1R - 427-06

REPORTS

DATE:

3-1-10

Texerra 505 N Big Spring, Suite 404 Midland, Texas 79701
Tel: 432-634-9257 E-mail: lpg@texerra.com

March 1st, 2010

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: Remediation Termination Request - Addendum
Rice Operating Company – EME SWD System: Jct. O-19
UL O, Sec 19, T 20S, R 37E
NMOCD Case Number: 1R427-06

Sent via E-mail & U.S. Certified Mail w/ Return Receipt No. 7007 0710 0003 0305 3828

Mr. Hansen:

This letter is in follow-up to the September 18, 2009 NMOCD request that Rice Operating Company (ROC) install and sample an up-gradient and down-gradient monitor well at the above-referenced location. Further information can be found in the ICP Report and Termination Request submitted to NMOCD for this project on behalf of ROC on July 27th, 2009.

The site location is given in Figure 1. On December 15, 2009, ROC installed two monitor wells (up-gradient MW-1 and down-gradient MW-2) as approximately shown in Figure 2. These were sampled on January 4th and 6th, 2010 and analyzed for chloride, sulfate, TDS and BTEX (Table 1, Appendix). BTEX analytes were below laboratory detection limits for samples from both monitor wells. Sulfates were slightly higher in the up-gradient monitor well (314 vs. 282 ppm). Chlorides were slightly higher in the down-gradient monitor well (790 vs. 700 ppm) as were TDS (1,920 vs. 1,870 ppm).

The slight increases in chlorides and TDS in the down-gradient versus the up-gradient monitor wells are consistent with findings presented in the ICP Report referenced above:

- The contributed residual soil chloride concentrations were low (averaging 267 ppm, Figure 2);
- The predicted (modeled) maximum increase in groundwater chloride concentrations was low (<150 ppm, Figure 3 & Appendix).

It is also worth noting that a clay infiltration barrier has been installed at this site, which would inhibit the downward movement of residual chlorides.

This site is located within an area of regionally impaired groundwater quality, as indicated by the chloride values shown in Figure 4.

Taken together, we believe that these results indicate that this location and the surrounding area have pre-existing groundwater quality impairment, and that the effects of past operations of the Jct. O-19 are insignificant. We, therefore, request that this project be granted remediation termination or similar closure status.

Rice Operating Company is the service provider (agent) for the EME Salt Water Disposal (SWD) System and has no ownership of any portion of pipeline, well or facility. The EME SWD System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

We greatly appreciate your consideration of this request.

Sincerely,

L. Peter Galusky, Jr. Ph.D.

Copy: Rice Operating Company

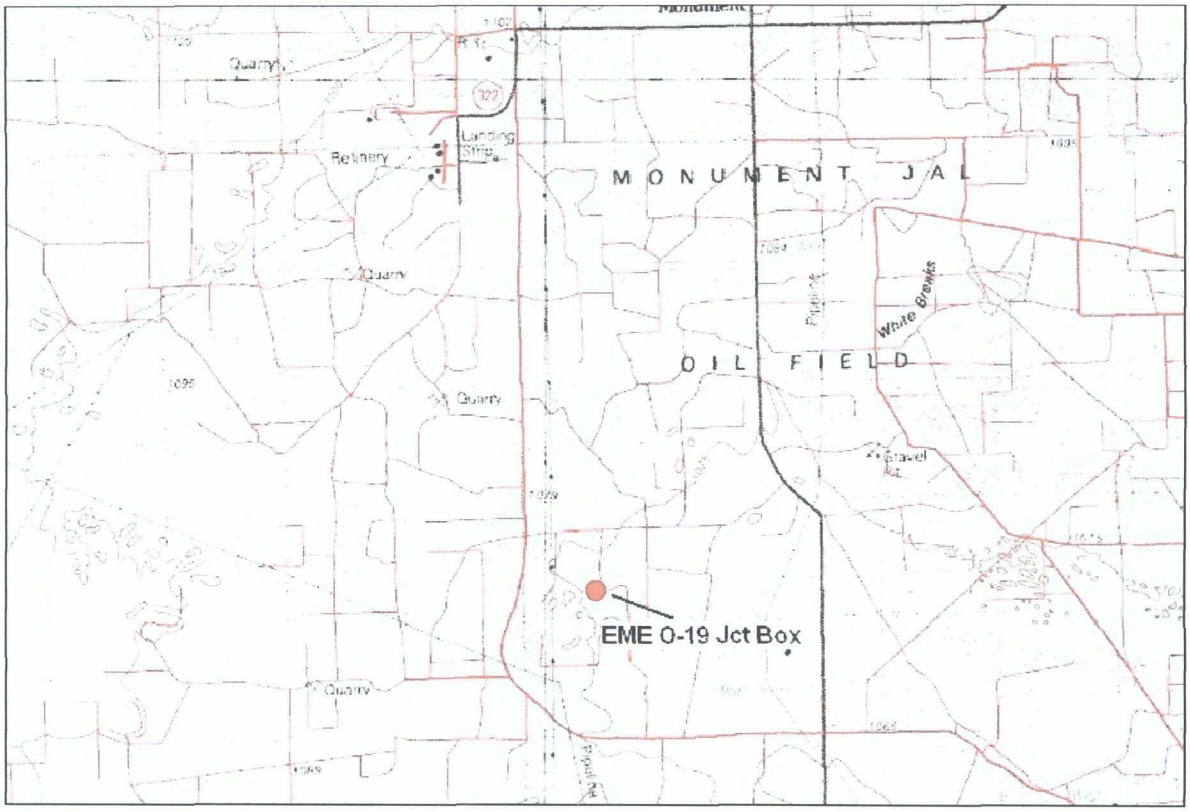


Figure 1 – EME Jct. O-19 location.

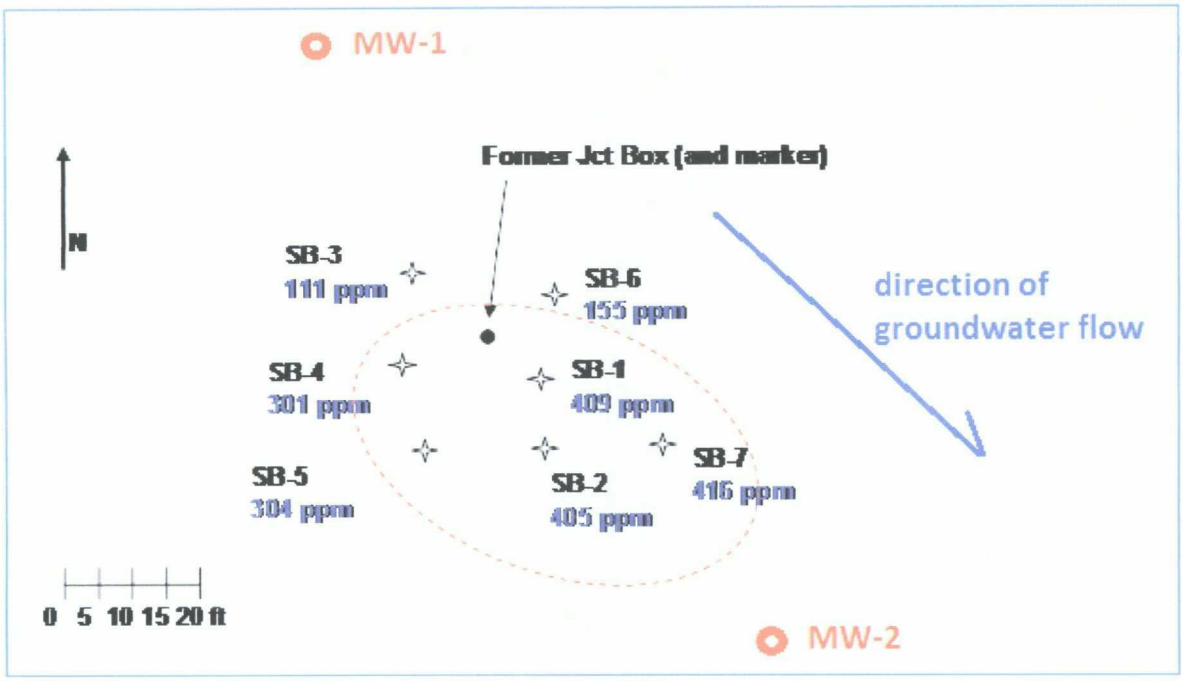


Figure 2 – Approximate locations of monitor wells and soil bores relative to the former junction box. The average field-measured, depth-averaged soil chloride concentrations are given for depths 0 to 20 ft bgs (to the water table capillary fringe). The dashed, red ellipse approximates the area (of 2,120 sq ft) encompassing average soil chloride concentrations greater than 250 ppm. The average soil chloride concentration from the sample points within this affected area is 367 ppm. It assumed that the natural background depth-averaged soil chloride concentration is 100 ppm. We thus calculate the increase in depth-averaged residual soil chlorides due to the former junction box to be 267 ppm (367 ppm – 100 ppm).

	Cl-	SO_4	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes
MW-1 (up)	700	314	1,870	<0.001	<0.001	<0.001	<0.003
MW-2 (down)	790	282	1,920	<0.001	<0.001	<0.001	<0.003

Table 1 – Analyte concentrations (all in ppm) for up-gradient monitor well (MW-1) and down-gradient monitor well (MW-2) sampled on January 4th and 6th, 2010.

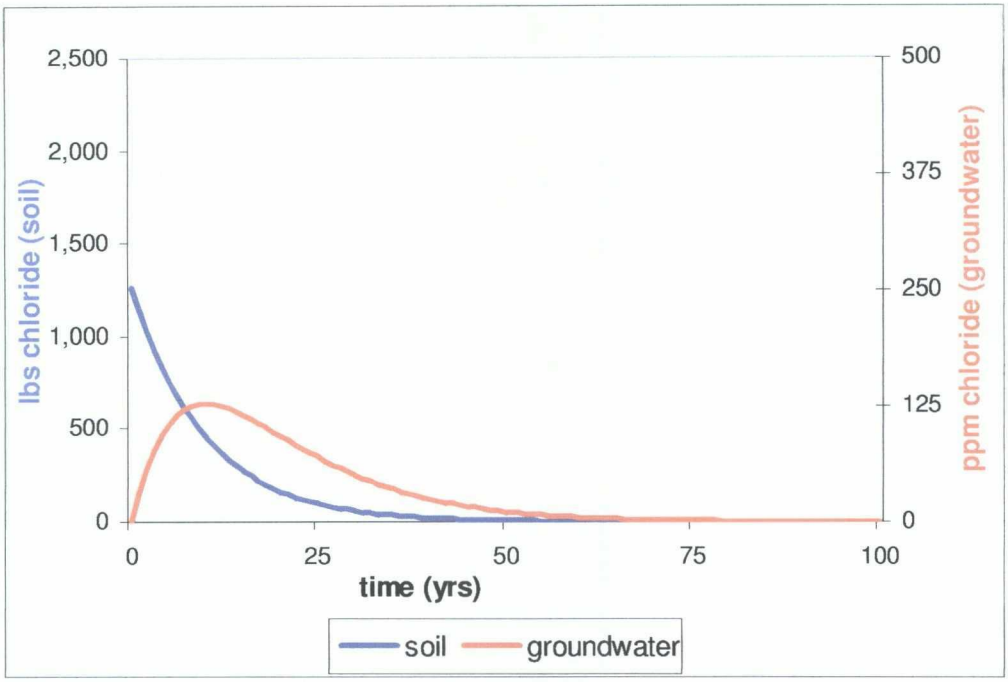


Figure 3[1] – Estimated change in baseline groundwater chloride concentrations (right axes) over time within a hypothetical plume originating at the former junction box and extending down-gradient for 250 ft and having a maximum width of 100 ft. The maximum anticipated elevation in groundwater chlorides in a reference plume of 250 ft in length by 100 ft in width due to the former junction box is less than 150 ppm.

[1] Previously submitted to NMOCD as Figure 8 in ICP Report of 7-27-09.

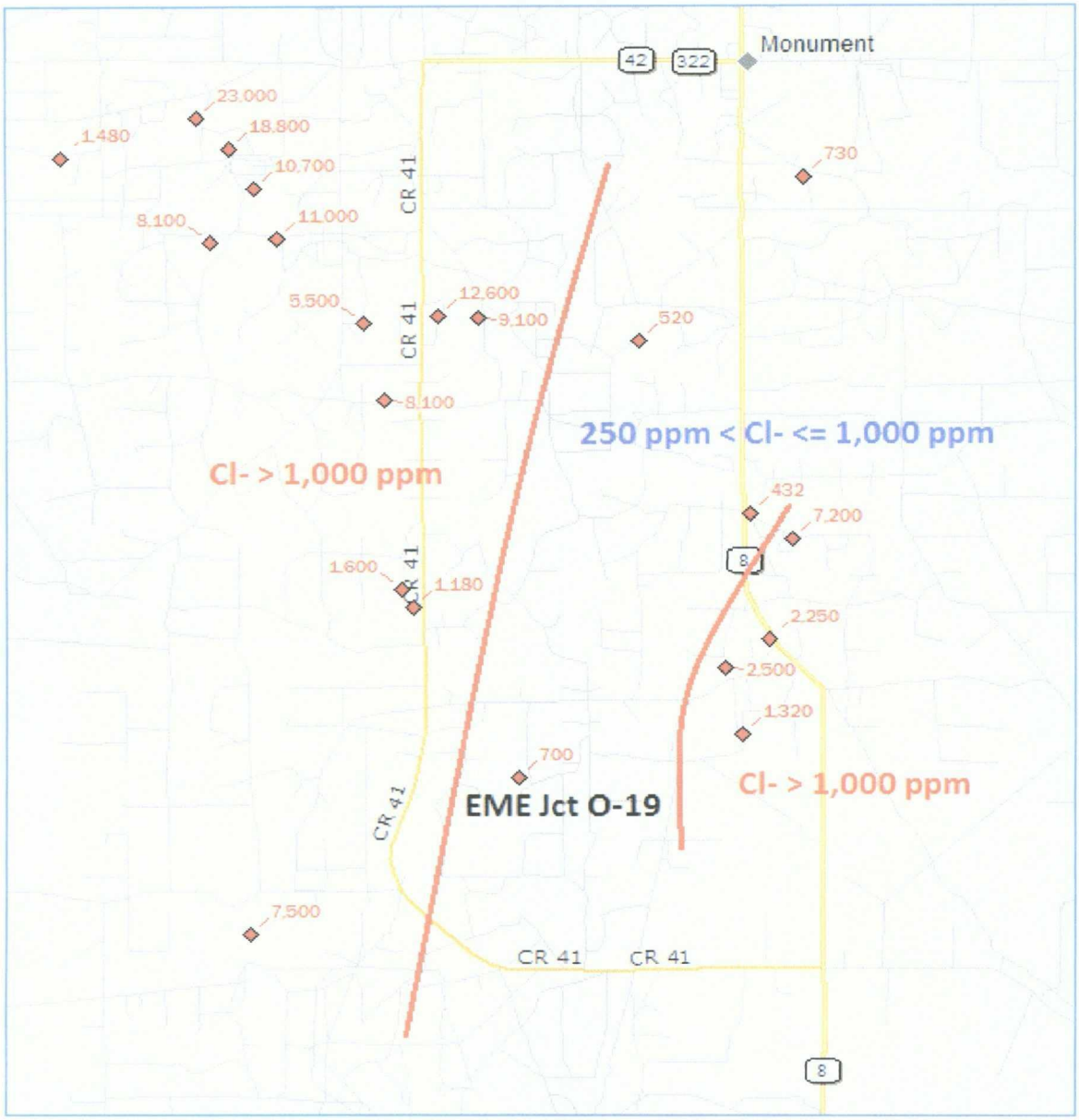


Figure 4 – EME regional groundwater chloride concentrations (in ppm) – 4th quarter, 2009. Groundwater chloride concentrations exceed 1,000 ppm in the western and east-southeastern portions of the area shown. Groundwater chloride concentrations in the middle section of the region are estimated to range between 250 and 1,000 ppm. The location of the EME Jct. O-19 up-gradient monitor well (MW-1) is shown (indicating 700 ppm) in the middle section of the map. Data used in this map were taken from Rice Operating Company files and from NMOCD public domain records.

APPENDIX

A - Groundwater Chloride Model

A-1 - Conceptual Rationale

A-2 - Equations

B - Groundwater Laboratory Analysis Reports

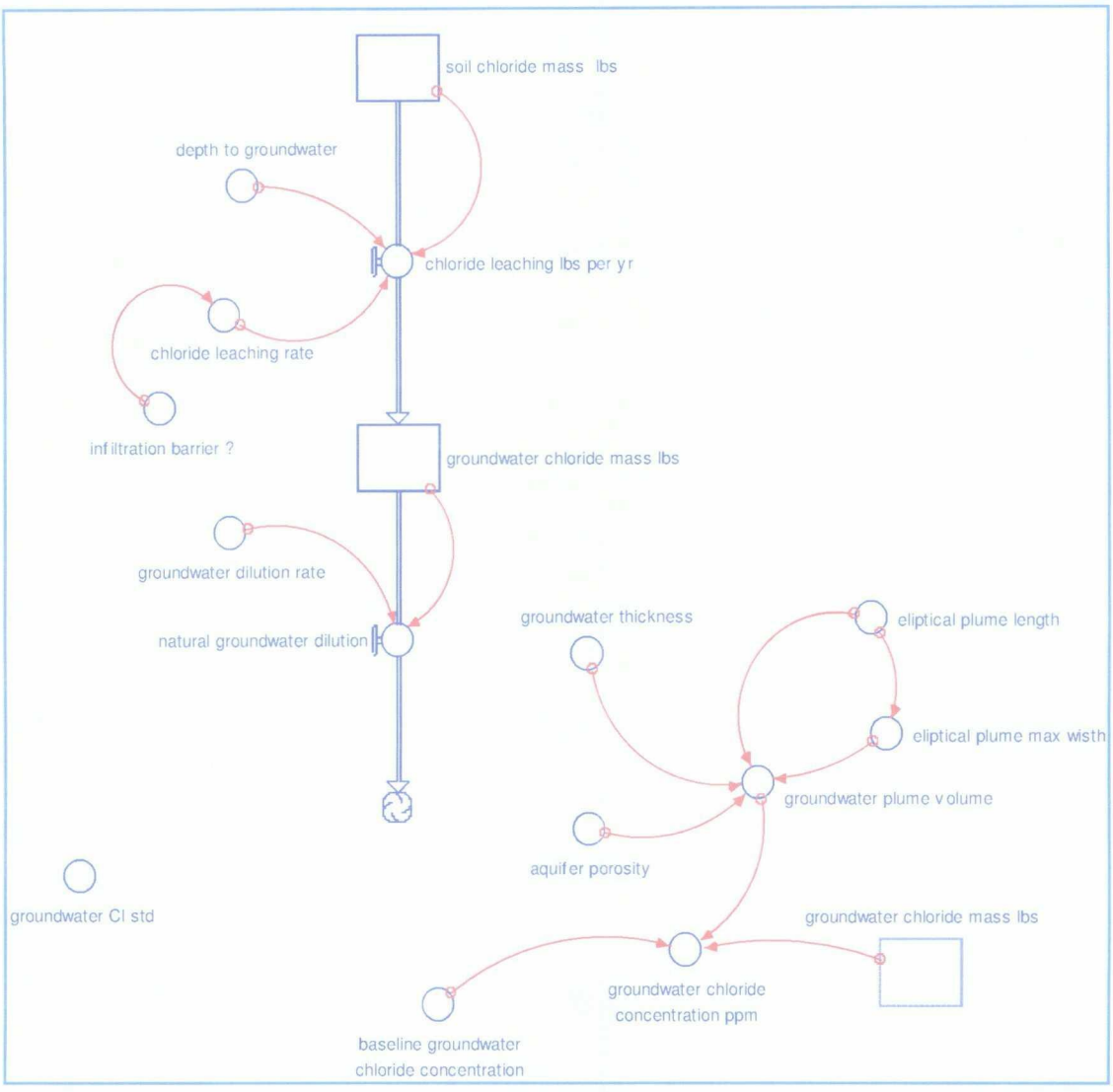
B-1 – Up-gradient monitor well (MW-1) inorganic analyses.

B-2 – Up-gradient monitor well (MW-1) BTEX analyses.

B-3 – Down-gradient monitor well (MW-2) inorganic analyses.

B-4 – Down-gradient monitor well (MW-2) BTEX analyses.

Appendix A-1[2] – Groundwater Chloride Model Conceptual Rationale



[2] Previously submitted to NMOCD as Figure 6 in ICP Report of 7-27-09

Appendix A-2[3] - Groundwater Chloride Model Equations

groundwater_chloride_mass_lbs(t) = groundwater_chloride_mass_lbs(t - dt) + (chloride_leaching_lbs_per_yr - natural_groundwater_dilution) * dt
INIT groundwater_chloride_mass_lbs = 0

INFLOWS:
chloride_leaching_lbs_per_yr = (chloride_leaching_rate/depth_to_groundwater)*soil_chloride_mass__lbs
OUTFLOWS:
natural_groundwater_dilution = groundwater_chloride_mass_lbs*groundwater_dilution_rate
soil_chloride_mass__lbs(t) = soil_chloride_mass__lbs(t - dt) + (-chloride_leaching_lbs_per_yr) * dt
INIT soil_chloride_mass__lbs = 1,258

OUTFLOWS:
chloride_leaching_lbs_per_yr = (chloride_leaching_rate/depth_to_groundwater)*soil_chloride_mass__lbs
aquifer_porosity = 0.3
baseline_groundwater_chloride_concentration = 0
chloride_leaching_rate = IF(infiltration_barrier_?=0) THEN 2.0 ELSE 2.0/20
depth_to_groundwater = 20
eliptical_plume_length = 250
eliptical_plume_max_wisth = eliptical_plume_length/2.5
groundwater_chloride_concentration_ppm = 119962*(groundwater_chloride_mass_lbs)/(groundwater_plume_volume*7.5)+baseline_groundwater_chloride_concentration
groundwater_Cl_std = 250
groundwater_dilution_rate = 0.1
groundwater_plume_volume = (3.14*(eliptical_plume_length/2)*(eliptical_plume_max_wisth/2)*groundwater_thickness)*aquifer_porosity
groundwater_thickness = 10
infiltration_barrier_? = 0

[3] Previously submitted to NMOCD as Figure 7 in ICP Report of 7-27-09

CARDINAL LABORATORIES

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

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

Receiving Date: 01/05/10
Reporting Date: 01/07/10
Project Number: NOT GIVEN
Project Name: EME JUNCTION O-19
Project Location: T20S R37E SEC19 O~ LEA CO., N.M.

Sampling Date: 01/04/10
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: JH
Analyzed By: HM

LAB NO.	SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L)	TDS (mg/L)
Analysis Date:		01/05/10	01/05/10	01/05/10
H18984-1	MONITOR WELL #1	700	314	1,870
Quality Control		500	38.2	NR
True Value QC		500	40.0	NR
% Recovery		100	95.4	NR
Relative Percent Difference		2.0	1.6	3.0
METHOD: Standard Methods, EPA		4500-ClB	375.4	160.1

Not accredited for Chloride, Sulfate and TDS.

Chemist

01/08/10
Date

H18984 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.

Appendix B1 – Up-gradient monitor well (MW-1) inorganic analyses.

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: 01/05/10
Reporting Date: 01/07/10
Project Number: NOT GIVEN
Project Name: EME JUNCTION O-19
Project Location: T20S-R37E-SEC19 O~ LEA CO., NM

Sampling Date: 01/04/10
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: JH
Analyzed By: ZL

LAB NUMBE SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE	01/06/10	01/06/10	01/06/10	01/06/10
H18984-1 MONITOR WELL 1	<0.001	<0.001	<0.001	<0.003
Quality Control	0.044	0.044	0.045	0.139
True Value QC	0.050	0.050	0.050	0.150
% Recovery	88.0	88.0	90.0	92.7
Relative Percent Difference	2.1	2.2	2.1	2.7

METHOD: EPA SW-846 8021B

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

Chemist

Date

Appendix B2 – Up-gradient monitor well (MW-1) BTEX analyses.

CARDINAL LABORATORIES

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

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

Receiving Date: 01/08/10
Reporting Date: 01/13/10
Project Number: NOT GIVEN
Project Name: EME JUNCTION O-19
Project Location: T20S R37E SEC19 O~ LEA CO., N.M.

Sampling Date: 01/06/10
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: AB
Analyzed By: HM

LAB NO.	SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L)	TDS (mg/L)
Analysis Date:		01/11/10	01/11/10	01/10/10
H19015-1	MONITOR WELL #2	790	282	1,920
Quality Control		500	39.6	NR
True Value QC		500	40.0	NR
% Recovery		100	98.9	NR
Relative Percent Difference		2.0	3.6	3.0
METHOD: Standard Methods, EPA		4500-Cl'B	375.4	160.1

Not accredited for Chloride, Sulfate and TDS.

Chemist

01/15/10
Date

H19015 RICE

Appendix B3 – Down-gradient monitor well (MW-2) inorganic analyses.

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: 01/08/10
Reporting Date: 01/11/10
Project Number: NOT GIVEN
Project Name: EME JUNCTION O-19
Project Location: T20S-R37E-SEC19 O~ LEA CO., NM

Sampling Date: 01/06/10
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: AB
Analyzed By: ZL

LAB NUMBE SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE	01/08/10	01/08/10	01/08/10	01/08/10
H19015-1 MONITOR WELL #2	<0.001	<0.001	<0.001	<0.003
Quality Control	0.048	0.046	0.048	0.135
True Value QC	0.050	0.050	0.050	0.150
% Recovery	96.0	92.0	96.0	90.0
Relative Percent Difference	2.0	2.1	2.0	2.6

METHOD: EPA SW-846 8021B

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

Chemist

01/15/10
Date

H19015WB.XLS

Appendix B4 – Down-gradient monitor well (MW-2) BTEX analyses.