PO Box 2948 | Hobbs, NM 88241 | Phone 575.393.2967

April 27th, 2014

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. N-10 (1R426-211): UL/N sec. 10 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 2.5 miles south of Eunice, New Mexico at UL/N sec. 10 T22S R37E as shown on the Geographical Location Map and Area Map (Figures 1 and

2). An updated study of NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 76 +/- feet.

In 2008, ROC initiated work on the former BD Jct. N-10 junction box. After the former junction box was removed, an investigation was conducted using a backhoe to collect soil samples at regular intervals, creating a 10 ft x 10 ft x 12 ft deep excavation. Each sample was screened for both hydrocarbons and chlorides. A 9 ft grab sample was taken from the center of the former junction box site and sent to a commercial laboratory for analysis. Laboratory tests of the source grab sample returned a chloride reading of non-detect, a Gasoline Range Organics (GRO) reading of non-detect and Diesel Range Organics (DRO) readings of 273 mg/kg. The excavated soil was blended on site and returned to the excavation. A composite sample was collected from the blended soil and sent to a commercial laboratory for analysis. The backfill composite returned a laboratory chloride reading of non-detect, a GRO reading of non-detect and a DRO reading of 126 mg/kg. Clean soil was imported to the site and used to backfill the remainder of the excavation to ground surface. The site was contoured to the surrounding area. On January 28th, 2008, the site was seeded with a blend of native vegetation.

To further investigate the presence of chloride, two soil bores were installed on October 23rd, 2008 (Figure 3). SB-1 was installed 10 ft southwest of the former junction box and was advanced to a depth of 20 ft. It was then abandoned in order to sample closer to the former junction box site. SB-2 was installed at the source of the former junction box and was advanced to a depth of 60 ft. Samples from each bore were taken every 5 ft and were field titrated for chlorides and hydrocarbons. The deepest sample at SB-2, 60 ft bgs, was sent to a commercial laboratory for analysis and returned a laboratory chloride reading of 432 mg/kg and a GRO, DRO and BTEX reading of non-detect. Both bore holes were plugged in entirety with bentonite.

NMOCD was notified of potential groundwater impact on December 24th, 2008. A junction box disclosure report (Appendix A) was submitted to NMOCD with all the 2008 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 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 of 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 $\leq$ 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 well may be required to fully delineation 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 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.

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

Sincerely,

L Flores

Laura Flores
Environmental Project Manager
Basin Environmental Service Technologies

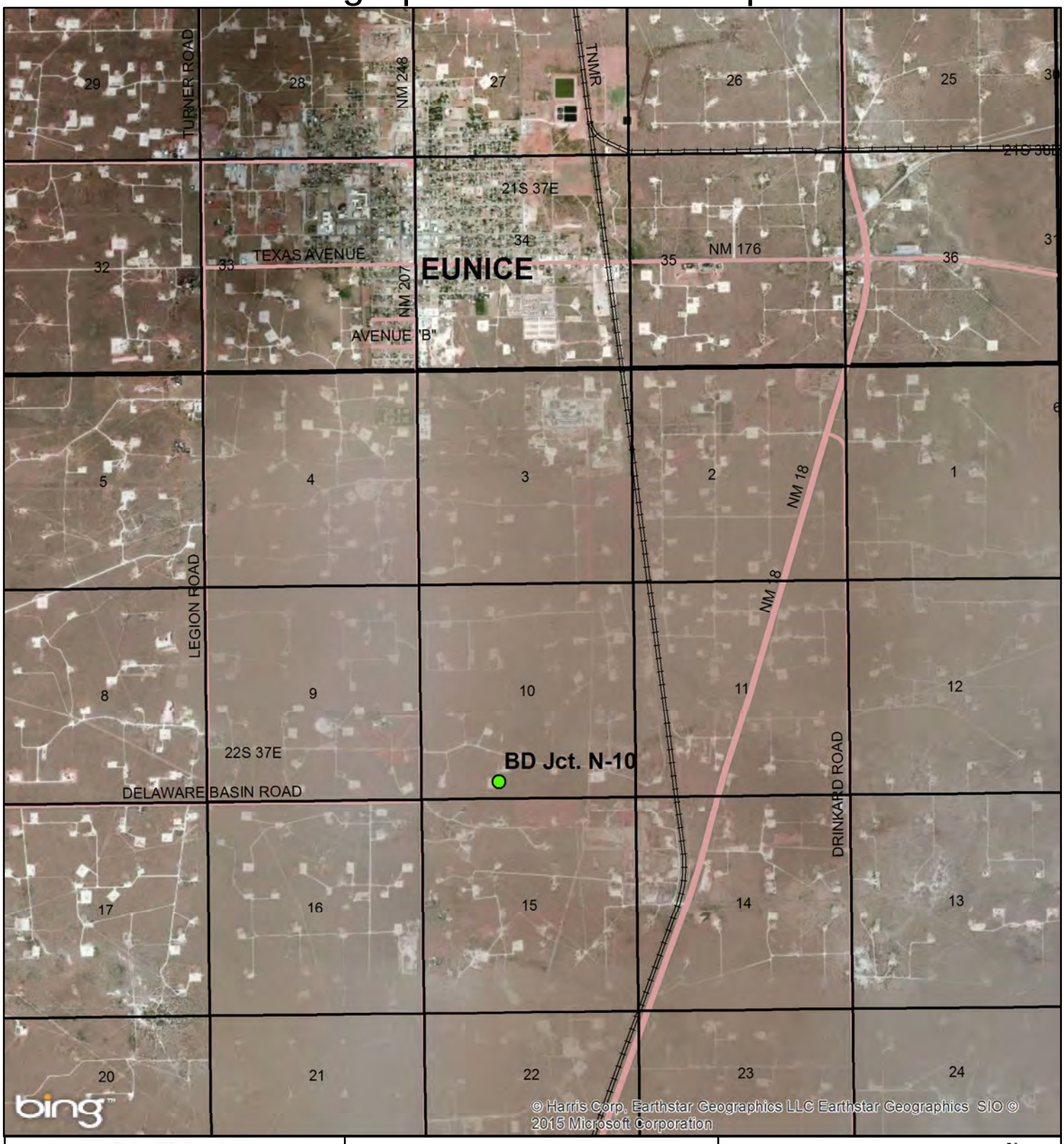
Attachments:

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 Service Technologies
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Geographical Location Map



Basin Environmental Service Technologies
Effective Solutions

BD Jct. N-10

Unit Letter N, Section 10
T-22-S R-37-E
NMOCD Case #: 1R426-211

Figure 1

N
W E
S

0 0.4 0.8
Miles

Drawing date: 5/19/14
Drafted by: C. Ursanic

Area Map

Basin Environmental Service Technologies
Effective Solutions

BD Jct. N-10

Unit Letter N, Section 10
T-22-S R-37-E
NMOCD Case #: 1R426-211

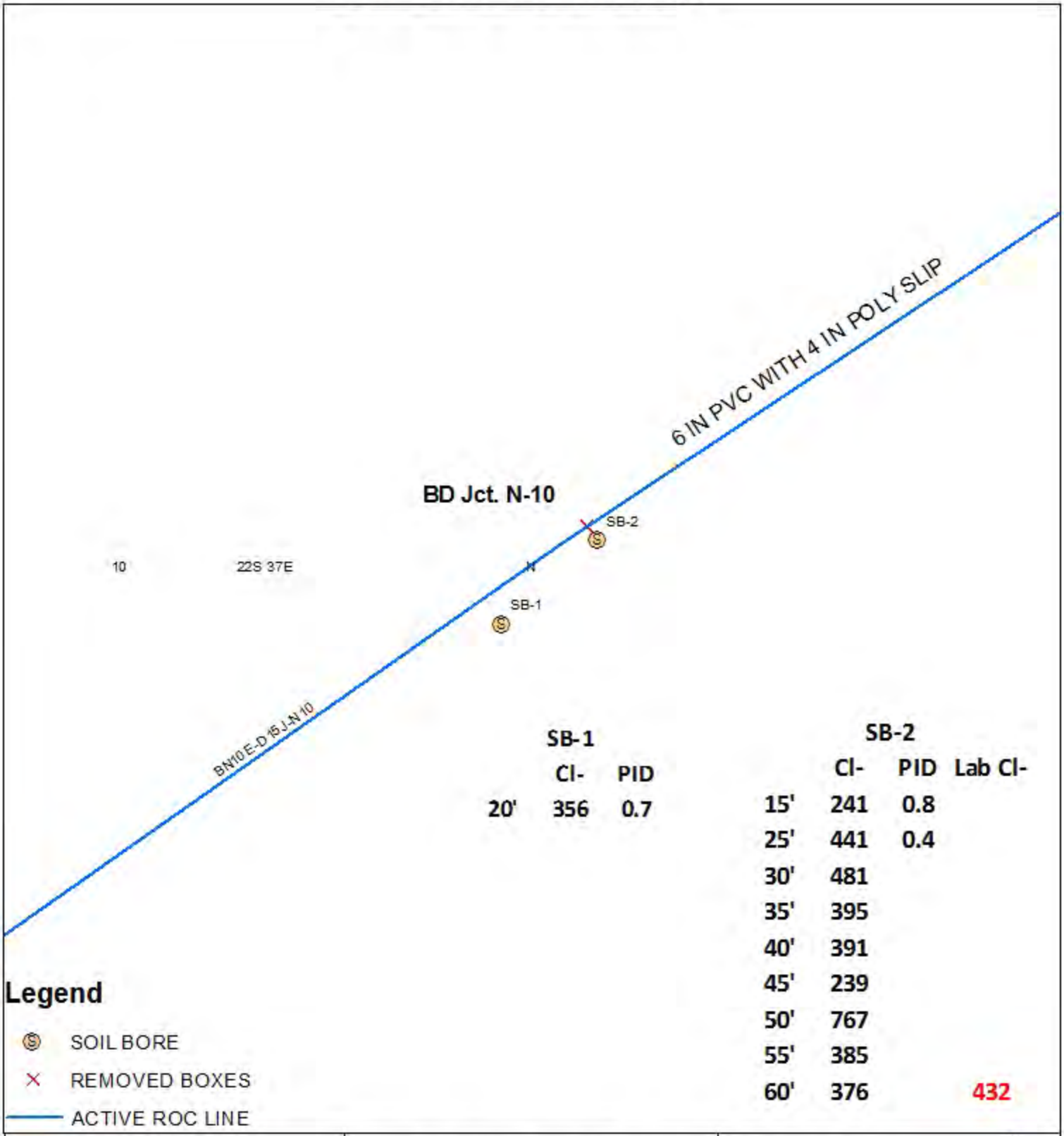
Figure 2

N
W E
S

0 360 720
Feet

Drawing date: 5/27/14
Drafted by: C. Ursanic

Soil Bore Installation



SB-1		
	Cl-	PID
20'	356	0.7

SB-2			
	Cl-	PID	Lab Cl-
15'	241	0.8	
25'	441	0.4	
30'	481		
35'	395		
40'	391		
45'	239		
50'	767		
55'	385		
60'	376		432

Legend

- SOIL BORE
- REMOVED BOXES
- ACTIVE ROC LINE

Basin Environmental Service Technologies
Effective Solutions

BD Jct. N-10

Unit Letter N, Section 10
T-22-S R-37-E
NMOCD Case #: 1R426-211

Figure 3

N W E S

0 0.001 0.002
Miles

Drawing date: 5/27/14
Drafted by: C. Ursanic

Appendix A

Junction Box Disclosure Report

Basin Environmental Service Technologies
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		
							Length 12'	Width 6'	Depth 4'
Blinebry-Drinkard (BD)	Jct. N-10	N	10	22S	37E	Lea	eliminated		

LAND TYPE: BLM ___ STATE ___ FEE LANDOWNER Pricilla Brunson Moody OTHER ___

Depth to Groundwater 92 feet NMOCD SITE ASSESSMENT RANKING SCORE: 30*

Date Started 1/8/2008 Date Completed 10/23/2008 OCD Witness no

Soil Excavated 44 cubic yards Excavation Length 10 Width 10 Depth 12 feet

Soil Disposed 0 cubic yards Offsite Facility n/a Location n/a

FINAL ANALYTICAL RESULTS:

Sample Date 1/8/2008, 10/23/2008 **Sample Depth** 9 ft, 60 ft

TPH, BTEX, and Chloride laboratory test results completed by using an approved lab and testing procedures pursuant to NMOCD guidelines.

Sample Location	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Total Xylenes mg/kg	GRO mg/kg	DRO mg/kg	Chloride mg/kg
SOURCE 9' GRAB	PID = 25.4 (field)				<10.0	273	<16
BACKFILL COMP.	PID = 24.4 (field)				<10.0	126	<16
SOIL BORING #2 @ 60'	<0.050	<0.050	<0.050	<0.300	<10.0	<10.0	432

General Description of Remedial Action: This junction 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. Chloride field tests were performed on each sample, which yielded generally low concentrations. Organic vapors were measured using a PID, which yielded some elevated concentrations. A 9 ft BGS sample from the source was sent to a commercial laboratory for analysis of chloride and TPH, which confirmed elevated TPH concentrations. The site was then excavated to 10x10x12-ft, with soil samples field tested at regular intervals. Chloride field tests yielded generally low concentrations. Organic vapors, measured using a PID, yielded some elevated concentrations. The excavated soil was blended on site and returned to the excavation. Clean, imported soil was used as a top cap and to contour to the surrounding area. On 1/28/2008, the site was seeded with a blend of native vegetation and is expected to return to a productive capacity at a normal rate. To further investigate depth of chloride and organic vapor presence, two soil borings (SB) were initiated on 10/23/2008. SB #1 at 10 ft southwest of the former junction box and SB #2 at the former junction box. SB #1 was advanced to 20 ft below ground surface (BGS) and soil bore #2 was advanced to 60 ft BGS, while soil samples were taken at regular intervals and field tested for chloride and organic vapor concentrations. The deepest sample at SB #2, 60 ft BGS, was sent to a commercial laboratory for analysis of chloride, BTEX, and TPH, which yielded slightly elevated concentrations of chloride. The entire borehole was plugged with bentonite to the ground surface. NMOCD was notified of potential groundwater impact on 12/24/2008.

CHLORIDE FIELD TESTS

LOCATION	DEPTH	mg/kg
background	6"	112
SOIL BORING at the former junction (source) 10/23/2008	15'	241
	20'	441
	30'	481
	35'	395
	40'	391
	45'	239
	50'	767
	55'	385
	60'	376

ADDITIONAL EVALUATION IS HIGH PRIORITY

**Domestic wells within radius.*

enclosures: photos, lab results, PID field screenings, boring data

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

REPORT ASSEMBLED BY Katie Jones INITIAL KJ COMPANY RICE OPERATING COMPANY

SITE SUPERVISOR Larry Bruce Baker Jr. SIGNATURE Larry Bruce Baker Jr.

DATE 1-20-09 TITLE PROJECT LEADER

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

BD Jct. N-10

Unit N, Section 10, T22S, R37E

undisturbed junction box, facing south 9/28/2007

excavating former junction box site, facing west 1/17/2008

backfilling excavation with clean, imported soil in background, facing southwest 1/25/2008

seeding backfilled site, facing southwest 1/25/2008

CARDINAL LABORATORIES

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

COPY

ANALYTICAL RESULTS FOR
RICE OPERATING CO.
ATTN: BRUCE BAKER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

JAN 17 2008

Receiving Date: 01/09/08
Reporting Date: 01/11/08
Project Number: NOT GIVEN
Project Name: BD JCT. N-10
Project Location: BD JCT. N-10

Sampling Date: 01/08/08
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: CK/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{12}) (mg/kg)	DRO (>C_{12}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE		01/10/08	01/10/08	01/09/08
H14036-1	SOURCE 9' GRAB	<10.0	273	<16
H14036-2	BLENDED BACKFILL	<10.0	126	<16
Quality Control		548	554	500
True Value QC		500	500	500
% Recovery		110	111	100
Relative Percent Difference		11.2	5.4	<0.1

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Std. Methods 4500-Cl^-B
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

01/11/08
Date

H14036TCL Rice

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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

Company Name: Rice Operating Co.	**BILL TO**
Project Manager: Bruce Baker	P.O. #:
Address: 122 W. Taylor	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: 393-9174 Fax #: 397-1471	Address:
Project #: Project Owner:	City:
Project Name: BD Jct. N-10	State: Zip:
Project Location: BD Jct. N-10	Phone #:
Sampler Name: Bruce Baker	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST										
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Cl-	TPH 8015M									
H14032-1	Source 9' Grab	G	1			✓							1-8-08	3:04 pm	✓	✓									
-2	Blended Backfill	C	1			✓							1-8-08	3:50 pm	✓	✓									

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 consequental 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.

Relinquished By: Bruce Baker	Date: 1/9/08 Time: 8:30	Received By: Misty LeBert	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool ☑ Yes ☐ No Intact ☑ Yes ☐ No	CHECKED BY: (Initials) MCKB	REMARKS: Email Results to bbaker@riceswd.com CC $ to jpurvis@riceswd.com

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

RICE OPERATING COMPANY

122 West Tayor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK.	MODEL	NO.		
✓				

MODEL: PGM 7600 SERIAL NO: 110-013676
MODEL: PGM 7600 SERIAL NO: 110-013744
MODEL: PGM 7600 SERIAL NO: 110-12383
MODEL: PGM 7600 SERIAL NO: 110-012920

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 07-3353	EXPIRATION DATE: 4/12/09
FILL DATE: 10/12/07	METER READING ACCURACY: 99 ppm

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
BD	Jct. N-10	N	10	22S	37E

Source

SAMPLE ID	PID	SAMPLE ID	PID
5'	0	Blended Backfill	24.4
6'	0.5		
7'	132		
8'	72		
9'	25.4		

I verify that I have calibrated the above insrument in accordance to the namufacture operation manual.

SIGNATUE: Bruce Baker DATE: 1-08-08

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 10/27/08
Reporting Date: 10/29/08
Project Number: NOT GIVEN
Project Name: BD JCT. N-10
Project Location: BD JCT. N-10

Sampling Date: 10/23/08
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB

LAB NUMBER SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE	10/28/08	10/28/08	10/29/08
H16201-1 SB #2 @ 60'	<10.0	<10.0	432
Quality Control	554	499	500
True Value QC	500	500	500
% Recovery	111	99.8	100
Relative Percent Difference	0.9	8.2	2.0

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

Chemist

10/31/08
Date

H16201 TCL RICE

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 10/27/08
Reporting Date: 10/30/08
Project Number: NOT GIVEN
Project Name: BD JCT. N-10
Project Location: BD JCT. N-10

Sampling Date: 10/23/08
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: ZL

LAB NUMBER SAMPLE ID	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL BENZENE (mg/kg)	TOTAL XYLENES (mg/kg)
ANALYSIS DATE	10/29/08	10/29/08	10/29/08	10/29/08
H16201-1 SB #2 @ 60'	<0.050	<0.050	<0.050	<0.300
Quality Control	0.049	0.047	0.047	0.155
True Value QC	0.050	0.050	0.050	0.150
% Recovery	98.0	94.0	94.0	103
Relative Percent Difference	5.7	1.6	2.0	3.8

METHOD: EPA SW-846 8021B

TEXAS NELAP CERTIFICATION T104704398-08-TX FOR BENZENE, TOLUENE, ETHYL BENZENE, AND TOTAL XYLENES.

Chemist

10/31/08
Date

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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

Company Name: Rice Operating Company	**BILL TO**
Project Manager: Hack Conder	**P.O. #:**
Address: 122 West Taylor	**Company:**
City: Hobbs **State:** NM **Zip:** 88240	**Attn:**
Phone #: 393-9174 **Fax #:** 397-1471	**Address:**
Project #: **Project Owner:**	**City:**
Project Name: BD jct. N-10	**State:** **Zip:**
Project Location: BD jct. N-10	**Phone #:**
Sampler Name: Lara Weinheimer	**Fax #:**

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST										
Lab I.D.	**Sample I.D.**	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Chlorides	TPH 8015 M	BTEX								
H16201-1	SB # 2 @ 60'	G	1			✓					✓		10-23-08	3:00	✓	✓	✓							

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.

Relinquished By: L. Weinheimer	**Date:** 10-27-08 **Time:** 4:30	**Received By:** Misty LaBart	
Relinquished By:	**Date:** **Time:**	**Received By:**	
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	**Sample Condition** Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	**CHECKED BY: (Initials)** MC/B	

Phone Result: ☐ Yes ☑ No **Add'l Phone #:**
Fax Result: ☐ Yes ☑ No **Add'l Fax #:**
REMARKS:

email results

Hconder@riceswd.com; jpurvis@riceswd.com; Lweinheimer@riceswd.com

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

NEED SAMPLES BACK, PLEASE

Logger:	Lara Weinheimer	**Client:** RICE Operating Company	**Well ID:** SB - 2
Driller:	Harrison & Cooper, Inc. Drilling		
Drilling Method:	Air rotary	**Project Name:** BD jct. N-10	
Start Date:	10-23-08		
End Date:	10-23-08	**Location:** BD SWD System unit 'N' Sec.10 T22S, R37E Lea County, NM	
Comments: Located at center of former junction box site TD = 60 ft GW = 65 ft			

Depth (feet)	chloride field tests	PID	Description
			10 - 15 ft VERY FINE TO FINE SAND
15	241	0.8	caliche, light brown, dry
			15 - 30 ft VERY FINE TO FINE SAND rocky, reddish-brown, dry
20	no sample		
25	441	0.4	
30	481		
			30 - 35 ft VERY FINE TO FINE SAND
35	395		caliche, light brown, dry
			35 - 45 ft VERY FINE TO FINE SAND quartz, reddish-brown, slightly moist
40	391		
45	239		
			45 - 60 ft VERY FINE TO FINE SAND quartz, reddish-brown, moist
50	767		
55	385		
60	376		
Lab	432		

Lithology

Soil Bore Construction

bentonite seal

Appendix B
Quality Procedures

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

Basin Environmental Service Technologies

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QP-2 Chloride Titration Using 0.282 Normal Silver Nitrate Solution

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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
Formula V= ($\pi r^2 h$)
2" well [V/231=gal] X 3 = 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.

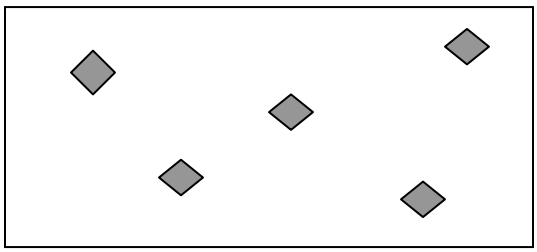
3.0 Sampling Procedure

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, (59-77^{0}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

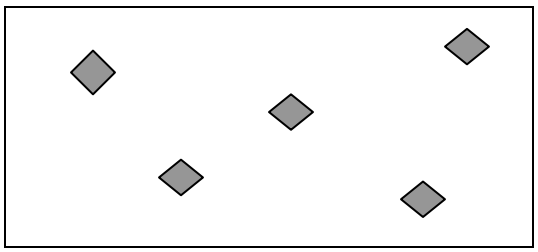
5.1. Do not touch the soil with your bare hands. Use new nitrile gloves to help minimize any cross-contamination.

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.