides, which confirmed field concentrations. Each bore hole was plugged with bentonite to the ground surface.

NMOCD was notified of potential groundwater impact on January 9th, 2009. A junction box disclosure report (Appendix A) was submitted to NMOCD with all the 2009 junction box closures and disclosures.

ROC will conduct additional investigative work at the site to determine if there is potential for groundwater degradation from residual constituents at the site.

Delineation Work Elements

1. Conduct vertical and lateral delineation of residual chlorides and hydrocarbons from samples taken using a drill rig, hand augur and/or backhoe (see Appendix B for Quality Procedures).
 - a. Vertical sampling will be conducted until the following criteria are met in the field.
 - i. Three samples in which the chloride concentration decreases and the third sample has a chloride concentration of ≤ 250 ppm; and,

- ii. Three samples in which PID readings decrease and the third sample has a PID reading of ≤ 100 ppm; or,
 - iii. The sampling reaches the capillary fringe.
 - b. Lateral sampling will be conducted until the following criteria are met in the field.
 - i. A decrease is observed in chloride concentrations between lateral bores at similar depths; and,
 - ii. A chloride concentration of ≤ 250 ppm is observed in a lateral surface sample; or,
 - iii. Safety concerns impede further lateral delineation
- 2. If warranted, install a monitor well to provide direct measurement of the potential groundwater impact at the site. Additional monitoring wells may be required to fully delineate groundwater quality. (All monitor wells will be installed by EPA, NMOCD, and industry standards).
- 3. Evaluate the risk of groundwater impact based on the information obtained.

If the evaluation of the site shows no threat to groundwater from residual constituents, then only a vadose zone remedy will be undertaken. However, if groundwater shows impact from residual chlorides, a CAP will be developed to address these concerns.

Basin appreciates the opportunity to work with you on this project. Please call Hack Conder at (575) 393-2967 if you have any questions or wish to discuss the site.

Sincerely,



Hack Conder
Vice President of Environmental Services
Basin
(575) 631-6432

Attachments:

- Figure 1 – Geographical Location Map
- Figure 2 – Area Map
- Figure 3 – Soil Bore Installation
- Appendix A – Junction Box Disclosure Report
- Appendix B – Quality Procedures

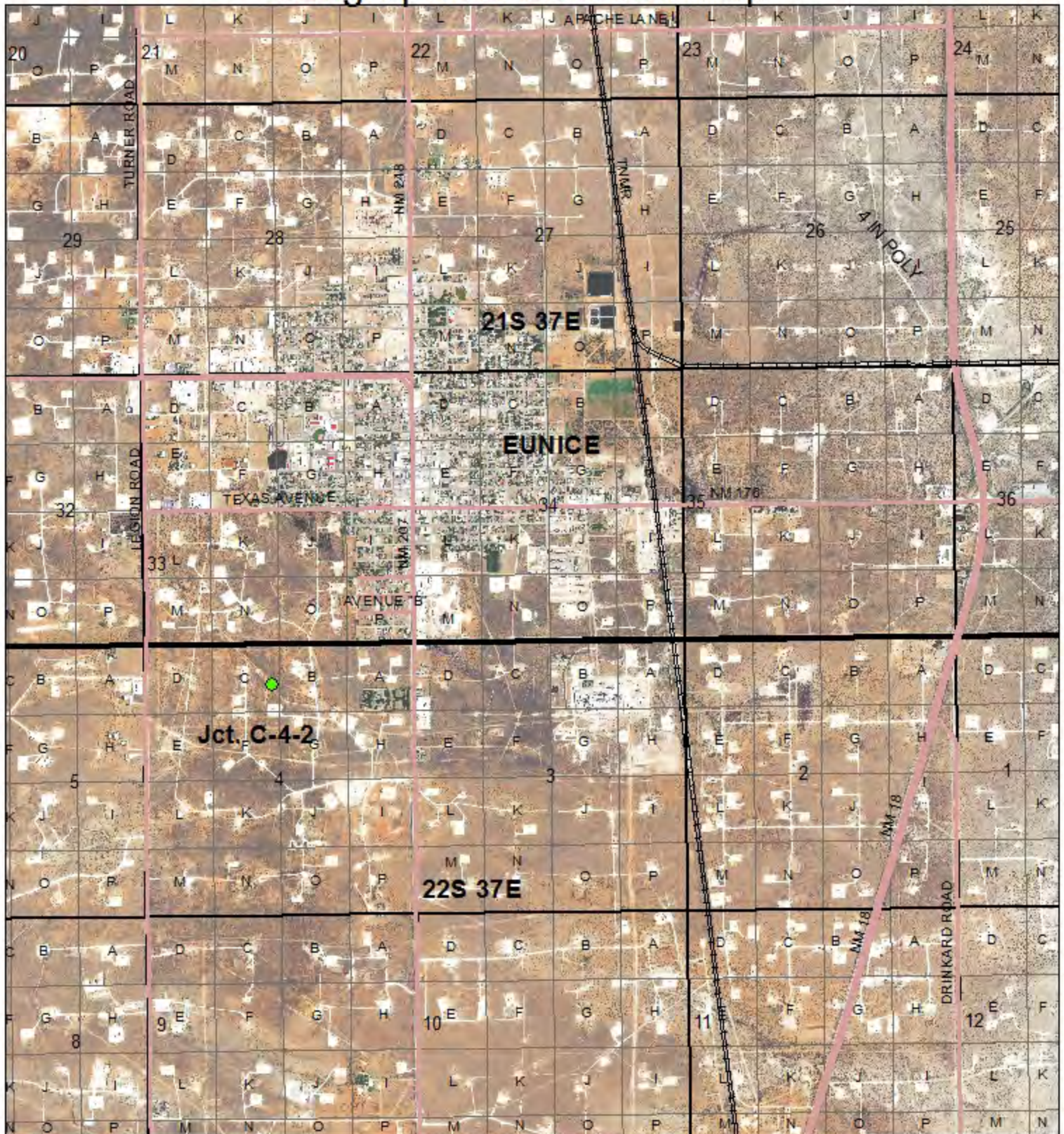
Figures

Basin Environmental

P.O. Box 2948, Hobbs, NM 88241

Phone 575.393.2967

Geographical Location Map



BD Jct. C-4-2

UL C SECTION 4
T-22-S R-37-E
LEA COUNTY, NM

NMOCD Case #: 1R426-202

Figure 1

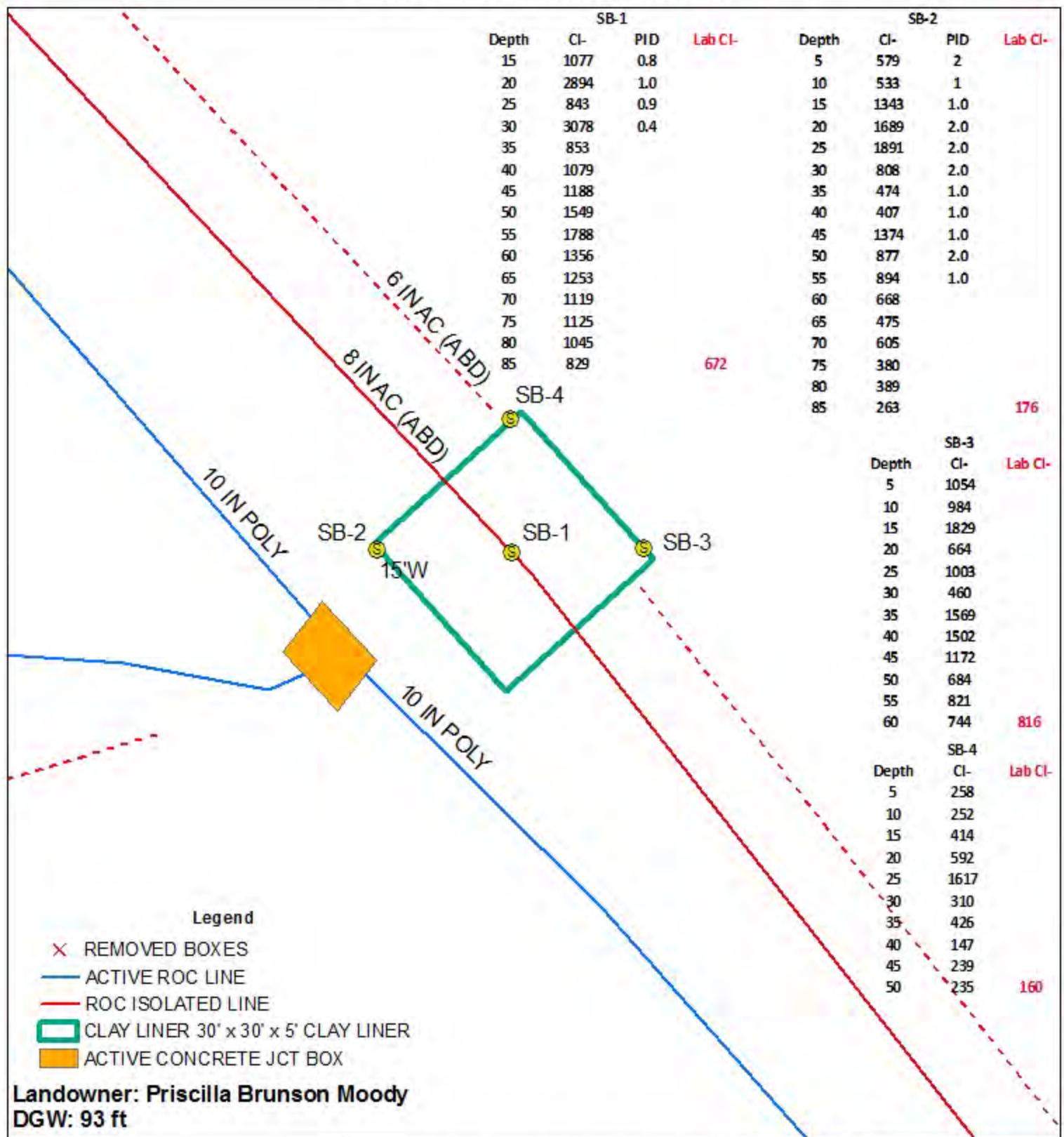
0 1,600 3,200
Feet

Drawing date: 3/12/2015
Drafted by: S. Edwards





Soil Bore Installation



BD Jct. C-4-2

UL C SECTION 4
 T-22-S R-37-E
 LEA COUNTY, NM

NMOCD Case #: 1R426-202

Figure 3

0 10 20
 Feet

Drawing date: 4/27/2015
 Drafted by: L. Flores



Appendix A

Junction Box Disclosure Report

Basin Environmental

P.O. Box 2948, Hobbs, NM 88241

Phone 575.393.2967

**RICE OPERATING COMPANY
JUNCTION BOX DISCLOSURE* REPORT**

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS - FEET		
Blinebry-Drinkard (BD)	Jct. C-4-2	C	4	T22S	R37E	Lea	Length	Width	Depth
							eliminated		

LAND TYPE: BLM _____ STATE _____ FEE LANDOWNER Priscilla West OTHER _____

Depth to Groundwater 95 feet NMOCD SITE ASSESSMENT RANKING SCORE: 10

Date Started 4/24/2007 Date Completed 11/1/2007 OCD Witness no

Soil Excavated 400 cubic yards Excavation Length 30 Width 30 Depth 12 feet

Soil Disposed 24 cubic yards Offsite Facility Sundance Location Eunice, NM

FINAL ANALYTICAL RESULTS: Sample Date 5/29/2007, 5/30/2007, 10/31/2007 Sample Depth 12 ft, 85 ft

Procure 5-point composite sample of bottom and 4-point composite sample of sidewalls. TPH and Chloride laboratory test results completed by using an approved lab and testing procedures pursuant to NMOCD guidelines.

CHLORIDE FIELD TESTS

Sample Location	PID (field) ppm	GRO mg/kg	DRO mg/kg	Chlorides mg/kg
4-WALL COMP.	3.2	<25.0	33.6	1,620
BOTTOM COMP.	1.5	<25.0	34.8	2,290
BLENDED BACKFILL	1.5	26.9	30.4	1,280
SOIL BORING #1 85' grab				672

LOCATION	DEPTH	mg/kg
4-wall comp.	n/a	1,595
bottom comp.	12'	1,877
blended backfill	n/a	1,448
background	6"	224
SOIL BORING #1 at the former junction (source) 10/31/2007	15'	1,077
	20'	2,894
	25'	843
	30'	3,078
	35'	853
	40'	1,079
	45'	1,188
	50'	1,549
	55'	1,788
	60'	1,356
	65'	1,253
	70'	1,119
	75'	1,125
	80'	1,045
	85'	829

General Description of Remedial Action: This junction box was eliminated during the pipeline replacement/upgrade program. After the former junction box was removed, an investigation was conducted using a backhoe to collect soil samples at regular intervals producing a 30x30x12-ft-deep excavation. Chloride field tests performed on each sample yielded elevated concentrations that did not relent with depth. Organic vapors were measured using a PID, which yielded low concentrations. Representative composite samples were sent to a commercial laboratory for analysis of chloride and TPH, which confirmed elevated chloride concentrations. The excavated soil was blended on site with clean imported soil and returned to the excavation up to 6 ft below ground surface (BGS). At 6-5 ft BGS, a 1-ft-thick clay barrier was installed. The remaining fill was used to backfill the excavation and clean, imported soil was used as a top cap and to contour to the surrounding area. On 6/18/2007, the site was seeded with a blend of native vegetation and is expected to return to a productive capacity at a normal rate. An identification plate was placed on the surface above the former junction to mark the presence of the clay below.

To further investigate depth of chloride presence, four soil borings were initiated on 10/31/2007 and 11/1/2007. Soil borings #1 and #2 were advanced to a depth of 85 ft BGS, soil boring #3 was advanced to a depth of 60 ft BGS, and soil boring #4 was advanced to a depth of 50 ft BGS. Soil samples were collected every 5 ft and field tested for chlorides. The deepest sample from each soil boring was sent to a commercial laboratory for analysis of chloride, which confirmed elevated concentrations. Each borehole was plugged with bentonite to the ground surface. NMOCD was notified of potential groundwater impact on 1/9/2009.

ADDITIONAL EVALUATION IS HIGH PRIORITY

enclosures: photos, cross-section, lab results, boring log

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

SITE SUPERVISOR Noel Carmona SIGNATURE [Signature] COMPANY RICE OPERATING COMPANY

REPORT ASSEMBLED BY Katie Jones INITIAL KJ

PROJECT LEADER Larry Bruce Baker Jr. SIGNATURE [Signature] DATE 1-27-09

*This site is a "DISCLOSURE." It will be placed on a prioritized list of similar sites for further consideration.

BD Jct. C-4-2

Unit C, Section 4, T22S, R37E



undisturbed junction box

7/28/2003



excavation at former junction site

5/25/2007



excavation with clay barrier installed

6/11/2007



seeding backfilled site

6/18/2007



site complete with clay marker

6/18/2007



soil boring #1 at the source

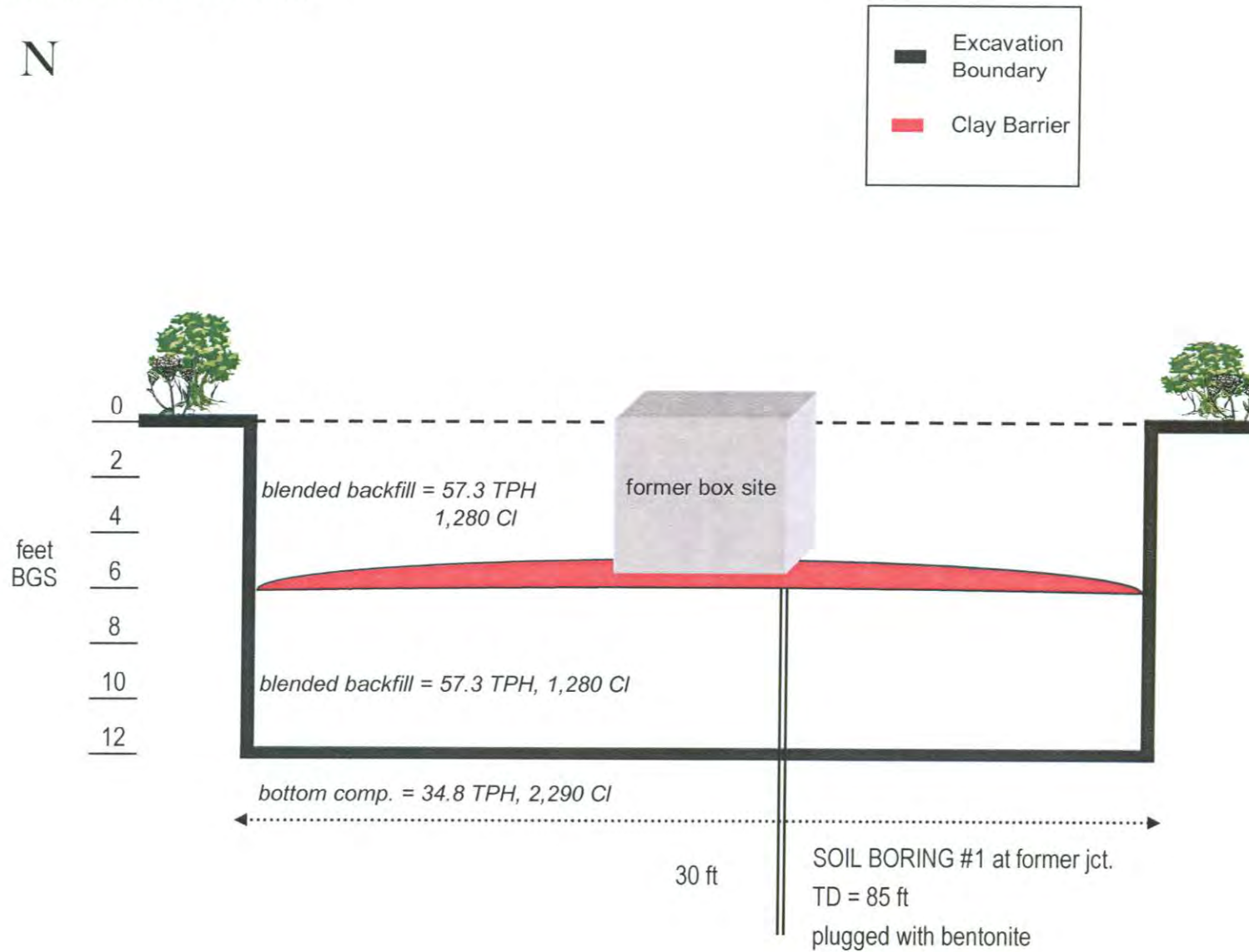
10/31/2007

BD Jct. C-4-2
Unit 'C', Sec. 4, T22S, R37E

Excavation Cross-Section

N

S



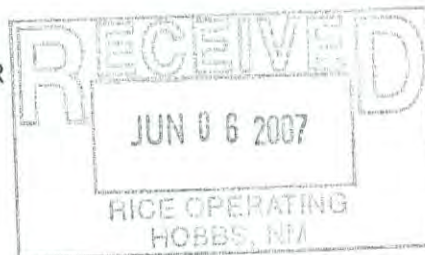


ARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
RICE OPERATING CO.
ATTN: ROY R. RASCON
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (505) 397-1471



Receiving Date: 05/30/07
Reporting Date: 06/01/07
Project Number: NOT GIVEN
Project Name: B.D. JCT. C-4-2
Project Location: NOT GIVEN

Sampling Date: 05/29/07, 05/30/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AB
Analyzed By: LB/AB

COPY

LAB NUMBER	SAMPLE ID	GRO (C ₆ -C ₁₀) (mg/Kg)	DRO (>C ₁₀ -C ₂₈) (mg/Kg)	CI* (mg/Kg)
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ANALYSIS DATE		05/31/07	05/31/07	05/31/07
H12676-1	4 WALL COMP. @ 30x30	<25.0	33.6	1620
H12676-2	BTTM. 5 PT. COMP @12'	<25.0	34.8	2290
H12676-3	BLENDED BACKFILL	26.9	30.4	1280
Quality Control		898	974	480
True Value QC		1000	1000	500
% Recovery		89.8	97.4	96
Relative Percent Difference		5.0	7.6	4.1

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; CI: Std. Methods 4500-CI'B

*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

Date

H12676 RICE

PLEASE NOTE: **Liability and Damages** Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analysis. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise.



2111 Beechwood, Abilene, TX 79603 (325) 673-7001 Fax (325) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page of

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† Cardinal cannot accept verbal changes. Please fax written changes to (325) 673-7020.



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

RECEIVED

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: KRISTIN POPE
122 WEST TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

NOV 12 2007

RICE OPERATING
HOBBS NM

Receiving Date: 11/07/07
Reporting Date: 11/08/07
Project Number: NOT GIVEN
Project Name: BD JCT. C-4-2
Project Location: BD JCT. C-4-2

Analysis Date: 11/07/07
Sampling Date: 10/31/07 & 11/01/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: SB
Analyzed By: HM

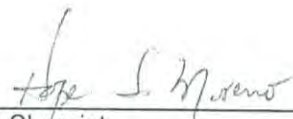
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LAB NO.	SAMPLE ID	Cl ⁻ (mg/kg)
H13659-1	SB #2 20' W OF SOURCE @ 85'	176
H13659-2	SB #3 20' E OF SOURCE @ 60'	816
H13659-3	SB #4 20' N OF SOURCE @ 50'	160
H13659-4	SB #1 20' AT SOURCE @ 85'	672
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods

4500-Cl⁻B

Note: Analyses performed on 1:4 w:v aqueous extracts.


Chemist


11-08-07
Date

H13659 RICE

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

<small>PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.</small>							
Relinquished By:  Lara Weinheimer		Date: 11-7-07 Time: 11:05		Received By: 		Phone Result: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Add'l Phone #: Fax Result: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Add'l Fax #:	
Relinquished By:		Date: Time:		Received By: Sue Barnes 11/07/07 11:05		REMARKS: email results kpope@riceswd.com; jpurvis@riceswd.com; Lweinheimer@rice.swd.com	
Delivered By: (Circle One) (Sampler) UPS - Bus - Other:		Sample Condition Cool Intact <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No		CHECKED BY: (Initials) SB			

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

Logger:		Lara Weinheimer		Client:		Well ID:	
Driller:		Harrison & Cooper Drilling		RICE Operating Company		SB - 1	
Drilling Method:		Split spoon & Air Rotary		Project Name:			
Start Date:		10-31-07		BD jct. C-4-2			
End Date:		10-31-07		Location:			
Comments: Located at the source of former junction site TD = 85 ft GW = 89 ft				BD SWD System unit 'C' Sec.4 T22S, R37E Lea County, NM			
Depth (feet)	chloride field tests	PID	Description		Lithology	Soil Bore Construction	
			12 - 15 ft VERY FINE TO FINE SAND reddish-brown, dry, no odor				
15	1077	0.8	15 - 20 ft VERY FINE TO FINE SAND yellowish-orange, dry, no odor				
20	2894	1					
25	843	0.9					
30	3078	0.4					
35	853						
40	1079						
45	1188		20 - 75 ft VERY FINE TO FINE SAND yellowish-orange, dry, no odor				
50	1549						
55	1788						
60	1356						
65	1253						
70	1119						
75	1125		75 - 80 ft VERY FINE TO FINE SAND light brown, dry, no odor				
80	1045						
85	829						

Appendix B

Quality Procedures

Basin Environmental
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Basin Environmental Service Technologies

Table of Contents

- QP-1 Soil Samples for Transportation to a Laboratory
- QP-2 Chloride Titration Using 0.282 Normal Silver Nitrate Solution
- QP-3 Development of Cased Water-Monitoring Wells
- QP-4 Sampling of Cased Water-Monitoring Well
- QP-5 Composite Sampling of Excavation Sidewalls and Bottoms for TPH and Chloride Analysis
- QP-6 Sampling and Testing Protocol for VOC in soil
- QP-7 Composite Sampling of Excavation Sidewalls and Bottoms for BTEX
- QP-8 Procedure for Plugging and Abandonment of Cased Water-Monitoring wells

Basin Environmental Service Technologies

Quality Procedure Soil Samples for Transportation to a Laboratory

1.0 Purpose

This procedure outlines the methods to be employed when obtaining soil samples to be taken to a laboratory for analysis.

2.0 Scope

This procedure is to be used when collecting soil samples intended for ultimate transfer to a testing laboratory.

3.0 Preliminary

- 3.1 Obtain sterile sampling containers from the testing laboratory designated to conduct analyses of the soil.
- 3.2 If collecting TPH, BTEX, RCRA 8 metals, cation /anions or O&G, the sample jar may be a clear 4 oz. container with Teflon lid. If collecting PAH's, use an amber 4 oz. container.

4.0 Chain of Custody

- 4.1 Prepare a Sample Plan. The plan will list the number, location and designation of each planned sample and the individual tests to be performed on the sample. The sampler will check the list against the available inventory of appropriate sample collection bottles to insure against shortage.
- 4.2 Transfer the data to the Laboratory Chain of Custody Form. Complete all sections of the form except those that relate to the time of delivery of the samples to the laboratory.
- 4.3 Pre-label the sample collection jars. Include all requested information except time of collection. (Use a fine point Sharpie to insure that the ink remains on the label.) Affix the labels to the jars.

5.0 Sampling Procedure

- 5.1 Do not touch the soil with your bare hands. Use new nitrile gloves to help minimize any contamination.
- 5.2 Go to the sampling point with the sample container. If not analyzing for ions or metals, use a trowel to obtain the soil.

- 5.3 Pack the soil tightly into the container leaving the top slightly domed. Screw the lid down tightly. Enter the time of collection onto the sample collection jar label.
- 5.4 Place the sample directly on ice for transport to the laboratory if required.
- 5.5 Complete the Chain of Custody form to include the collection times for each sample. Deliver all samples to the laboratory.

6.0 Documentation

- 6.1 The testing laboratory shall provide the following minimum information:
 - a. Project and sample name.
 - b. Signed copy of the original Chain of Custody Form including the time the sample was received by the lab.
 - c. Results of the requested analyses
 - d. Test Methods employed
 - e. Quality Control methods and results

Basin Environmental Service Technologies

QUALITY PROCEDURE Chloride Titration Using 0.282 Normal Silver Nitrate Solution

1.0 Purpose

This procedure is to be used to determine the concentration of chloride in soil.

2.0 Scope

This procedure is to be used as the standard field measurement for soil chloride concentrations.

3.0 Sample Collection and Preparation

- 3.1 Collect at least 80 grams of soil from the sample collection point. Take care to insure that the sample is representative of the general background to include visible concentrations of hydrocarbons and soil types. If necessary, prepare a composite sample for soils obtained at several points in the sample area. Take care to insure that no loose vegetation, rocks or liquids are included in the sample(s).
- 3.2 The soil sample(s) shall be immediately inserted into a one-quart or larger polyethylene freezer bag. Care should be taken to insure that no cross-contamination occurs between the soil sample and the collection tools or sample processing equipment.
- 3.3 The sealed sample bag should be massaged to break up any clods.

4.0 Sample Preparation

- 4.1 Take a clean glass vial having a minimum 40 ml capacity. Add at least 10 grams of the soil sample and record the weight.
- 4.2 Add at least 20 grams of reverse osmosis water to the soil sample and shake well.
- 4.3 Allow the sample to set for a period of 5 minutes or until the separation of soil and water.

5.0 Titration Procedure

- 5.1 Using a graduated pipette, remove 10 ml extract and dispense into a clean plastic cup.
- 5.2 Add 2-3 drops potassium chromate (K_2CrO_4) to mixture if necessary.

5.3 Using a 1 ml pipette, carefully add .282 normal silver nitrate (one drop at a time) to the sample while constantly agitating it. Stop adding silver nitrate when the solution begins to change from yellow to red. Be consistent with endpoint recognition.

5.4 Record the ml of silver nitrate used.

6.0 Calculation

To obtain the chloride concentration, insert measured data into the following formula:

$$\frac{.282 \times 35,450 \times \text{ml AgNO}_3}{\text{ml water extract}} \times \frac{\text{grams of water in mixture}}{\text{grams of soil in mixture}}$$

Using Step 5.0, determine the chloride concentration of the RO water used to mix with the soil sample. Record this concentration and subtract it from the formula results to find the net chloride in the soil sample.

Record all results on the delineation form.

Basin Environmental Service Technologies

Quality Procedure Development of Cased Water-Monitoring Wells

1.0 Purpose

This procedure outlines the methods to be employed to develop cased monitoring wells.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells. It is not to be used for standing water samples such as ponds or streams.

3.0 Sample Collection and Preparation

- 3.1 Prior to development, the static water level and height of the water column within the well casing will be measured with the use of an electric D.C. probe.
- 3.2 All measurements will be recorded within a field log notebook.
- 3.3 All equipment used to measure the static water level will be decontaminated after each use by means of Liquinox, a phosphate free laboratory detergent, and water to reduce the possibility of cross-contamination. The volume of water in each well casing will be calculated.

4.0 Purging

- 4.1 Wells will be purged by using a 2" decontaminated submersible pump or dedicated one liter Teflon bailer. Wells should be purged until the pH and conductivity are stabilized and the turbidity has been reduced to the greatest extent possible.
- 4.2 If a submersible is used the pump will be decontaminated prior to use by scrubbing the outside surface of tubing and wiring with a Liquinox water mixture, pumping a Liquinox-water mixture through the pump, and a final flush with fresh water.

5.0 Water Disposal

- 5.1 All purge and decontamination water will be temporarily stored within a portable tank to be later disposed of in an appropriate manner.

6.0 Records

- 6.1 Basin Environmental Consulting and Safety will record the amount of water removed from the well during development procedures. The purge volume will be reported to the appropriate regulatory authority when filing the closure report.

Basin Environmental Service Technologies

Quality Procedure Sampling of Cased Water-Monitoring Well

1.0 Purpose

This procedure outlines the methods to be employed in obtaining water samples from cased monitoring wells.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells. It is not to be used for standing water samples such as ponds or streams.

3.0 Preliminary

3.1 Obtain sterile sampling containers from the testing laboratory designated to conduct analyses of the water.

3.2 The following table shall be used to select the appropriate sampling container, preservative method and holding times for the various elements and compounds to be analyzed.

Compound to be Analyzed	Sample Container Size	Sample Container Description	Cap Requirements	Preservative	Maximum Hold Time
BTEX	40 ml	VOA Container	Teflon Lined	HCL	14 days
TPH (8015 Extended)	40 ounces	(2) 40ml VOA vials	Teflon Lined	HCL and Ice	14 days
PAH	1 liter	amber glass	Teflon Lined	Ice	7 days
Cation/Anion	1 liter	HD polyethylene	Any Plastic	None	48 Hrs
Metals	1 liter	HD polyethylene	Any Plastic	Ice/HNO ₃	28 Days
TDS	300 ml	clear glass or 250 ml HD polyethylene	Any Plastic	Ice	7 Days
Cl-	500 ml	HD polyethylene	Any Plastic	None	28 Days

4.0 Chain of Custody

- 4.1 Prepare a Sample Plan. The plan will list the well identification and the individual tests to be performed at that location. The sampler will check the list against the available inventory of appropriate sample collection bottles to insure against shortage.
- 4.2 Transfer the data to the Laboratory Chain of Custody Form. Complete all sections of the form except those that relate to the time of delivery of the samples to the laboratory.
- 4.3 Pre-label the sample collection jars. Include all requested information except time of collection. (Use a fine point Sharpie to insure that the ink remains on the label). Affix the labels to the jars.

5.0 Bailing Procedure

- 5.1 Identify the well from the sites schematics. Place pre-labeled jar(s) next to the well. Remove the plastic cap from the well bore by first lifting the metal lever and then unscrewing the entire assembly.
- 5.2 Using a dedicated one liter Teflon bailer or submersible pump, purge a minimum of three well volumes. Place the water in storage container for transport to a ROC disposal facility.
- 5.3 If using a bailer, take care to insure that the bailing device and string does not become cross-contaminated. A clean pair of nitrile gloves should be used when handling either the retrieval string or bailer. The retrieval string should not be allowed to come into contact with the ground.

6.0 Sampling Procedure

- 6.1 Once the well has been bailed in accordance with 5.2 of this procedure, a sample may be decanted into the appropriate sample collection jar directly from the bailer or submersible pump.
- 6.2 Note the time of collection on the sample jar with a fine Sharpie.
- 6.3 Place the sample directly on ice for transport to the laboratory. The preceding table shows the maximum hold times between collection and testing for the various analyses.

6.4 Complete the Chain of Custody form to include the collection times for each sample. Deliver all samples to the laboratory.

7.0 Documentation

7.1 The testing laboratory shall provide the following minimum information:

- A. Project and sample name.
- B. Signed copy of the original Chain of Custody Form including the time the sample was received by the lab.
- C. Results of the requested analyses
- D. Test Methods employed
- E. Quality Control methods and results

Calculation for Determining the Minimum Bailing Volume for Monitor Wells

$$\text{Formula } V = (\pi r^2 h)$$

$$2'' \text{ well } [V/2.31 = \text{gal}] \times 3 = \text{Purge Volume}$$

V=Volume

π =pi

r=inside radius of the well bore

h=maximum height of well bore in water table

Example:

π	r^2	h(in)	V(cu.in)	V(gal)	X 3 Volumes	Actual
3.1416	1	180	565.488	2.448	7.34 gal	>10 gal

Basin Environmental Service Technologies

Quality Procedure Composite Sampling of Excavation Sidewalls and Bottoms For TPH and Chloride Analysis

1.0 Purpose

This procedure outlines the methods to be employed when obtaining final composite soil samples for TPH and Chloride analysis.

2.0 Scope

This procedure is to be used in conjunction with *Quality Procedure – 02: Soil Samples for Transportation to a Laboratory* and will be inserted at subparagraph 5.2 of Section 5.0: Sampling Procedure.

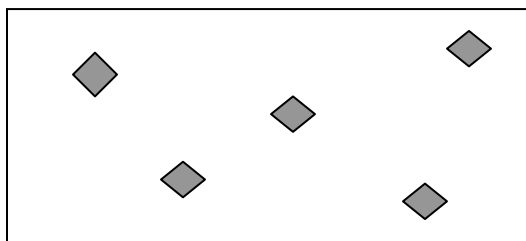
3.0 Sampling Procedure

Follow *Quality Procedure – 02: Soil Samples for Transportation to a Laboratory* for all Sections and subparagraphs until subparagraph 5.2 of Section 5.0: Sampling Procedure. Instead of 5.2 instructions, perform the composite sample collection procedure as follows:

3.1 Go to the excavation with a new plastic baggie. If not analyzing for ions or metals, use a trowel to obtain the soil. If the excavation is deeper than 6' BGS, do not enter the pit, but use a backhoe to assist in procurement of the sample. (If a backhoe is used, the backhoe will obtain an amount of soil from each composite point; bring the purchase to the surface staging area where a sample-portion of soil will be extracted from the backhoe purchase. The remainder of the backhoe purchase will be staged on the surface with other staged soils.)

3.2 Sidewall samples

3.2.1 On each sidewall, procure a 5oz sample from each of five distinct points on the sidewall with distinct points resembling the “W” pattern:



- 3.2.2 Thoroughly blend these five samples in a labeled baggie.
- 3.2.3 Repeat steps 3.2.1 through 3.2.4 for each remaining sidewall.
- 3.2.4 From each labeled baggie, procure a 5 oz portion and pour into a baggie labeled “Sidewall Composite”. Blend this soil mixture completely.
- 3.2.5 Obtain proper laboratory sample container for “Sidewall Composite” and continue with subparagraph 5.3 of QP – 01.

3.3 Bottom Sample

- 3.3.1 From bottom of excavation, procure a 5oz sample from each of five distinct points with distinct points resembling the “W” pattern as illustrated above.
- 3.3.2 Thoroughly blend these five samples in a clean baggie.
- 3.3.3 Obtain proper laboratory sample container for “Bottom Composite” and continue with subparagraph 5.3 of QP – 01.

Basin Environmental Service Technologies

QUALITY PROCEDURE

Sampling and Testing Protocol for VOC in Soil

1.0 Purpose

This procedure is to be used to determine the concentrations of Volatile Organic Compounds in soils.

2.0 Scope

This procedure is to be used as the standard field measurement for soil VOC concentrations. It is not to be used as a substitute for full spectrographic speciation of organic compounds.

3.0 Procedure

3.1 Sample Collection and Preparation

3.1.1 Collect at least 500 g. of soil from the sample collection point. Take care to insure that the sample is representative of the general background to include visible concentrations of hydrocarbons and soil types. If necessary, prepare a composite sample of soils obtained at several points in the sample area. Take care to insure that no loose vegetation, rocks or liquids are included in the sample(s).

3.1.2 The soil sample(s) shall be immediately inserted into a one-quart or larger polyethylene freezer bag and sealed. When sealed, the bag should contain a nearly equal space between the soil sample and trapped air. Record the sample name and the time that the sample was collected on the Field Analytical Report Form.

3.1.3 The sealed samples shall be allowed to set for a minimum of five minutes at a temperature of between 10-15 Celsius, (59-77⁰ F). The sample temperatures may be adjusted by cooling the sample in ice, or by heating the sample within a generally controlled environment such as the inside of a vehicle. The samples should not be placed directly on heated surfaces or placed in direct heat sources such as lamps or heater vents.

3.1.4 The sealed sample bag should be massaged to break up any clods, and to provide the soil sample with as much exposed surface area as practically possible.

3.2 Sampling Procedure

- 3.2.1 The instrument to be used in conducting VOC concentration testing shall be a RAE Systems Photoionization device. (Device will be identified on VOC Field Test Report Form.) Prior to use, the instrument shall be zeroed-out in accordance with the appropriate maintenance and calibration procedure outlined in the instrument operation manual. The PID device will be calibrated each day it's used.
- 3.2.2 Carefully open one end of the collection bag and insert the probe tip into the bag taking care that the probe tip not touch the soil sample or the sidewalls of the bag.
- 3.2.3 Set the instrument to retain the highest result reading value. Record the reading onto the Field Test Report Form.
- 3.2.4 **If the instrument provides a reading exceeding 100 ppm, proceed to QP-7. If the reading is 100 ppm or less, NMOCD BTEX guideline has been met and no further testing for BTEX is necessary. File the Field Test Report Form in the project file.**

4.0 Clean-up

After testing, the soil samples shall be returned to the sampling location, and the bags collected for off-site disposal. **IN NO CASE SHALL THE SAME BAG BE USED TWICE. EACH SAMPLE CONTAINER MUST BE DISCARDED AFTER EACH USE.**

Basin Environmental Service Technologies

Quality Procedure Composite Sampling of Excavation Sidewalls and Bottoms For BTEX

1.0 Purpose

This procedure outlines the methods to be employed when obtaining final composite soil samples for BTEX analysis.

2.0 Scope

This procedure is to be used when collecting soil samples intended for ultimate transfer to a testing laboratory for BTEX analysis. This procedure is to be used only when the PID field-test results for OVM exceeds 100 ppm.

3.0 Preliminary

- 3.1 Obtain sterile, clear, 2 oz. glass containers with Teflon lid from a laboratory supply company or the testing laboratory designated to conduct analyses of the soil.

4.0 Chain of Custody

- 4.1 Prepare a Sample Plan. The plan will list the number, location and designation of each planned sample and the individual tests to be performed on the sample. The sampler will check the list against the available inventory of appropriate sample collection bottles to insure against shortage.
- 4.2 Transfer the data to the Laboratory Chain of Custody Form. Complete all sections of the form except those that relate to the time of delivery of the samples to the laboratory.
- 4.3 Pre-label the sample collection jars. Include all requested information except time of collection. (Use a fine point Sharpie to insure that the ink remains on the label.) Affix the labels to the jars.

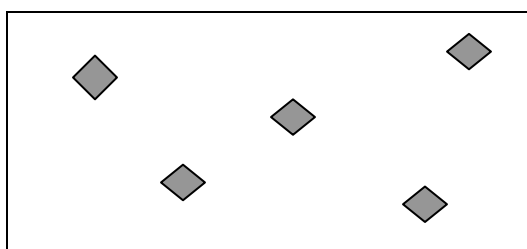
5.0 Sampling Procedure

- 5.1. Do not touch the soil with your bare hands. Use new nitrile gloves to help minimize any cross-contamination.
- 5.2. If safe and within OSHA regulations, go to the sampling point with the sample container. If not analyzing for ions or metals, use a trowel to

obtain the soil. If the excavation is deeper than 6' BGS, do not enter the pit, but use a backhoe to assist in procurement of the sample. (If a backhoe is used, the backhoe will obtain an amount of soil from each composite point; bring the purchase to the surface staging area where a sample-portion of soil will be extracted from the backhoe purchase. The remainder of the backhoe purchase will be staged on the surface with other staged soils.)

5.3.Sidewall Samples

5.3.1.On each sidewall, procure a 2oz sample from each of five distinct points on the sidewall with distinct points resembling the “W” pattern:



5.4.Pack the soil tightly into the container leaving the top slightly domed. Screw the lid down tightly. Enter the time of collection onto the sample collection jar label. Repeat for each sampling point.

5.5.Place the samples directly on ice for transport to the laboratory if required.

5.6.Complete the Chain of Custody form to include the collection times for each sample. Deliver all samples to the laboratory.

6.0 Documentation

6.1 The testing laboratory shall provide the following minimum information:

- a. Project and sample name.
- b. Signed copy of the original Chain of Custody Form including the time the sample was received by the lab.
- c. Results of the requested analyses
- d. Test Methods employed
- e. Quality Control methods and results

Basin Environmental Service Technologies

Procedure for Plugging & Abandonment of Cased Water Monitoring Wells

1.0 Purpose

This procedure outlines the methods to be employed to plug and abandon cased monitoring wells.

2.0 Scope

This procedure shall be used for developed, cased water monitoring wells located in the State of New Mexico

3.0 Preliminary

3.1 No well may be drilled, modified or plugged without NMOCD approval. Additional approvals may be required if the well is situated in a sensitive area, within municipal jurisdictions or on federal or tribal lands.

4.0 Plugging

4.1 Each bore will be filled with a 1% - 3% bentonite/concrete slurry to three feet bgs. The remaining three feet will be capped with concrete only.

4.2 All wellheads will be removed to below ground surface.

5.0 Records

5.1 The company plugging the well shall prepare a report on their company letter head listing the site name and describing general well construction including total depth of the well, the diameter of casing, material used to plug the well (e.g. bentonite/cement slurry), and date of the plugging operation.

5.2 It is recommended but not required that photographs of the final surface restoration be taken and included within the records.

5.3 Copies of the plugging report shall be submitted to all appropriate agencies and retained by the well operator for a minimum period of ten years.