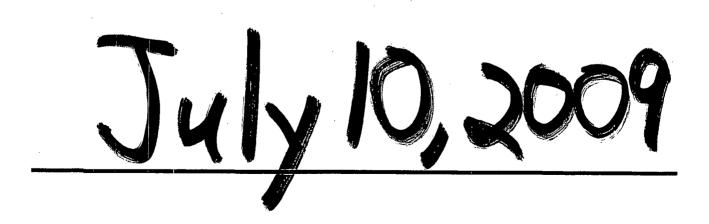
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REPORTS

DATE:



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IIII 20 /1109 Environmental Bureau Oil Conservation Division

CERTIFIED MAIL RETURN RECIEPT NO. 7099 3400 0017 1737 2633

July 10, 2009

Mr. Ed Hansen New Mexico Energy, Minerals, & Natural Resources Oil Conservation Division, Environmental Bureau 1220 S. St. Francis Drive Santa Fe, New Mexico 87504

RE: ICP Report and Termination Request EME Jct. J-1 Site (NMOCD Case No. 1R427-170) T20S-R36E-Section 1, Unit Letter J Lea County, New Mexico

Mr. Hansen:

On behalf of Rice Operating Company (ROC), Trident Environmental (Trident) is submitting this ICP Report and Termination Request for the above-referenced site in accordance with 19.15.29 NMAC. The investigation demonstrated that neither chloride nor hydrocarbons are present in the vadose zone in quantities that represent a threat to groundwater quality; however, regional impact from an unknown offsite source(s) of chlorides is evident.

Background

In accordance with the OCD-approved *Investigation and Characterization Plan* (ICP) dated December 27, 2007 (Attachment A) to investigate potential groundwater concerns at this site near Monument, five soil borings and two monitoring well installations were conducted on June 2, 2008. Groundwater was encountered at approximately 26 feet below ground surface (ft bgs). The ICP includes background information, a site location map, and a site map showing preliminary soil sampling results performed by ROC in August 2004.



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Environmental Bureau Oil Conservation Division

Boring/ Monitoring Well	Depth (ft bgs)	Field Chloride (ppm)
	15	324
B-1	20	394
	25	317
	5	232
	10	621
B-2	1.5	653
	20	392
	25	488
	5	205
	10	475
B-3	15	483
	20	516
·	25	408
	5	568
	10	794
B-4	15	543
	20	450
	25	479
	5	147
	10	276
B-5	15	476
	20	536
	25	780
	5	272
	10	255
MW-1	15	421
	20	561
	25	676
	5	282
	10	724
MW-2	15	497
	20	423
	25	348

Table 1: Soil Boring Sample Results

Vadose Zone Sampling Results

Soil samples in each boring and monitoring well were collected at 5-foot intervals and field tested for chloride concentrations. Several samples were split and submitted to Cardinal Laboratories which showed very consistent agreement. Earlier sampling activities during the removal of the junction box and excavation of a 30 ft wide by 30 ft long by 12 ft deep area in August 2004, did not indicate hydrocarbon impact to the vadose zone in any of the samples as all photoionization detector (PID) readings were 0.1 ppm, and total petroleum hydrocarbons (TPH) concentrations were well below OCD guidelines for samples submitted to the laboratory for analysis by Method 8015M (Attachment A).

Visual inspection of all soil samples during the subsequent soil boring activities in June 2008 indicated no presence of hydrocarbons. Results of soil boring sample activities are summarized in Table 1 and depicted on Figure 1. Copies of the soil boring lithologic logs are included in Attachment B. Laboratory analytical reports for soil sample analyses are included in Attachment C.

Field chloride values averaged less than 457 parts per million (ppm) and did not exceed 794 ppm; therefore, there is no indication of the vadose zone beneath the junction box of being a source of chlorides observed in the groundwater on site.

In addition, installation of a clay layer at 6 ft bgs on September 2, 2004, eliminates any potential threat of constituents of concern beneath the former junction box.

The site was tilled and seeded with a native grass mix in October 2004 and is being monitored for growth.

Simulation Modeling

The AMIGO program, developed for the American Petroleum Institute (API), was used to simulate the potential impact to groundwater due to chloride transport through the vadose zone. The input to the model employed all available field data collected from the site. Model input data that was not site-specific was conservatively estimated based on professional judgment, referenced publications, and interpolation of known data from nearby sites. An additional conservative measure taken was in not inputting the very low-permeability clay barrier installed at 6 ft bgs into the model simulation. The results of the simulation indicate that the chloride mass within the vadose zone will not contribute more than 41 mg/L in the groundwater below the site, if no further corrective actions are taken. Therefore, the AMIGO simulation demonstrates that any residual chlorides in the vadose zone do not pose a threat to groundwater quality. Attachment D includes a list of the specific parameters used in the simulation and the output of the AMIGO program for the EME Jct. J-1 site.

Groundwater Sampling Results

The monitoring wells were developed and sampled pursuant to OCD guidelines. Copies of the monitoring well construction diagrams, lithologic logs, and laboratory reports for soil and groundwater analyses are attached. Four quarters of groundwater sampling and laboratory analysis (Table 2) confirms that chloride and total dissolved solids (TDS) exceed the Water Quality Control Commission (WQCC) standards at the site; however, chloride and TDS concentrations are known to be elevated on a regional scale in this area near Monument as is clearly evidenced by the consistently higher chloride and TDS concentrations in the upgradient monitoring well (MW-2) at this site. A monitoring well was not installed downgradient from monitoring well MW-1 because of the likelihood of an unknown, upgradient, and offsite source of chlorides and TDS. Groundwater gradient maps that include the chloride, TDS, and groundwater elevations for each of the five sampling events are depicted in Figures 2A, 2B, 2C, 2D, and 2E. Copies of all laboratory reports for soil and groundwater analyses are included in Attachment C.

Monitoring Well	Sample Date	Depth to Groundwater (feet BTOC)	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl- benzene (mg/L)	Xylene (mg/L)
	06/24/08	34.10	5,200	13,300	0.072	0.014	< 0.002	< 0.006
	08/15/08	34.31	5,200	12,100	< 0.001	< 0.001	< 0.001	< 0.003
MW-1	11/18/08	34.38	5,350	11,600	< 0.001	< 0.001	< 0.001	< 0.003
	02/17/09	34.39	5,300	11,200	< 0.001	< 0.001	< 0.001	< 0.003
	06/03/09	34.55	5,300	10,700	< 0.001	< 0.001	< 0.001	< 0.003
	06/24/08	33.76	5,500	14,400	0.017	0.004	< 0.002	< 0.006
	08/15/08	33.87	5,900	12,500	< 0.001	< 0.001	< 0.001	< 0.003
MW-2	11/18/08	33.98	5,450	12,200	< 0.001	< 0.001	< 0.001	< 0.003
	02/17/09	33.98	5,500	10,800	< 0.001	< 0.001	< 0.001	< 0.003
	06/03/09	34.13	5,300	12,900	< 0.001	< 0.001	< 0.001	< 0.003
	V	VQCC Standards	250	1000	0.01	0.75	0.75	0.62

Table 2: Summary of Groundwater Monitoring Results

The BTEX analytical data from the initial sampling event conducted on June 24, 2008, are not consistent with any of the investigation activities, because no indications of hydrocarbons were observed while collecting subsurface soil samples in August 2004 or July 2008. Furthermore, four subsequent groundwater sampling events confirm BTEX concentrations are below the laboratory detection limits for each constituent. Laboratory or sampling errors are suspected for the June 2008 BTEX anomaly.

Recommendations

The evidence provided herein demonstrates that operation of the EME J-1 junction box did not contribute to the chlorides observed in groundwater at the site, nor does the vadose zone exhibit any potential future threat to groundwater. Therefore, we conclude that conditions at the site do not meet the criteria that would mandate corrective action under Part 29 of NMAC Rule 19 and respectfully request termination of the regulatory file for this site. Upon NMOCD approval of site termination, ROC will plug the monitoring wells.

ROC is the service provider (agent) for the EME Salt Water Disposal System and has no ownership of any portion of the pipelines, wells, or facilities. The EME System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis. Environmental remediation projects of this magnitude require System Partner AFE approval and work begins as funds are received.

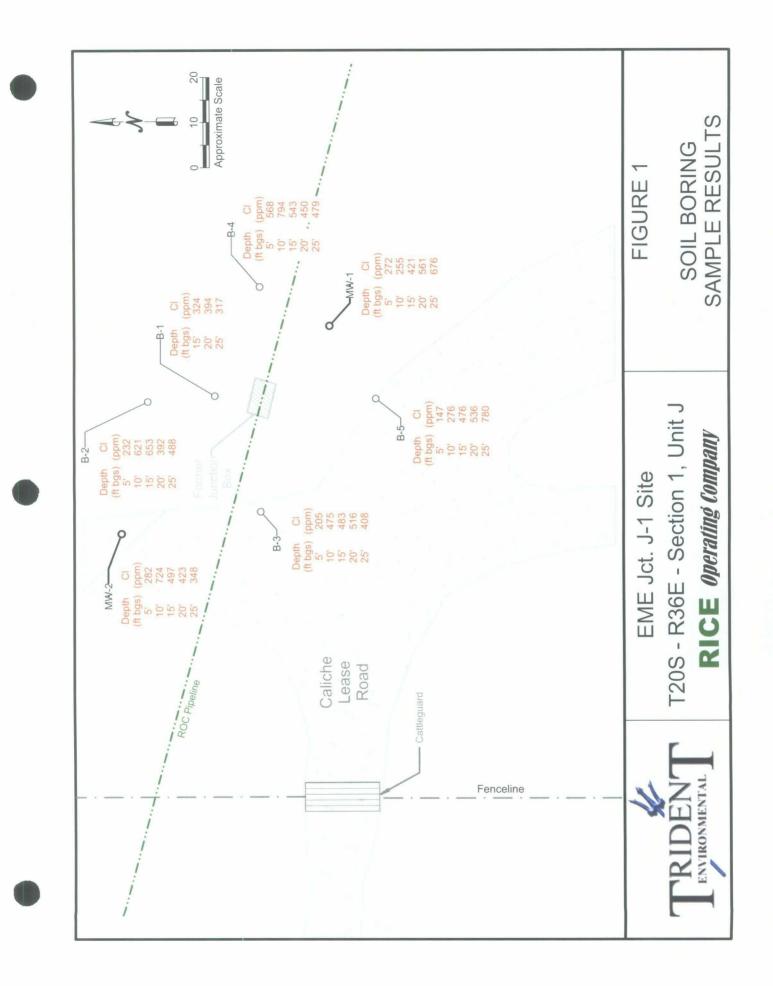
Thank you for your consideration concerning this request for site termination. Please feel free to call me at 432-638-8740 or Hack Conder at 575-393-9174, if you have any questions.

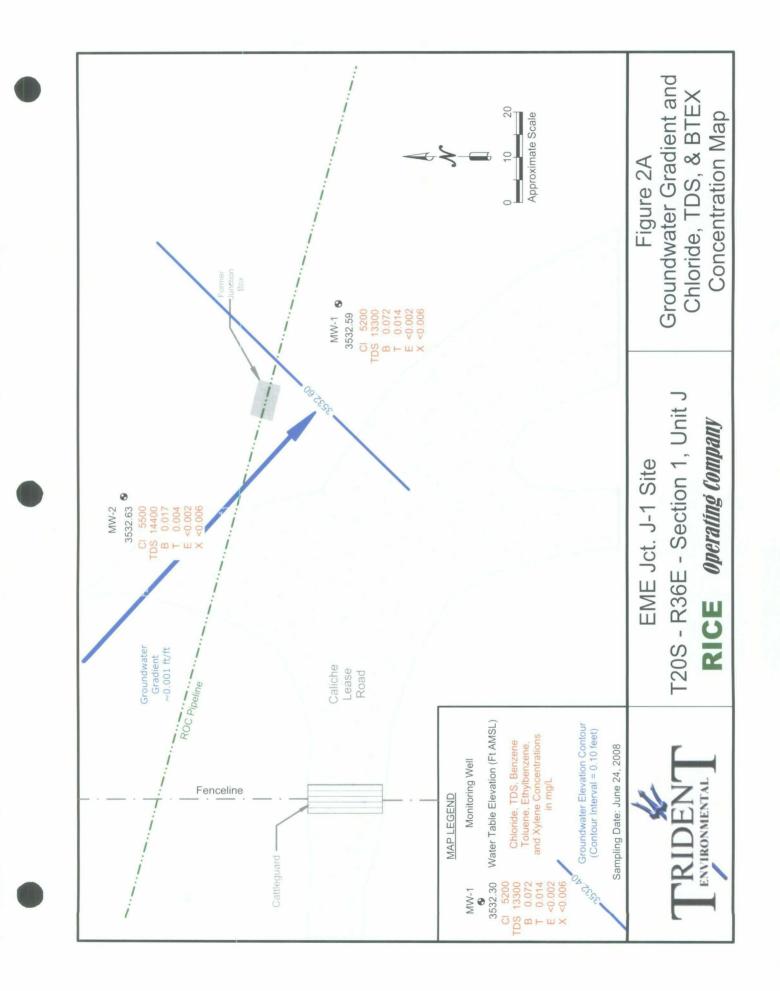
Sincerely,

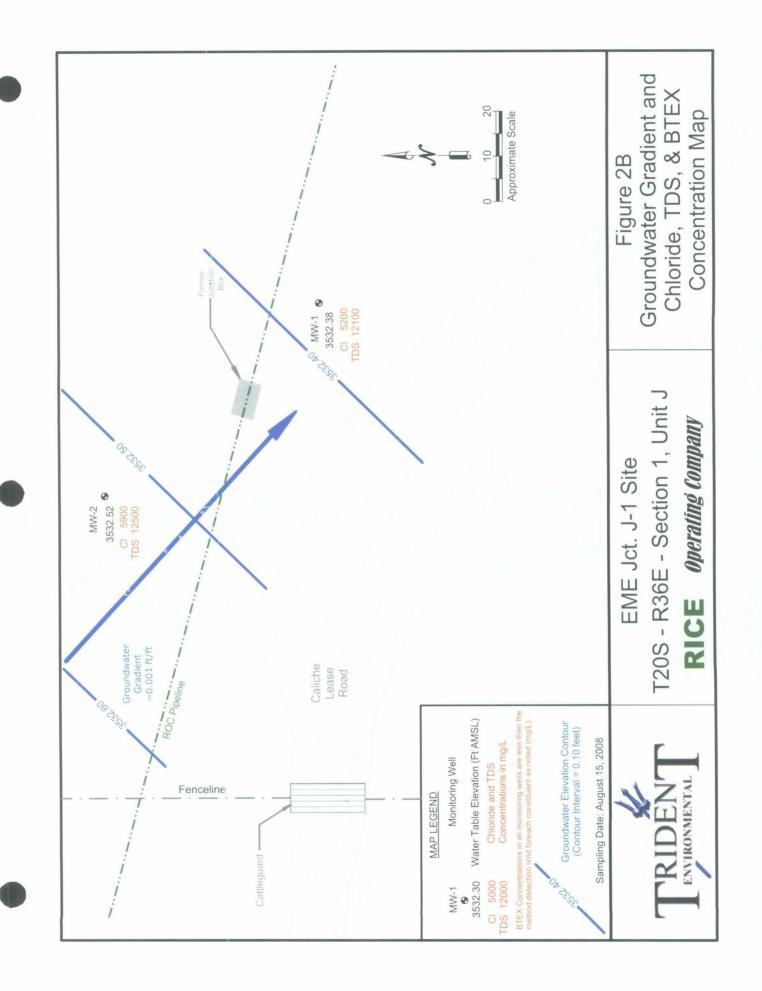
Gilbert J. Van Deventer, REM, PG Trident Environmental - Project Manager

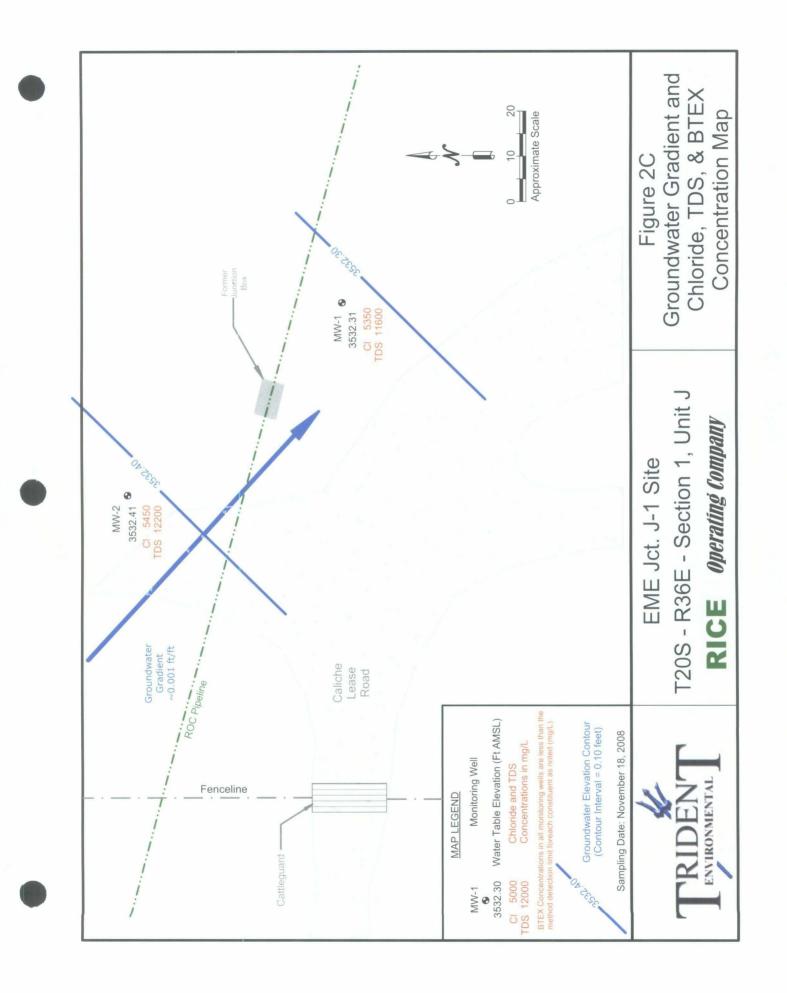
cc: Hack Conder (Rice Operating Co. – Hobbs, NM) Larry "Buddy" Hill (NMOCD District 1 –Hobbs, NM) Brad Jones (NMOCD - Santa Fe, NM)

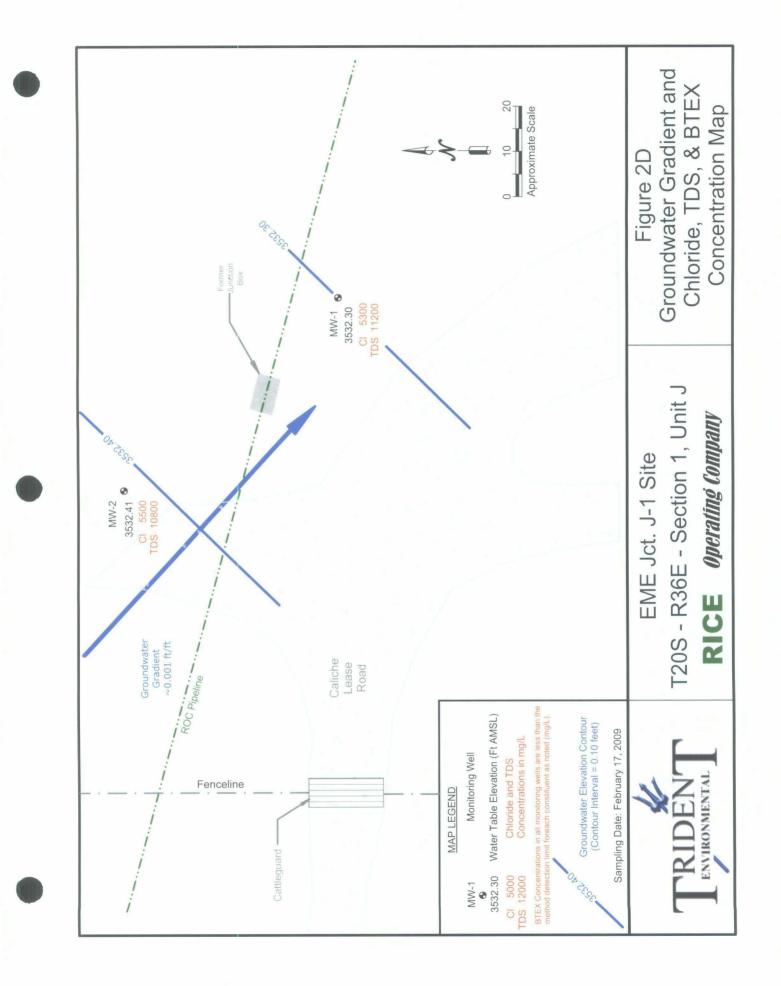
Figures

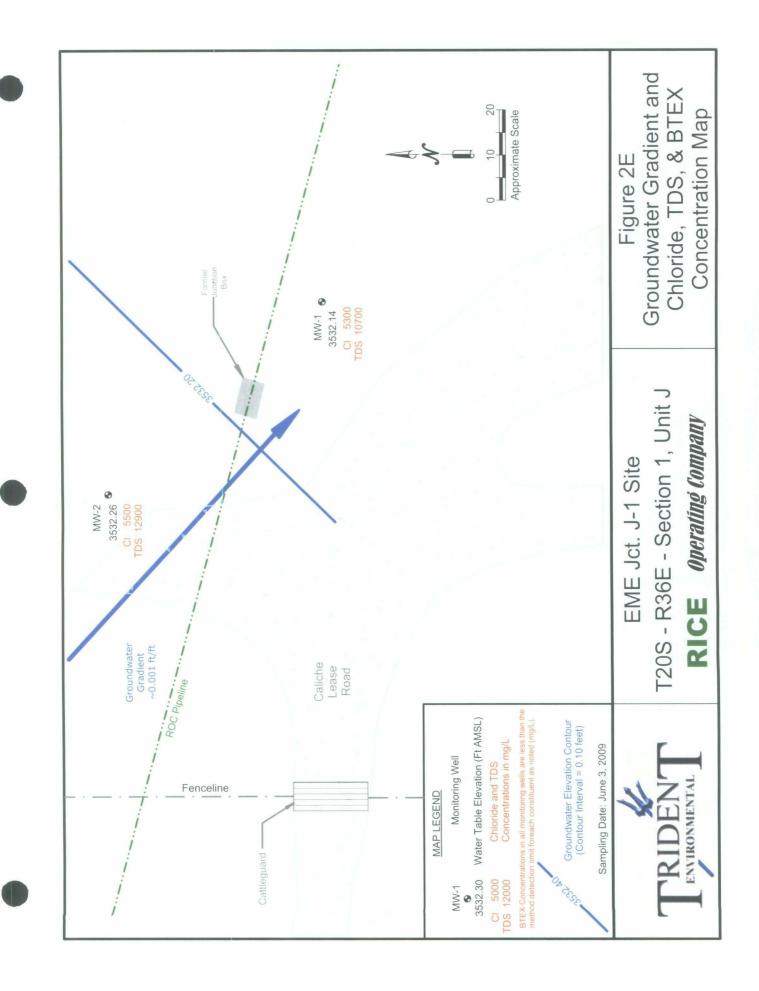












Attachment A

Investigation and Characterization Plan (December 27, 2007)



CERTIFIED MAIL RETURN RECIEPT NO. 7099 3400 0017 1737 2138

December 27, 2007

Mr. Edward Hansen New Mexico Energy, Minerals, & Natural Resources Oil Conservation Division, Environmental Bureau 1220 S. St. Francis Drive Santa Fe, New Mexico 87504

RE: INVESTIGATION & CHARACTERIZATION PLAN EME Jct. J-1 Site T20S-R36E-Section 1, Unit Letter J

Mr. Hansen:

RICE Operating Company (ROC) has retained Trident Environmental to address potential environmental concerns at the above-referenced site. ROC is the service provider (agent) for the Blinebry-Drinkard (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 Partners, who provide all operating capital on a percentage ownership/usage basis. Environmental projects of this magnitude require System Partner AFE approval and work begins as funds are received. In general, project funding is not forthcoming until NMOCD approves the work plan. Therefore, your timely review of this submission is requested.

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

- o protects public health,
- o provides the greatest net environmental benefit,
- o complies with NMOCD Rules, and
- is supported by good science.

Each site shall have three submissions or a combination of:

- 1. This <u>Investigation and Characterization Plan</u> (ICP) is a proposal for data gathering and site characterization and assessment.
- 2. Upon evaluating the data and results from this ICP, a recommended remedy will be submitted in a <u>Corrective Action Plan</u> (CAP).
- 3. Finally, after implementing the remedy, a <u>closure report</u> with final documentation will be submitted.

BACKGROUND

The Jct. J-1 site is located at township 20 south, range 36 east, section 1, unit letter J approximately three miles southwest of Monument, New Mexico as shown on the attached Site Topographic Map (Figure 1). The site is situated on state land with grazing rights allotted to James R. Byrd. Land in the site area is primarily utilized for natural oil and gas production and pasture land for cattle grazing.

Groundwater in the site area occurs within the High Plains aquifer under water table (unconfined) conditions (Hart and McAda, 1985) at a depth of approximately 30-35 feet bgs. The saturated portion of the aquifer is estimated to be 10-15 ft thick (Nicholson and Clebsch, 1961).

PREVIOUS WORK

In March 2004, ROC initiated the removal of the J-1 junction box as part of the Junction Box Upgrade Program. The J-1 junction box was permanently removed and 3-inch polyethylene line was installed inside the existing 8-inch A/C pipeline to maintain the operation of the saltwater disposal system.

Initial soil sampling activities at the former junction box location were conducted between August 16 and 19, 2004 by trenching with a backhoe. During the course of excavating an area 30 feet wide by 30 feet long to a depth of 12 feet below ground surface (bgs), soil samples were collected at regular intervals directly beneath the former junction box, at a point 5 feet north of the junction box, and at 15 feet from the junction box in each of four directions as shown in Figure 2. On August 23, 2004, composite soil samples were recovered from the floor and walls of the excavation, and from blended soil to be used for backfill, for laboratory analysis. All soil samples were recorded using a Mini-RAE Model 76 photoionization detector (PID). There was no indication of hydrocarbon impact to the vadose zone in any of the samples as all PID readings were 0.1 ppm, and total petroleum hydrocarbons (TPH) concentrations were well below NMOCD guidelines for samples submitted to the laboratory for analysis by Method 8015M. Although the highest chloride concentration measured only 1,208 parts per million (ppm), chloride levels did not conclusively decline vertically or horizontally throughout the 30 x 30 x 12-ft-deep excavation.

Following characterization activities, the excavated soil was blended on site and backfilled to a depth of 6 feet bgs. A 1-foot thick compacted clay layer was installed to prevent potential downward migration of any residual constituents of concern and the remaining blended soils were placed above the clay. An identification plate was placed on the surface to mark the location of the former junction box and the disturbed surface was seeded with a blend of native vegetation on October 4, 2004.

Notice of potential groundwater impact was sent to the NMOCD October 15, 2004. A Junction Box Disclosure Report (attached) documenting the procedures described above was submitted to the OCD with all the 2004 annual junction box reports.

RECOMMENDATION FOR FURTHER ACTIONS

The replacement of the junction box has minimized the threat of additional impact from the vadose zone, however further investigation and characterization of the site is necessary to delineate the vadose zone below twelve feet and evaluate the potential for groundwater impact. The additional assessment is also necessary to assist ROC in selecting the appropriate soil and/or groundwater remedy.







EME Jct. J-1 Site T20S-R36E-Section 1, Unit Letter J December 27, 2007

Task 1 Evaluate Concentrations of Constituents of Concern in the Vadose Zone

Subsurface soil samples for characterization of the lateral and vertical extent of chloride-impacted soil will be collected at a maximum of 5-foot intervals using a drilling rig in accordance with the procedures explained in QP-02, QP-03, and QP-07 (attached). Soil samples will be field-tested for chloride content using the titration method. A concentration of 1,000 ppm chloride will be used to delineate the extent of impact to the vadose zone. Preliminary sampling results indicate no hydrocarbon impact to the vadose zone, however if further sampling activities exhibit evidence of hydrocarbon-impact, samples will also be collected for headspace analysis using an organic vapor meter (OVM), which will be calibrated to assume a benzene response factor. Select samples with OVM headspace readings above 100 ppm, if present, will also be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8021B.

Task 2 Evaluate Concentrations of Constituents of Concern in the Groundwater

If we detect evidence of groundwater impact, one monitoring well will be placed in the area with the greatest potential for groundwater impact, in accordance with EPA and industry standards and developed by bailing with a rig or hand bailer, or pumping with a submersible pump to remove fine-grained sediment disturbed during drilling and to ensure collection of representative samples. If data suggest ground water impairment, two quarters of ground water monitoring will be conducted to confirm any initial result. If groundwater impact is confirmed, additional monitoring wells may be installed to determine the local groundwater gradient direction and lateral extent of groundwater impact. Groundwater samples will be collected in accordance with procedures explained in QP-04 and QP-05 (attached), and analyzed for BTEX, major ions, and total dissolved solids (TDS).

The information gathered from tasks 1 and 2 will be evaluated and utilized to design a soil and/or ground water remedy if needed. The remedy that offers the greatest environmental benefit while causing the least environmental impairment will be selected. Such recommendations and findings will be presented to NMOCD in a subsequent Corrective Action Plan (CAP). When evaluating any proposed remedy or investigative work, ROC will confirm that there is a reasonable relationship between the benefits created by the proposed remedy or assessment and the economic and social costs.

We appreciate the opportunity to work with you on this project. Please feel free to call me at 432-638-8740 or Kristin Pope at 505-393-9174, if you have any questions.

Sincerely,

All Call of Art. But St.

Gilbert J. Van Deventer, REM, PG Trident Environmental - Project Manager

cc: CDH, JSC, KFP, file

enclosures: site location and sampling maps, disclosure report, photos, and sampling procedures

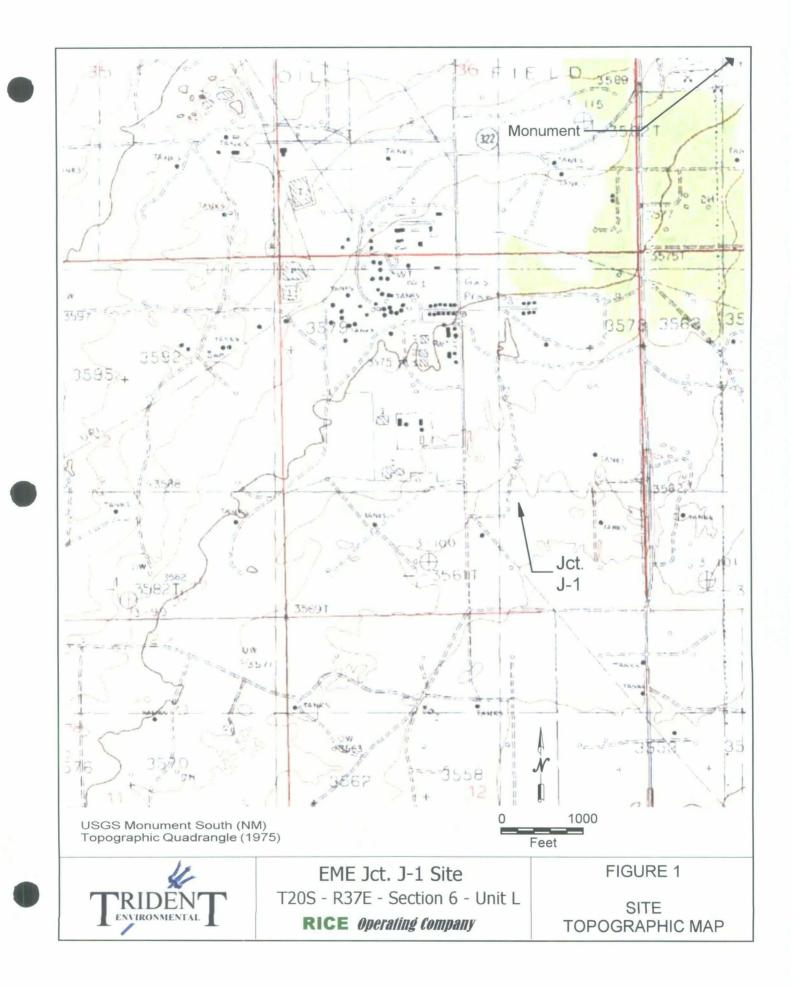


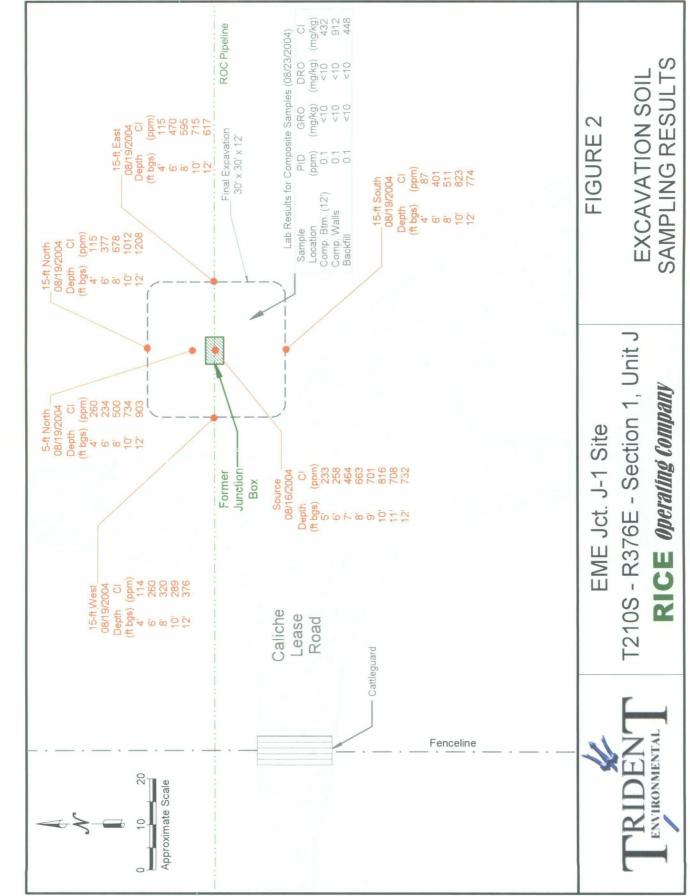
Site Location Map

And

Site Map of Soil Sampling Results









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Junction Box Disclosure Report



RICE OPERATING COMPANY JUNCTION BOX DISCLOSURE* REPORT

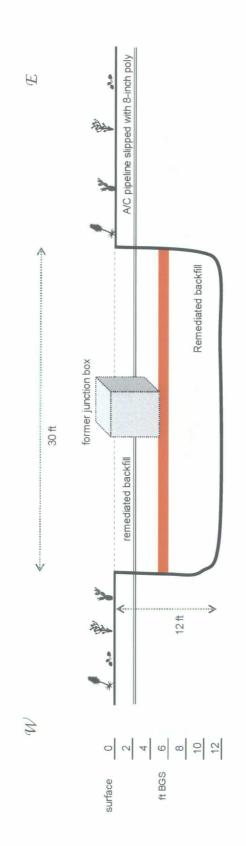
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	I HEREBY CE	ERTIFY THAT THE INFORM	ATION ABOVE IS TRUE A	ND COMPLETE TO THE BEST OF MY	
		KN	IOWLEDGE AND BELIEF.		
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	SITE SUPERVISOR	Joe Gatts SIGNATURE	- fr fat	COMPANY RICE Operating Company	
ĥ				· / · · · · · · · · · · · · · · · · · ·	
)	REPORT ASSEMBLED BY	Kristin Farris Pope	SIGNATURE Kni	tin James Pope	
	DATE	10/15/2004	TITLE	Project Scientist	

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

EME jct. J-1 30 x 30 x 12 ft

Excavation Cross-Section













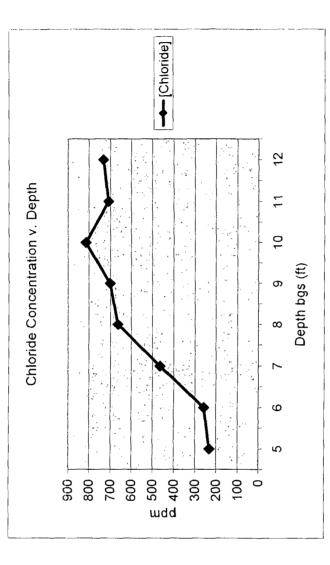
RICE Cperating Company

EME jct. J-1 T20S, R36E

Vertical Delineation at Source

_	_		_		_			
[CT] ppm	233	258	464	663	102	816	804	732
Depth bgs (ft)	Ş	9	7	8	6	10	11	12

Groundwater = 40 ft





RICE Cpenting Company

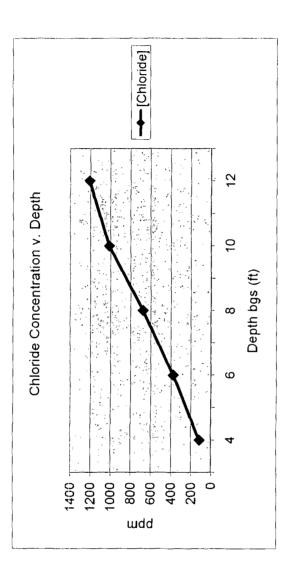


EME jct. J-1 T205, R36E

15 fi North cf junction

[CI] ppm	115	377	678	1012	1208	
Depth bgs (ft)	4	9	8	10	12	

Groundwater = 40 ft





EME jct. J-1



unit 'J', Sec. 1, T20S, R36E





undisturbed junction box





8/23/2004

final excavation



10:4-2004

tilling seed into soil

10/4/2004

seeding disturbed surface: ID plate in foreground

page 2

1



PHONE (505) 393 2826

ANALYTICAL RESULTS FOR RICE OPERATING ATTN: ROY RASCON 122 W. TAYLOR HOBBS, NM 88240 FAX TO:



Receiving Date: 08/26/04 Reporting Date: 08/30/04 Project Number: NOT GIVEN Project Name: EME J-1 Project Location: NOT GIVEN

% Recovery

Sampling Date: 08/23/04 Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: GP Analyzed By: BC/AH

	ER SAMPLE ID	GRO (C ₆ -C ₁₀) (mg/Kg)	DRO (>C ₁₀ -C ₂₈) (mg/Kg)	CI* (mg/Kg)
ANALYSIS	DATE	08/28/04	08/28/04	08/27/04
H9080-1	BOTTOM COMP @ 12'BGS	<10.0	<10.0	912
H9080-2	4 WALL COMP.	<10.0	<10.0	432
H9080-3	REMD. BACKFILL	<10.0	<10.0	448
Quality Con	trol	791	780	1010
True Value	QC	800	800	1000

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

98.9

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Relative Percent Difference

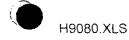
Date

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101

6.8



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 whatsuever shall be deemed waived unless made in writing and received by Cardinal within thiny (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.

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

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HOBBS, NEW MEXICO 88240 PHONE: (505) 393-9174 FAX: (505) 397-1471 VOC FIELD TEST REPORT FORM

MINI RAE PLUS CLASSIC PHOTOIONIZATION GAS DETECTOR

MODEL NO: PGM 7615 CALIBRATION GAS GAS COMPOSITION: ISOBUTYLENE AIR LOT NO: <u>02-22-30</u> EXP. DATE: <u>11/20(04</u> METER READING ACCURACY: <u>00.</u>

SERIAL NO: 104412

100 PPM

BALANCE FILL DATE: 5/20/03 ACCURACY: + 02 270

SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE
EME	J-1	J	(

SAMPLE	PID RESULT	SAMPLE	PLD RESULT
15' North 4'	0.1	15 Struth 10'	0.1
15 North 6	0.1	1550mth 12'	0.1
15 Wouth 8	0,1	15'West 4'	
15 North 10	0.1	IT want 6'	0.1
15 Wouth 12'	0.1	15 West 8'	0.(
15'East 4'	0.1	15 West 10'	0.1
15' East 6'	0.1	15'West 12'	0.1
15'East 8'	0.1		
15 Fast 10'	0.1		
15'East 12'	01		
15' Sutth 4'	0,1		a - landeren et fotalder allfölder". Här förall det fot ander ende det att att att
15' South 6'	011		a na a manual and a sub- na a fil a stange star part a sub- sub-
15' South 8'	0.1		

Economy for the large calibrates the above instrument in accordance to the manufacture operation manual.

Figurature

новвз, NEW MEXICO 88240 Phone: (505) 393-9174 FAX: (505) 397-1471 **VOC FIELD TEST REPORT FORM**

MINI RAE PLUS CLASSIC PHOTOIONIZATION GAS DETECTOR

MODEL NO: PGM 7618 CALIBRATION GAS GAS COMPOSITION: ISOBUTYLENE AIR LOT NO: <u>02-22-30</u> EXP. DATE: <u>II/20(04</u> METER READING ACCURACY: <u>60.1</u> SERIAL MO: 104412

100 PPM BALANCE FILL DATE: 5/20/03 ACCURACY: + 5276

SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE
EME	J-1	J	(

SAMPLE	PID RESULT	SAMPLE	PLD RESULT
15' North 4'	0.1	15' Struth 10'	0.1
15 North 6	0.1	1550mth 12'	0.1
15 Worth 8	0,1	15' West 4'	
15 North 10	0.1	11 West 6'	0.1
15 Wouth 12	D.1	15 West 8'	0.1
15 East 4'	0.1	15 West 10'	0.1
15' Fact 6'	0.1	(5' West 12'	011
15'East 8'	0.(
15 Fast 10'	0.1		
15 East 12'	0.1		
15' South 4'	0.1		
15' South 6'	0.1		
15' South 8'	0.1		

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

Fignature

новья, new Mexico 83240 Phone: (505) 393-9174 fax: (505) 397-1471 **VOC FIELD TEST REPORT FORM**

MINERAE PLUS CLASSIC PHOTOJONIZATION GAS DETECTOR

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MODEL NO: PGM 761S CALIBRATION GAS GAS COMPOSITION: ISOBUTYLENE AIR LOT NO: <u>02-22-30</u> EXP. DATE: <u>IL/20/09</u> METER READING ACCURACY: <u>100. (</u>

SERIAL NO: 104412

100 PPM BALANCE FILL DATE: 5/20/05 ACCURACY: 4 or - 290

SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE
EME	5-(J	1		

SAMPLE	PID RESULT	SAMPLE	PID RESULT
Source 5	0.1		
Source 6	0.1		
Source 7'	0.1		
Source 8	0.1		
Source 9'	0.1		
Source 6	0.1		
Source 11	0.1		a and a fact the second damage and and and an a set of the second and a second damage of the second se
Source 12'	0.1	المان من المراجع والمراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع الم	
5 North 4	0,1		
5 North 6'	0,1		
5 Worth 8'	0.)		
5 North 10	Dij	anning a grand and we call the set of the device of the set of the	
5 North 12'	0.1		

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

Yn Fats Vienauire

8/16/04 Dare

FNCINESS SUINA)	LABORATORY TE PETTIGREW & ASS 1110 N. GRIME HOBBS, NM 88 (505) 393-982	SOCIATES, P.A. ES 240	debra P. Hicks William M. Hicks	
To:	Rice Operating Altn: Carolyn Haynes 122 W. Taylor		Material:	Red Clay	
Project:	Hobbs, NM 88240 EME JCT J-1444E		Test Method:	ASTM: D 2922	
Date of Test:	August 24, 2004		Depth:	2' Below Bottom of	Pipe
			Dry Density		
Test No.		Location	% Maximum	% Moisture	Depth
SG-1	Pit - 20' \	N. & 10' N. of SE Corner	104.4	16.7	

..

Control Densit	ry: 106.2 ASTM: D 698	Optimum Moisture: 17.3
Required Com	paction: 95%	
Lab No.:	04 10114-10115	PETTIGREW & ASSOCIATES
opies To:	Rice	BY:

RICE *Operating Company* Quality Procedures

QP-02: Procedure for Obtaining Soil Samples for Transportation to a LabQP-03: Sampling and Testing Protocol for Chloride TitrationQP-04: Development of Cased Water-Monitoring WellsQP-05: Procedure for Obtaining Water Samples (Cased Wells)QP-07: Sampling and Testing Protocol for VOC in Soil





Rice Operating Company

Quality	Procedure
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Procedure for Obtaining	
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. The shipment should include a Certificate of Compliance from the manufacturer of the collection bottle or vial and a Serial Number for the lot of containers. Retain this Certificate for future documentation purposes.
- 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 latex gloves with each sample to help minimize any cross-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 Operating Company

QUALITY PROCEDURE

Sampling and Testing Protocol Chloride Titration Using .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 crosscontamination 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 10 grams of reverse osmosis water to the soil sample and shake for 20 seconds.
- 4.3 Allow the sample to set for a period of 5 minutes or until the separation of soil and water.
- 4.4 Carefully pour the free liquid extract from the sample through a paper filter into a clean plastic cup if necessary.



- 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 (K2CrO4) to mixture.
- 5.3 If the sample contains any sulfides (hydrogen or iron sulfides are common to oilfield soil samples) add 2-3 drops of hydrogen peroxide (H₂O₂) to mixture.
- 5.4 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.
- 5.5 Record the ml of silver nitrate used.
- 6.0 Calculation

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

<u>282 X 35,450 X ml AgNO₂</u>	Х	grams of water in mixture
ml water extract		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.

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QP-04

Rice Operating Company

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 or a steel engineer's tape and water sensitive paste.
- 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 crosscontamination. 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 Operating Company 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 Operating Company

Quality Procedure

Procedure for Obtaining Water Samples (Cased Wells) Using One Liter Bailer

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. The shipment should include a Certificate of Compliance from the manufacturer of the collection bottle or vial and a Serial Number for the lot of containers. Retain this Certificate for future documentation purposes.
- 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	Sample	Sample	Cap	Preservative	Maximum
to be	Container	Container	Requirements		Hold Time
Analyzed	Size	Description			
BTEX	40 ml	VOA Container	Teflon Lined	HCI	7 days
TPH	l liter	clear glass	Teflon Lined	HCI	28 days
PAH	l liter	amber glass	Teflon Lined	Ice	7 days
Cation/Anion	1 liter	clear glass	Teflon Lined	None	48 Hrs
Metals	1 liter	HD polyethylene	Any Plastic	Ice/HNO3	28 Days
TDS	300 ml	clear glass	Any Plastic	Ice	7 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, purge a minimum of three well volumes. Place the water in storage container for transport to a ROC disposal facility.
- 5.3 Take care to insure that the bailing device and string do not become cross-contaminated. A clean pair of rubber 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. The collection jar should be filled to the brim. Once the jar is sealed, turn the jar over to detect any bubbles that may be present. Add additional water to remove all bubbles from the sample container.
- 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 gai	>10 gal

Rice Operating Company

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, $(59-77^{\circ}F)$. 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 an Environmental Instruments 13471 OVM / Datalogger or a similar PID-type instrument. (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 conduct BTEX Speciation in accordance with QP-02 and QP-06. 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.

Gil Van Deventer

 "Gil Van Deventer" <gilbertvandeventer@suddenlink.net>

 "Hansen, Edward J., EMNRD" <edwardj.hansen@state.nm.us>

 "Scott Curtis" <scurtis@riceswd.com>; "Wayne Price" <wayne.price@state.nm.us>; "Kristin Pope"

 <kpope@riceswd.com>

 Sent:
 Thursday, December 27, 2007 10:57 AM

 Attach:
 J-1 ICP_sans_Discl-Rpt_QP.pdf

 Subject:
 Investigation & Characterization Plan - EME Jct. J-1 Site

Attention: Edward Hansen, New Mexico Oil Conservation Division - Environmental Bureau

Subject: Investigation & Characterization Plan

Site Name: EME Jct. J-1 Site

Site Location: T20S-R36E-Section 1, Unit Letter J

Site Agent: RICE Operating Company

Hello Edward:

Trident Environmental is pleased to submit the attached abbreviated version of the *Investigation & Characterization Plan* (ICP) for the above-referenced site. One complete hard copy and one copy on compact disk is being sent via USPS Certified Mail (# 7099 3400 0017 1737 2138) today.

Thank you for your consideration of this ICP. If you have any questions, please contact me at 432-638-8740, or Kristin Pope at , 505-393-9174.

Sincerely, Gilbert J. Van Deventer, PG, REM Trident Environmental www.trident-environmental.com Work/Mobile: 432-638-8740 Fax: 413-403-9968 Home: 432-682-0727

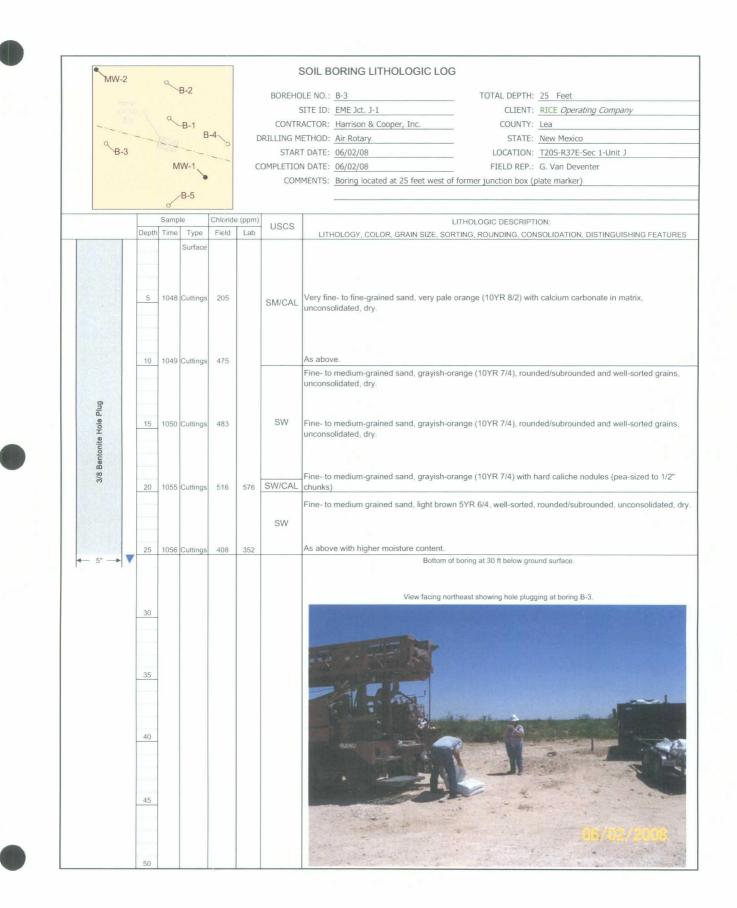


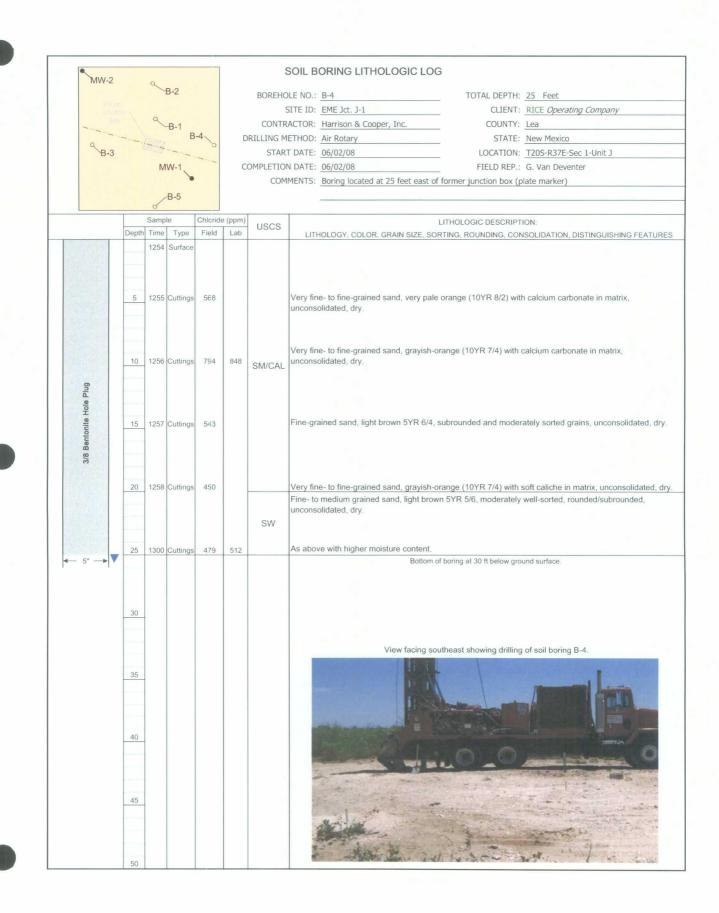
Attachment B

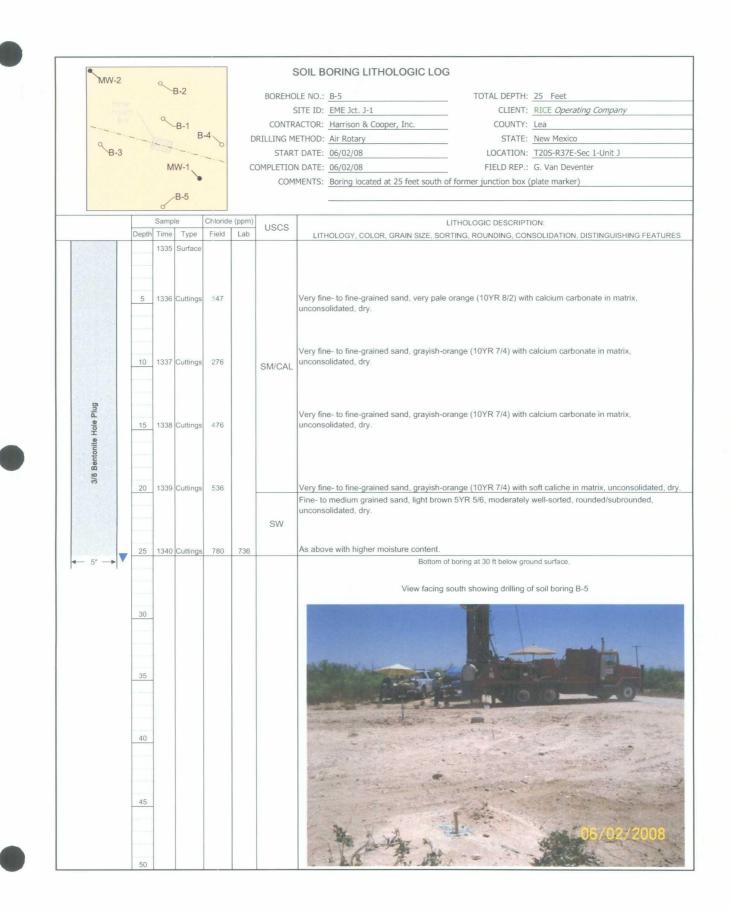
Lithologic Logs And Monitoring Well Construction Diagrams

MW-2						S	SOIL BORING LITHOLOGIC LOG
10100-2		a	B-2			BOREHO	DLE NO.: B-1 TOTAL DEPTH: 25 Feet
F(04) Jacob							SITE ID: EME Jct. J-1 CLIENT: RICE Operating Company
		2	-B-1				RACTOR: Harrison & Cooper, Inc. COUNTY: Lea
		an	B-4	4	D		ATTIETHOD: Air Rotary STATE: New Mexico
B-3		Call of		0		STAR	T DATE: 06/02/08 LOCATION: T20S-R37E-Sec 1-Unit J
		M	1W-1		C	OMPLETIO	N DATE: 06/02/08 FIELD REP.: G. Van Deventer
						COM	IMENTS: Boring located at 10 feet north of former junction box (plate marker)
		1	-B-5				
		Sam	ple	Chloride	e (ppm)	11000	LITHOLOGIC DESCRIPTION:
	Dept	h Time	Туре	Field	Lab	USCS	LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING FEATURE
			Surface			BF	Compacted backfill material consisting of fine-grained sand, very pale orange (10YR 8/2) with calcium carbonate in matrix. Sand grains are moderately well-sorted, subrounded, unconsolidated, dry.
	5					CL	Compacted clay layer, grayish red (5R 4/2).
						UL	
	10					BF	Compacted backfill material consisting of fine-grained sand, very pale orange (10YR 8/2) with calcium carbonate in matrix. Sand grains are moderately well-sorted, subrounded, unconsolidated, dry.
ß							
Bentonite Hole Plug	15	0915	Cuttings	324		SM/CAL	Fine- to medium-grained sand, very pale orange (10YR 8/2) with calcium carbonate in matrix. Sand gra are moderately well-sorted, subrounded, unconsolidated, dry.
3/8 Ber							
	20	0920	Cuttings	394			As above. Fine sand, light brown 5YR 6/4, well-sorted, rounded/subrounded, unconsolidated, dry.
							Fine sand, light brown 51R 6/4, weil-sorted, rounded/subrounded, unconsolidated, dry.
	25	0925	Cuttings	317	256	0.04	Fine sand, light brown 5YR 6/4, well-sorted, rounded/subrounded, unconsolidated, damp.
	•					SW	
		-					
← 5" →	30	0927	Cuttings				Fine sand, light brown 5YR 6/4, well-sorted, rounded/subrounded, unconsolidated, moist.
		0021	outurigo				Bottom of boring at 30 ft below ground surface.
							View facing west showing drilling of soil boring B-1
	35			×			
	40						
							- ANT
	45						
	50						
	55						A CONTRACT AND A CONTRACT

•	MW-2		C	1				0	SOIL BORING LITHOLOGIC LOG
			0	B-	-2			BOREHO	LE NO.: B-2 TOTAL DEPTH: 25 Feet
									SITE ID: EME Jct. J-1 CLIENT: RICE Operating Company
_				ЗВ	3-1				ACTOR: Harrison & Cooper, Inc. COUNTY: Lea
			-10		B	-4	D		ETHOD: Air Rotary STATE: New Mexico
	B-3			22.		0		STAR	T DATE: 06/02/08 LOCATION: T20S-R37E-Sec 1-Unit J
				MW	/-1		С	OMPLETIO	N DATE: 06/02/08 FIELD REP.: G. Van Deventer
								COM	MENTS: Boring located at 25 feet north of former junction box (plate marker)
				В	-5				
	_			ď					
		Don	th Ti	ample	Туре	Chloride Field	E (ppm)	USCS	
		Dep			Surface	Tielu	Lau	CAL	LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING FEATUR Caliche
	1			5	unace			0/12	
- A.									
	10	5	1	002 Ci	uttings	232		SM	Fine- to medium-grained sand, light brown (5YR 6/4) with some caliche. Sand grains are
	407								rounded/subrounded, moderately sorted, unconsolidated, dry.
									Very fine- to fine-grained sand, very pale orange (10YR 8/2) with calcium carbonate in matrix,
		10	1	003 CI	uttings	621			unconsolidated, dry.
6n	,								
le Pl		15	1	004 0	uttings	653	688	SM/CAL	Very fine- to fine-grained sand, very pale orange (10YR 8/2) with calcium carbonate in matrix,
9 Ho		10	1	004 01	utungs	000	000		unconsolidated, dry.
onite									
Bentonite Hole Plug									
3/8									
177		20	1	005 CI	uttings	392			As above Fine- to medium grained sand, light brown 5YR 6/4, moderately well-sorted, rounded/subrounded,
									unconsolidated, dry.
								SW	
1 miles au		25	5 1	007 C	uttings	488	464		As above with higher moisture content.
← 5"									Bottom of boring at 30 ft below ground surface.
		30							
		35							
		40							
		45	5						
			-						







1-	MW			q	-					LL NO .: 1	4W-1	TOTAL DEPTH:	40 Feet
1					B-2	2				-	EME Jct. J-1		RICE Operating Company
1									CONTR	ACTOR:	Harrison & Cooper, Inc.	COUNTY:	Lea
	0			a	B-	1		D	RILLING M	ETHOD: /	Air Rotary	STATE:	New Mexico
				100		B-4	2			DATE: (T20S-R37E-Sec 1-Unit J
	В	-3			4			C	OMPLETION	-			G. Van Deventer
					MW-	1			COM	MENTS: [Monitoring well located appro	oximately 19 feet southeas	st of former junction box (marker plate)
				ď	-B-{	5							
			523	Depth	Samp Time	1	Chloride Field	e (ppm) Lab	USCS	LITH	DLOGY, COLOR, GRAIN SIZE,	LITHOLOGIC DESCRIPT SORTING, ROUNDING, COM	ION: NSOLIDATION, DISTINGUISHING FEATUR
					1408	Surface							
Cement	asing	Cement		5	1409	Cuttings	272				- to fine-grained sand, very p idated, dry.	ale orange (10YR 8/2) wit	h calcium carbonate in matrix,
3/8 Bentonite Hole Plug	Sched 40 PVC Blank Casing	3 Bentonite Hole Plug		10	1410	Cuttings	255		SM/CAL		- to fine-grained sand, grayis e in matrix, unconsolidated, c		very pale orange (10YR 8/2) calcium
3/8	2" S	3/8		15	1411	Cuttings	421				- to fine-grained sand, grayis idated, dry.	h-orange (10YR 7/4) with	calcium carbonate in matrix,
				20	1412	Cuttings	561			dry. Fine- to n			d, subrounded/rounded, unconsolidated
20/40 Brady Silica Sand Pack	Screen with 0.010" Slots	20/40 Brady Silica Sand Pack	•	25	1415	Cuttings	676	656		Fine- to n		rown 5YR 5/6, moderately	well-sorted, rounded/subrounded,
20/40 Bra	Diameter Screen wit	20/40 Bra		30	1417				SW		medium-grained sand, light l idated, damp.	brown (5 YR 6/4), moderat	tely well-sorted, subrounded,
	2" D			35	1420						medium-grained sand, light l idated, very moist.	brown (5 YR 6/4), moderal	tely well-sorted, subrounded,
				40	1430						medium-grained sand, light l idated, wet.	brown (5 YR 6/4), moderal	tely well-sorted, subrounded,
-	5"	-		-10	,430							of boring at 40 ft below gr	round surface.
											View facing w	vest showing completed m	onitoring well MM-1
											view racing w	root showing completed m	
				45						-	Las me a	and a second	La martin and restation
											A DECEMBER OF	and and a start	
											and the state added	Summer of the	
				50						and the second se	and the second second	and the state of t	A State of the second s
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				55							and the second	the Pite	
											and the second	and the second	AT THE P
												10 No.	
				60						10			

•	MW	-2		Q				M	ONITOR WE	/ELL NO.: MW-2 TOTAL DEPTH: 40 Feet
					B-2					SITE ID: EME Jct. J-1 CLIENT: RICE Operating Company
				0						RACTOR: Harrison & Cooper, Inc. COUNTY: Lea
-				a	-B-			D		METHOD: Air Rotary STATE: New Mexico
	9			- [2]	4.	B-4	d	0		RT DATE: 06/02/08 LOCATION: T20S-R37E-Sec 1-Unit J DN DATE: 06/02/08 FIELD REP.: G. Van Deventer
	В	-3					-	C		MMENTS: Monitoring well located approximately 43 feet northwest of former junction box (marker plate).
					MW-1	~			COM	million and the place of the pl
		_		ď	B-5					
				Depth	Samp Time		Chloride Field	e (ppm) Lab	USCS	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING FEATURE
nt		nt			1525	Surface				
ug Cement	k Casing	ug Cement		5	1526	Cuttings	282			Very fine- to fine-grained sand, light brown (5YR 6/4) and grayish-orange (10YR 7/4) with calcium carbonate in matrix, unconsolidated, dry.
3/8 Bentonite Hole Plug	Sched 40 PVC Blank Casing	Bentonite Hole Plug		10	1527	Cuttings	724	960	SM/CAL	Very fine- to fine-grained sand, grayish-orange (10YR 7/4) with calcium carbonate in matrix, unconsolidated, dry.
3/8 Ben	2" Sched	3/8 Ben								Very fine- to fine-grained sand, grayish-orange (10YR 7/4) with calcium carbonate in matrix,
				15	1528	Cuttings	497			unconsolidated, dry.
				20	1529	Cuttings	423			Very fine- to fine-grained sand, grayish-orange (10YR 7/4) with calcium carbonate in matrix, unconsolidated, dry. Fine- to medium grained sand, light brown 5YR 5/6, moderately well-sorted, rounded/subrounded,
Pack		ack	-							unconsolidated, dry.
20/40 Brady Silica Sand P	Screen with 0.010" Slots	Brady Silica Sand Pack	▼	25	1532	Cuttings	348	336		Fine- to medium grained sand, light brown 5YR 6/4, moderately well-sorted, rounded/subrounded, unconsolidated, slightly moist.
20/40 Bra	Diameter Screen with	20/40 Brad		30	1535				SW	Fine and medium-grained sand, light brown (5 YR 6/4), moderately well-sorted, subrounded, unconsolidated, damp.
	2" Dia			35	1537					Fine and medium-grained sand, light brown (5 YR 6/4), moderately well-sorted, subrounded, unconsolidated, very moist.
				40	1540					Fine and medium-grained sand, light brown (5 YR 6/4), moderately well-sorted, subrounded, unconsolidated, wet.
-	- 5"	->		40						Bottom of boring at 40 ft below ground surface.
										View facing southeast showing completed monitoring well MW-2 (foreground) and MW-1 (background
				45						a state and a state
										and the second
				50						the second s
				50						and the second sec
				55						
				60						

Attachment C

Laboratory Analytical Reports

and

Chain of Custody Documentation



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

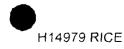
Receiving Date: 06/13/08 Reporting Date: 06/13/08 Project Number: NOT GIVEN Project Name: EME JCT. J-1 Project Location: EME JCT. J-1 Analysis Date: 06/13/08 Sampling Date: 06/02/08 Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: KS

		CI
LAB NO.	SAMPLE ID	(mg/kg)
H14979-1	SB #1 @ 25'	256
H14979-2	SB #3 @ 25'	352
H14979-3	MW #1 @ 25'	656
Quality Contro	<u>רו</u>	500
······	С	500
True Value Q		
% Recovery		100
% Recovery	ent Difference	100 2.0

Note: Analyses performed on 1:4 wiv aqueous extracts.

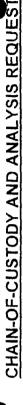
Bust Auprobe

06/13/08 Date



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Company Name	~	505) 393-247		-	673-7001 FAX (325)673-7020	-7020	and the second second			0,022		, i	ł
	e. Rice Operating Company	<u> </u>				017719			ANALYSIS	SIS	REQUESI	IS1	
Project Manage	Project Manager: Hack Conder				P.O.#:								
Address: 122	Address: 122 West Taylor				Company:								
city: Hobbs	S	State: NM Z	Zip: 88240	1240	Attn:							•••••	
Phone #: 393-	393-9174 Fa	Fax #: 397-1471	~		Address:								
Project #:	ŭd	Project Owner:			city:			Ş					
Project Name: EME jct. J-1	EME jct. J-1				State:	Zip:		sə	,				
Project Locatio	Project Location: EME ict. J-1				Phone #:			bir					
Sampler Name:	: Lara Weinheimer/Darnell Mitchell	Mitchell			Fax #:					• <u> </u>			
FOR LAB USE ONLY			F	MATRIX	PRESERV	SAMPLING	ų	40					
Lab I.D.	Sample I.D.		# Соитаіие 36 (С)ОмР. 8 2001710583	яатамоиоояс матаwатгам лог лог лог Велоде	DTHER : CE / COOL DTHER : DTHER :	DATE	TIME)					
1-9941H	SB #1 @ 25'			>			11.3			╞			
2	SB #3 @ 25'		- ر.	>	>	6/2/08	10:53			+			
5	MW #1 @ 25'		- در	>	>	6/2/08	2.12	>					
PLEASE NOTE: Liability a	PLEASE NOTE: Liability and Damages. Cardinal's liability and client's erclusive teneoly for any datim arising whether based in contract or (ort. Shall be fimiled to the amount paid by the client for the	cclusive remedy for any	daim arisir	no whether based in contrac	t or tort, shall be limited	to the amount baid	by the client for t			-			
analyses. All claims includ service. In no event spall (affiliates or succeptors fris	anabyses. All claims including those for negogence and any other cause whatboever shad be deemed waived unless made in writing and received by Cardinal writim 30 days after completion of the applicable service. In no event spall Cardinal be fable for incidential consequential damages, including writingtian, business interruptans, bas of use, or has of profit, incurred by client, its ubbidiaries affikiates or succeptors pristing out of or related to the performance of services hereunder by Cardinal versions and of the above stated reasons or otherwise.	whatsoever shaff be dee J damages, including wi vices hereunder by Caro	med waive hout limita inal. regar	ed unless made in writing a tion, business interruptions dless of whether such claim	id received by Cardinal voice of p to the set of the se	within 30 days after stofts incurred by cli te above stated reas	completion of the tent, its subsidiari sons or otherwise	applicable es					
Relinquished BV:		Date:	Receiv	Received By	11		Phone Result	ult: 1 Yes 2 No		Add'l Phone #:			
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Delivered By	Delivered By: (Circle One)	-				СНЕСКЕД ВУ:	Lweinh	Lweinheimer@rice.swd.com	wd.con	~			
Sampler - UPS	- Bus - Other:				-2	Initials)							
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t Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476 * Quint inted Sample back after that ing



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

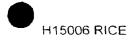
Receiving Date: 06/18/08 Reporting Date: 06/18/08 Project Number: NOT GIVEN Project Name: EME JCT. J-1 Project Location: EME JCT. J-1 Analysis Date: 06/18/08 Sampling Date: 06/02/08 Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: KS

LAB NO.	SAMPLE ID	CI [–] (mg/kg)
H15006-1	SB #4 @ 25'	512
H15006-2	SB #2 @ 15'	688
H15006-3	SB #2 @ 25'	464
H15006-4	SB #3 @ 20'	576
H15006-5	SB #4 @ 10'	848
H15006-6	SB #5 @ 25'	736
H15006-7	MW #2 @ 10'	960
H15006-8	MW #2 @ 25'	336
Quality Contro))	500
True Value Q	С	500
% Recovery		100
Relative Perc	ent Difference	< 0.1
METHOD: Stan	dard Methods	4500-CI'B

Note: Analyses performed on 1:4 wiv aqueous extracts.

Sinster Aprobe

<u>06/18/08</u> Date



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10	101 East Marland, Hobbs, NM 88240 (505) 393-2326 FAX (505) 393-2476	, Hobbs, NM 88240 FAX (505) 393-2476		2111 Beechwood, Abilene, TX 79603 (325) 673-7001 FAX (325)673-7020	d, Abilene, TX 796 FAX (325)673-7020	X 79603 -7020			
Company Name:	Rice Operating Company	any			8	BILL TO		ANALYSIS REQUEST	
Project Manager:	Hack Conder				P.O. #:				
Address: 122 W	122 West Taylor				Company:				·
City: Hobbs		State: NM	Zip: 88240		Attn:				
Phone #: 393-9174	74	Fax #: 397-1471	171		Address:				
Project #:		Project Owner:			City:				
Project Name: EN	EME jct. J-1				State:	Zip:			
Project Location: EME jct.	EME jct. J-1				Phone #:		5 :		
Sampler Name: Le	Lara Weinheimer/Darnell Mitchell	ell Mitchell			Fax #:		> / /		
				MATRIX	PRESERV	SAMPLING			
Lab I.D.	Sample I.D.	Ġ	АВ ОЯ (С)ОМР. СИТАІИЕRS ОUNDWATER		НЕВ : \ COOF D\BYZE: НЕВ :		177		
1 1.2.2.1	e)) #	0ור 105	ACII ACII	DATE	TIME		
H 1200e-1 +	53 4 1 6 25		5	>	2	1100	6-2-08 1		
	SB #2 E 15'		رد.	د.	>	1	6-2-3		
5-	SP#1 E 251		و'،	>	2	(. 9 ;0!	6-2-5		
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	Mu # 2 C 25		3	3	2	3: 31	6 2 - 2 J		
PLEASE NOTE: Liability and D anatyses. All claims including th	PLEASE NOTE: Lisbility and Damages. Cardinal's lisbility and client's exclusive remedy for any claim arising whethar 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	rs exclusive remedy for a use whatsoever shall be	ny claim arising wh demed waived un	ether based in contract o ess made in writing and i	sed in contract or tort, shall be United to the amount paid by the client for the is in writing and received by Cardinal within 30 days after completion of the dr	1 to the amount paid within 30 days after	by the client for the completion of the applicable		
service. In no event shall cardin affiliates or successors arising or	a carona of nable for increating of consequences arising out of or related to the performance of	entar damayes, including without timitation, bu services hereunder by Cardinal, regardless of	without Ithutation, I ardinal, regardless	outimets interruptions, loss of whether such claim is b	as of use, or loss of based upon any of t	profits incurred by cli he above stated reas	ent, its subsidiaries. ons or otherwise.		
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Delivered By: (Circle One Sampler - UPS - Bus - Othe	(Circle One) Bus - Other:			Sample Condition Cool Intact Yes Yes No No		CHECKED BY: (Intials)	nconaer@riceswa.com; jpur Lweinheimer@rice.swd.com	nconger@riceswa.com; jpurvis@riceswa.com; Lweinheimer@rice.swd.com	;moo
† Cardinal ca	Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476	nanges. Please	: fax writter	ı changes to 5	05-393-2476)	* Hara meredo	do samples retu	wred



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

Receiving Date: 06/24/08 Reporting Date: 06/26/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J~LEA COUNTY, NM Sampling Date: 06/24/08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: CK Analyzed By: HM/KS

		Na	Ca	Mg	ĸ	Conductivity	T-Alkalinity
LAB NUMBE	R SAMPLE ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(uS/cm)	(mgCaCO ₃ /L)
ANALYSIS E	DATE:	06/26/08	06/26/08	06/26/08	06/26/08	06/25/08	06/25/08
H15049-1	MONITOR WELL #1	1,980	1,020	510	12.5	15,600	200 '
H15049-2	MONITOR WELL #2	2,170	1,080	510	13.1	16,400	236
Quality Cont	rol	NR	52.1	51.0	2.96	1,418	NR
True Value C	DC	NR	50.0	50.0	3.00	1,413	NR
'% Recovery		NR	104	102	98.7	100	NR
Relative Per	cent Difference	NR	8.0	< 0.1	1.3	1.1	NR
METHODS:		SM3	500-Ca-D 3	8500-Mg E	80 4 9)	120.1	310.1

		CI	SO₄	CO_3	HCO3	рН	TDS
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	(mg/L)
ANALYSIS D	DATE:	06/25/08	06/26/08	06/25/08	06/25/08	06/25/08	06/24/08
H15049-1	MONITOR WELL #1	5,200	1,390	0	244	6.92	13,300
H15049-2	MONITOR WELL #2	5,500	1,480	0	288	6.88	14,400
Quality Contr	rol	510	41.8	NR	98 8	7.05	NR
True Value C	2C	500	40.0	NR	1000	7.00	NR
% Recovery		102	105	NR	98.8	101	NR
Relative Perc	cent Difference	2.0	0.6	NR	1.2	0.3	NR
METHODS:		SM4500-CI-B	375.4	310.1	310.1	150.1	160.1

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Date

PLEASE NOTE 1 fability and Damages. Cardinalis fold in ends on owner rambo, for any claim assent whether based in contract or fort, oblit be an early the annexit paid by teacher shall be annexit paid by teacher shall be deemed wated unless inside in a weat to able to an early and the annexit paid by teacher shall be deemed wated unless inside in a weat to able to able to an early of the structure of the annexit paid by teacher shall be deemed wated unless inside in a weat to able to able to an early of the annexit paid by teacher shall be deemed wated unless inside in a weat to able to an early of the structure what we early able to a construction of the annexit paid by teacher able and the teacher and the annexit paid by the annexit pa



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

Receiving Date: 06/24/08 Reporting Date: 06/26/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J~LEA COUNTY, NM

Sampling Date: 06/24/08 Sample Type WATER Sample Condition: COOL & INTACT Sample Received By: CK Analyzed By: HM/KS

		Na	Ca	Mg	K	Conductivity	T-Alkalinity
LAB NUMBE	R SAMPLE ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(#S/cm)	(mgCaCO ₃ /L)
ANALYSIS D	ATE:	06/26/08	06/26/08	06/26/08	06/26/08	06/25/08	06/25/08
H15049-1	MONITOR WELL #1	1,980	1.020	510	12.5	15,600	200
H15049-2	MONITOR WELL #2	2,170	1,080	510	13.1	16,400	236
Quality Contr	0)	NR	52-1	51.0	2.96	1,418	NB
True Value C	C	NR	50.0	50.0	3.00	1,413	NR
⁰₀ Recovery		NR	104	102	98.7	100	NR
Relative Perc	cent Difference	NR	8.0	< 0.1	1.3	1.1	NR
METHODS:		SMC	3500-Ca-D (3500-Mg E	8049	120.1	310-1
		CI	SO.;	CO ₃	HCO3	ρH	TDS
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(\$.u.)	(mg/L)
ANALYSIS D	ATE:	06/25/08	06/26/08	06/25/08	06/25/08	06/25/08	06/24/08
H15049-1	MONITOR WELL #1	5,200	1,390	0	244	6.92	13,300
H15049-2	MONITOR WELL #2	5,500	1,480	0	288	6.88	14 400
Ouality Contr	oi	510	41.8	NR	988	7.05	NR

40.0

105

0.6

375.4

SM4500-CI-B

Ouality Control	510
True Value OC	500
% Recovery	102
Relative Percent Difference	2.0

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METHODS

Date

NR

NR

NR

310.1

1000

98.8

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NR

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

Receiving Date: 06/24/08 Reporting Date: 06/30/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J ~ LEA CO., NM Sampling Date: 06/24/08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: CK Analyzed By: CK

TOTAL

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LAB NUMBER	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DAT	Ē:	06/27/08	06/27/08	06/27/08	06/27/08
H15049-1	MONITOR WELL #1	0.072	0.014	<0.002	<0.006
H15049-2	MONITOR WELL #2	0.017	0.004	<0.002	<0.006
		·	:	· · · · · · · · · · · · · · · · · · ·	
Quality Control True Value QC % Recovery Relative Percen	t Difference	0.051 0.050 102 3.8	0.043 0.050 85.6 5.0	0.045 0.050 90.7 6.2	0.139 0.150 92.7 6.9

METHOD: EPA SW-846 8260B

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PLBASE 1011- Linbitity and Damages. Cardinal's tability and client's exclusive remedy for any order at seg, whether cuded in contract or tot - shall be instead to the associate part by client for analyses. At dom't, 11:0049 With and Damages. Cardinal's tability and client's exclusive remedy for any order at seg, whether cuded in contract or tot - shall be instead or one and uny other cause while under an applicable service. In no event shall be instead to the order or consequential comages individue, without instance or business repeating to a service or the state to moderate or consequential comages individue, without instance or business representation and set or tested to the order or vector of the sub-adal avaitable or related to the order or consequential comages. For our set without to the service service or related to the order or consequential comages or contract or order was sub-adal avaitability or related to the order or consequential comages. Cardinal regardies of whether such campings and or related to the order or consequential comages. Part of the service such as well we such as a difficulty of the service service or related to the order or consequential comage. Results relate service should be adapted by the the service service or relative services or otherway is the service service or to be service. This report and not be reproduced exception to write approach or consequentiation of consequence or consequence approach exception to a write approach or consequence or

	Carcanal Laboratorics, Inc. Laborabi	BILL TO Catagoans RICE Operating Company	i i i i i i i i i i i i i i i i i i i	172 Willipfor Street - Hotbbs New Meildo 50240	Fitzive#	(575) 393-9174 (575) 397-1471		н <u>д</u> 60	Samplei Signature: Cathe Watkins	MATRIX PRESERVATIVE SAMPLING	205 024 207 02 207 02 200 04 200 04 200 04 200 05 200 0	 4 СОИТ; 4 СОИТ; 4 СОИТ; 5 СОИТ; 5 СОИТ; 5 СОИТ; 5 СОИТ; 5 СОИТ; 7 СОИТ;	G 3 X 2 1 6-24	G 3 X 2 1 6.24 X X X X X X X X X X					Date Tune Received by Date Tune Phone Results Yes No	Date Tune Received By (Laboratory Staff) Date Tune ReMARKS: (Sumple Contribution CHECKED BY	Yas Trans III Interface
80. New 201		comains Hains. RICE Operating Company	िाठोहरदी जिलावेग्रहा	k Coi	Acdress (Sree) CR, Zan	100 W Taylor Cricer - Hustes New Me way 20040	none# (575) 393-9174	Project # Project Name EME Junction	Project Lacator T20S-R36E-Sec1 J ~ Lea County New Mexico		LAB # FIELD CODE	LAB USE V ONLY	Monitor Well #1	Manitor Well #2							Delivered By Includie One)	



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

Receiving Date: 08/15/08 Reporting Date: 08/25/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20.5-R36E-SEC1 J ~ LEA COUNTY, NM Sampling Date: 08/15/08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: HM/TR

				Na	Ca	Mg	К	Conductivity	T-Alkalinity
LAB NUMBER	SAMPLE ID		(m	g/L)	(mg/i)	(mg/L)	(mg/L)	(<i>u</i> S/cm)	(mgCaCO ₃ /L)
ANALYSIS DA	TE:		. 08	3/20/08;	08/20/08	08/20/08	08/20/08	08/19/08	08/19/08
H15748-1	MONIFOR WELL #1		,	2,130	1,040	436	14.6	15,500	240
H15748-2	MONITOR WELL #2			2,640	1,040	510	14.6	15,900	272
		-		-					-
Quality Contro	I			NR	48.1	48.1	3.00	1,391	NR
True Value QC	,			NR	50.0	50.0	3.00	1,413	NR
% Recovery	* 10		ţ	NR	96.2	96.2	98.5	98.4	NR
Relative Perce	nt Difference			NR	8.0	5.9	6.9	1.4	
METHODS:	al anno 11 - Sheeran an Maria			SM3	500-Ca-D 3	500-Mg E	8049	120.1	310.1
			C		SO.	CO-	HCO.	nН	TOS

				C	1	504	$\cup \cup_3$	HCO_3	рн		105
				(mg	J/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	(1	ng/L)
ANALYSIS D	ATE:			08	/19/08	08/19/08	08/19/08	08/19/08	08/19/08		08/19/08
H15748-1	MONITOR W	ELL #1			5,200	1,630	0.	293	6.23		12,100
H15748-2	MONITOR W	ELL #2			5,900	1,810	0	332	6.57		12,500
					:	1	-				
		a ana ana aka							1		
Quality Contr	ol .		••		510	43.9	NR	976	7.05		NR
True Value Q	C				500	40.0	NR	1000	7.00		" NR
% Recovery					102	110	NR	97.6	101		NR
Relative Perc	ent Difference	-	-	_	2.0	2.4	NR,	2.5	0.7	'	- NR
METHODS:		and adds		SM450	0-CI-B:	375.4	310.1	310.1	150.1	-	160.1

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08.26 Date

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

Receiving Date: 08/15/08 Reporting Date: 08/19/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location T20S-R36E-SEC1 J ~ LEA CO., NM Sampling Date: 08/15/08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: ZL

			ETHYL	TOTAL
	BENZENE	TOLUENE	BENZENE	XYLENES
LAB NUME SAMPLE ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)
ANALYSIS DATE	08/18/08-	08/18/08	08/18/08	08/13/08
H15748-1 MONITOR WELL #1	<0.001	< 0.001	<0.001	<0.003
H15748-2 MONITOR WELL #2	<0.001	< 0.001	<0.001	<0.003
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		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
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Name and a second of the second s				!
Quality Control	0.054	0.045	0.047	0.152
True Value QC	0.050	0.050	0.050	0.150
% Recovery	107	90.3	93.6	101
Relative Percent Difference	1.9	2.2	2.2	7.4

METHOD: EPA SW-846 80216

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

Lab Director

Dale

PLEASE NO FILL Liability and Damagus. Cardinal's Lability and clears exclusive remedy for any claim arising, whether based in constant or lost install be Printed to the emoval paid by ment for photo-sec. All an HILS 748WB RUGE is about or one close unated annaes including, whether based in contract or lost install be Printed to the annual paid by ment for photo-sec. Source in the exect that Cardinal by value for incidential consequential canages including, whether based in contract or lost in the source or lost or provide a due to the second consequential canages including to the second photo-section of the about the second cardinal canages including whether such charters upons, loss of law or loss or provide annual by the second or loss or provide annual by the second or consequential canages including trademostic claims is bound is bound upon any of the above-stated massing or them so. Revense color coly to the rangers identified abloce. This report shall not be recorded adopt in full with written approval cancers.

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								(575)397-1471				Rozanne Johnson (575)631-9310	rozanne@valornet.com	AMP	(80	DATE (20	8-15	8-15					+		1			5		
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	101 East Marland - Hebts, New 1.1	ыстись селени Гел (575) 395-2320 Fax (575) 303-2478	Company Name:	RICE Operating Company	Project Manager:	Hack Conder	l vi	122 W Taylor Street - Hobbs New Mexico 88240	Tt.	5) 3	Ť.	Project Location	T20S-R36E-Sec1 J ~ Lea County New Mexico		LAB #	LAB USE ONLY	j J								Relinquished by:	Rozanne Johnson	Relinquished by	11.	Delivered By:	Sampler
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ANALYTICAL RESULTS FOR RICE OPERATING COMPANY ATTN: HACK CONDER 122 W. TAYLOR STREET HOBBS, NM 88240 FAX TO, (575) 397-1471

Receiving Date: 11/19/03 Reporting Date: 11/24/08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J ~ LEA CO , NM Sampling Date: 11/18/08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: HM/TR

	Na	Ca	Mg	к	Conductivity	T-Alkalinity
LAB NUMBE SAMPLE ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(#S/cm)	(mgCaCO ₃ /L)
ANALYSIS DATE:	11/24/08	11/21/08	11/24/08	11/21/08	11/20/08	11/20/08
H16358-1 MONITOR WELL #1	2.220	1.060	474	14.8	13,100	256
H16358.2 MONITOR WELL #2	2,190	1,100	510	14,4	13,300	280

Quality Control	NR	48.1	48.6	2.77	1.430	MR
True Value QC	ŇR	50.Ö	50.0	3.00	1,413	NR
% Recovery	NR	96-2	97.2	92.4	101	NR
Relative Percent Difference	NR	8.Û	<().1	10.3	0.1	NR
METHODS:	SM	3500-Ca-D (3500-Mg E	8049	120.1	310.1
	CI	SO.	001	HCO ₃	рH	TDS
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	(mg/L)
ANALYSIS DATE:	11/21/08	11/21/08	11/20/08	11/20/08	11/20/08	11/19/08
H16358-1 MONITOR WELL#1	5.350	1,590	0	312	6 79	11,600
H16358-2 MONITOR WELL #2	5 450	1,600	0	342	6.77	12,200

Quality Control	500	45.6	NR	1000	7.02	NR
True Value QC	500	40.0	NR	1000	7.00	NR
¹ Recovery	100	114	NR	100	100	NR
Relative Percent Difference	-<0,1	1.6	NR	<0.1	0.1	NR
METHODS:	SM4500-CI-B	375.4	310.1	310.1	150-1	160.1

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ANALYTICAL RESULTD FOP RICE OPERATING COMPANY ATTN: HACK CONDER +22 W. TAYLOR HOBES, NM 88240 FAX TO: (575) 397-1471

Receiving Date: 11:19/08 Reporting Date: 11:26.08 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J- LEA CO., NM Sampling Date: 11:13:08 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: ZL

				ETHYL	TOTAL
		BENZENE	TOLUENE	BENZENE	XYLENES
LAS NUMBER	SAMPLE ID	(mg·L)	and the	(mg/L)	(mg/L)
ANALYSIS DA	TE	11/25/08	11:25-08	11/25/08	11/25/08
H16358-1	MONITOR WELL#1	<0.001	<0.001	<0.001	<0.003
H16358-2	MONITOR WELL #2	< 0.001	<0.001	<0.001	<0.003
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Quality Contro	1	0.060	0.049	0.055	0.151
True Value QC		0.050	0,050	0.050	0,160
% Recovery		120	98.0	110	101
Relative Perce	ent Différence	3.4	21	1.2	3.0

METHOD: EPA SW-846 8260B

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

Chemist

Date

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Cerepart, Martie RICE Operating Company		BILL TO RICE (o do	ыць то Сещану RICE Operating Company	g Co	mpa	∧		PO#								ANA	ANALYSIS	LS R	EQL	REQUEST							
Project Managel			Ì	Address		-		Sheet	(Street City, Zip)	Zupi		Г				± .	1106	5 · 5	ecity.	, ke	(unde or specify metrico No.	, -	-	-	-	-		
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LAB # FIELD CODE	dwolg	SAENI				2047			(BoGH)		(86	209/91		(9001 XT)		। इस ह ै स हा		sepio	~80928 				lnaing.	MigN s		00 2216	ennT br	
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A. F. ADALERSENT AND A ROLE (FERATIONS CONTRACT ATTAL MACK CONTRACT ID 10 TAMAGE STREET ADBES AND 20240 FACTOR STOLENTIALS

Network Date: Clabbe Popular Date: Clabbe Project Namber - NOT GIVEN Project Name - EMELS NOT NOT -Project Location - 1203-R ISE-SECTION LEA COT RM C Norting Enter (PDATIC) Dample Type - WATER Sample Condition - Cohol & Pathaut Sama - Ancohol By - Cr Anonymod By - HMATR

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LAE MENELSAMPLE (D	n thiệt từ s	(mp.c)	Cong (Co	10.1	1210-01	ະຫຼຸມສະບີ ເ
UAL CSIS DATE	21.25.62	01/20/09	021.0408	1004 P.C.P	0.27.307.35	ਹੋਰ ਦਾ ਸ
HICODEL MORTOR WELL #1	1,400	1,040	h	·		
H16510-2 MONTOF WELL #2	<u>,</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1,420	\$ 1 F	1. 1	15,200	

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(*ETHO(/S)	810	Súr)-Cla-Er ()	510-119 E	31.1	120-1	2014
Relative Percent Enderence 1	· . f ^{**} .	816-1	<11	<u></u>	<u>(</u>)	τ
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Tua'il, Control	NE	16 1	51 Å		1,4.2	18

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PLACESIS CAPE	0245-65	02110/09	22 19 66	62 (S.)	22/19/39	02 19
与许多的人。这个人不会接受了自己。#3	8,150	1,135	-	<u>-: :</u> -		
HARON MONTOR ABLE \$2	7 7000	1.6.0	-	127	7.23	10 8 MG
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AMALYTICAL RESULTS FOR RICE OPERATING COMPANY ATTN: HACK CONDER (22 W. TAYLOR HOBBS, NM 88240 FAX TO: (575) 397-1471

Receiving Date: 02/18/09 Reporting Date: 02/20/09 Project Number: NOT GIVEN Project Name: EME JUNCT/ON J-1 Project Location: T20S-R36E-SEC1 J ~ LEA CO., NM Sampling Date: 02/17/09 Sample Type: WATER Sample Condition: COOL & INTACT Sample Received By: CK Analyzed By: ZL

LAB NUMBI	EFSAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (Ing/L)
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METHOD: EPA SW-846 8021 8

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

Receiving Date: 06 05:09	Sampling Date 06/03.09
Reporting Date: 06-11/09	Sample Type: WATER
Project Number: NOT GIVEN	Sample Condition: COOL & INTACT
Project Name: EME JUNCTION J-1	Sample Received By: ML
Project Location、T20S-R36E-SEC1 J ~ LEA CO , NM	Analyzed By: AB/HM

LABIND.	SAMPLE ID		CE angel.)	SO _u (mg·L)	TDS (mg/L)
Analysis Date:		and a second	06/11 09	06/11/09	08/09/09
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H17563-2	MONITOR WELL #2		5,600	1.330	12 966
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ANALYTICAL RESULTS FOR RICE OPERATING COMPANY ATTN, HACK CONDER 122 W TAYLOR HOBBS, NM 88240 FAX FOT (575-397-1471

Receiving Date: 06/05/09 Reporting Date: 06/09/09 Project Number: NOT GIVEN Project Name: EME JUNCTION J-1 Project Location: T20S-R36E-SEC1 J~ LEA CO. NM

Sampling Date 00/03/09 Cample Type: WATER Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: ZL

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LAB NUMBER	SAMPLE ID	BENZENE (mg·L)	TOLUEME :mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
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True Value QC		0.050	0.050	0.050	0.150
% Recovery		116	106	98.0	98.7
Relative Percer	nt Difference	0.7	9.7	8.3	5,3

METHOD: EP4 SVV-846 8021 8

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

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Attachment D

Input and Results of the AMIGO Simulation

EME Jct. J-1 Site (1R0427-170) T20S-R36E-Sec 1, Unit J Lea County, New Mexico

INPUT AND RESULTS OF THE AMIGO SIMULATION

The AMIGO program, developed for the American Petroleum Institute (API), was used to simulate the potential impact to groundwater due to chloride transport through the vadose zone. The input to the model employed all available field data collected from the site. Model input data that was not site-specific was conservatively estimated based on professional judgment, referenced publications, and interpolation of known data from nearby sites. The specific parameters t sed in the simulation at the EME Jct J-1 site are listed in the table below.

Model Parameter	Value	Source of Value
Climate (non-smoothed)	1946 - 1992	Pearl, NM Station
Distance (It) to potential receptor (water well)	NA	No water well within 1000 ft of site (NMOSE & USGS Databases)
Background Chloride Concentration in Aquifer (mg/L)	5,200	Lowest concentration measured on site (upgradient-offsite source)
Aquifer Porosity (unitless)	0.25	Sample description
Depth to Groundwater (ft below ground surface)	30	Measured on site
Aquiter Thickness (ft)	30	Nicholson & Clebsch (1961) and interpolated from nearby sites
Slope of Water Table	0.001	Measured on site
Hydraulic Conductivity (ft/d)	10	Professional Judgment (based on aquifer tests conducted by Trident in Lea County)
Longitudinal Dispersivity (unitless)	10	Professional Judgment Conservative Assumption
Transverse Dispersivity (unitless)	1	Professional Judgment Conservative Assumption
Average Chloride Load (kg/m ²)	5.03	Calculated from site data using Massload spreadsheet
Maximum Length of Spill in Direction of Groundwater Flow (ft)	30	Site Data (conservatively used length and width of excavation)
Plant Uptake Trigger (%)	1	Professional Judgment Conservative Assumption
Surface Layer Lithology	Med. Sand	Lithology of on site soil borings
Soil Profile at Depth (Ratio - Caliche : Medium Sand)	1:5	Lithology of on site soil borings

Table 1: AMIGO Input Parameters

It is important to note that the background chloride concentration of 5,200 mg/L (lowest concentration observed at monitoring well MW-1) was used due to the strong likelihood of an unknown, upgradient, offsite source causing the impairment at the site. Offsite encroachment of chlorides in groundwater at the site is clearly evidenced by the consistently higher chloride and

TDS concentrations in the upgradient monitoring well (MW-2) located 64 feet northwest of MW-1. Chloride and TDS concentrations are known to be elevated on a regional scale in this area near Monument.

The caliche and medium sand (1:5 ratio) soil types used in the simulation are consistent with those described in the lithologic logs for each soil boring and monitoring well. An additional conservative measure taken was in not accounting for the presence of the very low-permeability clay barrier installed at 6 ft bgs into the model simulation.

Published values of hydraulic conductivity range from 2 ft/day to 200 ft/day in Lea County. A conservative value of 10 ft/day for hydraulic conductivity was used based on experience of Trident Environmental in conducting aquifer tests in Lea County at sites with similar lithology and hydrogeologic characteristics. Dispersivity is a scale-dependent parameter which is generally larger as the scale of the plume increases. Longitudinal dispersivity represents the spreading of the plume in the direction of groundwater flow and the transverse component represents spreading perpendicular to the flow direction. A typical rule of thumb is that the longitudinal dispersivity is 10 percent of the length of the plume (National Research Council, 1990). However, values of dispersivity reported in the literature range generally range from 1 to 100 percent of the problem scale (Gelhar, 1986). Usually, the longitudinal dispersivity is 5 to 10 times higher than transverse. Dispersivity terms do not have a significant impact to the AMIGO simulations. A conservative value of 10 was used for longitudinal dispersivity and a value of 1 for the transverse component.

The *Massloud* spreadsheet which compliments the AMIGO modeling simulation tool was used to calculate the potential chloride load in the vadose zone that could potentially contribute to the chlorides already present in groundwater. This was accomplished by inputting the field chloride analyses for each depth sampled in the vadose zone from the five soil borings (B-1 through B-5), two monitoring wells (MW-1 and MW-2), and three trenches (located 15 feet north, east and south of the former junction box where the higher chloride concentrations were observed). With each sample point weighted equally, the chloride load was calculated to be 5.03 kg/m² as shown in Table 2.

Soil Boring, Monitoring Well, or Trench Location	Proportional Area Weights	Chl. Load of each Borehole	Equal Area Weights
B-1	0.10	5.95	1.00
B-2	0.10	2.40	1.00
B-3	0.10	4.88	1.00
B-4	0.10	7.14	1.00
B-5	0.10	1.54	1.00
MW-1	0.10	5.00	1.00
MW-2	0.10	5.45	1.00
15-ft East of Jct Box	0.10	5.68	1.00
15-North of Jct Box	0.10	6.03	1.00
15-ft South of Jct Box	0.10	6.20	1.00
Sum of weights	1		10

Table 2: AMIGO Input Parameters

Averaged Chloride Load of All Boreholes: 5.03 kg/m²

EME Jct. J-1 Site (1R0427-170) T20S-R36E-Sec 1, Unit J Lea County, New Mexico

Input of the data described above resulted in the simulation as depicted in Figure 1 below which includes the AMIGO groundwater output charts copied directly from the model results screen.

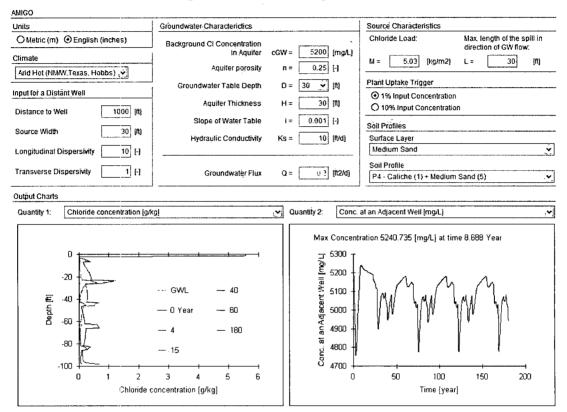


Figure 1: AMIGO Output Charts

The results of the simulation indicate that the chloride mass within the vadose zone will not contribute more than 41 mg/L in the groundwater below the site, if no further corrective actions are taken.

The simulated concentration in groundwater is a *worst-case* prediction because of the conservative input parameters used in the model. The above-described AMIGO simulation supports the conclusion that the chlorides in the vadose zone do not represent a threat to human health and the environment.