

1R - 427-13

WORKPLANS

Date:

5-22-12

Rice Environmental Consulting & Safety

P.O. Box 5630 Hobbs, NM 88241

Phone 575.393.4411 Fax 575.393.0293

CERTIFIED MAIL

RETURN RECEIPT NO. 7007 2560 0000 4569 9668

May 22nd, 2012

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 and Characterization Plan (ICP)
Rice Operating Company – EME SWD System
EME K-11 (1R427-13): UL/K sec. 11 T21S R36E
Formerly EME N-11**

RECEIVED OGD
2012 MAY 24 P 1:27

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 EME Salt Water Disposal (SWD) system. The site was previously referred to as the EME N-11. However, the site name has changed to the EME K-11 to match its geographical location (Figure 1). All future correspondence will reference EME K-11.

ROC is the service provider (agent) for the EME 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 5.5 miles northwest of Monument, New Mexico at UL/K sec. 11 T21S R36E as shown on the Site Location Map (Figure 1). NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 200 +/- feet.

In 2003, ROC initiated work on the former EME K-11 junction box. The site was delineated using a backhoe to form a 33 ft x 30 ft x 14 ft deep excavation and soil samples were screened at regular intervals for both hydrocarbons and chlorides. Chloride field data numbers showed no vertical or lateral decline. Field hydrocarbons numbers were low throughout. To further investigate the site, a soil bore was advanced on December 31st, 2003, ten feet west of the source. The boring was advanced to 80 ft bgs and samples were taken every five feet. The samples were field tested for chlorides and the 80 ft sample was taken to a commercial laboratory to be analyzed for chlorides. The laboratory chloride reading showed a result of 2,559 mg/kg. The bore was plugged in total with drilling cuttings.

The excavated area was backfilled and contoured to the surrounding landscape 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 January 9th, 2004 and a junction box disclosure report (Appendix A) was submitted to NMOCD with all the 2003 junction box closures and disclosures.

RECS proposes additional investigative work at the site to determine if there is potential for groundwater degradation from residual chlorides and hydrocarbons 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 or hydrocarbons, then only a vadose zone remedy will be undertaken. However, if groundwater shows impact from residual chlorides or hydrocarbons, a CAP will be developed to address these concerns.

RECS 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:

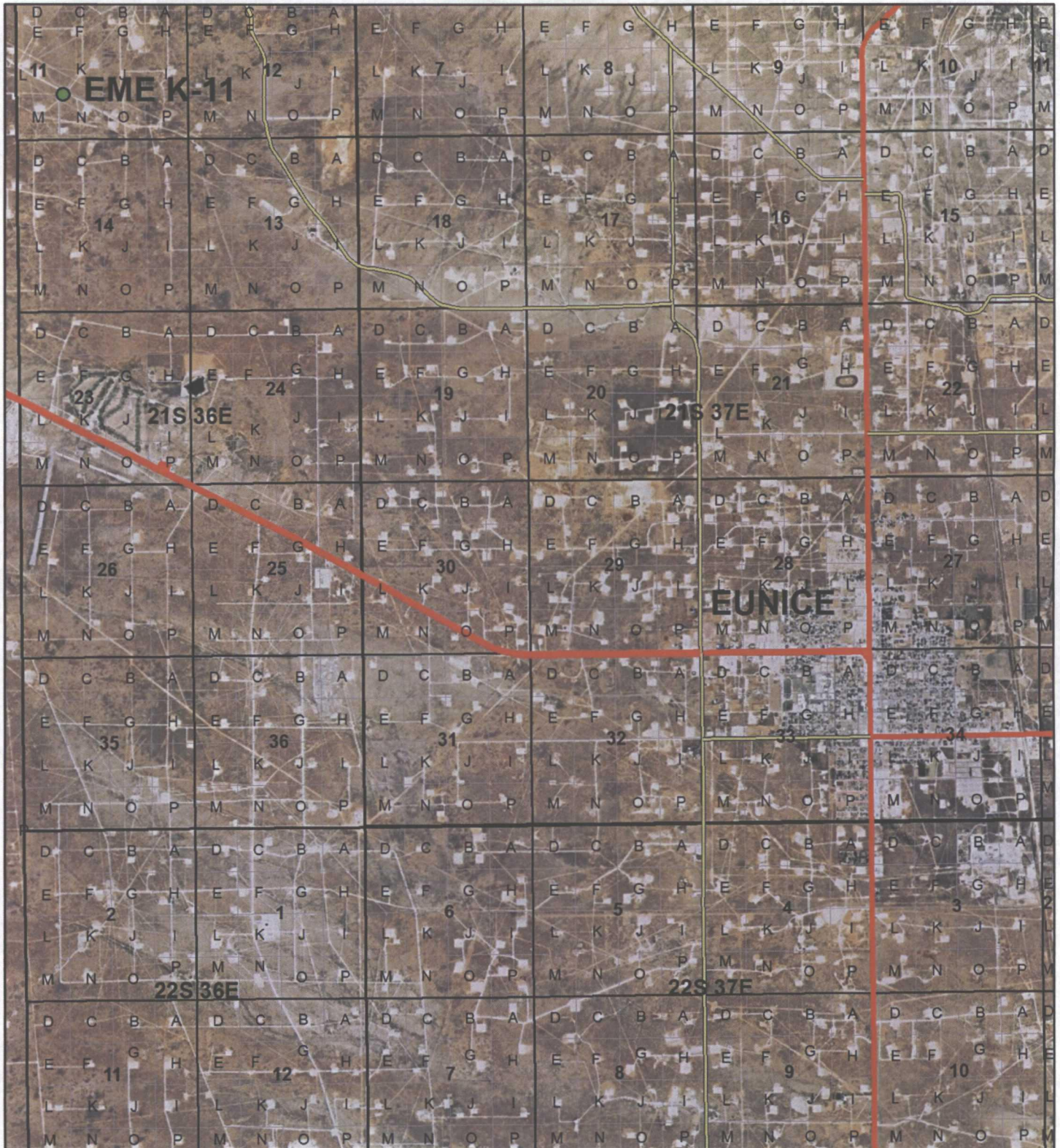
- Figure 1 – Site Location Map
- Appendix A – Junction Box Disclosure Report
- Appendix B – Quality Procedures



Figures

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

Site Location Map



EME K-11

Legals: UL/K sec. 11
T-21-S R-36-E
LEA COUNTY, NM

NMOCD CASE #: 1R427-13

Figure 1



0 0.375 0.75 1.5
Miles

Drawing date: 5-7-12
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 | | | | | | | BOX DIMENSIONS - FEET | | |
|--------------|----------|------|---------|----------|-------|--------|-----------------------|-------|-------|
| SWD SYSTEM | JUNCTION | UNIT | SECTION | TOWNSHIP | RANGE | COUNTY | Length | Width | Depth |
| EME | N-11 | N | 11 | 21S | 36E | Lea | Moved 150 ft west | | |

LAND TYPE: BLM _____ STATE X FEE LANDOWNER _____ OTHER _____

Depth to Groundwater 200 feet NMOCD SITE ASSESSMENT RANKING SCORE: 0

Date Started 8/26/2003 Date Completed 9/12/2003 OCD Witness No

Soil Excavated 433 cubic yards Excavation Length 33 Width 30 Depth 12-14 feet

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

FINAL ANALYTICAL RESULTS: Sample Date 12/31/2003 Sample Depth 80 ft

Procure 5-point composite sample of bottom and 4-point composite sample of sidewalls. 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 |
|---------------------------------|----------------|---------------|---------------------|---------------------|-----------|-----------|----------------|
| Soil Bore @ 80 ft | XXX | XXX | XXX | XXX | XXX | XXX | 2559 |
| 10 ft West @ 14 ft (field test) | PID = 21.5 ppm | | | | XXX | XXX | 12457 |

General Description of Remedial Action: The junction box site was delineated vertically and laterally with a backhoe while chloride tests and PID readings were conducted regularly. PID readings were minimal and all readings were less than 100 ppm. The 30 x 30 x 14-ft excavation yielded no vertical or lateral declines of chloride concentrations (see graph). A soil bore was conducted at this site in an attempt to find the vertical extent of chloride impact. The drilling was stopped at 80 ft bgs because a conclusive trend was not established (see graph). The site was been backfilled and marked with an identification plate for further consideration in the future.

CHLORIDE FIELD TESTS

| LOCATION | DEPTH (ft) | ppm |
|------------|------------|------|
| Soil bore | 15 | 696 |
| 10 ft west | 20 | 887 |
| of jct. | 25 | 732 |
| | 30 | 792 |
| | 35 | 1362 |
| | 40 | 1143 |
| | 50 | 1807 |
| | 60 | 2005 |
| | 70 | 2579 |
| | 80 | 2549 |

ADDITIONAL EVALUATION IS LOW PRIORITY.

enclosures: lab results, chloride graphs, photos, soil bore log, diagram, PID readings

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

DATE 2/2/2004 PRINTED NAME Kristin Farris

SIGNATURE Kristin Farris TITLE Project Scientist

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

EME jct. N-11



Undisturbed Junction Box

7/23/2003



Backhoe Delineation & Excavation

Aug. 2003



Delineation Soil Bore 12/31/2003

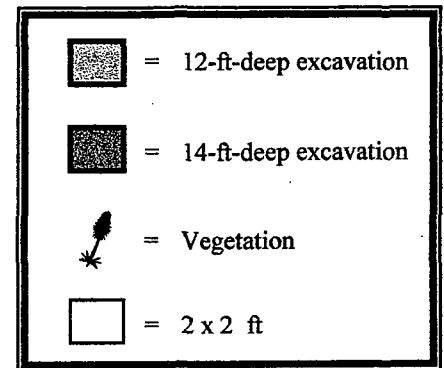


Construction of New Junction Box 150 ft West of Old

Oct. 2003

EME jct. N-11

30 ft x 33 ft Excavation

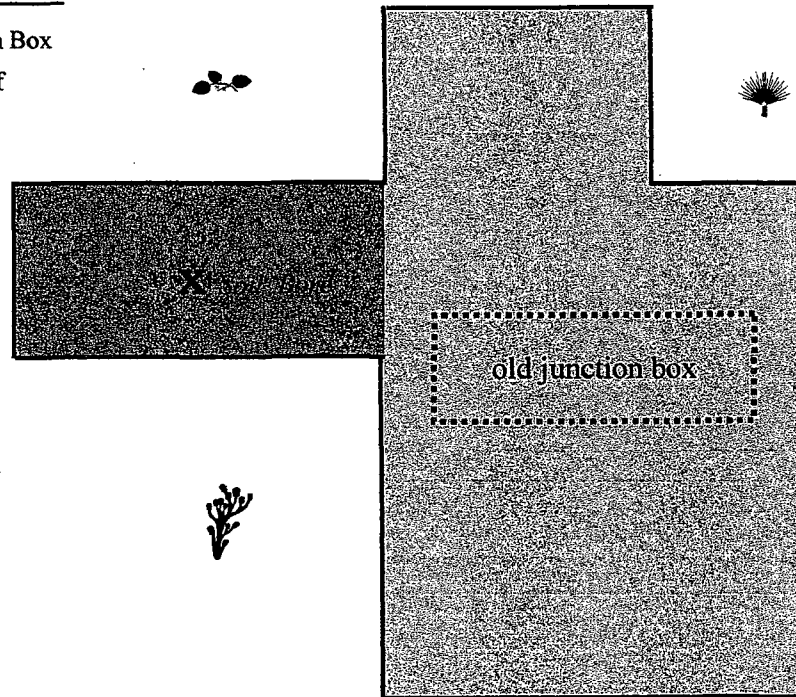


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New Junction Box
150 ft west of
old box



old junction box

CALICHE PAD

No Vegetation

CHLORIDE CONCENTRATION CURVE

RICE Operating Company

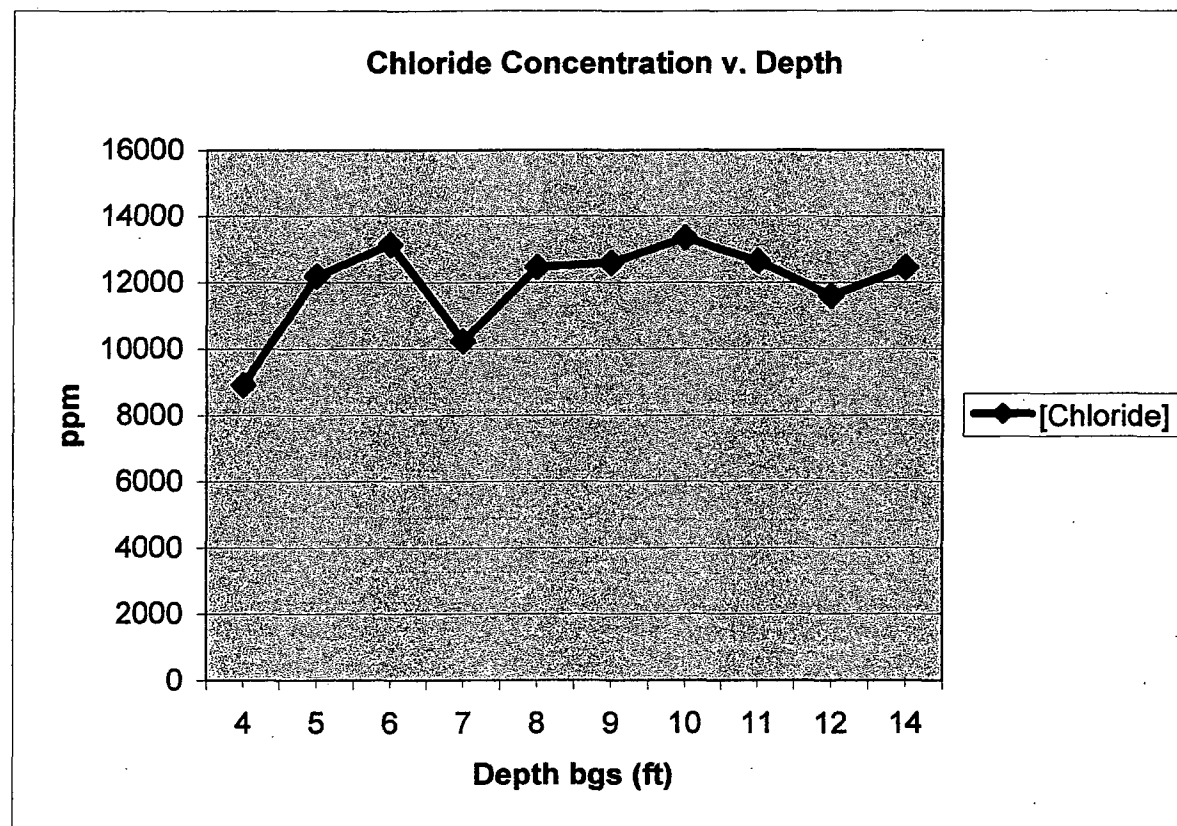
EME jct. N-11

T21S, R36E

10 ft West of Center

| Depth bgs (ft) | [Cl] ppm |
|----------------|----------|
| 4 | 8914 |
| 5 | 12196 |
| 6 | 13147 |
| 7 | 10238 |
| 8 | 12470 |
| 9 | 12596 |
| 10 | 13343 |
| 11 | 12656 |
| 12 | 11606 |
| 14 | 12457 |

Groundwater = 200 ft



LOG OF BORING

K. Farris
RICE Operating Company

| | | | | | | | | | |
|--------------------------------|--|---|--|--|--|------------------------|--|--|--|
| Logger: | | Joe Gatts; Mort Bates | | Client: | | RICE Operating Company | | Well ID: SB-1 | |
| Driller: | | Atkins Engineering Associates, Inc. | | Project Name: | | | | | |
| Drilling Method: | | Hollow Stem Auger | | Location: | | | | | |
| Start Date: | | 12/31/2003 | | Jct. N-11 | | | | | |
| End Date: | | 12/31/2003 | | EME SWD System | | | | | |
| Notes: | | 10 ft West of old junction site TD = 80 ft Groundwater = 200 ft | | | | Sec. 11, T21S, R36E | | | |
| | | | | | | Lea County, NM | | | |
| | | | | | | | | | |
| Depth (feet) | | Split Spoon chloride PID | | Description | | Lithology | | Additional Notes | |
| 0.0 | | | | 0-3 ft Silty Sand with Caliche: loose, tan, dry | | | | Mixed lithology backfill from original excavation to 12 - 14 ft | |
| 5.0 | | | | 3-5 ft Silty Sand: loose, reddish brown, dry | | | | | |
| 10.0 | | | | 5-9 ft Silty Sand: loose, tan, dry | | | | | |
| | | no | | 9-15 ft Broken Caliche: firm, tan, dry | | | | | |
| 15.0 | | 696 odor | | 15-17 ft Caliche: hard, tan, dry | | | | remainder of bore backfilled with drill cuttings | |
| | | no | | | | | | | |
| 20.0 | | 887 odor | | | | | | | |
| | | no | | | | | | | |
| 25.0 | | 732 odor | | | | | | | |
| | | no | | | | | | | |
| 30.0 | | 792 odor | | | | | | | |
| | | no | | | | | | | |
| 35.0 | | 1362 odor | | | | | | | |
| | | no | | | | | | | |
| 40.0 | | 1143 odor | | | | | | | |
| | | | | | | | | | |
| 45.0 | | | | | | | | | |
| | | no | | | | | | | |
| 50.0 | | 1807 odor | | 17-80 ft Silty Sand: loose, tan, dry | | | | | |
| 55.0 | | | | | | | | | |
| | | no | | | | | | | |
| 60.0 | | 2005 odor | | | | | | | |
| 65.0 | | | | | | | | | |
| | | no | | | | | | | |
| 70.0 | | 2579 odor | | | | | | | |
| | | | | | | | | | |
| 75.0 | | | | | | | | | |
| | | no | | | | | | | |
| 80.0 | | 2549 odor | | | | | | | |
| lab = 2559 ppm Cl ⁻ | | | | | | | | | |

CHLORIDE CONCENTRATION CURVE

RICE Operating Company

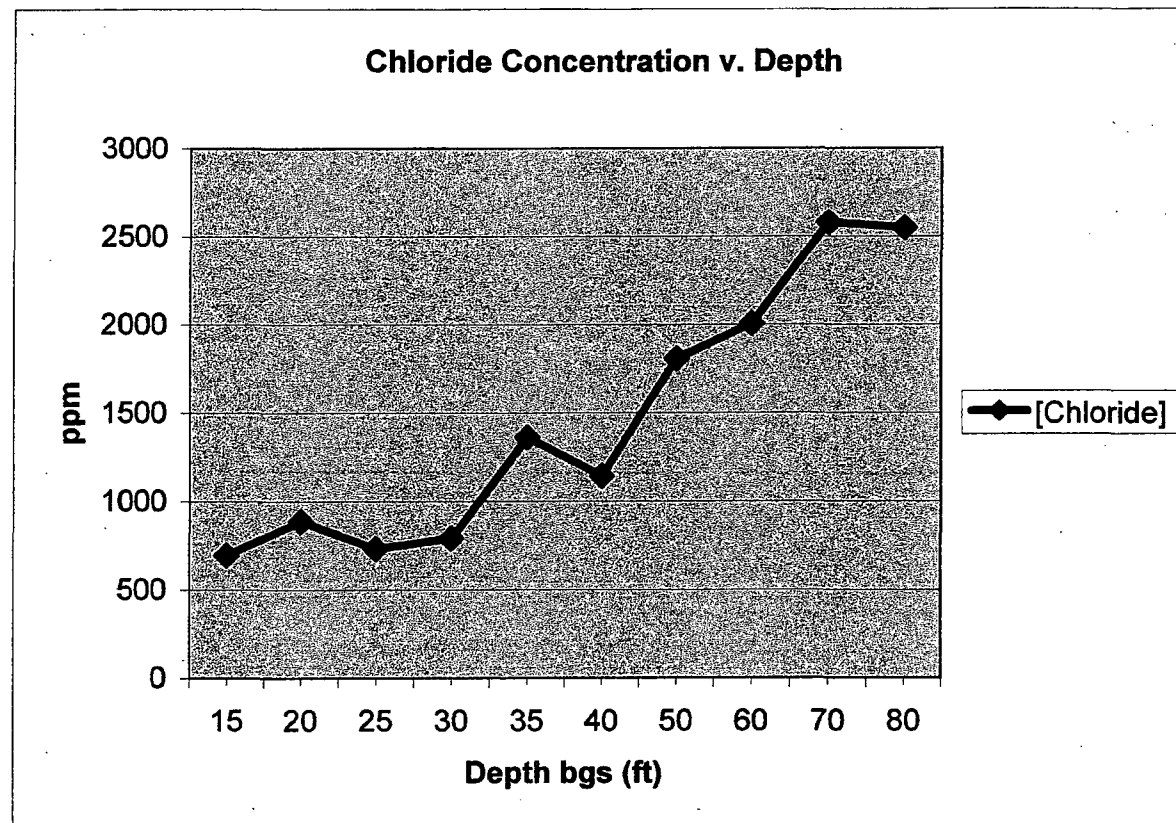
EME jct. N-11

T21S, R36E

SOIL BORE 10 ft West of Center

| Depth bgs (ft) | [Cl ⁻] ppm |
|----------------|------------------------|
| 15 | 696 |
| 20 | 887 |
| 25 | 732 |
| 30 | 792 |
| 35 | 1362 |
| 40 | 1143 |
| 50 | 1807 |
| 60 | 2005 |
| 70 | 2579 |
| 80 | 2549 |

Groundwater = 200 ft





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: KRISTIN FARRIS
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (505) 397-1471

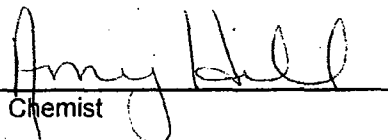
Receiving Date: 01/05/04
Reporting Date: 01/06/04
Project Number: NOT GIVEN
Project Name: N-11
Project Location: EME

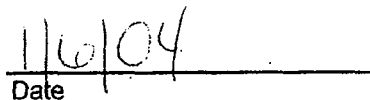
Analysis Date: 01/06/04
Sampling Date: 12/31/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: AH

| LAB NUMBER | SAMPLE ID | Cl ⁻ (mg/Kg) |
|-----------------------------|--------------------|----------------------------|
| H8319-1 | SOIL BORE N-11 86' | 2559 |
| | | |
| | | |
| | | |
| | | |
| | | |
| Quality Control | | 1010 |
| True Value QC | | 1000 |
| % Recovery | | 101 |
| Relative Percent Difference | | 7.0 |

| | |
|--------------------------|------------------------|
| METHOD: Standard Methods | 4500-Cl ⁻ B |
|--------------------------|------------------------|

Note: Analysis performed on a 1:4 w:v aqueous extract.


Chemist


Date

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.

h8319



(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page of

[illegible]

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

10' W (5)

ETGT Initial Report EME N-11

Vertical 14' North West running
W. to E. 10' West from center

| | | |
|-------------------------|-----------------------------|-----------------------------|
| Vert 4' | Vert 5' | Vert 6' |
| ppm 8914 | ppm 12,196 | ppm 13,147 |
| TPH strong odor | TPH strong odor | TPH mild odor |
| Light Brown Sand | Light Brown Sand | Light Brown Sand |
| Vert 7' | Vert 8' | Vert 9' |
| ppm 10,238 | ppm 12470 | ppm 12596 |
| TPH strong odor | TPH mild odor | TPH Little odor |
| Light Brown Sand | celiche Light Brown Sand | celiche Light Brown Sand |
| Vert 10' | Vert 11' | Vert 12' |
| ppm 13,343 | ppm 12,656 | ppm 11606 |
| TPH Little odor | TPH Little odor | TPH Little odor |
| celiche | celiche | celiche |
| Light Brown Sand | Light Brown Sand | Light Brown Sand |
| ppm PID 27.3 | PID 40.9 | PID 37.5 |
| Skip Vert 13' | Vert 14' | |
| | ppm 12,457 | |
| | TPH no odor | |
| | Light Brown Sand | |
| | PID 21.5 | |



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 |

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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.

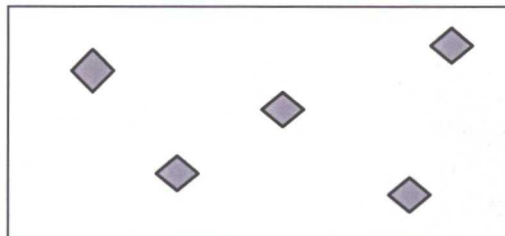
3.0 Sampling Procedure

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.

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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.**

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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.

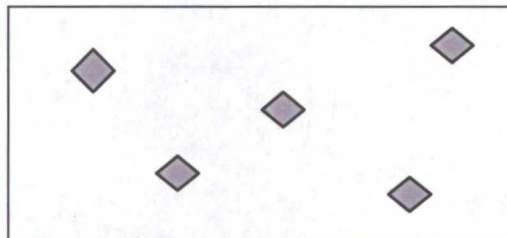
5.0 Sampling Procedure

- 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

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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.