1R-427-180

WORKPLANS

Date:
11-1-11

Texerra

627 Forest View Way Monument, Colorado 80132
Tel: 719-339-6791 E-mail: lpg@texerra.com

November 1st, 2011

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 and Characterization Plan Report and
Corrective Action Plan
Rice Operating Company – EME SWD System
EME Jct. N-18 UL N, Sect 18, Township 20S, Range 37E
NMOCD Case Number 1R427-180

Sent via Email and U.S. Certified Mail Return Receipt No. 7011 0110 0001 5863 4820

Mr. Hansen,

This report presents the results of soil and groundwater investigative work outlined in the Investigation and Characterization Plan for this site (location given in Figure 1), as approved by NMOCD on June 28th, 2010.

Soils in the unsaturated zone within the area of the former junction box exhibited moderately elevated chloride concentrations, averaging 414 mg/kg among the five soil bores and the near-source monitoring well (MW-1) taken on September 16th, 2010 (Figure 2). An up-gradient monitoring well (MW-2) was also installed on September 16th, 2010. The estimated mass of soil chlorides believed to have been contributed from the former junction box is approximately 597 lbs or 270 kg (Table 1), which is low relative to the area encompassed. No significant residual hydrocarbons were found, as evidenced by the laboratory "below detect" levels (see attached laboratory report in Appendix A).

The most recent (August 15th, 2011) groundwater samples tested 860 mg/L in a near-source, down-gradient well (MW-1) and 1,380 mg/L chlorides in the up-gradient well (MW-2); see also Figure 3 and Appendix B. BTEX concentrations were below detection levels for both samples. Given that this site is within a known, regionally chloride impacted area, these data indicate that this site is not contributing significant chloride to groundwater. This is not surprising given that residual soil chloride levels were only moderately elevated and that a clay infiltration barrier was installed at a depth of 6 ft bgs across the site (35ft x 25ft) when the old junction box was replaced in 2004 (Figure 4).

A soil transport model, MultiMed, was run in order to estimate whether these residual soil chlorides pose a likelihood of affecting groundwater. The model was specified using source area and chloride concentration parameter values taken from Table 1 and other estimated site-specific parameter values given in Table 2. The model projects that the maximum elevation in groundwater chloride concentrations (from the present baseline value) is less than 200 mg/L (Figure 5), indicating that this site poses essentially no risk to future groundwater quality. Model output values (estimated groundwater chloride concentrations beneath the site over time) are given in Appendix C.

Although it is apparent that this site has not impacted groundwater, based on our recent groundwater samples, and is not likely to in the future, based on MultiMed modeling, we recommend that chloride mass equivalent to the contributed residual soil chloride mass (597 lbs or 270 kg, as noted above) be removed from the existing recovery system located at EME A-20 (Figure 6). With a current chloride concentration of 3,700 mg/L in RW-1, approximately 459 barrels will need to be removed to account for the 270 kg of chloride. This proposed remedial measure is intended to serve as the Corrective Action Plan (CAP) for this project. Upon the removal of this mass of groundwater chloride we anticipate submitting to NMOCD a final remediation progress report and request for project termination.

We do not recommend or anticipate conducting surface restoration work, as the affected area is encompassed by a working lease road and is constantly impacted by oil field traffic. Moreover, the vegetation adjacent to the site is apparently healthy (Figure 7).

ROC is the service provider (agent) for the EME Salt Water Disposal 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.

Please do not hesitate to contact either myself or Rice Operating Company if you have any questions or need additional information.

Sincerely,

L. Peter Galusky, Jr. Ph.D.,P.G.

Attachments: Laboratory reports, MulitMed output file

Copy: Rice Operating Company

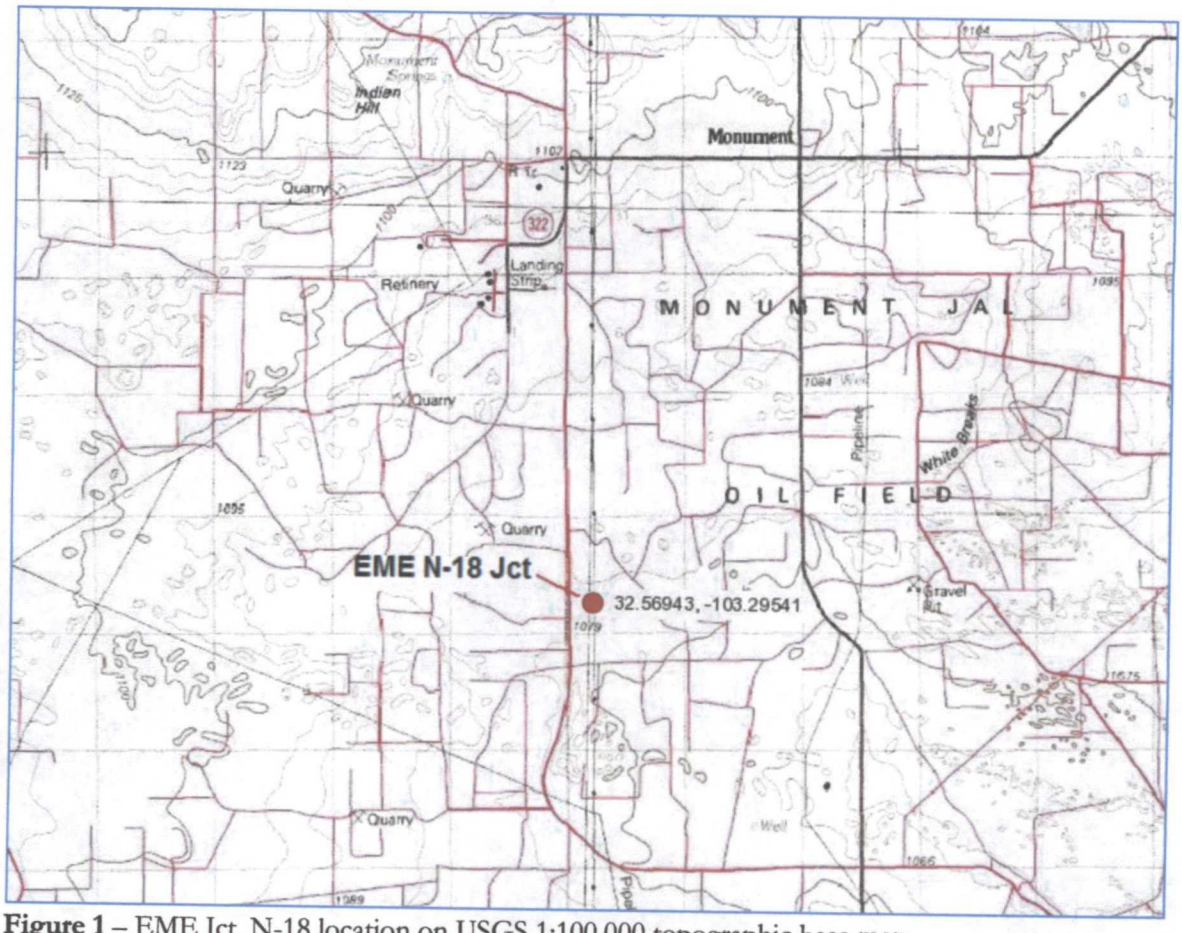


Figure 1 – EME Jct. N-18 location on USGS 1:100,000 topographic base map.

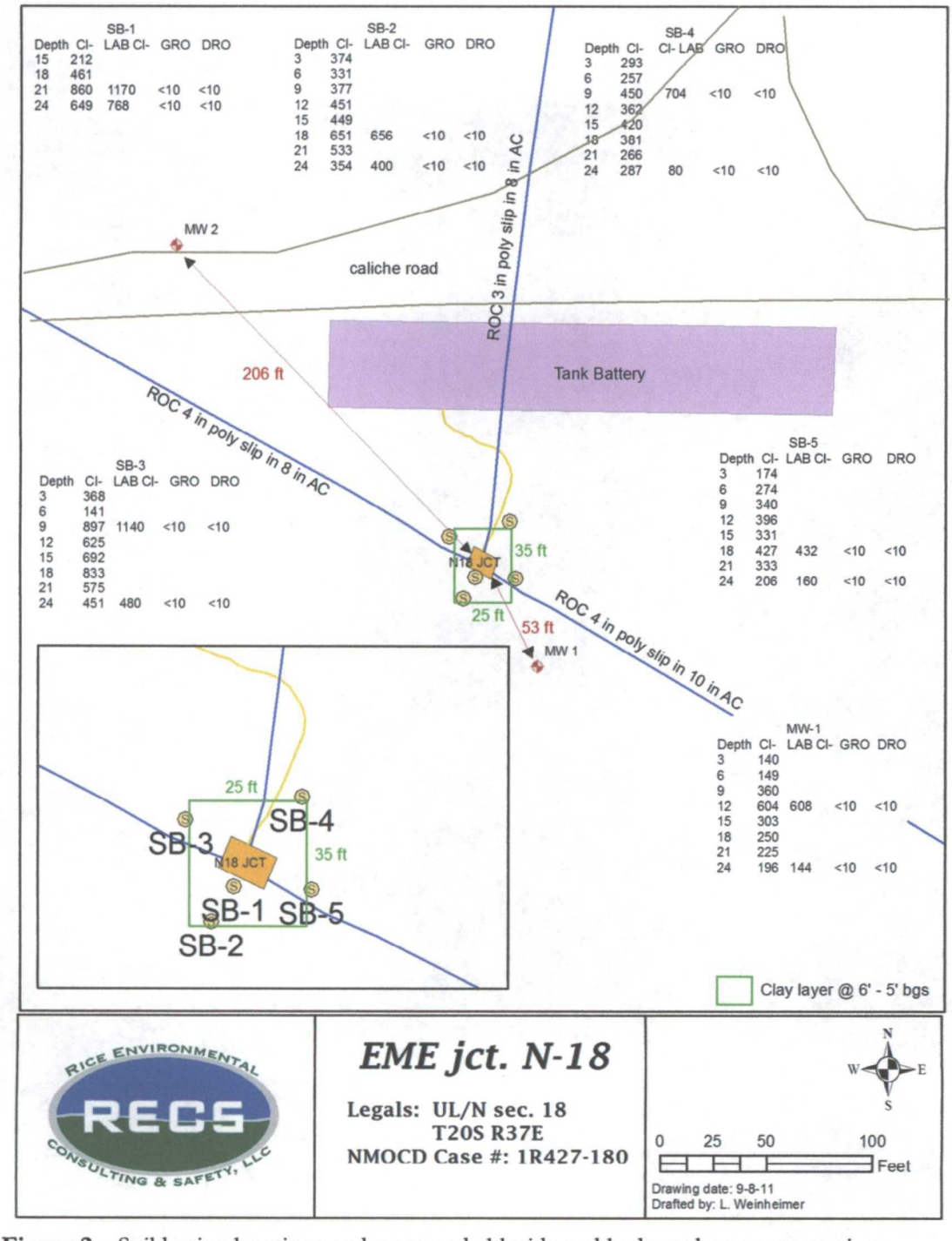


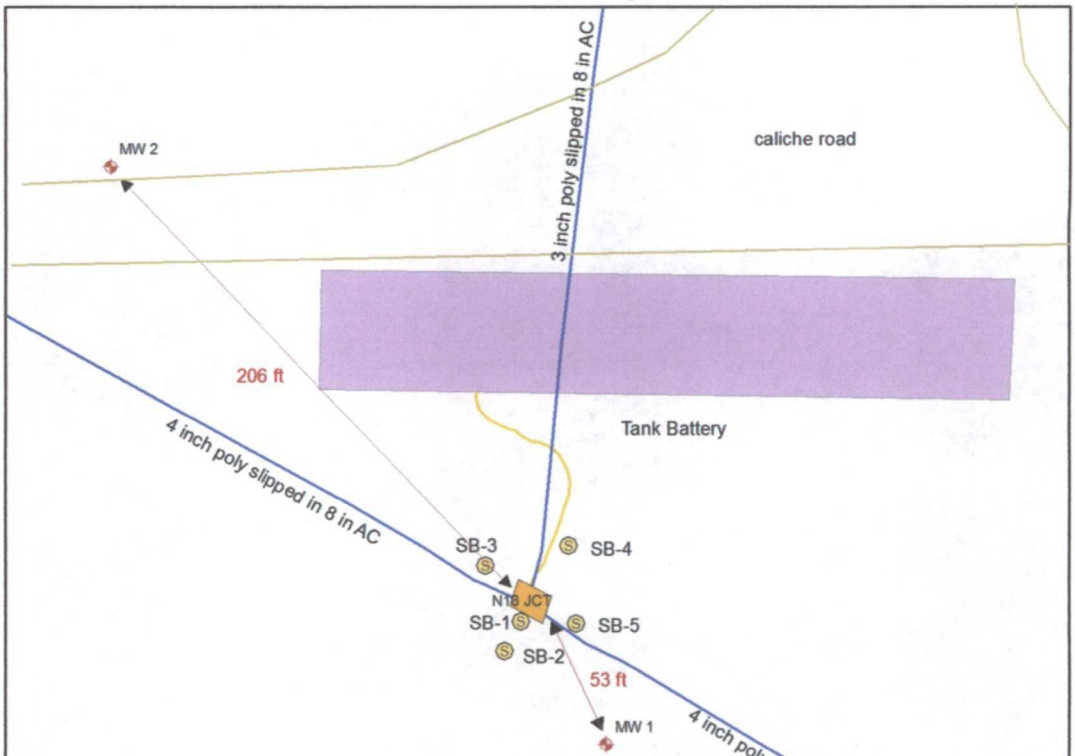
Figure 2 – Soil boring locations and measured chloride and hydrocarbon concentrations.

Soil & Groundwater Chloride Calculator
Estimated Mass of Contributed, Residual Chloride
from unsaturated zone soil and saturated zone groundwater

Site:	**EME N-18 Jct**	
This estimate prepared by:	L. Peter Galusky, Jr.	
Date:	9/20/11	
Model Inputs		Notes
length of affected area (ft)	50	measured/estimated
width of affected area (ft)	50	measured/estimated
depth to water table (ft)	24+	measured
unsat zone affected depth (ft)	10	bottom 10 ft of unsat zone
sat zone affected thickness (ft)	10	prescribed by NMOCD
unsat zone avg Cl- conc of affected soil (ppm)	414	measured/estimated
unsat zone est. natural background Cl- conc (ppm)	140	lowest reading found
unsat zone mass density (lbs/cu yd)	3,000	estimated
Cl- conc of affected groundwater (ppm)	0	no effect found
Cl- conc of up-gradient groundwater (ppm)	1,320	measured
sat zone mass density (lbs/cu yd)	3,000	estimated
Intermediate (calculated) Parameters		
affected area (sq ft)	1,963	calculated
unsat zone Cl- conc attributed to source (ppm)	274	calculated
unsat zone volume of affected soil (cu yds)	727	calculated
unsat zone total mass of affected soils (lbs)	2,180,556	calculated
unsat zone mass of contributed residual soil chloride (lbs)	597	calculated
volume of affected groundwater (cu ft)	25,000	calculated
mass of affected groundwater (lbs)	187,500	calculated
mass of contributed Cl- in affected groundwater	0	calculated
Estimated Contributed Cl- Mass and Equivalent Pumping Volume & Time		
Max potential chlorides from unsaturated zone (soils)	597	calculated
Maximum potential chlorides from affected groundwater	0	calculated
Total mass of contributed chlorides (lbs)	**597**	**calculated**

Note: It is assumed that only the lower 10 ft of soils in the affected unsaturated zone will potentially contribute chlorides to groundwater, as an infiltration barrier has been installed across this site. Therefore, in estimating the mass of contributed chlorides from the unsaturated zone only the lower ten feet were considered in the calculations.

Table 1 – Estimated mass of residual chlorides contributed by operation of the former EME Jct. N-18 box.



MW	Depth to Water	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
1	30.7	10/15/2010	970	2220	<0.001	<0.001	<0.001	<0.003	291
1	30.56	2/28/2011	1000	2260	<0.001	<0.001	<0.001	<0.003	268
1	30.58	5/25/2011	850	2430	<0.001	<0.001	<0.001	<0.003	256
1	30.83	8/15/2011	860	2090	<0.001	<0.001	<0.001	<0.003	250

MW	Depth to Water	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
2	29.19	10/15/2010	1320	2780	<0.001	<0.001	<0.001	<0.003	140
2	29.06	2/28/2011	1340	2640	<0.001	<0.001	<0.001	<0.003	151
2	29.07	5/25/2011	1420	3110	<0.001	<0.001	<0.001	<0.003	150
2	29.35	8/15/2011	1380	2810	<0.001	<0.001	<0.001	<0.003	139

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

EME jct. N-18

Legals: UL/N sec. 18
T20S R37E
NMOCD Case #: 1R427-180

N W E S

0 20 40 80 Feet

Drawing date:10-21-11
Drafted by: L. Weinheimer

Figure 3 – Monitoring well sampling results.

Figure 4 – Compaction of installed clay infiltration barrier upon removal of former junction box.

Table 2 – MultiMed input parameter values used in model run.

MultiMed Input Parameter Value Estimates			
Parameter Group:	**SOURCE**		Notes
Source Length	15	m	... surface footprint of affected area.
Source Width	15	m	... surface footprint of affected area.
Source Infiltration Rate	0.033	m/yr	... assumed.
"	1.3	in/yr	
Initial Concentration	414	mg/l	... avg residudual soil Cl- conc
Source Duration	derived	yrs	
Source Decay Coef	2.5%	per year	... assumed.
Parameter Group:	**UNSAT ZONE FLOW**		
Flow Layer Thickness	9.14	m	... actual value is 7.32.
Sat Hydraulic Cond	3.60	cm/hr	... assumed
Effective Porosity	0.3		... assumed
Parameter Group:	**UNSAT ZONE FLOW**		
Transport Layer Thickness	9.14	m	... actual value is 7.32.
Bulk Density	1.83	g/cm3	... assumed
Parameter Group:	**UNSAT ZONE FLOW**		
Aquifer Thickness	20	m	... assumed.
Mixing Zone Thickness	derived	m	
Effective Porosity	0.30		... assumed
Sat Hydraulic Cond	30	m/yr	... assumed
Hydraulic Gradient	0.003	m/m	... assumed
Parameter Group:	**WELL LOC and TIME**		
Radial Dist to Receptor Well	1	m	... assumed

Notes:
1- Model would not run with unsat thickness of less than 9.14 m.
2- Model would not run with aquifer thickness << approx. 20 m.
3- Assumed infiltration rate of 1.3 in/yr was used.

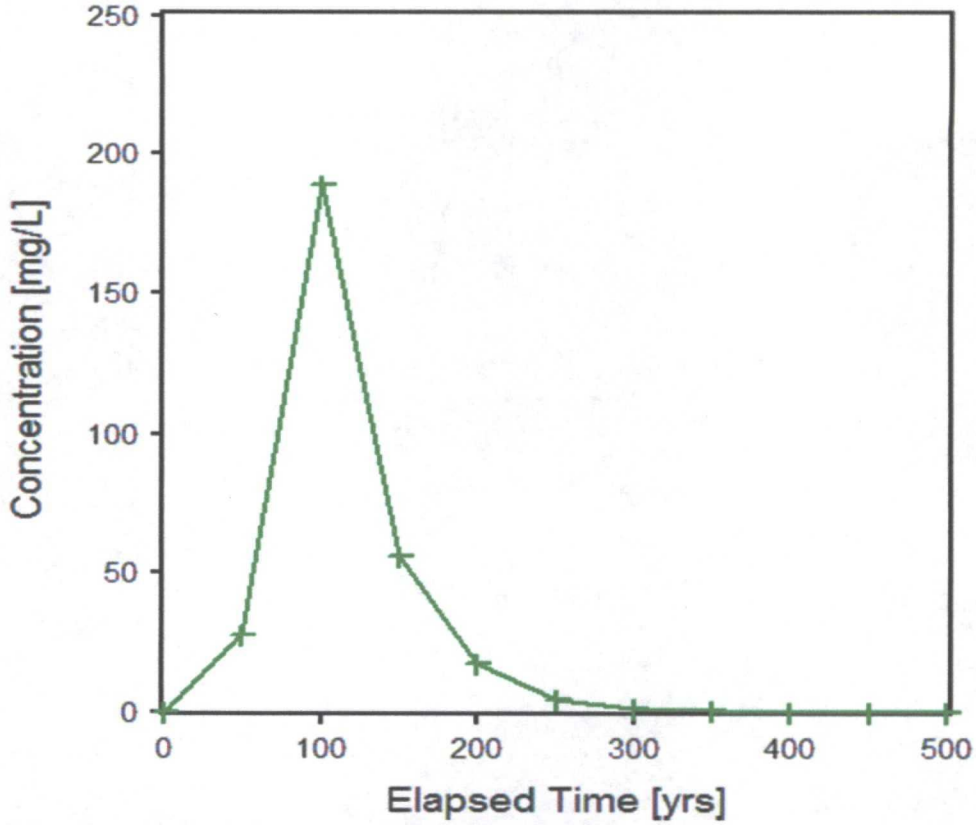


Figure 5 – MultiMed projected elevation (from baseline) in groundwater chloride concentrations over time beneath the EME Jct. N-18 location.

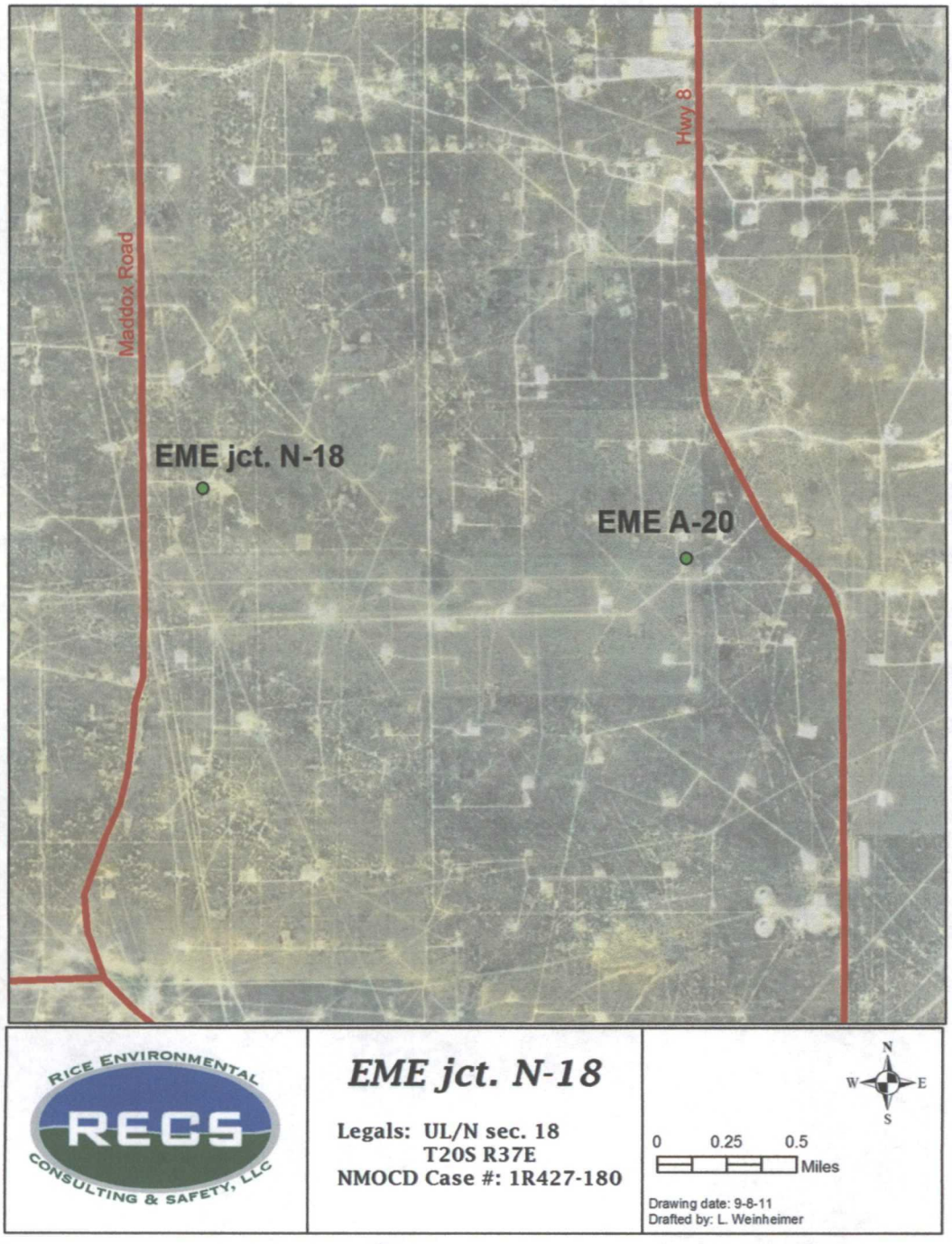


Figure 6 – EME Jct. N-18 in relation to the recovery system located at EME A-20.

Figure 7 – View of EME Jct. N-18 site showing active lease road.

APPENDIX A - Soil Sample Laboratory Analyses

(... for samples taken September 16th, 2010)

CARDINAL Laboratories

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

September 20, 2010

HACK CONDER

RICE ENVIRONMENTAL CONSULTING & SAFETY LLC

112 W. TAYLOR

HOBBS, NM 88240

RE: EME JCT N-18

Enclosed are the results of analyses for samples received by the laboratory on 09/16/10 15:36.

Cardinal Laboratories is accredited through Texas NELAP for:

Method SW-846 8021	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method SW-846 8260	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method TX 1005	Total Petroleum Hydorcarbons

Certificate number T104704398-08-TX. Accreditation applies to solid and chemical materials and non-potable water matrices.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene
Lab Director/Quality Manager

Page 1 of 10

CARDINAL Laboratories

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

Analytical Results For:

RICE ENVIRONMENTAL CONSULTING & SAFETY,
HACK CONDER
112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: SB - 1 @ 21' (H020866-01)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1070	16.0	09/17/2010	ND	416	104	400	0.00	

TPH 8015M — mg/kg — Analyzed By: AB — S-04

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*78.5 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*62.1 %*	*70-130*

Sample ID: SB - 1 @ 24' (H020866-02)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	768	16.0	09/17/2010	ND	416	104	400	0.00	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*66.2 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*85.0 %*	*70-130*

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*=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

RICE ENVIRONMENTAL CONSULTING & SAFETY
HACK CONDER
112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: SB - 2 @ 18' (H020866-03)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	656	16.0	09/17/2010	ND	416	104	400	0.00	

TPH 8015M — mg/kg — Analyzed By: AB — S-04

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*90.2 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*63.0 %*	*70-130*

Sample ID: SB - 2 @ 24' (H020866-04)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	400	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*92.4 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*73.4 %*	*70-130*

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Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

RICE ENVIRONMENTAL CONSULTING & SAFETY
HACK CONDER
112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: SB - 3 @ 9' (H020866-05)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1140	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*89.9 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*79.3 %*	*70-130*

Sample ID: SB - 3 @ 24' (H020866-06)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	480	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*94.5 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*83.7 %*	*70-130*

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

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HACK CONDER
112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: SB - 4 @ 9' (H020866-07)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	704	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*89.4 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*73.1 %*	*70-130*

Sample ID: SB - 4 @ 24' (H020866-08)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	80.0	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*93.3 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*87.8 %*	*70-130*

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Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: SB - 5 @ 18' (H020866-09)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	432	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*93.9 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*99.3 %*	*70-130*

Sample ID: SB - 5 @ 24' (H020866-10)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	160	16.0	09/17/2010	ND	416	104	400	16.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/19/2010	ND	168	84.0	200	1.01	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	164	81.9	200	3.91	

Surrogate: 1-Chlorooctane	*93.2 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*106 %*	*70-130*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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112 W. TAYLOR
HOBBS NM, 88240
Fax To: (575) 397-1471

Received:	09/16/2010	Sampling Date:	09/16/2010
Reported:	09/20/2010	Sampling Type:	Soil
Project Name:	EME JCT N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	EME JCT N-18		

Sample ID: MW - 1 @ 12' (H020866-11)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: MM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifer
Chloride	608	16.0	09/17/2010	ND	416	104	400	15.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifer
GRO C6-C10	<10.0	10.0	09/19/2010	ND	174	87.1	200	2.17	
DRO >C10-C28	<10.0	10.0	09/19/2010	ND	165	82.4	200	0.797	

Surrogate: 1-Chlorooctane	*53.6 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*75.1 %*	*70-130*

Sample ID: MW 1 @ 24' (H020866-12)

Chloride, SM4500Cl-B — mg/kg — Analyzed By: MM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifer
Chloride	144	16.0	09/17/2010	ND	416	104	400	15.7	

TPH 8015M — mg/kg — Analyzed By: AB

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifer
GRO C6-C10	<10.0	10.0	09/20/2010	ND	174	87.1	200	2.17	
DRO >C10-C28	<10.0	10.0	09/20/2010	ND	165	82.4	200	0.797	

Surrogate: 1-Chlorooctane	*101 %*	*70-130*
Surrogate: 1-Chlorooctadecane	*83.0 %*	*70-130*

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* =Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

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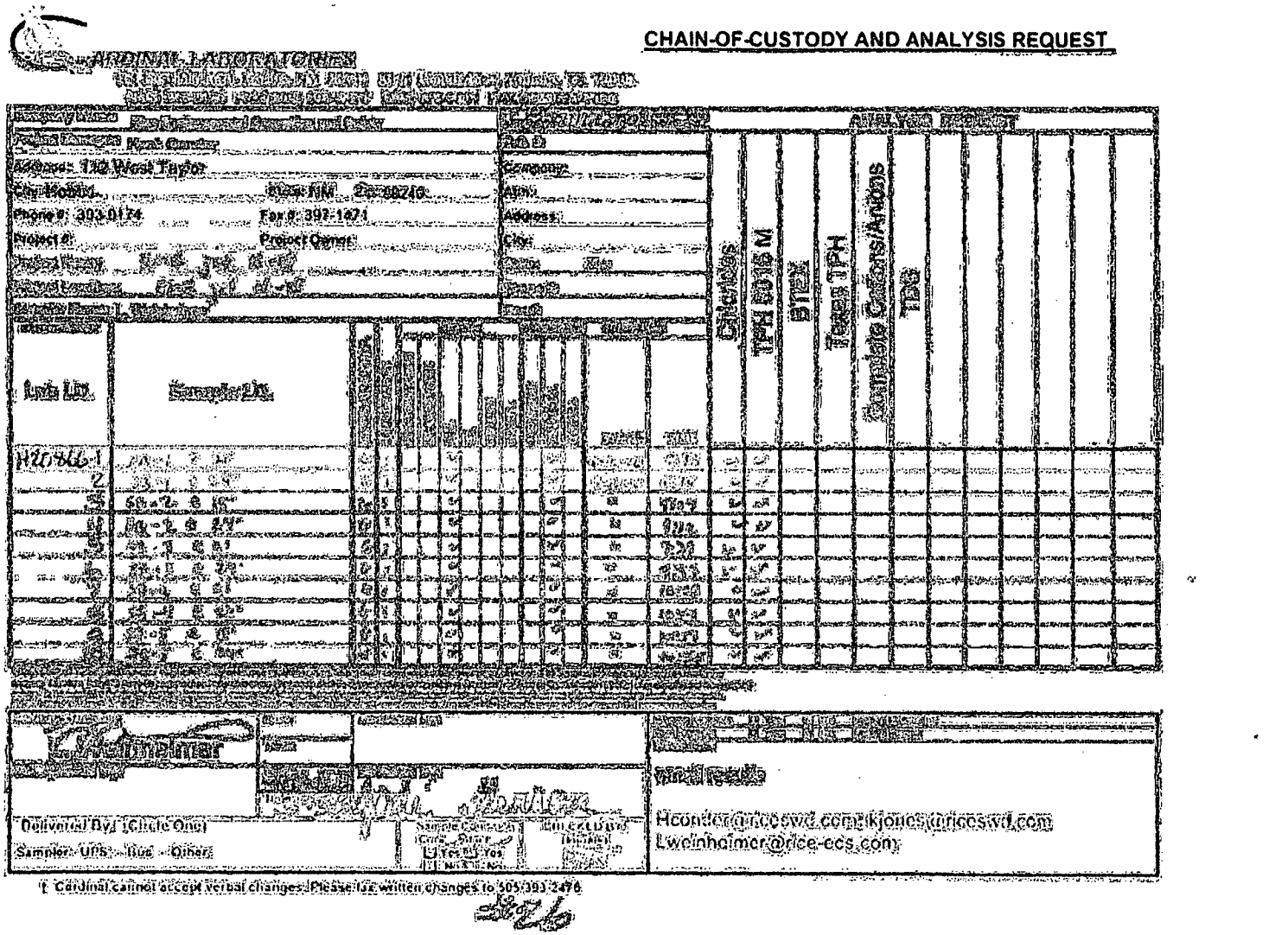
Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

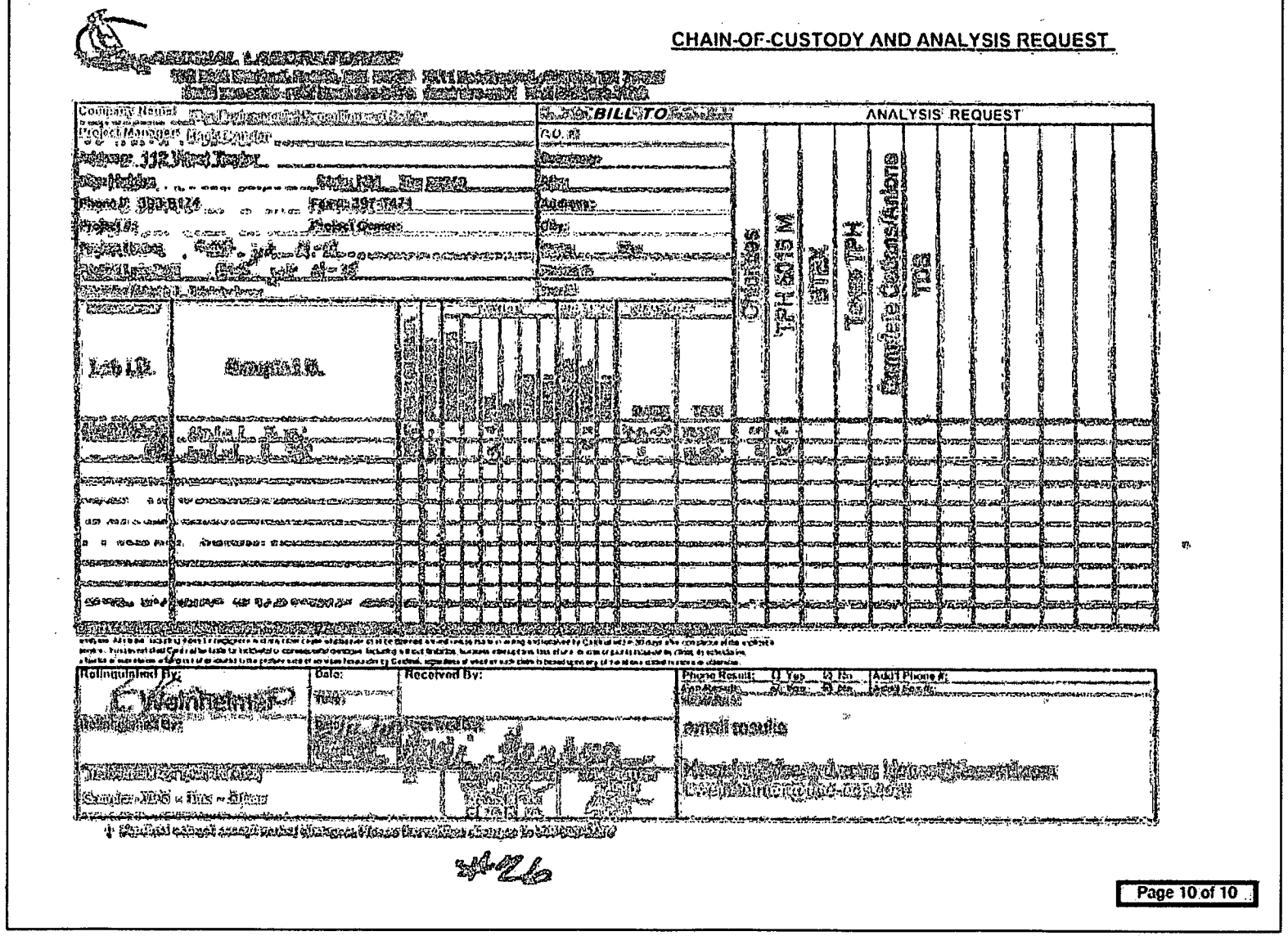


CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES

Chlorides
TPH 8015 M
BTEX
Total TPH
Cumulative Gallons/Anions
TDS

Page 9 of 10



CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

BILL TO

ANALYSIS REQUEST

Chlorides
TPH 8015 M
BTEX
Total TPH
Complete Cations/Anions
TDS

Relinquished By:
Date:
Received By:
Phone Result: Yes No
Add'l Phone #:
email results

Page 10 of 10

APPENDIX B - Groundwater Sample Laboratory Analyses

(... for samples taken August 15th, 2011)

CARDINAL Laboratories

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

August 24, 2011

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: EME JUNCTION N-18

Enclosed are the results of analyses for samples received by the laboratory on 08/18/11 17:25.

Cardinal Laboratories is accredited through Texas NELAP for:

Method SW-846 8021	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method SW-846 8260	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method TX 1005	Total Petroleum Hydorcarbons

Certificate number T104704398-08-TX. Accreditation applies to solid and chemical materials and non-potable water matrices.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

Page 1 of 5

CARDINAL Laboratories

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

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	08/18/2011	Sampling Date:	08/15/2011
Reported:	08/24/2011	Sampling Type:	Water
Project Name:	EME JUNCTION N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Aaron Berry
Project Location:	T20S-R36E-SEC18 N-LEA CTY., NM		

Sample ID: MONITOR WELL #1 (H101756-01)

BTEX 8260B — mg/L — Analyzed By: CMS

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	08/20/2011	ND	0.018	91.4	0.0200	4.82	
Toluene*	<0.001	0.001	08/20/2011	ND	0.019	93.6	0.0200	6.73	
Ethylbenzene*	<0.001	0.001	08/20/2011	ND	0.020	99.4	0.0200	6.76	
Total Xylenes*	<0.003	0.003	08/20/2011	ND	0.056	93.1	0.0600	6.09	

Surrogate: Dibromofluoromethane	*140 %*	*70-130*
Surrogate: Toluene-d8	*95.2 %*	*70-130*
Surrogate: 4-Bromofluorobenzene	*76.5 %*	*70-130*

Chloride, SM4500Cl-B — mg/L — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	860	4.00	08/19/2011	ND	108	108	100	0.00	

Sulfate 375.4 — mg/L — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate	250	10.0	08/19/2011	ND	18.5	92.5	20.0	1.08	

TDS 160.1 — mg/L — Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS	2090	5.00	08/19/2011	ND	231	96.2	240	3.36	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

Rice Operating Company
Hack Conder
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	08/18/2011	Sampling Date:	08/15/2011
Reported:	08/24/2011	Sampling Type:	Water
Project Name:	EME JUNCTION N-18	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Aaron Berry
Project Location:	T20S-R36E-SEC18 N-LEA CTY., NM		

Sample ID: MONITOR WELL #2 (H101756-02)

BTEX 8260B mg/L Analyzed By: CMS

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	08/20/2011	ND	0.018	91.4	0.0200	4.82	
Toluene*	<0.001	0.001	08/20/2011	ND	0.019	93.6	0.0200	6.73	
Ethylbenzene*	<0.001	0.001	08/20/2011	ND	0.020	99.4	0.0200	6.76	
Total Xylenes*	<0.003	0.003	08/20/2011	ND	0.056	93.1	0.0600	6.09	

Surrogate: Dibromofluoromethane	*137 %*	*70-130*
Surrogate: Toluene-d8	*94.7 %*	*70-130*
Surrogate: 4-Bromofluorobenzene	*71.8 %*	*70-130*

Chloride, SM4500Cl-B mg/L Analyzed By: KM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1380	4.00	08/19/2011	ND	108	108	100	0.00	

Sulfate 375.4 mg/L Analyzed By: KM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate	139	10.0	08/19/2011	ND	18.5	92.5	20.0	1.08	

TDS 160.1 mg/L Analyzed By: KM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS	2810	5.00	08/19/2011	ND	231	96.2	240	3.36	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

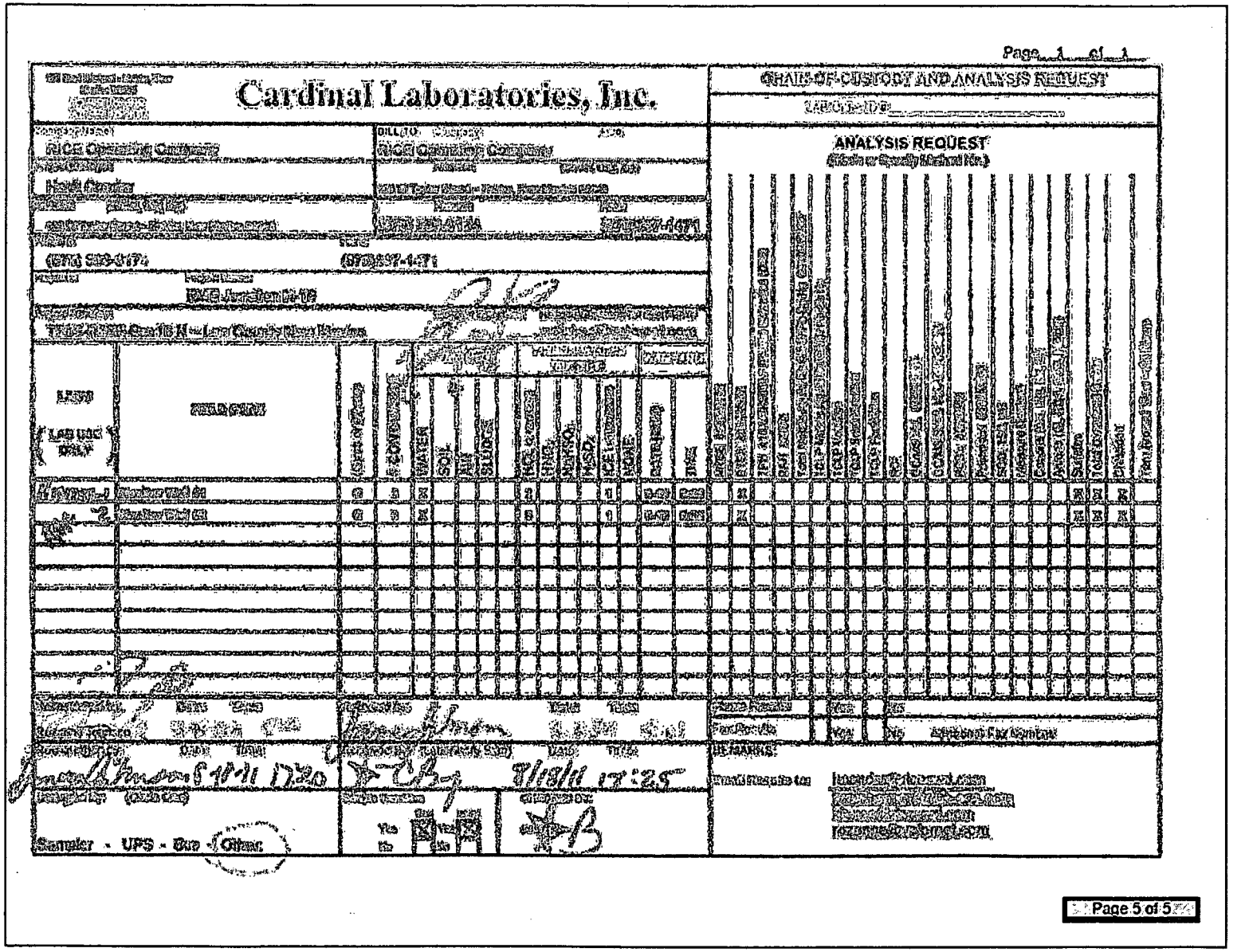
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on as as received basis (wet) unless otherwise noted on report

Cardinal Laboratories

°=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

EME Jct. N-18



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Cardinal Laboratories, Inc.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

ANALYSIS REQUEST

Page 5 of 5

APPENDIX C – MultiMed Output

```
  MULTIMED  V1.01   DATE OF CALCULATIONS: 28-OCT-2011  TIME: 13:27:58

                      U. S.   E N V I R O N M E N T A L   P R O T E C T I O N   A G E N C Y

                                        E X P O S U R E   A S S E S S M E N T

                                          M U L T I M E D I A   M O D E L

                                        MULTIMED  (Version 1.50, 2005)
1
 Run options
 --- -------




 Chemical simulated is Chloride


 Option Chosen                          Saturated and unsaturated zone models
 Run was                                DETERMIN
 Infiltration Specified By User: 3.300E-02 m/yr
 Run was transient
 Well Times: Entered Explicitly
 Reject runs if Y coordinate outside plume
 Reject runs if Z coordinate outside plume
 Gaussian source used in saturated zone model
1
1
 UNSATURATED ZONE FLOW MODEL PARAMETERS
 (input parameter description and value)
 NP       - Total number of nodal points                240
 NMAT     - Number of different porous materials          1
 KPROP    - Van Genuchten or Brooks and Corey             1
 IMSHGN   - Spatial discretization option                 1
 NVFLAYR  - Number of layers in flow model                1


 OPTIONS CHOSEN
 ------- ------
 Van Genuchten functional coefficients
 User defined coordinate system
1


 Layer information
 -----------------
 LAYER NO.     LAYER THICKNESS     MATERIAL PROPERTY
 ---------     ---------------     -----------------
     1                 9.14              1


                                                  DATA FOR MATERIAL  1
                                                  ---- --- --------
                                              VADOSE ZONE MATERIAL VARIABLES


-------------------------------------------------------------------------------------------------------------------
                    VARIABLE NAME                UNITS      DISTRIBUTION          PARAMETERS
LIMITS
                                                                                  MEAN      STD DEV
MIN         MAX
-------------------------------------------------------------------------------------------------------------------
          Saturated hydraulic conductivity       cm/hr      CONSTANT             3.60      -999.
-999.       -999.
          Unsaturated zone porosity              --         CONSTANT            0.250      -999.
-999.       -999.
          Air entry pressure head                m          CONSTANT            0.700      -999.
```

```
-999.       -999.
            Depth of the unsaturated zone              m           CONSTANT        9.14      0.000
0.000       0.000

                                                    DATA FOR MATERIAL  1
                                                    ---- --- --------
                                                 VADOSE ZONE FUNCTION VARIABLES

-------------------------------------------------------------------------------------------------------------------
                        VARIABLE NAME                  UNITS      DISTRIBUTION          PARAMETERS
LIMITS                                                                                   MEAN      STD DEV
MIN         MAX
-------------------------------------------------------------------------------------------------------------------
            Residual water content                     --          CONSTANT        0.116     -999.
-999.       -999.
            Brook and Corey exponent,EN                --          CONSTANT        -999.     -999.
-999.       -999.
            ALFA coefficient                          1/cm         CONSTANT        0.500E-02 -999.
-999.       -999.
            Van Genuchten exponent, ENN                --          CONSTANT         1.09     -999.
-999.       -999.
1

 UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

 NLAY    - Number of different layers used                    1
 NTSTPS  - Number of time values concentration calc          40
 DUMMY   - Not presently used                                1
 ISOL    - Type of scheme used in unsaturated zone           2
 N       - Stehfest terms or number of increments           18
 NTEL    - Points in Lagrangian interpolation                3
 NGPTS   - Number of Gauss points                          104
 NIT     - Convolution integral segments                     2
 IBOUND  - Type of boundary condition                        3
 ITSGEN  - Time values generated or input                    1
 TMAX    - Max simulation time                --           0.0
 WTFUN   - Weighting factor                   --           1.2


 OPTIONS CHOSEN
 ------- ------
 Convolution integral approach
 Exponentially decaying continuous source
 Computer generated times for computing concentrations
1

                                                    DATA FOR LAYER   1
                                                    ---- --- -----
                                                    VADOSE TRANSPORT VARIABLES

-------------------------------------------------------------------------------------------------------------------
                        VARIABLE NAME                  UNITS      DISTRIBUTION          PARAMETERS
LIMITS                                                                                   MEAN      STD DEV
MIN         MAX
-------------------------------------------------------------------------------------------------------------------
            Thickness of layer                         m           CONSTANT        9.14      -999.
-999.       -999.
            Longitudinal dispersivity of layer         m           DERIVED         -999.     -999.
-999.       -999.
            Percent organic matter                     --          CONSTANT        0.000     -999.
-999.       -999.
```

	Bulk density of soil for layer	g/cc	CONSTANT	1.83	-999.
-999.	-999.				
	Biological decay coefficient	1/yr	CONSTANT	0.000	-999.
-999.	-999.				
1					

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	
			MEAN	STD DEV
LIMITS				
MIN MAX				
Solid phase decay coefficient	1/yr	CONSTANT	0.000	-999.
-999. -999.				
Dissolved phase decay coefficient	1/yr	CONSTANT	0.000	-999.
-999. -999.				
Overall chemical decay coefficient	1/yr	CONSTANT	0.000	-999.
-999. -999.				
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.
-999. -999.				
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.
-999. -999.				
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.
-999. -999.				
Reference temperature	C	CONSTANT	25.0	-999.
-999. -999.				
Normalized distribution coefficient	ml/g	CONSTANT	0.000	-999.
-999. -999.				
Distribution coefficient	--	DERIVED	-999.	-999.
-999. -999.				
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.
-999. -999.				
Air diffusion coefficient	cm2/s	CONSTANT	-999.	-999.
-999. -999.				
Reference temperature for air diffusion	C	CONSTANT	-999.	-999.
-999. -999.				
Molecular weight	g/M	CONSTANT	-999.	-999.
-999. -999.				
Mole fraction of solute	--	CONSTANT	-999.	-999.
-999. -999.				
Vapor pressure of solute	mm Hg	CONSTANT	-999.	-999.
-999. -999.				
Henry`s law constant	atm-m^3/M	CONSTANT	-999.	-999.
-999. -999.				
Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000
0.000 1.00				
Not currently used		CONSTANT	0.000	0.000
0.000 0.000				
Not currently used		CONSTANT	0.000	0.000
0.000 0.000				
1				

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	
			MEAN	STD DEV
LIMITS				
MIN MAX				
Infiltration rate	m/yr	CONSTANT	0.330E-01	-999.
-999. -999.				
Area of waste disposal unit	m^2	DERIVED	0.139E+04	-999.
-999. -999.				
Duration of pulse	yr	DERIVED	50.0	-999.

-999. -999.
Spread of contaminant source m DERIVED -999. -999.
-999. -999.
Recharge rate m/yr CONSTANT 0.000 -999.
-999. -999.
Source decay constant 1/yr CONSTANT 0.250E-01 0.000
0.000 0.000
Initial concentration at landfill mg/l CONSTANT 414. -999.
-999. -999.
Length scale of facility m CONSTANT 20.1 -999.
-999. -999.
Width scale of facility m CONSTANT 24.4 -999.
-999. -999.
Near field dilution DERIVED 1.00 0.000
0.000 1.00
1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	-999.	-999.	-999.	-999.
Aquifer porosity	--	CONSTANT	0.300	-999.	-999.	-999.
Bulk density	g/cc	CONSTANT	1.70	-999.	-999.	-999.
Aquifer thickness	m	CONSTANT	20.0	-999.	-999.	-999.
Source thickness (mixing zone depth)	m	DERIVED	3.00	-999.	-999.	-999.
Conductivity (hydraulic)	m/yr	CONSTANT	30.0	-999.	-999.	-999.
Gradient (hydraulic)		CONSTANT	0.300E-02	-999.	-999.	-999.
Groundwater seepage velocity	m/yr	DERIVED	-999.	-999.	-999.	-999.
Retardation coefficient	--	DERIVED	-999.	-999.	-999.	-999.
Longitudinal dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Transverse dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Vertical dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Temperature of aquifer	C	CONSTANT	20.0	-999.	-999.	-999.
pH	--	CONSTANT	7.00	-999.	-999.	-999.
Organic carbon content (fraction)		CONSTANT	0.000	-999.	-999.	-999.
Well distance from site	m	CONSTANT	1.00	-999.	-999.	-999.
Angle off center	degree	CONSTANT	0.000	-999.	-999.	-999.
Well vertical distance	m	CONSTANT	0.000	-999.	-999.	-999.

1

TIME	CONCENTRATION
0.000E+00	0.00000E+00
0.500E+02	0.27562E+02
0.100E+03	0.18901E+03
0.150E+03	0.55758E+02
0.200E+03	0.17119E+02

0.250E+03	0.46315E+01
0.300E+03	0.14038E+01
0.350E+03	0.38302E+00
0.400E+03	0.11000E+00
0.450E+03	0.30663E-01
0.500E+03	0.74366E-02