

1R - 426-279

WORKPLANS

Date:

5 - 23 - 11

Rice Environmental Consulting & Safety

P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

CERTIFIED MAIL

RETURN RECEIPT NO. 7008 1140 0001 3070 5832

May 23rd, 2011

Mr. Edward Hansen

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

**RE: INVESTIGATION & CHARACTERIZATION PLAN
Rice Operating Company – BD SWD System
BD jct. C-23-1 (1R426-279): UL/C sec. 23 T22S R37E**

2011 MAY 24 A 11:51
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Mr. Hansen:

RICE Operating Company (ROC) has retained Rice Environmental Consulting and Safety (RECS) 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/usage basis. Environmental projects of this nature require System Party AFE approval prior to work commencing at the site. In general, project funding is not forthcoming until NMOCD approves the work plan. Therefore, your timely review of this submission is greatly appreciated.

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 4 miles south-east of Eunice, New Mexico at UL/C sec. 23 T22S R37E as shown on the Site Location Map (Figure 1). NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 59 +/- feet.

In 2010 ROC initiated work on the former BD C-23-1 junction box. The site was delineated using a backhoe to form a 35 ft x 5 ft x 12 ft deep excavation and soil samples were screened at regular intervals for both hydrocarbons and chlorides. From the excavation, the four-wall composite, the bottom composite and the backfill were taken to a commercial laboratory for analysis. Laboratory tests of the four-wall composite showed a chloride reading of 784 mg/kg and negligible gasoline range organics (GRO) and a diesel range organics (DRO) readings. The bottom composite showed a chloride laboratory reading of 2,200 mg/kg and negligible GRO and DRO readings. The soil was blended on site and backfilled to six feet below ground surface (bgs). Laboratory analysis of the blended backfill showed a chloride reading of 1,310 mg/kg and negligible GRO and DRO readings. At 6-5 ft bgs, a one foot thick clay layer was installed to inhibit downward movement of chlorides. A clay compaction test was performed on March 23rd, 2010. The remaining backfill was hauled to an NMOCD approved facility for disposal. Clean imported soil was used to backfill the site to ground surface.

The area was contoured to the surrounding landscape, seeded, and an identification plate was placed on the surface of the site to mark its location for future environmental considerations. NMOCD was notified of potential groundwater impact on August 4th, 2010 and a junction box disclosure report (Appendix A) was submitted to NMOCD with all the 2010 junction box closures and disclosures.

ROC proposes additional investigative work at the site to determine if there is potential for groundwater degradation from residual chlorides at the site.

Proposed Work Elements

1. Conduct vertical and lateral delineation of residual soil hydrocarbons and chlorides from samples taken using a drill rig, hand auger, 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. (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 chlorides, 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.

ROC appreciates the opportunity to work with you on this project. Please call Hack Conder at (575) 393-9174 or me if you have any questions or wish to discuss the site.

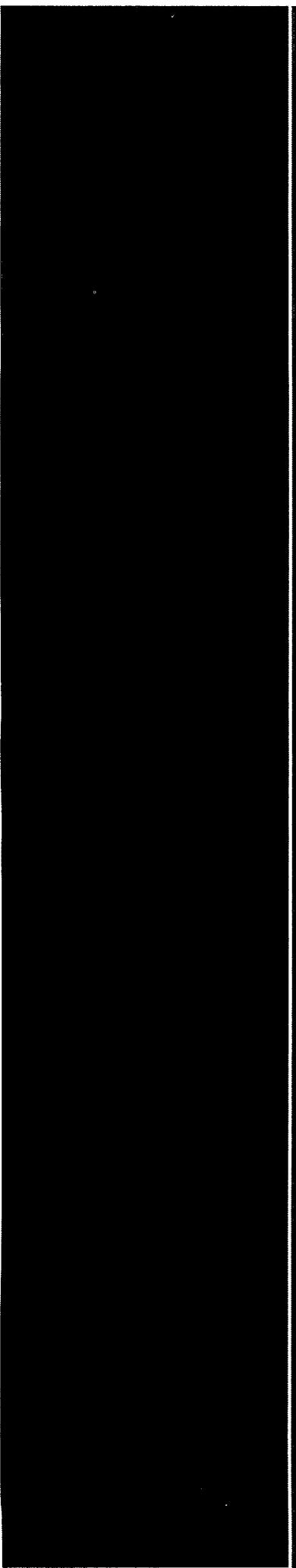
Sincerely,



Lara Weinheimer
Project Scientist
RECS
(575) 441-0431

Attachments:

- Figures – Site location map
- Appendix A – Junction Box Disclosure Report
- Appendix B – Quality Procedures



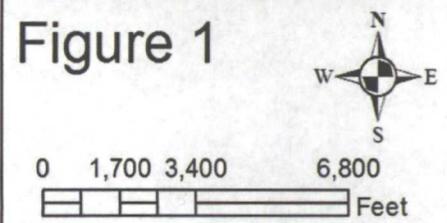
Figures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

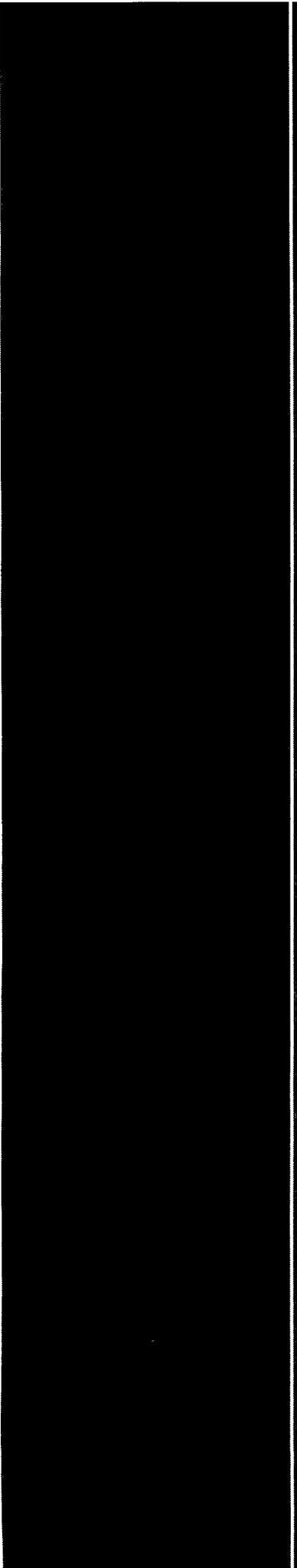
Site Map



BD jct. C-23-1
LEGALS: UL/C sec. 23
T22S R37E
NMOCD Case #: 1R426-279



Drawing date: 5-3-11
Drafted by: L. Weinheimer



Appendix A

Junction Box Disclosure Report

RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

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

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS - FEET		
							Length 13'	Width 5'	Depth 5'
Blinebry-Drinkard (BD)	Jct. C-23-1	C	23	22S	37E	Lea	Eliminated		

LAND TYPE: BLM _____ STATE _____ FEE LANDOWNER Walco Ranch, LLC OTHER _____

Depth to Groundwater 59 feet NMOCD SITE ASSESSMENT RANKING SCORE: 20

Date Started 1/27/2010 Date Completed 3/23/2010 OCD Witness no

Soil Excavated 77.8 cubic yards Excavation Length 35 Width 5 Depth 12 feet

Soil Disposed 156 cubic yards Offsite Facility Sundance Location Eunice, NM

FINAL ANALYTICAL RESULTS: Sample Date 2/24/2010 Sample Depth 12 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.

Sample Location	PID (field) ppm	GRO mg/kg	DRO mg/kg	Chlorides mg/kg
4-WALL COMP.	0.1	<10.0	<10.0	784
BOTTOM COMP.	0.3	<10.0	<10.0	2,200
BACKFILL COMP.	0.0	<10.0	<10.0	1,310

CHLORIDE FIELD TESTS

LOCATION	DEPTH	mg/kg
4-wall comp.	n/a	1609
bottom comp.	12'	2532
backfill comp.	n/a	1,749
background	6"	211
vertical delineation trench 20 ft. south of junction (source)	2'	897
	4'	1,597
	6'	2,391
	8'	2,932
	10'	4,129
	12'	4,616

General Description of Remedial Action: This junction box and line were eliminated during the pipeline replacement/upgrade program. After the former junction box was removed, an investigation was conducted using a backhoe to collect samples at regular intervals producing a 35x5x12-ft deep excavation. Chloride field tests were performed on each sample which did not relent with depth. Organic vapors, measured using a PID, yielded low concentrations. The excavated soil was blended on site and representative composite samples were collected from the blended backfill, the bottom of the excavation, and the excavation walls. The representative samples were sent to a commercial laboratory for analysis of chloride and TPH. The excavated soil was blended on site 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 with a compaction test performed on 3/23/2010. The remaining backfill was hauled to an NMOCD approved facility. Clean imported soil was used to backfill the remaining excavation to ground surface and contoured to the surrounding area. An identification plate was placed on the surface at the former junction box site to mark the presence of clay below. On 3/25/2010, the site was seeded with a blend of native vegetation and is expected to return to a productive capacity at a normal rate. NMOCD was notified of potential groundwater impact on 8/4/2010.

ADDITIONAL EVALUATION IS HIGH PRIORITY

enclosures: photos, lab results, PID (field) screenings, compaction test, hydraulic conductivity, proctor, cross-section, chloride curve

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

SITE SUPERVISOR Robert Egans SIGNATURE [Signature] COMPANY RICE OPERATING COMPANY

REPORT ASSEMBLED BY Larry Bruce Baker Jr. INITIAL LB

PROJECT LEADER Larry Bruce Baker Jr. SIGNATURE [Signature] DATE 8-26-10

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

BD Jct. C-23-1

Unit C, Section 23, T22S, R37E



Junction box prior to excavation

1/27/2010



Taking a sample

2/19/2010



Backfilling site above clay liner

3/23/2010



Seeding excavation

3/25/2010



**ARDINAL
LABORATORIES**

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: BRUCE BAKER
122 W. TAYLOR
HOBBS, NM 88240

Receiving Date: 02/24/10
Reporting Date: 03/01/10
Project Number: NOT GIVEN
Project Name: BD JCT. C-23-1 (2237)
Project Location: BD JCT. C-23-1 (2237)

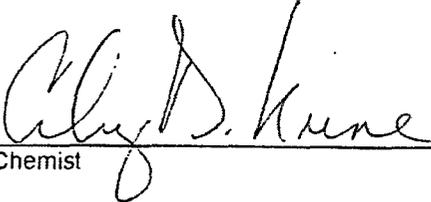
Sampling Date: 02/24/10
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: JH
Analyzed By: AB/HM

	GRO	DRO	
	(C ₆ -C ₁₀)	(>C ₁₀ -C ₂₅)	Cl*
LAB NUMBER SAMPLE ID	(mg/kg)	(mg/kg)	(mg/kg)

ANALYSIS DATE	02/26/10	02/26/10	02/26/10
H19336-1 5PT BOTTOM COMP @ 12'	<10.0	<10.0	2,200
H19336-2 4-WALL COMP.	<10.0	<10.0	784
H19336-3 BLENDED BACKFILL	<10.0	<10.0	1,310
Quality Control	392	476	510
True Value QC	500	500	500
% Recovery	78.4	95.2	102
Relative Percent Difference	1.9	4.8	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-ClB
*Analysis performed on a 1:4 w:v aqueous extract.
Reported on wet weight.

COPY



Chemist

03/02/10

Date

H19336 TCL 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 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 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. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

RICE OPERATING COMPANY

122 West Tavor Hobbs, NM 88240
 PHONE: (575) 393-9174 FAX: (575) 397-1471
 PID METER CALIBRATION & FIELD REPORT FORM

	Check Model Number:		
<input type="checkbox"/>	Model: PGM 7300 Serial No: 590-000183	<input type="checkbox"/>	Model: PGM 7600 Serial No: 110-023920
<input checked="" type="checkbox"/>	Model: PGM 7300 Serial No: 590-000508	<input type="checkbox"/>	Model: PGM 7600 Serial No: 110-013744
<input type="checkbox"/>	Model: PGM 7300 Serial No: 590-000504	<input type="checkbox"/>	Model: PGM 7600 Serial No: 110-013676

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO: 925621	EXPIRATION DATE: 9-27-2012
FILL DATE: 9-28-09	METER READING ACCURACY: 99.8

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
BD	C-23-1	C	23	22	37

SAMPLE ID	PID	SAMPLE ID	PID
<i>Bottom 5pt. Composite</i>	<i>0.3</i>		
<i>Blended Backfill</i>	<i>0</i>		
<i>4-Wall Composite</i>	<i>0.1</i>		

COPY

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: *Robert J. ...*

DATE: *2-24-2010*



*Corrected Copy 8/20/10
LABORATORY TEST REPORT
PETTIGREW & ASSOCIATES, P.A.
 1110 N. GRIMES
 HOBBS, NM 88240
 (575) 393-9827



DEBRA P. HICKS, P.E./L.S.I.
 WILLIAM M. HICKS, III, P.E./P.S.

To: Rice Operating Company
 122 W. Taylor
 Hobbs, NM 88240

Material: Wallach Red Clay

Project: BD JCT C-23-1 (22/37)
 Project No. 2010.1074

Test Method: ASTM: D 2922

***Date of Test:** March 23, 2010

Depth: See Below

Depth of Probe: 12"

Test No.	Location	*Dry Density % Max	% Moisture	Depth
SG 2	20' S. & 10' W. of NE Corner of Pit	91.3	16.1	FSG

COPY

Control Density: 102.3
 ASTM: D 698

Optimum Moisture: 20.3%

Required Compaction: 90-95%

Densometer ID: 5572
PETTIGREW & ASSOCIATES

Lab No.: 10 2305-2306

Copies To: Rice Operating

BY: Ericam Hart
 BY: Debra Hicks P.E.



ETTL Engineers & Consultants Inc.

GEOTECHNICAL * MATERIALS * ENVIRONMENTAL * DRILLING * LANDFILLS

HYDRAULIC CONDUCTIVITY DETERMINATION FLEXIBLE WALL PERMEAMETER - CONSTANT VOLUME (Mercury Permometer Test)

Project: Pettigrew & Associates, P.A., Hobbs, NM - Project #2010.1028 Report No: 1-1201-000003
 Date: 2/5/2010 Panel Number: P 3; ASTM D 5084
 Project No.: C 4635-101 Permometer Data

Boring No.:	sp = 0.031418 cm ²	Set Mercury to	Equilibrated	1.8 cm ³
Sample: 8540	sa = 0.797120 cm ²	Equalized	Pipet Rp	6.7 cm ³
Depth (ft):	M1 = 0.030180	C = 0.000434704	Annulus Ra	1.5 cm ³
Other Location: Wallach Plant Eunice	M2 = 1.040853	T = 0.203780828		

Material Description: Red Clay (Your Sample No 10 1422-1424) Compacted D 698 at 95% of your M/D curve (wet side)

SAMPLE DATA

Wet Wt. sample + ring or tare:	561.37 g	Before Test	After Test
Tare or ring Wt.:	0.0 g	Tare No.:	T 5 Tare No.:
Wet Wt. of Sample:	561.37 g	Wet Wt.+tare:	731.80
Diameter:	2.77 in	7.05 cm ²	Dry Wt.+tare:
Length:	2.79 in	7.08 cm	641.75
Area:	6.04 in ²	38.99 cm ²	Tare Wt.:
Volume:	16.84 in ³	276.82 cm ³	218.78
Unit Wt.(wet):	128.85 pcf	2.03 g/cm ³	Dry Wt.:
Unit Wt.(dry):	104.85 pcf	1.88 g/cm ³	422.97
		Water Wt.:	80.15
		% moist.:	21.3
			110.18
			23.5

Specific Gravity: 2.77 Max Dry Density(pcf) = 104.8948 OMC = 21.313663
 % of max = 100.0 +/- OMC = 0.00
 Calculated % saturation: 89.88 Void ratio (e) = 0.85 Porosity (n) = 0.39

TEST READINGS

Z1(Mercury Height Difference @ 11): 6.1 cm Hydraulic Gradient = 9.10

Date	elapsed t (seconds)	Z (pistol @ l)	ΔZ _n (cm)	temp (deg C)	α (temp cm)	k (cm/sec)	k (ft./day)	Reset = *
2/5/2010	4740	6	0.858897	25	0.889	1.17E-08	3.32E-05	
2/5/2010	5940	5.9	0.768897	25	0.889	1.09E-08	3.09E-05	
2/5/2010	6900	5.8	0.858897	25	0.889	1.08E-08	3.05E-05	
2/5/2010	7800	5.7	0.858897	25	0.889	1.08E-08	3.05E-05	

SUMMARY

ka = 1.10E-08 cm/sec	Acceptance criteria = 25 %
k1 = 1.17E-08 cm/sec	Vm = $\frac{k_a - k_1}{k_a} \times 100$
k2 = 1.09E-08 cm/sec	6.3 %
k3 = 1.08E-08 cm/sec	1.2 %
k4 = 1.08E-08 cm/sec	2.5 %

Hydraulic conductivity	k = 1.10E-08 cm/sec	3.13E-05 ft/day
Void Ratio	e = 0.85	
Porosity	n = 0.39	
Bulk Density	γ = 2.03 g/cm ³	127.0 pcf
Water Content	W = 0.38 cm ³ /cm ³	(at 20 deg C)
Intrinsic Permeability	kint = 1.13E-13 cm ²	(at 20 deg C)

Liquid Limit LL	
Plastic Limit PL	
Plasticity Index PI	
- 200 Sieve	%
+ No 40 Sieve	%
+ No 4 Sieve	%

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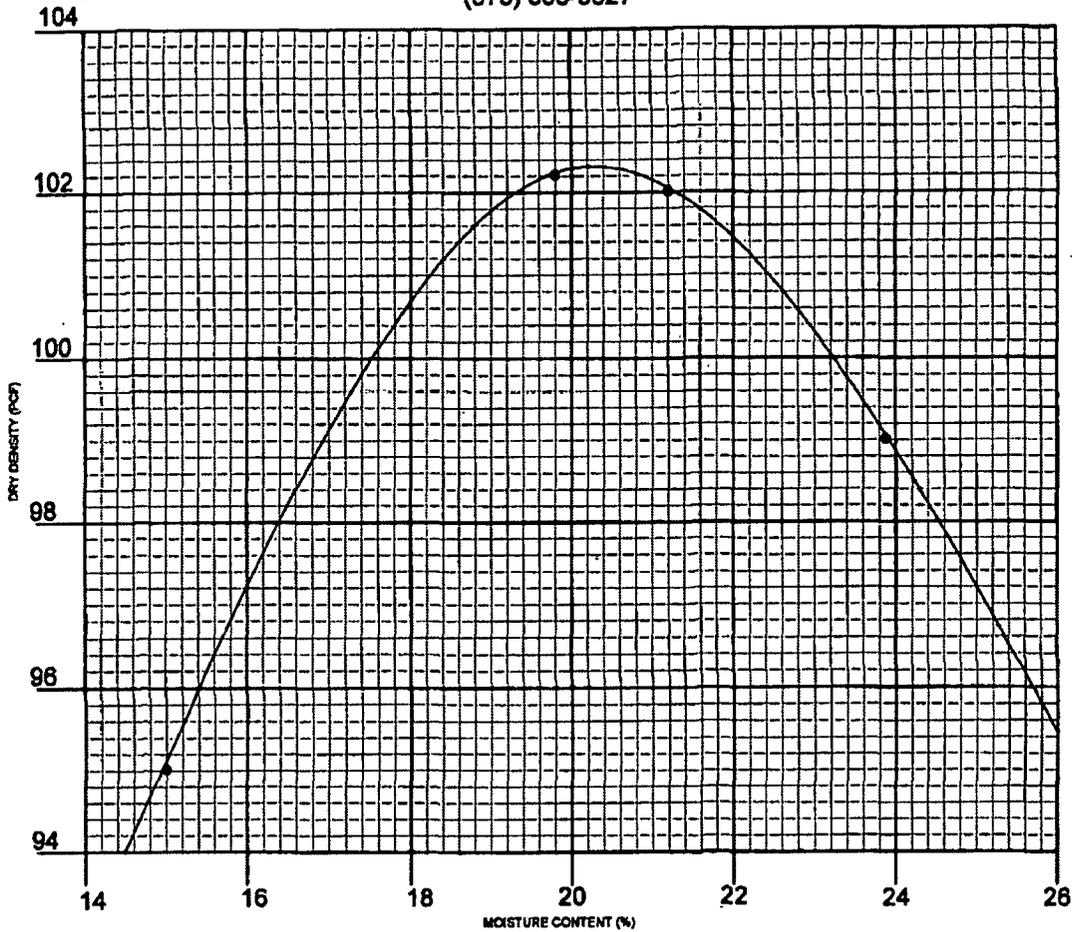
210 Beach Street
Tomball, AR 71854
870-772-0013 Phone
870-216-2413 Fax

1717 East Erwin
Tyler, Texas 75702
903-595-4431 Phone
903-598-8113 Fax
www.ettlinc.com

707 West Cotton Street
Longview, Texas 75604-5503
903-758-0616 Phone
903-758-8245 Fax



*Corrected Copy 2/17/10
PETTIGREW & ASSOCIATES, P.A.
 1110 N. GRIMES ST.
 HOBBS, NM 88240
 (575) 393-9827



General Information

CLIENT: Rice Operating PROJECT: Project No. 2010.1026
 SAMPLE LOCATION: Eunice Wallach Plant
 SOIL DESCRIPTION: Wallach Red Clay
 SOIL CLASSIFICATION: _____ TEST METHOD: ASTM: D 698
 ATTERBERG: LL _____ PI _____ Sampled & Delivered 2/8/10
 DATE: 2/12/10 LAB NO. 10 1422-1424

DRY WEIGHT LB/CU. FT. 102.3 MOISTURE CONTENT % 20.3

SIEVE ANALYSIS - % PASSING									

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PETTIGREW & ASSOCIATES

BY: Erica M. Hart

COPIES: Rice Operating

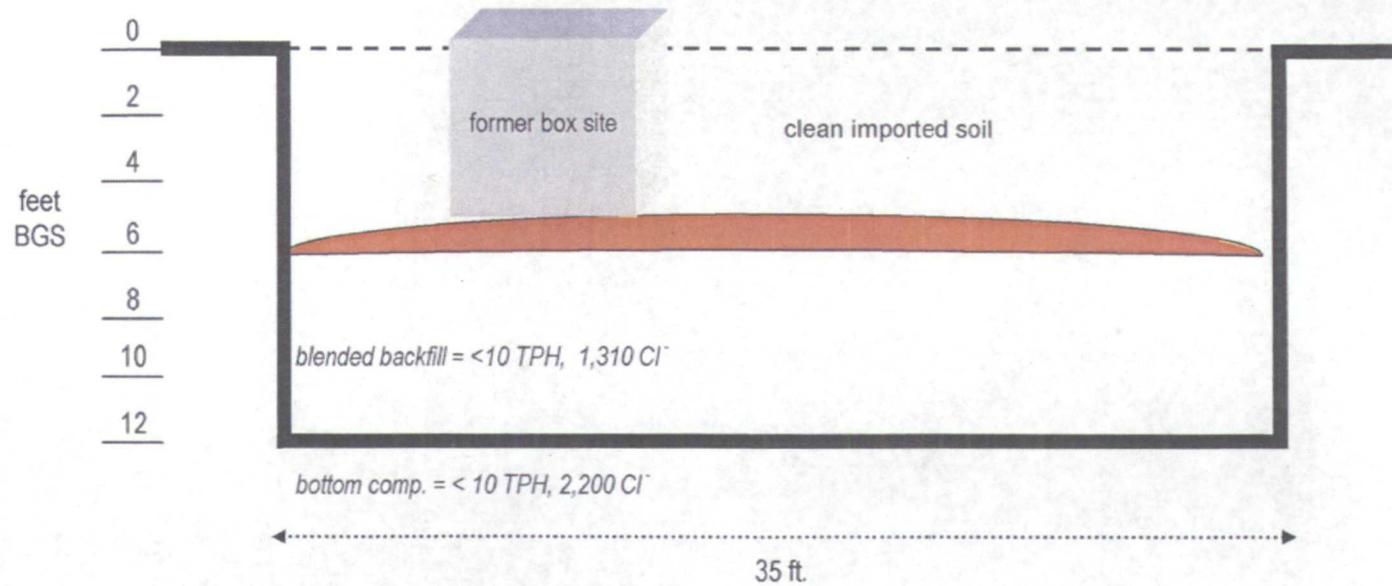
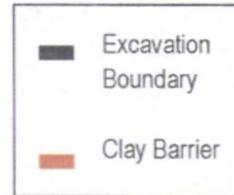
BY: C. J. [Signature] P.E.

BD Jct. C-23-1
Unit 'C', Sec. 23, T22S, R37E

Excavation Cross-Section

N

S



CHLORIDE CONCENTRATION CURVE

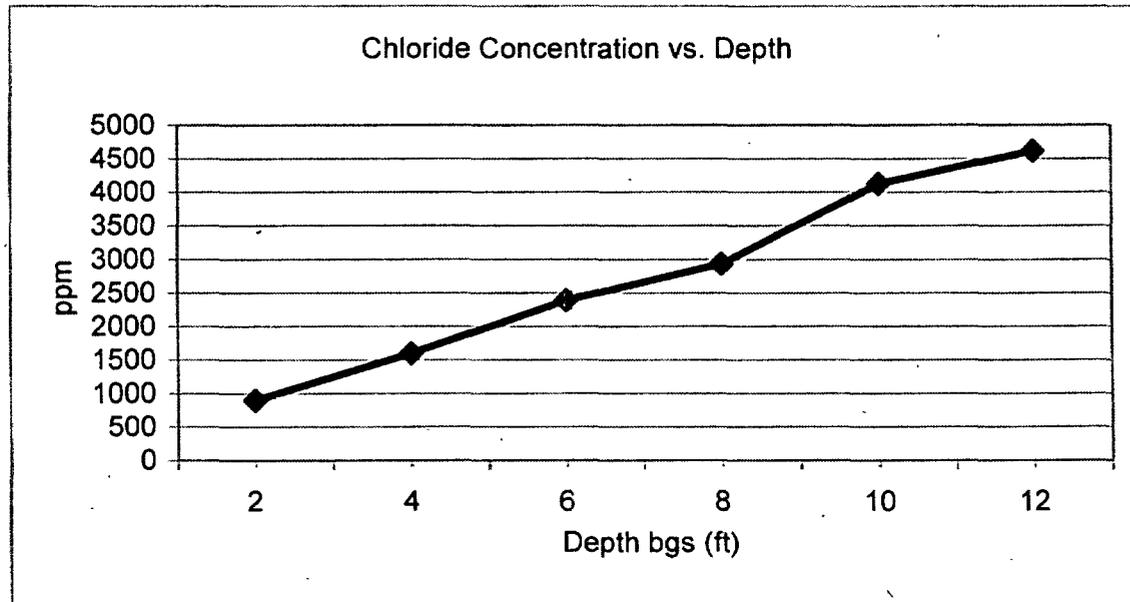
RICE Operating Company

BD JCT. C-23-1

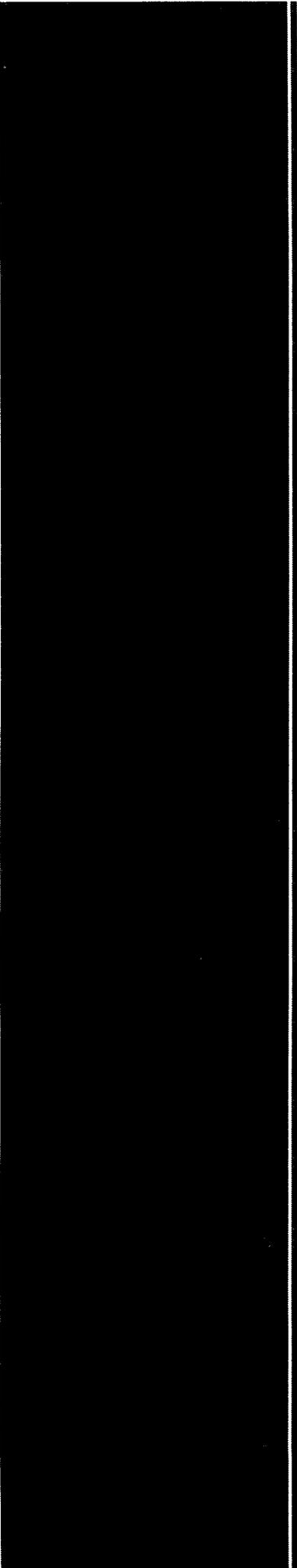
Unit 'C', Sec. 23, T22S, R37E

Backhoe samples 20 ft. south of the junction (source)

Depth bgs. (ft)	[Cl ⁻] ppm
2	897
4	1,597
6	2,391
8	2,932
10	4,129
12	4,616



Groundwater = 59 ft.



Appendix B

Quality Procedures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

Rice Environmental Consulting and Safety

Quality Procedures

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- 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

Rice Environmental Consulting and Safety

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

Rice Environmental Consulting and Safety

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 Tare 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.

Rice Environmental Consulting and Safety

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 Rice 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.

Rice Environmental Consulting and Safety

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" well $[V/231 = \text{gal}] \times 3 = \text{Purge Volume}$

V=Volume

$\pi = \text{pi}$

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

Rice Environmental Consulting and Safety

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.

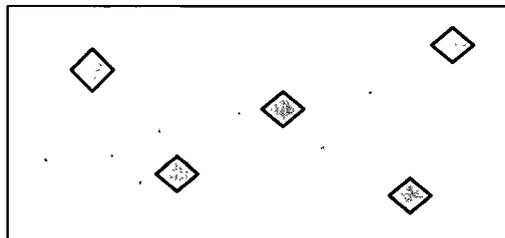
3.0 Sampling Procedure

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.

Rice Environmental Consulting and Safety

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, (59-77⁰F). 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.**

Rice Environmental Consulting and Safety

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.

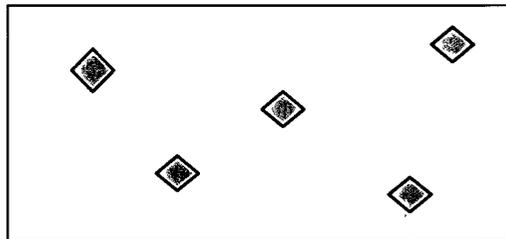
5.0 Sampling Procedure

- 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

Rice Environmental Consulting and Safety

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.