428-51 1R -

REPORTS

DATE:

4-13-11

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

April 13, 2011

Mr. Edward J. Hansen New Mexico Oil Conservation Division 1220 South St. Francis Drive Santa Fe, New Mexico 87505 Via E-mail

RE: Termination Request Hobbs Jct. F-31-2, NMOCD Case #1R428-56 Township 18S, Range 38E, Section 31, Unit F

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Mr. Hansen,

R.T. Hicks Consultants, Ltd. is submitting this Termination Request on behalf of Rice Operating Company (ROC) for the above-referenced site. The investigation demonstrated that neither chloride nor hydrocarbons are present in the vadose zone in quantities that represent a threat to fresh water or the environment and recommended re-vegetation. Excavation, liner installation, surface restoration and re-vegetation efforts have been completed at the site.

Background

The Hobbs Jct. F-31-2 site is located west of the city of Hobbs at Township 18S, Range 38E, Section 31, Unit F. In 2002 a 5-foot deep excavation at this site identified hydrocarbon-impacted soil. The Investigation & Characterization Plan (ICP) was dated January 20, 2010 and approved by the NMOCD on January 21, 2010. The ICP includes background information and a site vicinity map for this and three other nearby ROC sites and is attached as a supporting document in the Corrective Action Plan.

As part of the approved ICP, ROC planned to install and sample at least five 12-foot deep backhoe trenches. When near surface rock proved too hard to penetrate with a backhoe, a deep soil sampling program to delineate the extent and magnitude of media impact was implemented in April 2010. Our November 2, 2010 Corrective Action Plan (CAP) described the results of that field program and presented recommended actions. ROC submitted an addendum to the CAP that revised the recommended actions on December 14, 2010. The CAP and addendum were approved by the NMOCD on December 23, 2010. The CAP, addendum, and NMOCD approval are included in Attachment A.

The CAP recommended corrective action for the site included:

- Installing a 30 x 22.5 foot synthetic liner 10 feet below ground surface.
- Backfill above this liner would contain soil with no more than 1,000 mg/kg chloride and a field screening less than 100 using a PID.
- Installing a second 30 x 45 foot synthetic liner 4 feet below ground surface. (See the figure accompanying the Addendum in Attachment A)
- Backfill above this liner would contain soil with no more than 500 mg/kg chloride and a field screening less than 100 using a PID.
- Re-vegetation and basic surface restoration

April 13, 2011 Page 2

Corrective Action

Liner installation, backfilling and surface restoration efforts were conducted at the site between December 27, 2010 and February 17, 2011. ROC work included:

- Excavating the site to 30 x 45 x 5 feet below ground surface (bgs) and, on the north end, an area 30 x 22.5 x 10 feet bgs,
- Hauling 672 yards of soil to an NMOCD approved landfill,
- Installing synthetic liners as proposed,
- Importing 696 yards of soil, hay and sand,
- Sampling and analyzing backfill for Chloride and TPH,
- Contouring the site to the surrounding area,
- Installing silt net fencing around the area,
- Adding soil amendments and seeding the area with native grasses

Attachment B includes notes and photos documenting the excavation, liner installations, surface restoration and re-vegetation efforts at the site, as well as the laboratory results of sampling of backfill.

Recommendations

Previous investigations demonstrate that residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or suface water in excess of the standards in Subsections B and C of 19.15.30.9 NMAC through leaching, percolation or other transport mechanisms, or as the water table fluctuates. The installation of synthetic liners and re-vegetation of the site meets the mandate of NMOCD Rules for protection of surface water and the environment. ROC's documented actions will foster re-vegetation at the site. Re-vegetation of the ground surface will limit infiltration of precipitation and the subsequent migration of constituents of concern to ground water. We recommend termination of the regulatory file.

ROC is the service provider (agent) for the Hobbs Saltwater Disposal System and has no ownership of any portion of pipeline, well, or facility. A consortium of oil producers that own the Hobbs System (System Parties) provides all operating capital on a percentage ownership/usage basis. The Hobbs SWD system is in abandonment.

Please contact Hack Conder of ROC at 575-393-9174 if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely, R.T. Hicks Consultants, Ltd.

Katie Lee Project Scientist

Copy: Hack Conder, Rice Operating Company

Attachment A

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Corrective Action Plan & Addendum

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142 Albuquerque, NM 87104

Katie Lee

From:	Hansen, Edward J., EMNRD [edwardj.hansen@state.nm.us]
Sent:	Thursday, December 23, 2010 9:24 AM
To:	Hack Conder
Cc:	Leking, Geoffrey R, EMNRD; Katie Jones; 'Dale Littlejohn'; Katie Lee
Subject	: Corrective Action Plan (1R428-56) Approval - ROC Hobbs SWD Jct F-31-2 Site
RE:	"Corrective Action Plan" for the Rice Operating Company's Hobbs SWD Jct F-31-2 Site

Corrective Action Plan (1R428-56) Approval

Dear Mr. Conder:

The New Mexico Oil Conservation Division (OCD) has received the Corrective Action Plan for the Hobbs SWD Jct F-31-2 Site, dated November 2, 2010, and addendum (dated December 14, 2010) and has conducted a review of the Plan. The Plan indicates that Rice Operating Company (ROC) has met the requirements of 19.15.29 NMAC (Part 29; formerly, Rule 116) for a remediation plan. Therefore, the OCD hereby conditionally approves the Corrective Action Plan as proposed for above-referenced site in accordance with 19.15.29 NMAC:

Unit Letter F, Section 31, T18S, R38E, NMPM, Lea County, New Mexico

ROC must submit to the OCD a final report of the corrective actions within 120 days.

Please be advised that OCD approval of this Plan does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

If you have any questions regarding this matter, please contact me at 505-476-3489.

Edward J. Hansen Hydrologist Environmental Bureau

Katie Lee

From:	Katie Jones [kjones@riceswd.com]
Sent:	Tuesday, December 14, 2010 2:41 PM
То:	Edward J. EMNRD Hansen
Cc:	Hack Conder; Katie Lee
Subject:	Hobbs Jct. F-31-2 (1R428-56) CAP Addendum
Follow Up Flag:	Follow up
Flag Status:	Red
Mr Hansen	

wir. Hansen:

The following is an Addendum to the Hobbs Jct. F-31-2 (1R428-56) CAP submitted to the NMOCD on November 2, 2010. Page 4, section: Recommendations, paragraph 2; red lettering will be deleted from the paragraph and blue lettering should be added to the paragraph. If you need any other information, please let me or Hack Conder know.

"Our recommended corrective action for the site is installation of a 30 x 30 foot synthetic liner 4-5 feet below ground surface centered over the former junction box and backfilling with soil containing no more than 500 mg/kg chloride and with a field screening less than 100 using a PID: Our recommended corrective action for the site is installing double liners. First, a 30 x 22.5 foot synthetic liner 10 feet below ground surface will be installed based on the attached Figure. Backfill above this liner will contain soil with no more than 1,000 mg/kg chloride and a field screening less than 100 using a PID. Second, a 30 x 45 foot synthetic liner 4 feet below ground surface will be installed based on the attached Figure. Backfill above this liner will contain soil with no more than 500 mg/kg chloride and a field screening less than 100 using a PID. We also recommend revegetation of the ground surface to limit infiltration of precipitation and the subsequent migration of constituents of concern to ground water. A synthetic liner installed below the root zone as proposed will inhibit the downward migration of water through the subsurface, slowing movement of chloride or soluble hydrocarbons toward ground water. Plants capture water through their roots, thereby reducing the volume of water infiltrating below the root zone. This natural "infiltration barrier" also helps protect ground water. Upon documentation of installation of the liner and re-seeding of the site with an appropriate mix of native grasses we will submit a Termination Request for this site's regulatory file."

Thank you.

Katie Jones Environmental Project Coordinator RICE Operating Company

Proposed liner



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R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

November 2, 2010

Mr. Edward J. Hansen New Mexico Oil Conservation Division 1220 South St. Francis Drive Santa Fe, New Mexico 87505

RE: Rice Operating Company, Hobbs SWD System Junction F-31-2 Site T-18-S, R-38-E, Section 31, Unit F, Lea County, New Mexico, NMOCD CASE #1R428-56 Correction Action Plan

Mr. Hansen:

On behalf of Rice Operating Company (ROC), R.T. Hicks Consultants, Ltd. is submitting this Correction Action Plan for the Hobbs Junction F-31-2 site. The investigation demonstrates that residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface water, in excess of the standards in Subsections B and C of 19.15.30.9 NMAC through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates. Our recommended corrective action for the site is installation of a 30 x 30 foot synthetic liner 4-5 feet below ground surface centered over the former junction box and backfilling with soil containing no more than 500 mg/kg chloride and with a field screening less than 100 using a PID. We also recommend re-vegetation of the site. Our recommended corrective action meets the mandate of NMOCD Rules for protection of surface water and the environment.

Background

The Hobbs Junction F-31-2 is located west of the city of Hobbs, New Mexico at T-18-S, R-38-E, Section 31, in Unit F. An initial 4-foot deep excavation was installed on November 13, 2002, which identified chloride- and hydrocarbon-impacted soil. The NMOCD-approved Investigation Characterization Plan (ICP), dated January 20, 2010 (Attachment A) was prepared to address the further delineation of the site. It includes background information, a site vicinity map, and a regional ground water gradient map.

Field Programs

As a part of the approved ICP, ROC planned to install and sampled at least five 12-foot deep backhoe trenches. However, attempts to excavate the initial trench at the site verified that the near surface rock was too hard to penetrate with a backhoe.

Hicks Consultants supervised a deep soil sampling program to delineate the extent and magnitude of media impact. On April 21 and 22, 2010, five 45- to

November 2, 2010 Page 2

55-foot deep soil borings were drilled near the original junction box location (SB-1) and the surrounding area (SB-2 to SB-5). ROC conducted field analysis of soil samples for chloride and volatile hydrocarbon vapors for the boring program. Most of the samples were recovered from drill cuttings because the soil was too hard to recover material with a split spoon sampler.

Plate 1 is a summary map that includes results of the field chloride analyses and hydrocarbon screening data as well as laboratory results for the soil samples used to verify the ROC field data. Attachment B provides the soil lithology logs for the soil borings, which includes the field chloride and hydrocarbon screening data and laboratory results. Attachment C provides the laboratory reports and chain of custody documents for all of the soil verification samples.

Results: Chloride

The initial ROC source area excavation, conducted in 2002, encountered a maximum chloride concentration of 319 mg/kg at 3 feet below the surface.

The soil borings were installed to delineate the depth and extent of chlorideimpacted soil relative to the NMOCD guideline target level. Generally, the highest chloride concentrations were observed adjacent to the inactive pipeline (SB-1 and SB-3) at depths of 20 to 40 feet below the surface. The maximum chloride concentrations were identified in SB-1 at 20 feet below the surface (1,250 mg/kg) and in SB-3 at 35 feet below the surface (1,140 mg/kg). Concentrations decrease with depth in each of the borings but remain above target level in SB-1 (336 mg/kg). A summary of the chloride laboratory results from all of the soil borings relative to the regulatory screening guideline is provided on Table 1.

Results: Hydrocarbons

The initial ROC source area excavation, conducted in 2002, encountered visible indications of hydrocarbon-impacted soil with "slight" odors. The excavation was fenced and left open.

Field screening of hydrocarbon vapors in the soil from the soil borings identified concentrations greater than 1,000 ppm only in SB-1 near the source area. The maximum reading (1,233 ppm) was observed at 20 feet below the surface from a split spoon sample. Laboratory analysis of this sample indicated concentrations of benzene (<0.05 mg/kg), toluene (4.63 mg/kg), ethylbenzene (9.61 mg/kg), and total xylenes (47.7 mg/kg). In addition, the sample contained gas and diesel range organics which are essentially non-soluble with respect to leaching. A summary of the hydrocarbon laboratory results from all of the soil borings relative to the regulatory screening guidelines is provided on Table 1 below.

Sample Location	Depth (feet)	Sample Date	PID (ppm)	Chloride (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)
	1000			1.			Nike Press		and the		
SB-1	20	4/21/10	1,233	1,250	< 0.05	4.63	9.61	47.70	62.0	1,700	3,910
1.	25	4/21/10	720	976	0.084	1.14	2.04	13.00	16.3	479	2,850
	55	4/21/10	13	336						<10	389
SB-2	10	4/21/10	106	832	< 0.05	0.210	0.361	2.58	3.20	<10	256
	15	4/21/10	297	432	< 0.05	0.198	0.695	3.07	4.01	<50	1,890
	55	4/21/10	146	128	<0.05	<0.05	< 0.05	0.378	0.53	<10	<10
SB-3	5	4/22/10	353	32	0.211	3.71	1.14	15.40	20.5	897	13,800
10000	35	4/22/10	222	1,140	< 0.05	0.707	0.226	2.34	3.32	<50	2,150
	55	4/22/10	35	144	<0.05	0.442	0.165	2.16	2.82	<50	316
SB-4	20	4/22/10	6	288						<10	<10
	45	4/22/10	27	208						<10	412
SB-5	20	4/22/10	712	624	< 0.05	0.438	1.20	8.29	10.0	362	4,350
	55	4/22/10	12	208						<10	81
NMOCD Gu	ideline Re	mediation L	evels	250	10		-		50		
2006 NMED Soil Com./Indus. Vapor Exposure Risk Screening Guidelines Protect GW (DAF ₂₀)					25.8	252	128	82		No reg	ulatory
					0.0201	21.7	20.2	2.06	-	standar	ds have
Site Specific GW Protective Levels (DAF ₂₉₉)				0.300	324	302	30.8		Deen est	aunshed	

Table 1 Rice Operating Hobbs Jct. F-31-2 Site Laboratory Data - Soil Samples

Elevated concentrations of chloride, benzene, and xylenes in the soil require further evaluation to insure the protection of the underlying ground water; therefore a conservative estimate of 6,400 ft^2 (80 ft x 80 ft) was used in the simulation modeling evaluations.

Simulation Modeling

We used the AMIGO tool (HYDRUS-1D model) to determine if un-saturated chloride transport through the vadose zone would cause the underlying ground water to exceed 250 mg/L chloride in the future. The input to the model employed field data from the site, nearby locations, and conservative input data for parameters that were not measured at or near the site.

In the absence of any corrective action by ROC, the simulation indicates that a maximum ground water chloride concentration of 170 mg/L will occur in the year 2057. Attachment D provides an explanation of the data used and results from the chloride model simulation at the site.

We used the VLEACH vadose zone model to determine if the benzene and xylenes identified during the site assessment would cause the underlying ground water to exceed the regulatory standard. The input to the model employed field data from the site, nearby locations, and conservative default values for parameters that were not measured at or near the site.

The simulation results indicate that if no further actions are taken the maximum ground water impact will occur in 240 years for benzene (0.0011 mg/L) and 700 years for xylenes (0.019 mg/L). During this time neither the benzene nor xylenes mass input to the ground water will be sufficient to cause the water concentrations below the site to exceed the New Mexico water quality standards.

November 2, 2010 Page 4

VLEACH is conservative of ground water quality because the model does not take into account the natural biological degradation of the hydrocarbons. Attachment D provides an explanation of the data used and results from the simulation at the Hobbs Junction F-31-2 Vent site. A detailed description of the model and a free windows-based program download is available from the USEPA at <u>http://www.epa.gov/ada/csmos/models/vleach.html</u>.

Recommendations

The site data that documents the residual mass of chloride and hydrocarbons in the vadose zone permit a conclusion that these constituents in the vadose zone will not with reasonable probability contaminate ground water or surface water in excess of the standards in Subsection B and C of the 19.15.30.9 NMAC through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates.

Our recommended corrective action for the site is installation of a 30 x 30 foot synthetic liner 4-5 feet below ground surface centered over the former junction box and backfilling with soil containing no more than 500 mg/kg chloride and with a field screening less than 100 using a PID. We also recommend revegetation of the ground surface to limit infiltration of precipitation and the subsequent migration of constituents of concern to ground water. A synthetic liner installed below the root zone as proposed will inhibit the downward migration of water through the subsurface, slowing movement of chloride or soluble hydrocarbons toward ground water. Plants capture water through their roots, thereby reducing the volume of water infiltrating below the root zone. This natural "infiltration barrier" also helps protect ground water. Upon documentation of installation of the liner and re-seeding of the site with an appropriate mix of native grasses we will submit a Termination Request for this site's regulatory file.

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

Please contact Hack Conder of ROC at 575-393-9174 if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely, R.T Hicks Consultants, Ltd.

)all T. Latterson

Dale T Littlejohn Geologist

Copy: Hack Conder, ROC



Attachment A Previous Submissions

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142 Albuquerque, NM 87104

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

January 20, 2010

Mr. Edward J. Hansen New Mexico Oil Conservation Division 1220 South St. Francis Drive Santa Fe, New Mexico 87505

RE: Investigation & Characterization Plan Hobbs Jct. F-31-2 NMOCD Case # 1R428-56 Township 18S, Range 38E, Section 31, Unit F

Dear Mr. Hansen:

On behalf of Rice Operating Company (ROC), R.T. Hicks Consultants, Ltd. is pleased to submit this Investigation & Characterization Plan (ICP) for the Hobbs Jct. F-31-2 site. Plate 1 is a map showing the site relative to major roads in the area. Plate 2 shows the site, nearby USGS monitoring wells, and a regional potentiometric surface map.

The work elements proposed below will allow us to characterize this site and develop an appropriate corrective action plan.

- 1. ROC will identify and document the location of all current and historic equipment and pipelines associated with the site.
- 2. ROC will use a backhoe with a 12-foot vertical reach to install a series of sampling trenches in order to recover soil samples and delineate the lateral extent (and potentially the vertical extent) of impacted soil.
- 3. If characterization by the backhoe is insufficient to define the extent and magnitude of past releases, ROC and Hicks Consultants will use a drilling rig to drill one soil boring at the center of the source area to delineate the vertical extent of chloride in the soil.
- 4. Soil samples obtained by the backhoe or drilling rig will be obtained from regular intervals below ground surface.
- 5. Representative soil samples will be sent to a laboratory to allow for verification of the field chloride and PID results.
- 6. General soil texture descriptions will be provided for each sample trench or boring.
- 7. The criteria to delineate the extent of impact during trenching as well as in a soil boring is 5 point chloride decline vs. depth, or:
 - a. After three consecutive samples demonstrate <250 ppm chloride using field analyses and <100ppm total hydrocarbon vapors using the headspace method, or
 - b. After five consecutive samples show a decreasing trend of chloride and hydrocarbons and the last sample shows chloride < 250 ppm and total hydrocarbon vapors <100ppm.
 - c. Soil boring to capillary fringe should neither (a) or (b) apply.
- 8. If the boring penetrates the capillary fringe, a monitoring well will be considered for completion with a 2 or 4" diameter casing down gradient from

confirmed impact for use during possible corrective actions. Plate 2 presents a potentiometric surface map for the site area.

9. If field analysis of hydrocarbon vapors and observations of staining show that hydrocarbon impact is unlikely at the site or below 20-feet, collection of samples from cuttings may be substituted for split spoon sampling (chloride only).

The ROC trench characterization will be employed to identify the lateral extent of chloride at the site, if possible. If trenching does not fully characterize the lateral extent of chloride at the site, boreholes will be advanced 20 feet beyond the furthest trenches where the soil data has an average chloride concentration greater than 1,000 mg/kg. The total depth of borings drilled to characterize lateral extent shall be 20 feet below ground surface with soil samples for delineation taken at 5 foot intervals.

Rice Operating Company (ROC) is the service provider (agent) for the Hobbs Saltwater Disposal System and has no ownership of any portion of pipeline, well, or facility. A consortium of oil producers who own the Hobbs System (System Parties) provide all operating capital on a percentage ownership/usage basis. Major projects require System Parties' authorization for expenditures (AFE) approval and work begins as funds are received. We will implement the work outlined herein after NMOCD approval and subsequent authorization from the System Parties. The Hobbs SWD system is in abandonment.

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

- 1. Protects public health,
- 2. Provides the greatest net environmental benefit,
- 3. Complies with NMOCD Rules,
- 4. Is supported by good science.

Following the site characterization described above, a Corrective Action Plan with the data and analysis supportive of a procedure for site file termination, or a termination request will be submitted, depending on characterization findings.

Please contact Hack Conder of ROC at 575-393-9174 if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely, R.T Hicks Consultants, Ltd.

atie Lee

Katie Lee Project Scientist

Copy: Hack Conder, ROC





11/19/2009



S:/PROJECTS/ROC/NOV2009_ICPS/PLATES/GWELEV_USGS.MXD

Attachment B Soil Lithology

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142 Albuquerque, NM 87104

Logger:		Dale Littl	ejohn			
		Harrison &	Cooper,	(101-3) @	E DPER	ATING COMP
Driller:	All and a second	Inc. Dri	lling	88-2	Que	NA NA
Consult	ant:	R.T. Hi	cks	Alarma Para		
Drilling	Method:	Air rot	arv	58-1	54 17	NOE 1965
Start Dat	te:	4/21/2	010	131+4 38-0		
End Date	e.	4/21/2	010	5 0 5 10 20 Feet	Project Name:	Well ID:
Comm	ents: S	plit spoor	samplir	ng from 20,25,45 ft. All others	Hobbs Jct. F-	-31-2 SB-1
were fr	om cutting	s. Locate	d at the	source of the former jct. box.	Location: UI	L/F Sec. 31 T18S R38E
		Drat	fted by: La	ara Weinheimer	Lat: 32°42'26.88	32"N County: Lea
	TD =	55 ft		GW = 63 ft	Long: 103°11'24	.837" W State: NM
Depth (feet)	chloride fie tests (ppm		PID	Description	Lithology	Bore Construction
				0 - 1.5		
				SILTY CLAY		
1.00	$\mathcal{A}_{1,2} = \mathcal{A}_{1,2}$			dark brown (top soil)		
5	453		200.6	1.5 - 8 ft		
				CALICHE; SILT	•••••••••	
				light gray to grayish brown (hard drilling), with interbedded light brown silt, hydrocarbon odor		
10	173		636.0	8 - 14 ft		
- 19				CALICHE; SILT		
				white to gray, with interbedded gray (discolored) to light brown silt, hydrocarbon odor		
15	475		519.0	14 - 18 ft		
				SAND; CALICHE; SANDSTONE	••••••••	
				light grayish brown to light brown, very fine grained, well sorted, interbedded gray sandstone and caliche, hydrocarbon odor		
20	957	1250	1233.0			
		7 1.12	17(90	18 - 29 ft		
		d an inte	3,0180	SAND		
25	972	214	720.0	brown, medium to fine grained, well sorted, angular, hydrocarbon odor		
	1. V.	100	177			
		0 0803	7,850			
30	783		179.5			bentonite
				29 - 32 ft		seal
-				SAND; QUARTZITE		
35	893		107.5	brown to light brown, medium grained, well sorted, angular with had interbedded quartzite, hydrocarbon odor		

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
40	965		240.0	32 - 43 ft SAND light brown, fine grained, well sorted, angular, hydrocarbon odor		
45	598		723.0			
				43 - 55 ft		
50	328		144.5	SAND; SANDSTONE brown to light brown, fine to medium grained, moderately sorted, sub-rounded,		
	- Alexandre			with interbedded cemented sandstone, hydrocarbon odor		
55	357	976.).	13.1			
		CRO	<10.0			
1		nixo/	988			



Driller: Harrison & Cooper, Inc. Drilling Start Date: Air rotary Start Date: 4/21/2010 Start Date: 4/21/2010 Comments: All samples from cuttings. Located 25 ft NW of the former junction box site Project Name: Well Hobbs Jct. F-31-2	ID: SB-2
Consultant: R.T. Hicks Drilling Method: Air rotary Start Date: 4/21/2010 End Date: 4/21/2010 Comments: All samples from cuttings. Located 25 ft NW of the former junction box site	ID: SB-2
Consultant: R.T. Hicks Drilling Method: Air rotary Start Date: 4/21/2010 End Date: 4/21/2010 Comments: All samples from cuttings. Located 25 ft NW of the former junction box site. Project Name: Well Hobbs Jct. F-31-2 Start Date: U// E Sec 31 T11	ID: SB-2
Drilling Method: Air rotary Start Date: 4/21/2010 End Date: 4/21/2010 Comments: All samples from cuttings. Located 25 ft NW of the former junction box site	ID: SB-2
Start Date: 4/21/2010 End Date: 4/21/2010 Comments: All samples from cuttings. Located 25 ft NW of the former junction box site Project Name: Well Hobbs Jct. F-31-2	ID: SB-2
End Date: 4/21/2010 Project Name: Well Comments: All samples from cuttings. Located 25 ft NW of the former junction box site Hobbs Jct. F-31-2 State of the	ID: SB-2
former junction box site	SD-Z
	8S R38E
Drafted by: Lara Weinheimer Lat: 32°42'27.018"N Cour	nty: Lea
TD = 55 ft GW = 63 ft Long: 103°11'25.139" W State	NM
Depth (feet)chloride field tests (ppm)LABPIDDescriptionLithologyBore Const	truction
0 - 1 ft	
SILTY CLAY	
dark brown (top soil)	
1-4 ft	
CALICHE	
5 225 112.8 gray to white (hard drilling)	
4 - 14 π	Section 1
10 847 105.5 CALICHE; SILT	
white to gray, with interbedded gray (discolored) to light brown silt, slight	
15 489 296.5	
14 - 18 ft	
SILTY SAND; CALICHE	
20 671 81.1 grayish brown, very fine grained, well sorted with some interbedded gray caliche	
18 - 23 ft	
SAND	
light brown, very fine grained, poorly sorted, angular	
23 - 25 ft	Sec.
SAND; QUARTZITE	
25 230 9.4 light brown, very fine grained, poorly sorted, angular, interbedded with dark brown, fine crystalline guartzite	bentonite
	seal

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
30	301		5.7			
				25 - 44 ft		
				SAND		
35	250		33.0	angular		
40	222		181.1			
45	250		67.5			
				44 55		
				44 - 35 SAND		
50	176		5.9	brown, fine to medium grained, moderately		
<u>(</u>				sortea, sub-rounaea		
55	209	200- 1- 1-28-1-	145.6			
	1 - 00	URO	<10.0			
	X 6.378	DRO	<10.0			



Logger:	Salar and	Dale Little	ejohn						
	На	arrison & (Cooper,	583-3 8	E DP	ERATING C	DMA		
Driller:		Inc. Dril	ling	. 88-2	Q.S.		24		
Consult	ant:	R.T. Hid	cks	Hassaget #dbtg		KEL			
Drilling	Method:	Air rota	ary	* *#8-1 *****	SINGE 1955				
Start Dat	te:	4/22/20	010	5B-5					
End Date	e:	4/22/20	010	42 20 200 Feet	Project Name	e: W	ell ID:		
Comm	ents: All	sample	s from	cuttings. Located 25 ft N of the	Hobbs Jc	t. F-31-2	SB-3		
former	junction box	site.			Location:	UL/F Sec. 31	T18S R38E		
	TD = {	55 ft	ted by: L	GW = 63 ft	Long: 103°11	'24.902" W St	ate: NM		
Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Co	nstruction		
				0 - 1.5 ft					
				SILTY CLAY					
				dark brown (top soil)					
-				1.5 - 4 ft					
				CALICHE					
5	148	101-32	353.4	gray to white (hard drilling)					
		i orio	8197	4 - 12 ft					
		080	13,800	CALICHE; SILT					
10	348		262.2	white to gray, with interbedded olive to light					
				brown silt, with some gray discoloration below 7 ft, slight hydrocarbon odor					
				12 - 18 ft					
15	207	2	121.1	SILT; CALICHE					
15	201		121.1	grayish to white, with some interbedded					
		-		quartzite					
				18 - 23 ft					
20	498		189.7						
				SILT & SAND; SANDSTONE; QUARTZITE					
				interbedded (thin) sandstone and quartzite					
25	730		115.7						
							No.		
				23 - 48 ft			bentonite		
30	849		249.8	SAND; SANDSTONE			seal		

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
				sand, brown, fine grained, well sorted,		
35	1060	(6140).	222.3	and 48 ft		
	E 14.228	GRO	<60.0			
	×2.34	DRO	2,150			
40	829		333.1			
45	360		214.1			
-						
50	211		170.9	48 - 55 ft		
	Alexand and	Sec.		SAND		
				brown, medium grained, moderately sorted, sub-rounded		
55	150	Ch Jaa	34.9			
		GRO	<50.0			
	No. Constant	ORO	316			



Logger:		Dale Little	ejohn						
0.111	H	larrison & (Cooper,	80-3 g	OF OPERATING COMPA				OMPO
Driller:		IIIC. Driii	mig	, ⁵⁸⁻²	-	23			1/2
Consulta	ant:	R.T. Hic	cks	Harapan pri 70352 • Sidebu v		5			-7
Drilling I	Method:	Air rota	ary	1000 s				LAND, POSTORIS	
Start Dat	te:	4/22/20	010	SB-5 0 8 10 20					
End Date	e:	4/22/20	010		Pro	oject Name	:	M	/ell ID:
former	ents: Al	II sample	s from	cuttings. Located 27 ft ESE of the		HODDS JCL.	F-3	1-2 /E sec. 31	5B-4
ionner	junction bo	Draf	ted by: L	ara Weinheimer	La	t: 32°42'26	.778	B"N C	ounty: Lea
	TD =	45 ft		GW = 63 ft	Lo	ng: 103°11'	24.	586" W S	tate: NM
Depth (feet)	chloride fie tests (ppm		PID	Description		Lithology		Bore Co	onstruction
				0 - 2 ft				11)
								VIA	
			1350	SILTY CLAY					1.2.1.1.1
				dark brown (top soil)				11	
			1946		1			11	
		- a - 1		2 - 12 ft				111	
E	222		20	CALICHE; SILT				VII	139 N 199
5	232		3.9	white to grav brown (hard drilling), with					
et app		6 1 6 8		interbedded brown silt, hydrocarbon odor				VIA	
								VIA	
10	197		51.4					VIA	
Lan Series									
				12 - 14 ft					
1 and the	Sec. 1			QUARTZITE; CALICHE				11	34
15	198		5.5	interbedded, quartzite brown to dark brown, fine crystalline				VIA	
				14 - 18 ft	1				
								11	
				CALICHE, SILT				11/	
20	336	2.88	6.4	brown silt				1/1	
								11	
		A STOCK	\$10.0					1//	bentonite
-		DRO	<10.0					11	seal
25	286		3.9	18 - 36 ft				11	
				SAND' SANDSTONE				1/1	
				CAND, CANDOTONE			1	11	
				brown to light brown, fine grained, well				VIA	
30	220		10	sandstone from 29 to 34 ft				11	
30	230	R. P. C.	4.0		1.714		Part Street	111	Contraction of the

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
35	282		13.5			
				36 - 45 ft		
40	278		73.1	SAND; SANDSTONE		
				light brown, very fine grained, well sorted, angular with some interbedded thin sandstone		
45	241	4.CA 209	27			
		GRG .	≥10.0			
		DRO	442			



Logger:		Dale Little	ejohn						
in the second	1	Harrison & (Cooper,	530-3		E DPE	CRA	TING (COMP
Driller:		inc. Drii	ling	58-3 5	1	Que			The last
Consulta	ant:	R.T. Hi	cks	Hanna pri 76352			4		
Drilling	Method:	Air rota	ary	* ****			HIM	JE 1955	
Start Dat	te:	4/22/20	010	38.5					
End Date	e:	4/22/20	010	⁰ C # 10 00 F++4	Pro	piect Name		M	/ell ID:
Comm	ents: A	Il sample	s from	cuttings. Located 20 ft WSW of the		Hobbs Jct.	F-3	1-2	SB-5
former	junction bo	ox site.			Lo	cation:	UL/I	= Sec. 31	T18S R38E
		Draf	ted by: L	ara Weinheimer	Lat	t: 32°42'26.	712	"N C	ounty: Lea
	TD =	= 55 ft		GW = 63 ft	Lo	ng: 103°11'	24.9	89" W S	tate: NM
Depth (feet)	chloride fie tests (ppm	eld LAB	PID	Description		Lithology		Bore Co	onstruction
				0 - 2 ft					
			4	SILTY CLAY				11	
100	Sec. 3			dark brown (top soil)					A CONTRACT
		-				• • • • • • • • • • • •			
				0.445				11	
5	206		291.6	2 - 14 π			1	VIA	States 11
49. S. 16.	Sec. 31			CALICHE; SILT				VIA	
									1.1
	ALL			white to gray (hard drilling), with interbedded				11	
10	0.50	24 B. C. S. C.	100 5	10 to 11 feet, hydrocarbon odor					
10	356		422.5					VIA	
								VIA	
	Sec.								
							1		
15	506		316.0		1			111	
10	000	TOY.	010.0	11 10 5			1.	VIA	
				14 - 19 1				VIA	1.20
			1	SAND; SANDSTONE		• • • • • •		111	
		-		light brown,very fine grained, well sorted, angular,		* * * * * * * * * * * * * * *		1/1	
20	696		7122	with thin interbedded sandstone layers, hydrocarbon		* * * * * * *	4.	1/1	
	000		112.2						
		1.0	3127					11	
				19 - 27 ft				11	
								11	
25	459		189.8	SAND, SANDSTONE; QUARTZITE	1			11	
				light brown, very fine grained, well sorted,		* * * * * * * *		1/1	
		-		angular, with thin interbedded thin sandstone	1	• • • • • • •		1/1	
	1. 1. 1. 1.			and dark brown fine crystalline quartzite		* * * * * * *		11	bentonite
	0.50		450 -	KARANE A PARTING AN				11	seal
30	352	-	152.7					111	
1.00					-			111	
	States in							1/1	1 march 1 million
1.1		A starte	12-1					VIA	

Depth (feet)	chloride field tests (ppm)	LAB	PID	Description	Lithology	Bore Construction
35	253		104.4	27 - 55 ft		
				SAND		
40	225		152.3	brown, fine to medium grainded, moderately sorted, sub-rounded interbedded (thick) with light brown very fine grained, well sorted,		
45	206		136.8			
50	226		17.6			
55	250	208	11.8			
		-GRO	<10.0			
		080			a and a state	



Attachment C

Laboratory Analyses

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142 Albuquerque, NM 87104



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

April 30, 2010

Hack Conder Rice Operating Company 112 West Taylor Hobbs, NM 88240

Re: Hobbs Jct. F-31-2

Enclosed are the results of analyses for sample number H19734, received by the laboratory on 04/23/10 at 8:05 am.

Cardinal Laboratories is accredited through Texas NELAP for:

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

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

Cardinal Laboratories is accredited though the State of Colorado Department of Public Health and Environment for:

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

Accreditation applies to public drinking water matrices.

Total Number of Pages of Report: 5 (includes Chain of Custody)

Sincerely, eene 'elev

Laboratory Director



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

ANALYTICAL RESULTS FOR RICE OPERATING COMPANY ATTN: HACK CONDER 112 W. TAYLOR HOBBS, NM 88240

Receiving Date: 04/23/10 Reporting Date: 04/27/10 Project Number: NOT GIVEN Project Name: HOBBS JCT. F-31-2 Project Location: HOBBS JCT. F-31-2 Sampling Date: 04/21/10 & 04/22/10 Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: JH Analyzed By: AB/HM

GRO	DRO	
(C ₆ -C ₁₀)	(>C ₁₀ -C ₂₈)	CI*
(mg/kg)	(mg/kg)	(mg/kg)

LAB NUMBER SAMPLE ID

ANALYSIS DATE	04/26/10	04/26/10	04/26/10
H19734-1 SB-1 @ 20'	1,700	3,910	1,250
H19734-2 SB-1 @ 25'	479	2,850	976
H19734-3 SB-1 @ 55'	<10.0	389	336
H19734-4 SB-2 @ 10'	<10.0	256	832
H19734-5 SB-2 @ 15'	<50.0	1,890	432
H19734-6 SB-2 @ 55'	<10.0	<10.0	128
H19734-7 SB-3 @ 5'	897	13,800	32
H19734-8 SB-3 @ 35'	<50.0	2,150	1,140
H19734-9 SB-3 @ 55'	<50.0	316	144
H19734-10 SB-4 @ 20'	<10.0	<10.0	288
H19734-11 SB-4 @ 45'	<10.0	412	208
H19734-12 SB-5 @ 20'	362	4,350	624
H19734-13 SB-5 @ 55'	<10.0	80.8	208
Quality Control	546	538	490
True Value QC	500	500	500
% Recovery	109	108	98.0
Relative Percent Difference	1.2	1.1	2.0

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

Reported on wet weight.

nemist

H19734 TCL RICE

PLEASE NOTE: Liability and Damages. Cardinal's flability and cliont's exclusive remedy for any claim arising, whether based in contract or tort, shall be illinited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in withing and received by Cardinal within thitly (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 profils incurred by client, its subsidiaries adfiliates or successorts ansing out of or related to the period services hereiunder by Cardinal, regulates of whether such claim is based upon any of the above-stated reasons or otherwise. Result relate only to the semples identified above. This report shell not be reproduced except in full with written approval of Cardinal Laboratories.



ANALYTICAL RESULTS FOR RICE OPERATING COMPANY ATTN: HACK CONDER 112 W, TAYLOR HOBBS, NM 88240 FAX TO: (575) 397-1471

Receiving Date: 04/23/10 Reporting Date: 04/30/10 Project Number: NOT GIVEN Project Name: HOBBS JCT, F-31-2 Project Location: HOBBS JCT, F-31-2 Sampling Date: 04/21/10 & 04/22/10 Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: JH Analyzed By: ZL

			EIHYL	TOTAL
	BENZENE	TOLUENE	BENZENE	XYLENES
LAB NUMBE SAMPLE ID	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
ANALYSIS DATE	04/28/10	04/28/10	04/28/10	04/28/10
H19734-1 SB-1 @ 20'	< 0.050	4.63	9.61	47.7
H19734-2 SB-1 @ 25	0.084	1.14	2.04	13.0
H19734-4 SB-2 @ 10'	<0.050	0.210	0.361	2.58
H19734-5 SB-2 @ 15'	<0.050	0.198	0.695	3.07
H19734-6 SB-2 @ 55'	<0.050	< 0.050	<0.050	0.378
H19734-7 SB-3 @ 5'	0.211	3.71	1.14	15.4
H19734-8 SB-3 @ 35'	<0.050	0.707	0.226	2.34
H19734-9 SB-3 @ 55'	<0.050	0.442	0.165	2.16
H19734-12 SB-5 @ 20'	<0,050	0.438	1.20	8.29
		-		
Quality Control	0.053	0.047	0.043	0.131
True Value QC	0.050	0.050	0.050	0.150
% Recovery	106	94.0	86.0	87.3
Relative Percent Difference	1.8	<1.0	4.2	8.4

METHOD: EPA SW-846 8021B

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

30/10

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remédy for any claim arising, whether based in contract or bit, shall be limited to the amount baild by client for analyses. All claims, individing these for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service, in he wert shall Cardinal be liable for incidental or consequential damages, including, without limitation, business informations, loss of use, or loss of profits incurred by client, its subsidianter affiliates on successors arking out or or related to the performance of services herebunder by Cardinal approval of Cardinal Laborationes, only of the above-stated reasons or otherwise. Result relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laborationes.

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CHAIN										LING	TIME	91:2.	3:5	2:56	1:39	3:30	0;1	3213 0	54.5 0	14.5 0	ងនៅ ២ទុ ពេទ បន្លែក សៃ ដែ លោក សំពោះទោល សំពី	y client, its subsiniatio reasons of otherwise.	Phone Result: Fax Result:	REMARKS:	email r	Hronde	Lweinh	N
a, TX 79603 673-7020	BILL TO		y:		••		Żip:			ERV SAMPI	отнея: DATER: DATE	4-11-10	1-12-10	1.4.10	1-11-1	ערארוו	4-11-1	4-77-2	4-22-7		ៃ ខ្មែររៀននៅ នេះ ដែរមានបានដែរ ភ្លេវភ្លាក់ថា សមារិទា និយ៍ នាទ្ទនាន	uss at praitin incurred.b				1020	HECKEU UY:	2476
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N.	Company Name	Project Manage	Address: 122	city: Hobbs	Phone #: 393-5	Project#:	Project Name:	Project Location	Sampler Name:	FOR LAB USE DAAD	Lab I.D.	1-162014	5	92	5	S	P	7	8	5-Q	PLEASE NO TE: Labery at Justices. At claims includie	sárvice. In 110 avent 11411 C. Attliates or successors arisi	Relinquished B	L. We	Relinquished B	1/02	Delivered By Sampler - UPS	† Cardinal

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Address: 122 West Taylor		Company:					SI				
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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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Attachment D VLEACH and AMIGO Model Explanations

R.T. Hicks Consultants, Ltd.

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Input and Results of the VLEACH Simulation Performed at the Rice Operating Co. Hobbs Junction F-31-2 Site

The specific parameters used in the simulation and diffusion to ground water equation at the site are presented in the table and figures below.

Model Parameter	Value	Source of Value
Ponzono & Vulono Chamical Daramatora	Chemical	NMED June 2006 Soil
benzene & Aylene Chemical Parameters	Specific	Screening Levels Document
Spill Area (ft ²)	6,400	Site Measurement (Estimate)
Croundwater Table Donth (ft)	60	Estimate from Soil Boring Data
Groundwater Table Depth (it)	00	and Regional Data
Vadose Zone Soil Bulk Density (g/cm ³)	1.5	NMED June 2006 Document
Vadose Zone Porosity (unitless)	0.43	NMED June 2006 Document
Volumetric Water Content (%)	0.26	NMED June 2006 Document
Vadose Zone Soil Organic Content (f_{∞})	0.0015	NMED June 2006 Document
Recharge Rate (ft/year)	0.028	Musharrafieh 1999
Banzona & Vylana Concentrations (11g/kg)	Chemical	Worst-Case Hydrocarbon
benzene & Aylene Concentrations (ug/kg)	Specific	Profile (Excavations & SB-1)
Slope of Water Table	0.0034	Regional Map (Attachment A)
Hydraulic Conductivity (ft/d)	· 81	Musharrafieh 1999
Max width perpendicular to direction	80	Site Measurement
of GW flow (ft)	00	Site Measurement
Aquifer Porosity (unitless)	0.25	Prof. Judgment
	0.25	Conservative Assumption
Mixing zone denth in aquifer	66	Prof. Judgment
mining zone deput in aquiter	0.0	Conservative Assumption

Table 1 – Common Parameters Employed in the VLEACH model for the Hobbs Junction F-31-2 Site

Figure 1 - Actual Input Screens from the VLEACH Model Program for the Benzene Run

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As a conservative measure, a "worst-case" hydrocarbon soil profile was constructed by taking the highest benzene and xylenes concentration from each sampled depth as shown in Figure 2. Sampling depths for which laboratory results were not available were estimated from the field screening data. The benzene and xylenes values from this profile were conservatively assumed to be present across the entire 6,400 ft² area.

The results from the VLEACH modeling relative to this assessment are provided as a graph that presents the subsurface impact as Mass Flux to Ground Water in grams/year (g/yr) as a function of future time as shown in Figure 3.

Simulation Time, Time Step, Output Time Interval, and Profile Time Interval were adjusted to provide the clearest presentation of the results based on the



time required to identify the maximum impact to groundwater. The model results show the highest benzene impact to ground water will occur about 250 years from now and the highest xylene impact to ground water will occur about 700 years from now.





In order to compare the modeled results to the NMED ground water standard, the VLEACH output data required a conversion from g/yr to mg/L. This was performed by calculating the annual recharge (flux) volume from the spill area and the annual ground water flow volume below the spill area as shown:

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<u>Recharge</u> is defined as: $Flux_{flow}(L/yr) = A \times R \times 29.317$ where,

A = spill area (ft²) R = recharge rate (ft/yr), and 29.317 = conversion factor from ft³ to liters

<u>Groundwater flow</u> is defined as: $GW_{flow}(L/yr) = \left(\frac{k \times i}{\theta_T}\right) \times T_{aq} \times W \times 29.317$ where,

k = hydraulic conductivity of the aquifer (ft/yr) i = groundwater gradient (ft/ft) θ_T = porosity of the aquifer T_{aq} = aquifer mixing zone thickness (ft) and, W = length of the spill area (ft) perpendicular to the ground water gradient direction

The relationship between the annual recharge volume and the annual ground water flow volume was used to calculate the predicted ground water concentration for the initial (year zero) time and the maximum impact year time for the constituent of concern as demonstrated on the table below:

		Present	Impact Dat	a		Maximun	n Impact Da	nta	NM
Chemical of Concern	Year	lmpact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	Year	Impact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	Water Quality (mg/L)
Benzene	0	5.15	1.0	0.0008	240	6.61	1.3	0.0011	0.01
Total Xylenes	0	40	8	0.006	700	. 119	23	0.019	0.6

text values indicate concentrations that exceed the NMED Water Quality Standard values for groundwater.

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Input and Results of the AMIGO Simulation Performed at the Rice Operating Co. Hobbs Jct. F-31-2 Site

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Model Parameter	Value	Source of Value
Climate (non-smoothed)	1946 - 1992	Pearl, NM Station
Input for distant or hypothetical well (ft)	NA	Not Required
Background Chloride in Aquifer (mg/L)	60	PTTC/PRRC Data
Aquifer Porosity (unitless)	0.25	Prof. Judgment Conservative Assumption
Groundwater Table Depth (ft)	60	Estimate from Soil Borings and Regional Data
Aquifer Thickness (ft)	30	Professional Judgment Conservative Assumption
Slope of Water Table	0.0034	Regional Map (Attachment A)
Hydraulic Conductivity (ft/d)	81	Musharrafieh 1999
Average Chloride Load (kg/m²)	18.0	Worst-Case Profile Match to Measured Site Data
Max length of spill in dir. of GW flow (ft)	80	Site Data
Plant Uptake Trigger (%)	1.0	Prof. Judgment Conservative Assumption
Surface Layer	Med. Sand	Site Data
Soil Profile	Sandy Clay (1/3) Caliche (1/3) Sand (1/3)	Site Data (Soil Borings) and Model Calibration to Chloride Levels in the Soil

Table 1 - Parameters Employed in AMIGO tool for the
Hobbs Junction F-31-2 Site

Musharrafieh and Chudnoff (1999) predict that the saturated thickness of the aquifer beneath the site will remain at least 50 feet until the year 2040. Data from similar sites show that, unlike hydrocarbons, chloride that enters the upper portion of an aquifer will become distributed throughout the entire saturated thickness within a relatively short travel distance from the source. The arbitrary selection of a 10-foot thick mixing zone (used as a default value for hydrocarbon sites) is unrealistic where the constituent of concern is chloride. In our opinion, a simulation using the 30-foot thickness of the aquifer is conservative for this site.

The AMIGO tool assumes a single surface spill is the initial source of chloride that is observed in the subsurface. In order to ensure an accurate calibration of the model to the historic spill which occurred at the Hobbs Junction F-31-2 site, we compared each year of the simulated profile with the field data until a conservative match was achieved. A favorable but conservative match to the field data was achieved using the year 30 simulation and the calculated chloride massload for the worst-case area of the release as demonstrated in Figure 1.

The red curve on Figure 1 is the profile using the maximum field chloride analysis for each depth sampled from the soil borings. The field (titration) concentrations were then adjusted based on a correction determined



Page 2



by comparing the field chloride concentrations with the duplicate laboratory sample concentrations as shown in Figure 2.

The blue curve in Figure 1 is the predicted chloride profile at year 30 of the simulation using a chloride load of 18.0 kg/m² (calculated from site data). Because the AMIGO simulation used the highest chloride area to represent the entire site it is considered a conservative input parameter.

The results of the simulation are shown below on the AMIGO ground water output chart which has been copied directly from

the model results screen. It indicates that chloride concentrations in the ground water below the site, using the "worst-case" chloride load, will reach a maximum concentration of 170 mg/L (below standards) in 77 years from the release date if no further corrective actions are taken. If we assume the release date occurred 30 years ago, based on the profile match from Figure 1, then the maximum impact to the ground water will occur in 2057. We believe the simulated concentration in ground water is a "worst-case" prediction because of the conservative input parameters used in the model.



	Figure 3
AMIGO) Ground Water Output Chart for Hobbs Junction F-31-2 Site

Attachment B Corrective Actions

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Hobbs Jct. F-31-2 (1R428-56) T-18-S, R-38-E, Section 31, Unit F Excavation Summary

- 12-27-10 The site was excavated to a size of 45x30x5-ft bgs and the north end of the site (22.5x30-ft) was excavated to a depth of 10 feet bgs. Five (5) loads of soil were hauled to Sundance for disposal and four (4) loads of blow sand were hauled in from Wallach.
- 12-28-10 The excavation was completed. The final dimensions were 45x30x5-ft bgs, with the north end of the site (22.5x30-ft) excavated to 10-ft bgs. Eleven (11) loads of soil were hauled to Sundance Disposal, and three (3) loads of soil were imported from Wallach.
- 12-29-10 The north side of the excavation 22.5x30x10-ft deep was padded with 6" of blow sand and a 20 mil, reinforced liner was installed. The liner was then padded with 6" of blow sand on the top of the plastic. Thirteen (13) loads of soil were hauled to Sundance Disposal.
- 12-30-10 Eight (8) loads of clean soil (Cl 112 mg/kg and 149 mg/kg) was imported from the surrounding R-O-W and used to backfill the 22.5x30-ft area up to 5 ft bgs. The 45x30x5-ft bgs excavation was then padded with 6" of blow sand. Eight (8) loads of soil were hauled to Sundance Disposal.
- 1-3-11 Four (4) loads of soil were hauled to Sundance Disposal. Nineteen (19) loads of clean soil from the surrounding R-O-W were hauled to the site. A backfill sample (R.O.W. backfill) was sent to the lab for analysis of chloride and TPH.
- 1-4-11 A 48x30-ft 20 mil, reinforced liner was installed at 4.5 ft bgs and was padded with 6" of blow sand. Nine (9) loads of soil were hauled to Sundance Disposal. Backfilling of the excavation began with the R.O.W. backfill (Cl⁻ <16, DRO <10, GRO <10).
- 1-5-11 The excavation was backfilled up to the depth of one (1) foot. Two (2) loads of soil were hauled to Sundance Disposal.
- 1-6-11 Approximately 6" of ashaltine on the south and east side of the excavation was scrapped and four (4) loads of soil were hauled to Sundance Disposal. Four (4) loads of blow sand were imported from Wallach.

- 1-7-11 Backfilling of the excavation was finished. Ten (10) loads of sand-hay mixture were imported from the TCT yard.
- 1-10-11 Seven (7) loads of hay-sand mix were imported to the site. The soil was spread and contoured to the surrounding area.
- 1-11-11 Three (3) loads of hay-sand mixture were imported from the TCT yard and it was contoured to the surrounding area. Boot guards were hauled into the location to expand the fence.
- 1-12-11 Silt net fencing was installed around the perimeter of the location.
- 2-17-11 150 lbs BioNhance and 100 lbs InfiltratioNhance were added to the site and the area was seeded with 15 lbs winter wheat, 10 lbs blue gramma, and 2lbs black gramma.

56 loads of soil removed 672 yards 58 loads of soil imported 696 yards



112 West Taylor Hobbs, NM 88240 Phone: (575) 393-9174 Fax: (575) 393-0293

REVEGETATION FORM

1. Genera	al Information					
Site Name: Ho	bbs Jct. F-31-2					
U/L	Section	Township	Range	County	Latitude	Longitude
F	31	185	38E	Lea	N. 32.70765	W. 103.18996
Contact Name:	Bruce Baker					
Email: bbaker(@riceswd.com					
Site size: (165)	x90-ft) 14,850 sq	uare feet	Map d	etail of site attac	ched 🗌	
Additional info	rmation:					•

2. Soils

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Salvaged from site 🖂	Bioremediated 🛛	Imported 🔀	Blended	Depth (in.):	
Texture: sandy	Describe soil and subsol	il: caliche		·	
Soil prep methods:	Rip Depth (in.):	Disc 🛛	Depth (in.): 4 in.	Rollerpack	
Date complete: 2/17/2	.011				

3. Bioremediation

Fertilizer	Hay 🔀	Other 🛛
Туре:		Describe: 150 lbs BioNhance
Lbs/acre:		100 lbs InfiltratioNhance

4. Seeding			
Custom seed mix 🛛	Prescribed mix	Seed mix name:	Seeding date: 2/17/2011
Broadcast 🖂			
Method: portable seede	er		
Soil conditions during s	seeding: Dry 🛛	Damp 🗌 Wet 🗌	
Photos attached	Observ	ations: 15 lbs winter whea	at, 10 lbs blue gramma, 2 lbs black gramma

5. Certification

Name: Robert Harrison	Title: Environmental Tech	Date: 2/17/2011	
Signature: not available		1	

Hobbs Jct. F-31-2 (1R428-56) T-18-S, R-38-E, Section 31, Unit F



site prior to excavation, facing east



blow sand pad below the liner, facing east



blow sand pad above the liner, facing east



blow sand pad below the 48x30-ft liner, facing northwest



final excavation, facing southwest



22.5x30-ft 20 mil liner installed at 10 ft bgs, facing east



backfilling above the 22.5x30-ft liner, facing northwest



48x30-ft 20 mil liner installed at 4 ft bgs, facing north



blow sand pad above the 20 mil liner, facing south



hauling off soil, facing northwest



hauling in imported soil blended with hay, facing north



adding amendments, facing south 2/16/2011



backfilling, facing east



backfilling with imported soil, facing south



site completed, facing south



2/16/2011

CARDINAL Laboratories

January 05, 2011

Hack Conder Rice Operating Company 112 W. Taylor Hobbs, NM 88240

RE: HOBBS JCT F-31-2

Enclosed are the results of analyses for samples received by the laboratory on 01/03/11 16:17.

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,

Celeg & Keine

Celey D. Keene Lab Director/Quality Manager



Analytical Results For:

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

Received:	01/03/2011	Sampling Date:	01/03/2011
Reported:	01/05/2011	Sampling Type:	Soil
Project Name:	HOBBS JCT F-31-2	Sampling Condition:	Cool & Intact
Project Number:	HOBBS JCT F-31-2	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: R. O. W. BACKFILL (H100002-01)

Chloride, SM4500CI-B mg/kg Analyzed By: HM Qualifier Analyte Result Reporting Limit Analyzed Method Blank BS True Value QC RPD % Recovery Chloride <16.0 16.0 01/04/2011 ND 432 108 400 0.00 TPH 8015M Analyzed By: CK mg/kg Qualifier Analyte Analyzed Method Blank BS True Value QC RPD Result Reporting Limit % Recovery GRO C6-C10 <10.0 10.0 01/04/2011 ND 177 88.3 200 0.491 DRO >C10-C28 <10.0 01/04/2011 ND 200 14,9 10.0 184 92.2 Surrogate: 1-Chlorooctane 120 % 70-130 Surrogate: 1-Chlorooctadecane 126 % 70-130

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Celey D. Keene, Lab Director/Quality Manager



Notes and Definitions

Z-01	Surrogates outside historical limits.
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

*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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