1R - 220

REPORTS

DATE:

MW- 10/2001 → 12/98

RICE *Operating Company*

122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

CERTIFIED MAIL
RETURN RECEIPT NO. 7000 1530 0005 9895 4299

October 29, 2001

Mr. William C. Olson
NM Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Dr.
Santa Fe, NM 87504

RE: MONITOR WELL PLUGGING REPORT
CASE NUMBER 1R0220
LOVINGTON MUNICIPAL WATER WELL AREA
ABO SWD SYSTEM JCT. L-31, SEC 31, T16S, R37E
LEA COUNTY, NEW MEXICO

Dear Mr. Olson:

Rice Operating Company (ROC) appreciates this opportunity to submit the plugging report concerning the monitor wells for the ABO Salt Water Disposal System Junction L-31 Release Site in the SE/4 of Section 31, T16S, R37E, Lea County, NM. This monitoring site is situated within the Lovington Municipal Water Supply Field.

The former Lovington Water Well (COL-6) that was included in the sampling program was plugged pursuant to NMOCD guidelines. Haliburton Energy Services performed the work. NMOCD representative Paul Sheeley was on location for a portion of the event. The City of Lovington representatives were on-site for much of the time.

Due to the huge cavity of the well, one truckload of river rock gravel and 750 sacks of minimum 5% bentonite cement grout were needed to accomplish the wellbore plugging. The cement also was treated with gel and $CaCl_2$ in order to hasten the curing process. The Haliburton plugging log is included in the attached information.

At this time is would not be prudent to plug the other three monitoring wells, as the wells do have future beneficial use. The City of Lovington has requested responsibility for one of the monitor wells in order to facilitate groundwater measurements for their Municipal Water Supply

Field. The other two wells would be of use to the ABO SWD System in order to continue monitoring groundwater quality in the area near the ABO Disposal Facility. (This is discussed in the ABO Emergency Overflow Pit Closure Plan. ROC will report the groundwater monitoring results of these two wells in the annual report for this closure.)

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

Thank you for your consideration concerning this plugging report and future disposition of the remaining monitor wells. If you have any questions or if I can be of any service, please don't hesitate to call.

RICE OPERATING COMPANY

Carolyn Doran Haynes

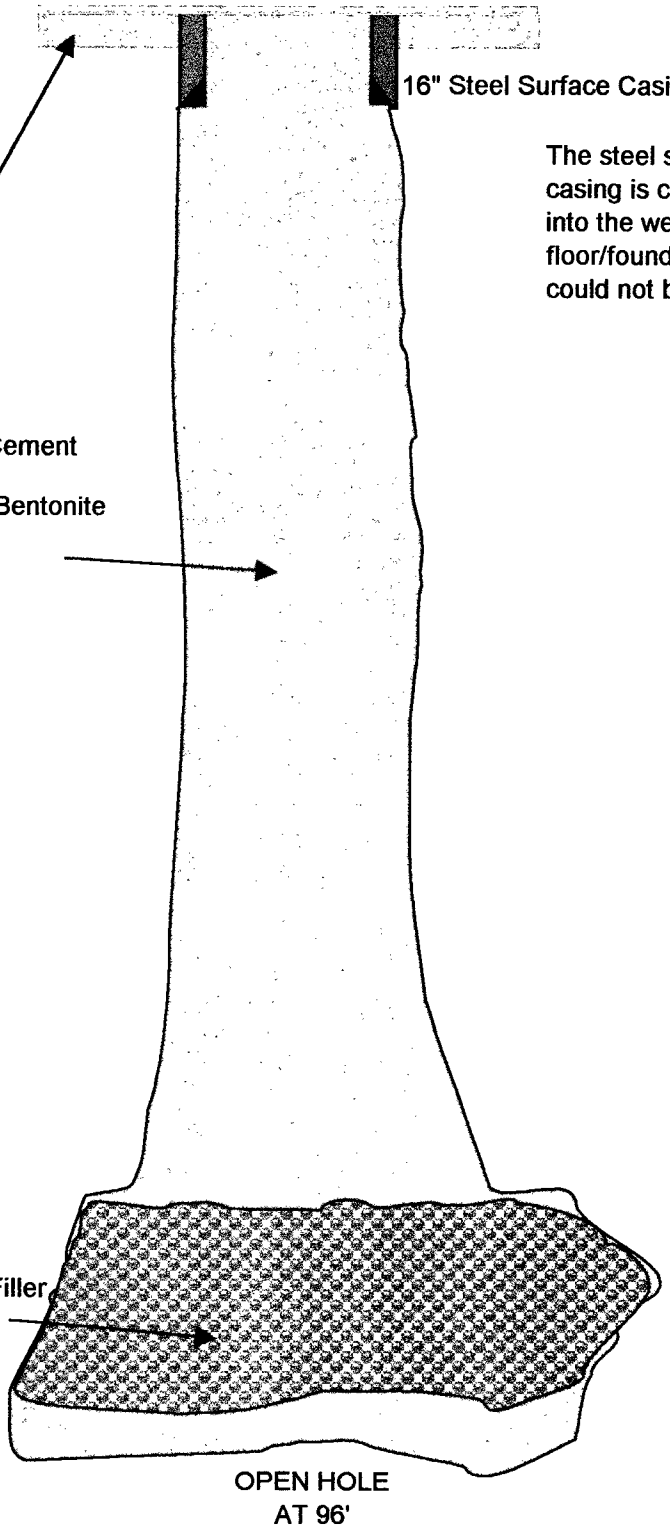
Carolyn Doran Haynes
Operations Engineer

Enclosure: Haliburton Plugging Report
Map of Monitor Wells
Schematic of COL #6 Wellbore

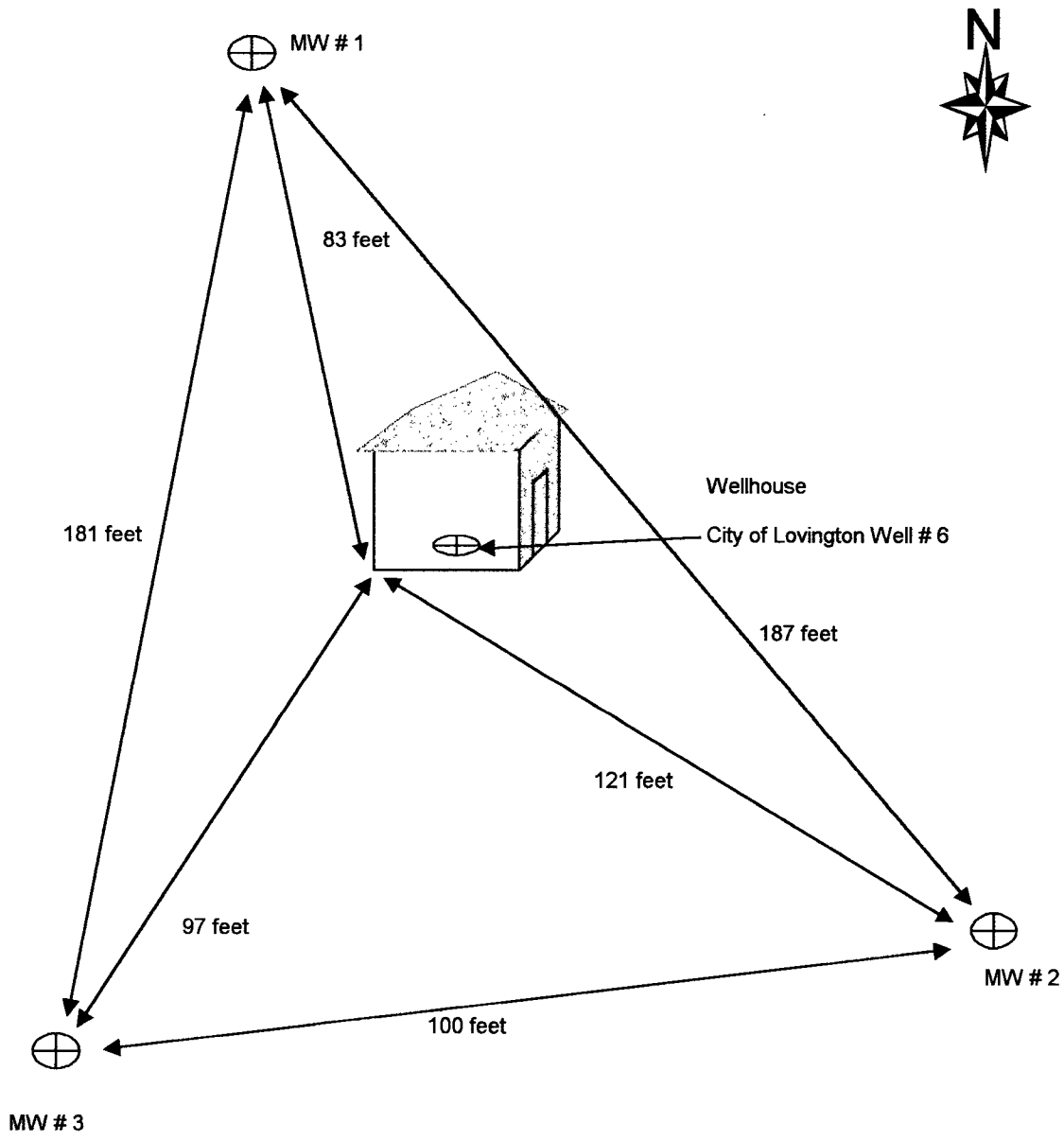
cc: LBG file, Chris Williams
NMOCD, District I Office
1625 N. French Drive
Hobbs, NM 88240

Bob Carter
Lovington City Manager
P. O. Box 1268
Lovington, NM 88260

CITY OF LOVINGTON MUNICIPAL WATER WELL # 6



RICE *Operating Company* 122 West Taylor Hobbs, NM 88240 (505) 393-9174	Wellbore Schematic After Plugging	**COL Well #6** Plugged July 3, 2001 Unit Letter L, Sec 31-T16S-R37E Lea County, New Mexico



MW # 3 will be used by the City of Lovington for measurements

MW # 1 and # 2 will be used for GW monitoring of ABO Pit Closure

COL # 6 has been plugged

Rice Operating Company 122 West Taylor Hobbs, NM 88240 (505) 393-9174	Monitor Wells	**Case # 1R0220** ABO SWD System Unit Letter L, Sec 31-T16S-R37E Lea County, New Mexico

HALLIBURTON ENERGY SERVICES, INC.

Field Ticket

Sales Order Number: 0001377353 **Sales Order Date:** Monday, July 02,2001

Sold To
RICE OPERATING

122 W. TAYLOR
HOBBS NM 88240

Ship To
RICE OPER CITY OF LOVINGTON WW, LEA
CITY OF LOVINGTON WATER WATER

LOVINGTON NM 88260

Order Type:	ZOS
Well Name:	CITY OF LOVINGTON WATER WATER
Company Code:	1100
Customer PO No.:	na
Shipping Point:	Hobbs, NM, USA
Sales Office:	Permian Basin BD
Well Type:	Water
Well Category:	Abandoned
Payment Terms:	Net due in 20 days

Material	Description	QTY	UOM	Base Amt	Unit Amt	Gross Amount	Discount	Net Amount
7528	PSL - CMT PLUG TO ABANDON - BOM	1	JOB					
	Plant: 0093							
1	"ZI-MILEAGE FROM NEAREST HES BASE,/UNIT"	30	MI		5.03	150.90	-12.07	138.83
	Number of Units	1	unit					
	Plant: 0093							
2	MILEAGE FOR CEMENTING CREW,ZI	30	MI		2.96	177.60	-14.21	163.39
	Number of Units	2	unit					
	Plant: 0093							
86955	ZI FUEL SURCHG-HEAVY TRKS >1 1/2 TON	30	MI		0.24	7.20		7.20
	Number of Units	1	unit					
	Plant: 0093							
86954	ZI FUEL SURCHG-CARS/PICKUPS<1 1/2TON	30	MI		0.08	4.80		4.80
	Number of Units	2	unit					
	Plant: 0093							
87605	ZI FUEL SURCHG-CMT & CMT ADDITIVES	549	TNM		0.10	54.90		54.90
	NUMBER OF TONS	1	ton					
	Plant: 0093							
7	ENVIRONMENTAL SURCHARGE,/JOB,ZI	1	JOB		75.51	75.51		75.51
	Plant: 0093							
16094	PLUG BACK/SPOT CEMENT OR MUD,ZI	2	EA		2,575.00	5,150.00	-412.00	4,738.00
	DEPTH	96						
	FEET/METRES (FT/M)		FT					
	Plant: 0093							
16096	ADDITIONAL HOURS (PUMPING EQUIPMENT), ZI	10	EA		516.00	5,160.00	-412.80	4,747.20
	HOURS	1	hr					
	Plant: 0093							
16104	LO TORC®VLV 2",W/HES,/DAY,5DAYS,ZI	1	EA			46.40	-3.71	42.69
	DAYS OR FRACTION (MIN5)	5	Days					
	Plant: 0093							

Material	Description	QTY	UOM	Base Amt	Unit Amt	Gross Amount	Discount	Net Amount
16106	STL HOSE 2"W/HES,/SECT,/DAY,5DAYS,ZI *DAYS OR FRACTION (MIN5)* *Plant: 0093*	4 5	EA Days			195.88	-15.67	180.21
16105	LEAD-OFF SWING,2",W/HES,/DAY,5 DAYS,ZI *DAYS OR FRACTION (MIN5)* *Plant: 0093*	4 5	EA Days			107.76	-8.62	99.14
100012205	Cement- Class C / Premium Plus (Bulk) *Plant: 0093*	750	SK		17.96	13,470.00	-1,077.60	12,392.40
100003682	CHEMICAL - BENTONITE (BULK) *Plant: 0093*	57	SK		15.29	871.53	-69.72	801.81
3965	HANDLE&DUMP SVC CHRG, CMT&ADDITIVES,ZI *NUMBER OF EACH* *Plant: 0093*	807 1	CF each		2.82	2,275.74	-182.06	2,093.68
76400	ZI MILEAGE,CMT MTLS DEL/RET MIN *NUMBER OF TONS* *Plant: 0093*	549 1	MI ton		1.72	944.28	-75.54	868.74
100005053	CHEMICAL-CALCIUM CHLORIDE HI T *Plant: 0093*	10 1	SKS SK		108.80	1,088.00	-87.04	1,000.96
					Totals	29,780.50	-2,371.04	27,409.46

OperatorName: JIM BOB

CustomerAgent CAROLYN HAINES

Halliburton Approval: _____

FIELD TICKET TOTAL $27,409.46

X _____

Customer Signature

Halliburton

JOB LOG

TICKET # 13773	TICKET DATE 07/02/01		
REGION NORTH AMERICA LAND	NWA / COUNTRY CENTRAL REGION	BDA / STATE MIDLAND, TX	COUNTY LEA
MBU ID / EMPL # HO 0102 104410	H.E.S EMPLOYEE NAME JIM BOB	PSL DEPARTMENT ZONAL ISOLATION	
LOCATION HOBBS, NM.	COMPANY RICE OPERATING	CUSTOMER REP / PHONE CAROLYN HAINES	
TICKET AMOUNT	WELL TYPE 02	API/UWI #	
WELL LOCATION LOVINGTON	DEPARTMENT CEMENTING SERVICES 10003	JOB PURPOSE CODE 7528	
LEASE / WELL # CITY OF LOVINGTON Well No.	SEC / TWP / RNG		

Chart No.	Time	Rate (BPM)	Volume (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
								ARRIVE ON LOCATION
								CONDUCT LOCATION ASSESSMENT SAFETY MEETING
	0852	0.5	0.5	1		16		PUMP H2O AHEAD
	0857	2.5	0	1		16		MIX PREMIUM PLUS .4% GEL
	0930	2.5	75.0	1		16		13.5 W, 1.6 Y
								T.O. TBG
	1215							TAG CEMENT AT 92'
	1218	1.0	0.5	1		16		PUMP H2O AHEAD
	1224	2.5	0	1		16		MIX PREMIUM PLUS .4% GEL, 2% CACL2, 50 SKS
	1232	2.5	15.0	1		16		13.5 W, 1.6 Y
								W.O.C 2 HRS.
	1424	0.5	0.5	1		16		PUMP H2O AHEAD
	1425	2.5	0	1		16		MIX PREMIUM PLUS .4% GEL, 2% CACL2, 50 SKS
	1431	1.5	15.0	1		16		13.5 W, 1.6 Y
	1432							T.O. TBG
	1600							TAG CEMENT AT 90'
	1606	2.5	0	1		29		MIX PREMIUM PLUS .4% GEL, 2% CACL2, 50 SKS
	1633	2.5	15.0	1		29		14.0 W, 1.6
	1634							T.O. TBG
	1730							TAG CEMENT AT 90'
	1735	0.5	0.5	1		29		MIX PREMIUM PLUS .4% GEL, 2% CACL2, 100 SKS
	1740	2.5	0	1		29		14.W, 1.6 Y
	1756	2.5	30.0	1		29		TAG CEMENT AT 90'
	1800							T.O. TBG
								FINISH FOR THE DAY
	0700							RETURN 7-3-01
	0800							TAG CEMENT AT 88'
	0910	0.5	0.5	1		29		H2O SPACER
	0916	2.5	0	1		29		MIX PREMIUM PLUS .4% GEL, 2% CACL2, 100 SKS
	0930	2.5	30.0	1		29		14. W, 1.6 Y
	0930							TOTBG
	1232	1.5	0.5	1		16		H2O SPACER
	1233	1.5	0	1		16		MIX PREMIUM PLUS .4% GEL, 50 SKS
	1245	1.5	15.0	1		16		14.W, 1.6 Y
								MIXING WATER QA RESULTS:
								pH 7
								Chlorides 500
								Temperature 80

Halliburton

Ticket Number	Company	Lease and Well Number	Well No.	Date	
1377353	RICE OPERATING	CITY OF LOVINGTON WATER		07/02/01	2

Chart No.	Time	Rate (BPM)	Volume (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
	1418							TAG CEMENT AT 42'
	1425	1.0	0	1		29		MIX PREMIUM PLUS .4% GEL, 55 SKS
	1505	1.0	17.0	1		29		14.0 W, 1.6 Y
								T.O.TBG
	1600			1				TAG CEMENT AT 10'
	1601	0.5	0	1		15		MIX PREMIUM PLUS .4% GEL
	1604	0.5	2.0	1		15		14.0 W, 1.6 Y
								CIRCULATED CEMENT TO SURFACE

JOB SUMMARY

Halliburton		SALES ORDER NUMBER: 1377353	TICKET DATE: 07/02/01
REGION: NORTH AMERICA	NWA / COUNTRY: CENTRAL REGION	BDA / STATE: MIDLAND TX	COUNTY: LEA NM.
MBU ID / EMPL #: HO 0102 104410	H.E.S EMPLOYEE NAME: JIM BOB	PSL DEPARTMENT: ZONAL ISOLATION	
LOCATION: HOBBS, NM.	COMPANY: RICE OPERATING	CUSTOMER REP / PHONE: CAROLYN HAINES	
TICKET AMOUNT:	WELL TYPE: 02	API/UWI #:	
WELL LOCATION: LOVINGTON	DEPARTMENT: CEMENTING SERVICES 10003	SAP BOMB NUMBER: 7528	Description: PLUG TO ABANDON
LEASE NAME: CITY OF LOVINGTON WATE	Well No.:	SEC / TWP / RNG:	

H.E.S. EMP NAME / EMP # / (EXPOSURE HOURS)	HRS	HRS	HRS	HRS
JIM BOB 104410	20.0			
JAIME GONZALES	20.0			
DAVE KEMP 231755	20.0			

H.E.S. UNIT #'S / (R / T MILES)	R / T MILES	R / T MILES	R / T MILES	R / T MILES
421551	30			
53611-78546	30			

Form. Name _____ Type: _____
Form. Thickness _____ From _____ To _____
Packer Type _____ Set At _____
Bottom Hole Temp. _____ Pressure _____
Retainer Depth _____ Total Depth _____

	Called Out	On Location	Job Started	Job Completed
Date	07/02/2001	07/02/2001	07/02/2001	07/03/2001
Time	0400	0700	0852	1600

Tools and Accessories

Type and Size		Qty	Make
Float Collar	NONE		
Float Shoe	NONE		
Centralizers	NONE		
Top Plug	NONE		
Packer	NONE		
DV Tool	NONE		
Insert Float	NONE		
Guide Shoe	NONE		
Other			

Well Data

	New/Used	Weight	Size Grade	From	To	Max. Allow
Casing	New		NONE	0	96	
Liner						
Liner						
Tubing			2" POLY	0	96	
Drill Pipe						
Open Hole			16"	0	96	Shots/Ft.
Perforations						
Perforations						
DV Tool						

Materials

Mud Type: FRESH H2O Density _____ Lb/Gal
Disp. Fluid: NONE Density _____ Lb/Gal
Prop. Type _____ Size _____ Lb _____
Prop. Type _____ Size _____ Lb _____
Acid Type _____ Gal. _____ % _____
Acid Type _____ Gal. _____ % _____
Surfactant _____ Gal. _____ In _____
NE Agent _____ Gal. _____ In _____
Fluid Loss _____ Gal/Lb _____ In _____
Gelling Agent _____ Gal/Lb _____ In _____
Fric. Red. _____ Gal/Lb _____ In _____
Breaker _____ Gal/Lb _____ In _____
Blocking Agent _____ Gal/Lb _____
Perfpac Balls _____ Qty. _____
Other _____
Other _____
Other _____
Other _____
Other _____

Hours On Location

Date	Hours
7/2	11.0
7/3	9.0
Total	20.0

Operating Hours

Date	Hours
7/2	3.0
7/3	3.0
Total	6.0

Description of Job

SEE JOB LOG

Hydraulic Horsepower
Ordered _____ Avail. _____ Used _____
Average Rates in BPM
Treating _____ Disp. _____ Overall _____
Cement Left in Pipe
Feet 96 Reason PLUG TO ABANDON

Cement Data

Stage	Sacks	Cement	Bulk/Sks	Additives	W/Rq.	Yield	Lbs/Gal
	750	PREMIUM PLUS	B	.4% GEL	8.9	1.69	13.5
			B				
			B				
			B				
			B				

Summary

Circulating _____ Displacement _____ Preflush: Gal - BBl 1 Type: H2O
Breakdown _____ Maximum _____ Load & Bkdn: Gal - BBl _____ Pad:Bbl -Gal _____
Lost Returns-YES _____ Lost Returns-NO _____ Excess /Return Gal BBl _____ Calc.Disp Bbl 0
Cmt Rtrn#Bbl _____ Actual TOC _____ Calc. TOC: _____ Actual Disp. 0
Average _____ Frac. Gradient _____ Treatment: Gal - BBl _____ Disp:Bbl-Gal BBL
Shut In: Instant _____ 5 Min. _____ 15 Min _____ Cement Slurry Gal - BBl 226
Total Volume Gal - BBl 226

Frac Ring #1	Frac Ring # 2	Frac Ring # 3	Frac Ring # 4

THE INFORMATION STATED HEREIN IS CORRECT

CUSTOMER REPRESENTATIVE _____
SIGNATURE

19606 San Gabriel
Houston, Tx. 77084
Phone: (281) 492-7077
Fax: (281) 646-8996

FAX COVER PAGE

To: Bill Olson

From: Mike Griffin

Company: NMOCD

Company: Whole Earth Environmental, Inc.

Fax No.: 505-476-3462

Pages including cover sheet: 2

Subject: Plugging Procedure

Message:

Date: 8/31/01

Attached, please find a copy of the plugging procedure we propose to employ on Case # 1R0220 for Rice Operating.

Could you review & comment?

Mike

ATKINS ENGINEERING ASSOCIATES INC.

August 31, 2001

Mike Griffin
Whole Earth Environmental
Fax No. 281-646-8996

Mike,

The procedure to use to plug and abandon existing monitor wells that have been grouted is as follows:

1. Remove well cover and concrete easement around well head by using jack-hammer or other hand tools
2. Attempt to pull casing with rig cable.
3. If casing pulls complete, then tremie pipe 16 to 17 pound/gallon grout with bentonite additive from total depth to land surface.
4. If casing has pulled apart, then remove upper part of casing and tremie pipe 14 to 15 pound/gallon grout through casing from total depth to land surface. Much of the grout will flow through the well screen.

This would be the only feasible way to accomplish the grouting job.

Sincerely,

Jackie D. Atkins, PE, PS, ES

JDA/pcd

(505) 624-2420
FAX: (505) 624-2421
caea@dfn.com

2904 West Second Street
Post Office Box 3156
Roswell, New Mexico 88202-3156

Olson, William
From: Olson, William
Sent: Monday, July 16, 2001 10:35 AM
To: 'riceswd'
Subject: RE: Case # 1R0220 Lovington Muni Water Well

The below referenced requests to extend the deadline for submission of plugging report and to turn one of the monitor wells over to the city of Lovington are approved.

From: riceswd [SMTP:riceswd@gte.net]
Sent: Wednesday, July 11, 2001 1:17 PM
To: wolson@state.nm.us
Subject: Case # 1R0220 Lovington Muni Water Well

Dear Bill Olson:

This email is to update you on the progress of closing the groundwater monitoring project at the ABO SWD System. In your letter of May 25, 2001, NMOCD refered to this project as Case # 1R0220: Lovington Municipal Water Well (COL-6).

The City of Lovington would like to take possession of the SouthEast monitor well to conduct future groundwater depth measurements for the area. If NMOCD approves the continued use of this monitor well, Rice Operaing Company (ROC) will legally assign all rights and responsibilities to the City of Lovington.

ROC has completed the plugging of the Lovington Municipal Water Well # 6, but requests an extension to the July 21, 2001 deadline in order to complete the remaining two monitor well pluggings. The cost of plugging #6 was over $30,000.00 and funds are exhausted. ROC would like an extension until October 31, 2001 in order to procure additional funding from System Partners and to finalize the transfer of the monitor well to the City of Lovington.

The System Partners of the ABO SWD System have been strained pretty hard lately with the cost of this plugging and the closure of the emergency overflow pit. Any relief you could extend on the deadline would be most welcome.

Thank you,

Carolyn Haynes

IMPORTANT MESSAGE

FOR Bill

DATE 6/29/01 TIME 9:17 (A.M.) P.M.

M Carolyn Haynes

OF Rice

PHONE 505-393-9174
AREA CODE NUMBER EXTENSION

☐ FAX

☐ MOBILE
AREA CODE NUMBER TIME TO CALL

TELEPHONED	✓	PLEASE CALL	
CAME TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		RUSH	
RETURNED YOUR CALL		SPECIAL ATTENTION	

MESSAGE Notification that they will be plugging City of Lovington Well #6 (ABO) on Monday with Halliburton. They also notified Hobbs office (spoke w/ Paul Sheeley)

SIGNED Faye

TOPS. FORM 3002P LITHO IN U.S.A.

RICE *Operating Company*

122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

CERTIFIED MAIL
RETURN RECEIPT NO. 7099 3220 0001 9928 4355

January 19, 2001

Mr. William C. Olson
NM Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Dr.
Santa Fe, NM 87504

RE: 2000 MONITOR WELL REPORT
GROUNDWATER REMEDIATION/MONITORING
LOVINGTON MUNICIPAL WATER WELL AREA
ABO SWD SYSTEM JCT. L-31, SEC 31, T16S, R37E
LEA COUNTY, NEW MEXICO

Dear Mr. Olson:

Rice Operating Company (ROC) appreciates this opportunity to submit the 2000 Monitor Well Report for the ABO Salt Water Disposal System Junction L-31 Release Site in the SE/4 of Section 31, T16S, R37E, Lea County, NM. This monitoring site is situated within the Lovington Municipal Water Supply Field.

The 2000 quarterly monitoring events were scheduled and conducted by Safety and Environmental Solutions, Inc. (SES) of Hobbs. The 2000 MW Report was compiled by SES. ROC contracted with SES for Year 2000 monitor well sampling and SES scheduled all major events with a 48-hour advance notice to the NMOCD. All sampling events were conducted pursuant to NMOCD guidelines.

The former Lovington Water Well (COL-6) that was included in the sampling program experienced an operational glitch during the June sampling event. The well was being purged using a submersible pump and the purge fluid was disposed via a 1¼" polypipe into the ABO SWD F-31 terminal tank. When the pump was stopped, hydrocarbon skim from the terminal tank siphoned through the hose and into the well. The hydrocarbons were immediately recovered from the well by manually bailing and then using absorbent socks. All hydrocarbons were recovered. This event is reported in detail by SESI in the June 22, 2000 MW Report that is

enclosed with this letter. After an additional purge, the quarterly sample was taken and the results indicated no long-term detriment in the water quality.

Well COL-6 is no longer connected to the Lovington Water Supply Unit and is used solely for the completion of this groundwater monitoring event. Well COL-6 is not cased beyond a five-foot surface pipe. The pump has been removed from this well and a steel plate covers the top. The wellhouse has been secured with a padlock.

The monitor well analytical results for this past year are very encouraging as all sample results were within the specifications for Standards for Domestic Water Supply. There have been 10 consecutive quarters of sampling results within these specifications. ROC is requesting closure for this project at this time.

Upon approval of this closure request, ROC proposes to plug and abandon the three monitor wells and the COL-6 well. This activity will be conducted pursuant to NMOCD guidelines.

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

Thank you for your consideration concerning this yearly summary of groundwater monitoring information. If you have any questions or if I can be of any service, please don't hesitate to call.

RICE OPERATING COMPANY

Carolyn Doran Haynes

Carolyn Doran Haynes
Operations Engineer

Enclosure: 2000 Year Report
June 22, 2000 SESI Report
Summary Tables

Cc: file, Ms. Donna Williams,
NMOCD, District I Office
1625 N. French Drive
Hobbs, NM 88240

SUMMARY OF WATER SAMPLE BTEX RESULTS

JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Sampled	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	Total BTEX (ppm)	TDS (mg/l)	Chloride (mg/l)
NMWQCC	Standards	0.010	0.750	0.750	0.620	N/A	1,000	250
MW-1	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	865	**250**
MW-1	11/25/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	782	94
MW-1	04/03/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1042**	**258**
MW-1	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1066**	**250**
MW-1	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	449	80
MW-1	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	**1091**	144
MW-1	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	573	94
MW-1	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	640	149
MW-1	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		646	135
MW-1	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		745	131
MW-1	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		850	126
MW-1	12/09/99	<0.0020	<0.0020	<0.0020	<0.0060		613	113
MW-1	02/24/2000	<0.0020	<0.0020	<0.0020	<0.0060		599	132
MW-1	06/16/2000	<0.0020	<0.0020	<0.0020	<0.0060		563	113
MW-1	09/18/2000	<0.0050	<0.0050	<0.0050	<0.0150		588	109
MW-1	12/12/2000	<0.0020	<0.0020	<0.0002	<0.0060		641	145
MW-2	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	394	46
MW-2	11/25/96	0.0013	<0.0010	<0.0010	<0.0030	<0.0030	408	52
MW-2	04/03/97	0.0020	<0.0010	<0.0010	<0.0030	<0.0030	617	92
MW-2	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	464	96
MW-2	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	857	180
MW-2	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	600	36
MW-2	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	418	76
MW-2	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	436	94
MW-2	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		374	60
MW-2	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		458	56
MW-2	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		444	57
MW-2	12/09/99	<0.0020	<0.0020	<0.0020	<0.0060		392	81
MW-2	02/24/2000	<0.0020	<0.0020	<0.0020	<0.0060		417	68
MW-2	06/16/2000	<0.0020	<0.0020	<0.0020	<0.0060		435	64
MW-2	09/18/2000	<0.0050	<0.0050	<0.0050	<0.0150		459	74
MW-2	12/12/2000	<0.0020	<0.0020	<0.0002	<0.0060		455	79
MW-3	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	389	52
MW-3	11/25/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	424	52
MW-3	04/03/97	**0.5070**	0.0020	0.0020	0.0090	0.5200	515	58
MW-3	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	454	58
MW-3	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0030	364	48
MW-3 (SPL)	12/06/97	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	N/A	N/A
MW-3	02/18/98	<0.0010	<0.0010	<0.0010	<0.0060	<0.0060	954	48
MW-3	08/16/98	<0.0020	<0.0020	<0.0020	<0.0020	<0.0060	317	42
MW-3	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	343	47
MW-3	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		336	48
MW-3	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		454	58
MW-3	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		431	45
MW-3	12/09/99	<0.0010	<0.0010	<0.0010	0.007		383	45
MW-3	02/24/2000	<0.0020	<0.0020	<0.0020	<0.0060		394	56
MW-3	06/16/2000	<0.0020	<0.0020	<0.0020	<0.0060		394	56
MW-3	09/18/2000	<0.0050	<0.0050	<0.0050	<0.0150		406	62
MW-3	12/12/2000	<0.0020	<0.0020	<0.0002	<0.0060		394	54
COL-6	03/22/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	863	282
COL-6	04/19/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1205**	**530**
COL-6	11/25/96	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	04/03/97	0.0010	<0.0010	<0.0010	<0.0030	<0.0030	780	**276**
COL-6	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	836	246
COL-6	12/06/97	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	02/14/98	<0.0010	<0.0010	<0.0010	<0.0060	<0.0060	571	128
COL-6	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	442	69
COL-6	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	453	86
COL-6	03/21/2000	<0.0020	<0.0020	<0.0020	<0.0060		168	143
COL-6	07/03/2000	<0.0020	<0.0020	<0.0020	<0.0060		554	128
COL-6	09/18/2000	<0.0050	<0.0050	<0.0050	<0.0150		423	66
COL-6	12/12/2000	<0.0020	<0.0020	<0.0020	<0.0060		429	66

Analysis was performed by Cardinal Laboratories in Hobbs, New Mexico.

Benzene, toluene, eythlbenzene, and xylene (BTEX); total dissolved solids (TDS); chloride analyses were conducted using EPA Methods 8020, 160.1, and 352.3, respectively.

Results presented in bold print exceed NMWQCC human health standards for ground water.

SUMMARY OF GROUNDWATER MEASUREMENTS

JCT L-31 SPILL SITE, ABO SWD SYSTEM

	MONITOR WELL #1 casing elevation 100.00 surface elevation 97.6		MONITOR WELL # 2 casing elevation 99.83 surface elevation 97.2		MONITOR WELL # 3 casing elevation 99.88 surface elevation 97.4		COL - 6 casing elevation 100.31 surface elevation 97.6	
Date Gauged	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**
04/17/96	79.25	20.75	79.25	20.58	79.50	20.38	85.50	14.81
09/19/96	79.20	20.80	79.10	20.73	79.20	20.68	80.00	20.31
10/03/96	78.84	21.16	78.78	21.05	78.90	20.98	79.21	21.10
10/16/96	78.70	21.30	78.60	21.23	78.70	21.18	79.04	21.27
10/30/96	78.39	21.61	78.70	21.13	79.00	20.88	79.01	21.30
11/25/96	78.38	21.62	78.65	21.18	78.76	21.12	78.73	21.58
04/23/97	79.36	20.64	79.25	20.58	79.37	20.51	79.70	20.61
07/02/97	80.21	19.79	80.17	19.66	80.28	19.60		
12/06/97	81.79	18.21	81.65	18.18	81.76	18.12		
12/23/97	81.30	18.70	81.10	18.73	81.20	18.68	81.60	18.71
02/14/98	81.22	18.78	81.15	18.68	81.27	18.61	81.58	18.73
08/16/98	83.13	16.87	83.44	16.39	83.58	16.30	83.82	16.49
11/22/98	83.02	16.98	83.11	16.72	83.25	16.63	83.38	16.93
05/03/99	82.15	17.85	82.10	17.73	82.18	17.70		
06/30/99	82.73	17.27	82.68	17.15	82.81	17.07		
09/13/99	84.07	15.93	83.93	15.90	84.10	15.78		
12/09/99	83.99	16.01	83.84	15.99	83.93	15.95		
02/24/2000	83.87	16.13	83.73	16.10	83.80	16.08		
06/16/2000	84.64	15.36	84.55	15.28	84.56	15.32	85.30	15.01
09/18/2000	85.63	14.37	85.48	14.35	85.51	14.37		
12/12/2000	84.66	15.34	84.54	15.29	84.63	15.25		

* Well casings are marked to provide consistent reference points for gauging operations.

** Calculated from survey plat performed by Rice Operating Company.

COL-6 = City of Lovington Well No. 6. All measurements are in feet.

Rice Operating Company
Abo Monitor Well Report
Unit L of Section 31, T16S, R37E,
Lea County, New Mexico

December 12, 2000

Prepared for:

Rice Operating Company
122 W. Taylor
Hobbs, New Mexico 88240

By:

Safety & Environmental Solutions, Inc.
703 E. Clinton, Suite 103
Hobbs, New Mexico 88240
(505) 397-0510

TABLE OF CONTENTS

I. Background

Safety & Environmental Solutions, Inc. (SESI) was engaged to perform sampling and data collection of the three (3) ground water monitor wells at the Abo Salt Water Disposal System Jct. L – 31 Site (See Vicinity Map). The subject area is located in Unit L of Section 31, Township 16 S, Range 37 E in Lea County, New Mexico. The casing size in all wells is 2".

II. Work Performed

SESI's environmental technician arrived at the site on December 12, 2000. The Ground water samples were taken from each well after hand bailer was used to develop the wells. Three to five casing volumes of water were removed from each well until pH and temperature of the water were stabilized. The development water was stored onsite in plastic drums. The drums were secured to the wellheads with rope. The samples were obtained and placed in appropriate containers, preserved and transported under chain of custody to Cardinal Laboratories of Hobbs, New Mexico for analysis. The analyses requested by Rice Operating Company included Benzene, Toulene, Ethyl Benzene, and Xylenes (BTEX) and Major Cations and Anions. (See Analytical Data)

In addition to the sampling, SESI also measured the depth to the top of ground water using a Solinst water level indicator. The total depth of each well was measured in order to compute the proper casing volumes. A summary of this data follows:

ID	DATE	TOP OF CASING ELEVATION	DEPTH TO WATER	POTETIO-METRIC ELEVATION	TOTAL WELL DEPTH	FREE PRODUCT THICKNESS
MW – 1	9/18/00	100.00'	84.66'	15.34'	87.97'	0.00
MW – 2	9/18/00	99.83'	84.54'	15.29'	91.90'	0.00
MW – 3	9/18/00	99.88'	84.63'	15.25'	90.30'	0.00

III. Analytical Results

The analysis of the groundwater samples performed by Cardinal Laboratories are summarized as follows:

SAMPLE ID	BENZENE (MG/L)	TOLUENE (MG/L)	ETHYL BENZENE (MG/L)	TOTAL XYLENES (MG/L)
MW - 1	<0.002	<0.002	<0.002	<0.006
MW - 2	<0.002	<0.002	<0.002	<0.006
MW - 3	<0.002	<0.002	<0.002	<0.006
Pump Well	<0.002	<0.002	<0.002	<0.006

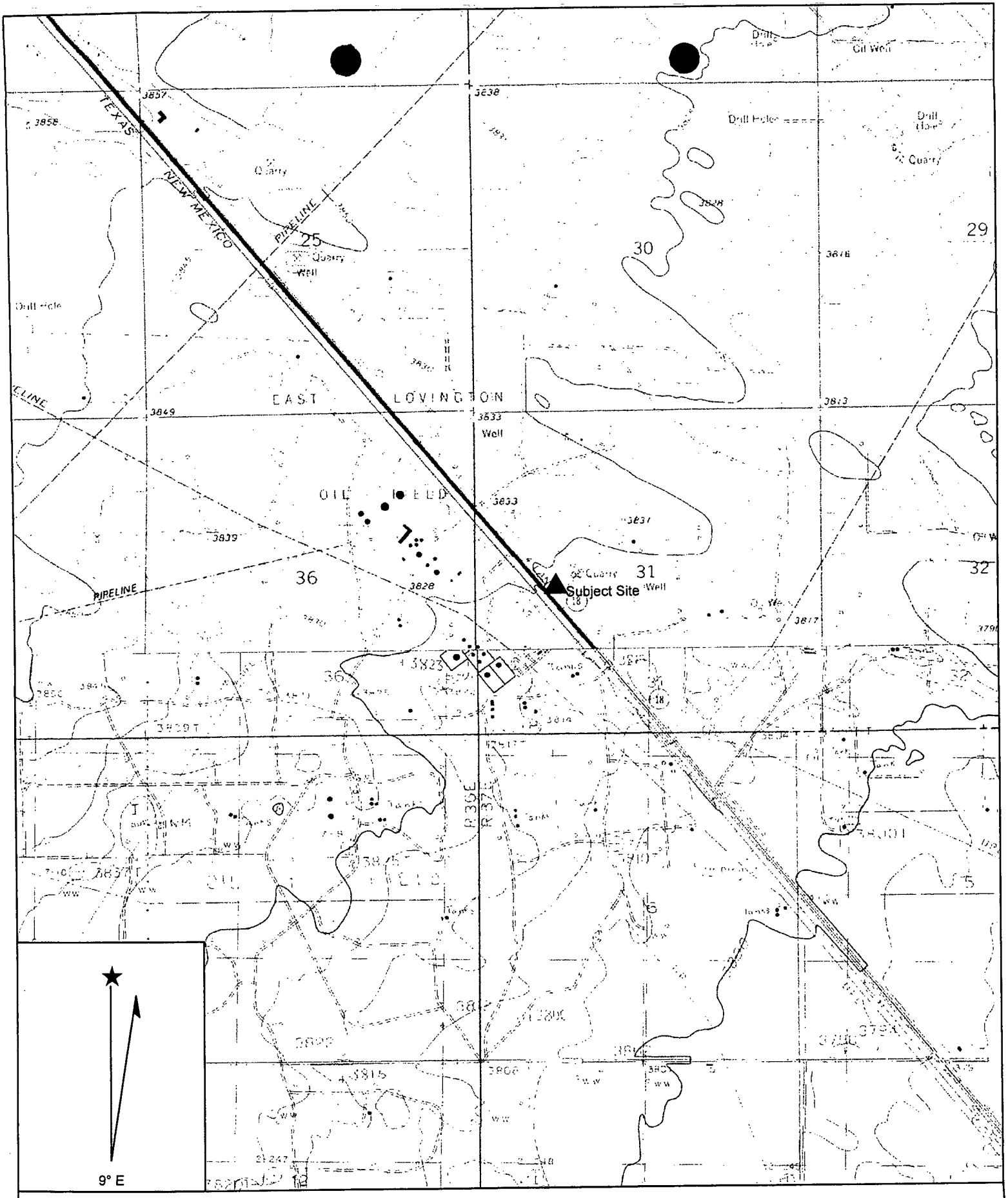
SAMPLE ID	NA (MG/L)	CA (MG/L)	MG (MG/L)	K (MG/L)	CONDUCTIVITY (UMHOS/CM)	TOTAL ALKALINITY ($MGCACO_3/L$)
MW - 1	150ppm	58ppm	16ppm	1.5ppm	1129ppm	254ppm
MW - 2	55ppm	73ppm	22ppm	1.05ppm	740ppm	168ppm
MW - 3	52ppm	73ppm	16ppm	1.01ppm	684ppm	201ppm
Pump Well	36ppm	73ppm	21ppm	1.26ppm	738ppm	205ppm

SAMPLE ID	CL^- (MG/L)	SO_4 (MG/L)	CO_3 (MG/L)	HCO_3 (MG/L)	PH (S.U.)	TDS (MG/L)
MW – 1	145ppm	102ppm	0ppm	310ppm	7.50	641ppm
MW – 2	79ppm	79ppm	0ppm	205ppm	7.54	455ppm
MW - 3	54ppm	69ppm	0ppm	245ppm	7.54	394ppm
Pump Well	66ppm	76ppm	0ppm	250ppm	7.22	429ppm

IV. Maps and Appendices

Vicinity Map
Potentiometric Surface Map
Cumulative Well Water Quality Data Results
Analytical Results
Water Analysis Validation

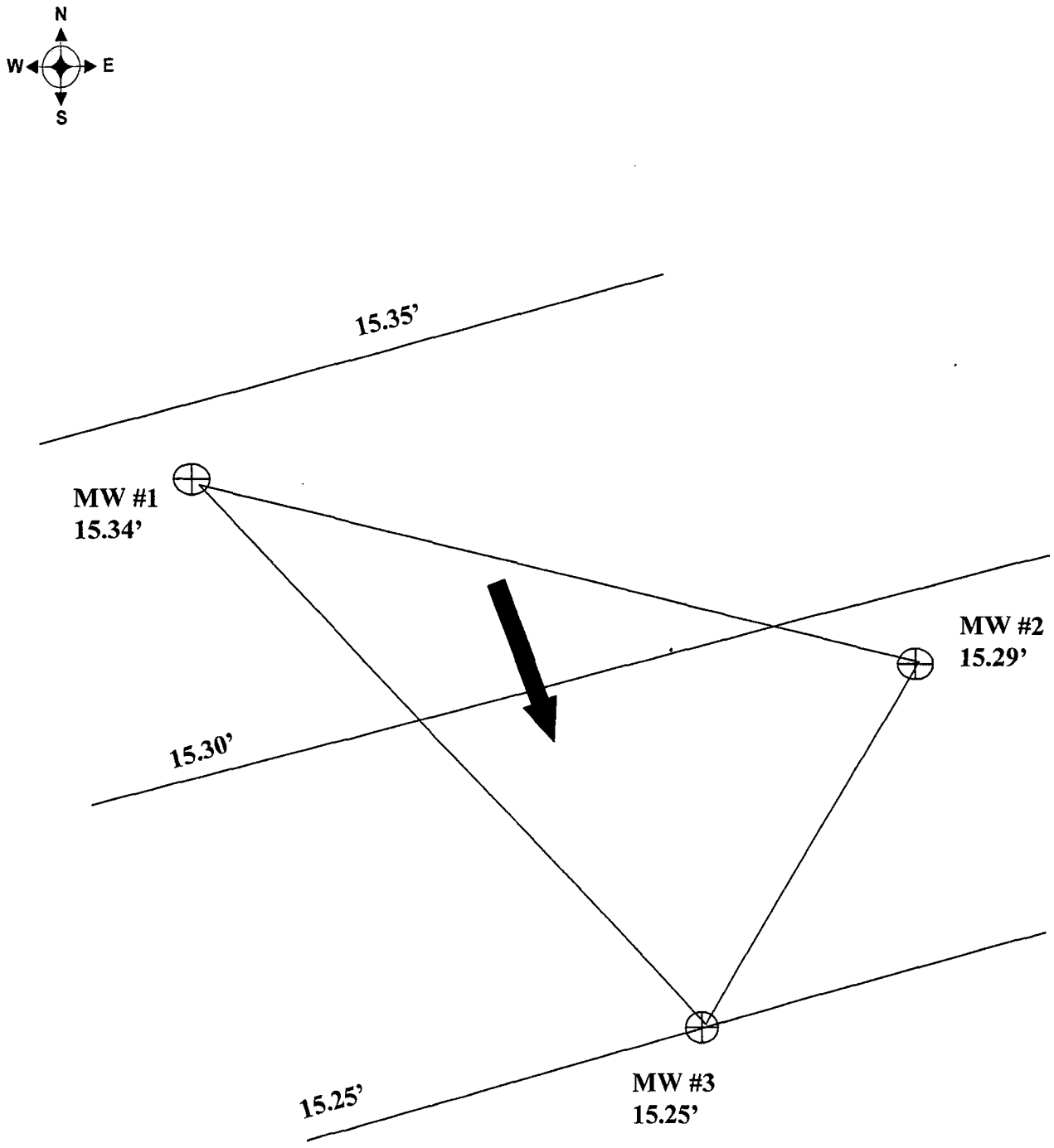
Figure 1
Vicinity Map



Name: LOVINGTON
Date: 12/26/2000
Scale: 1 inch equals 2000 feet

Location: 032° 52' 38.1" N 103° 17' 49.5" W
Caption: Rice Operating Company
Abo SWD System
Vicinity Map

Figure 2
Potentiometric Surface Map



Date 12-12-2000
Scale 1" = 40'
Contour Interval 0.05 ft.
Gradient 0.0005

Note: Elevation relative to top of casing datum of 100 ft. at MW - 1

Rice Operating Company **Potentiometric Surface Map**	**Abo SWD System** **Jct. L-31** **Lea Co., New Mexico**	**Safety & Environmental** **Solutions, Inc.**

Appendix A
Cumulative Well Water Quality Data Results

Cumulative Data on Abo Monitor Wells

Monitor Well #1

CONTAMINANT	WQCC STANDARD	INITIAL TEST 5/03/99	TEST DATE 6/30/99	TEST DATE 9/13/99	TEST DATE 12/09/99
Sodium	N/A	140ppm	144ppm	141ppm	139ppm
Calcium	N/A	50ppm	64ppm	46ppm	32ppm
Magnesium	N/A	23ppm	12ppm	16ppm	10ppm
Potassium	N/A	2.38ppm	3.0ppm	1.96ppm	3.1ppm
Conductivity	N/A	1263ppm	1220ppm	1021ppm	1095ppm
T-Alkalinity	N/A	240ppm	240ppm	232ppm	252ppm
Chlorides	250ppm	135ppm	131ppm	126ppm	113ppm
Sulfate (SO_4)	600ppm	92ppm	98.1ppm	78ppm	16.3ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	293ppm	293ppm	283ppm	307ppm
TDS	1000.0ppm	646ppm	745ppm	850ppm	613ppm
pH	> 6 & <9	7.40	7.21	7.54	7.57
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.006ppm	<0.006ppm

CONTAMINANT	WQCC STANDARD	TEST DATE 2/24/00	TEST DATE 6/16/00	TEST DATE 9/18/00	TEST DATE 12/12/00
Sodium	N/A	127ppm	75ppm	203ppm	150ppm
Calcium	N/A	63ppm	58ppm	38ppm	58ppm
Magnesium	N/A	17ppm	49ppm	11ppm	16ppm
Potassium	N/A	3.1ppm	1.43ppm	.69ppm	1.5ppm
Conductivity	N/A	1,102ppm	888ppm	990ppm	1129ppm
T-Alkalinity	N/A	236ppm	295ppm	258ppm	254ppm
Chlorides	250ppm	132ppm	113ppm	109ppm	145ppm
Sulfate (SO_4)	600ppm	28ppm	105ppm	103ppm	102ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	288ppm	360ppm	315ppm	310ppm
TDS	1000.0ppm	599ppm	563ppm	588ppm	641ppm
pH	> 6 & <9	7.44	7.39	7.49	7.50
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.015ppm	<0.006ppm

Monitor Well #2

CONTAMINANT	WQCC STANDARD	INITIAL TEST 5/03/99	TEST DATE 6/30/99	TEST DATE 9/13/99	TEST DATE 12/09/99
Sodium	N/A	22ppm	24ppm	37ppm	52ppm
Calcium	N/A	66ppm	75ppm	62ppm	46ppm
Magnesium	N/A	23ppm	14ppm	18ppm	12ppm
Potassium	N/A	2.02ppm	1.6ppm	1.58ppm	2.8ppm
Conductivity	N/A	707ppm	660ppm	638ppm	686ppm
T-Alkalinity	N/A	144ppm	140ppm	152ppm	148ppm
Chlorides	250ppm	60ppm	56ppm	57ppm	81ppm
Sulfate (SO_4)	600ppm	77ppm	77.8ppm	77ppm	16.9ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	176ppm	171ppm	185ppm	181ppm
TDS	1000.0ppm	374ppm	458ppm	444ppm	392ppm
pH	> 6 & <9	7.42	7.35	7.51	7.67
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.006ppm	<0.006ppm

CONTAMINANT	WQCC STANDARD	TEST DATE 2/24/00	TEST DATE 6/16/00	TEST DATE 9/18/00	TEST DATE 12/12/00
Sodium	N/A	15ppm	24ppm	90ppm	55ppm
Calcium	N/A	63ppm	70ppm	53ppm	73ppm
Magnesium	N/A	23ppm	23ppm	15ppm	22ppm
Potassium	N/A	3.7ppm	1.52ppm	2.80ppm	1.05ppm
Conductivity	N/A	721ppm	631ppm	686ppm	740ppm
T-Alkalinity	N/A	160ppm	197ppm	180ppm	168ppm
Chlorides	250ppm	68ppm	64ppm	74ppm	79ppm
Sulfate (SO_4)	600ppm	32ppm	85ppm	97ppm	79ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	195ppm	240ppm	220ppm	205ppm
TDS	1000.0ppm	417ppm	435ppm	459ppm	455ppm
pH	> 6 & <9	7.50	7.46	7.54	7.54
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.015ppm	<0.006ppm

Monitor Well #3

CONTAMINANT	WQCC STANDARD	INITIAL TEST 5/03/99	TEST DATE 6/30/99	TEST DATE 9/13/99	TEST DATE 12/09/99
Sodium	N/A	23ppm	13ppm	29ppm	48ppm
Calcium	N/A	66ppm	83ppm	66ppm	42ppm
Magnesium	N/A	22ppm	16ppm	17ppm	14ppm
Potassium	N/A	1.56ppm	2.1ppm	1.73ppm	2.3ppm
Conductivity	N/A	692ppm	710ppm	614ppm	570ppm
T-Alkalinity	N/A	168ppm	144ppm	168ppm	229ppm
Chlorides	250ppm	48ppm	58ppm	45ppm	45ppm
Sulfate (SO_4)	600ppm	68ppm	74.9ppm	66ppm	18.2ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	205ppm	171ppm	205ppm	229ppm
TDS	1000.0ppm	336ppm	454ppm	431ppm	383ppm
pH	> 6 & <9	7.21	7.34	7.55	7.53
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.002ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.006ppm	0.007ppm

CONTAMINANT	WQCC STANDARD	TEST DATE 2/24/00	TEST DATE 6/16/00	TEST DATE 9/18/00	TEST DATE 12/12/00
Sodium	N/A	18ppm	26ppm	100ppm	52ppm
Calcium	N/A	53ppm	67ppm	54ppm	73ppm
Magnesium	N/A	27ppm	22ppm	11ppm	16ppm
Potassium	N/A	3.3ppm	1.15ppm	0.77ppm	1.01ppm
Conductivity	N/A	677ppm	591ppm	653ppm	684ppm
T-Alkalinity	N/A	176ppm	209ppm	217ppm	201ppm
Chlorides	250ppm	56ppm	56ppm	62ppm	54ppm
Sulfate (SO_4)	600ppm	31ppm	79ppm	83ppm	69ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm	0ppm
HCO_3	N/A	215ppm	255ppm	265ppm	245ppm
TDS	1000.0ppm	394ppm	394ppm	406ppm	394ppm
pH	> 6 & <9	7.48	7.46	7.56	7.54
Benzene	0.01ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.002ppm	<0.005ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.006ppm	<0.015ppm	<0.006ppm

Pump Well #4

CONTAMINANT	WQCC STANDARD	INITIAL TEST 3/21/00	TEST DATE 9/18/00	TEST DATE 12/12/00
Sodium	N/A	80ppm	103ppm	36ppm
Calcium	N/A	77ppm	47ppm	73ppm
Magnesium	N/A	22ppm	14ppm	21ppm
Potassium	N/A	2.7ppm	0.64ppm	1.26ppm
Conductivity	N/A	917ppm	684ppm	738ppm
T-Alkalinity	N/A	168ppm	197ppm	205ppm
Chlorides	250ppm	143ppm	66ppm	66ppm
Sulfate (SO_4)	600ppm	89ppm	93ppm	76ppm
Carbonate (CO_3)	N/A	0ppm	0ppm	0ppm
HCO_3	N/A	205ppm	240ppm	250ppm
TDS	1000.0ppm	168ppm	423ppm	429ppm
pH	> 6 & <9	7.71	7.42	7.22
Benzene	0.01ppm	<0.002ppm	<0.005ppm	<0.002ppm
Toluene	0.75ppm	<0.002ppm	<0.005ppm	<0.002ppm
Ethyl Benzene	0.75ppm	<0.002ppm	<0.005ppm	<0.002ppm
Total Xylenes	0.62ppm	<0.006ppm	<0.015ppm	<0.006ppm

Appendix B
Analytical Results

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, STE. 103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 12/12/00
Reporting Date: 12/14/00
Project Owner: NOT GIVEN
Project Name: RICE-ABO
Project Location: LOVINGTON, NM

Sampling Date: 12/12/00
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (mS/cm)	T-Alkalinity (mgCaCO3/L)
ANALYSIS DATE:		12/16/00	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00
H5424-1	MW #1	150	58	16	1.5	1129	254
H5424-2	MW #2	55	73	22	1.05	740	168
H5424-3	MW #3	52	73	16	1.01	684	201
H5424-4	PUMPING WELL	36	73	21	1.26	738	205
Quality Control		NR	46	55	5.02	1489	NR
True Value QC		NR	50	50	5.00	1413	NR
% Recovery		NR	92	110	100	105	NR
Relative Percent Difference		NR	4.3	1.8	1.2	0.3	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl⁻ (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		12/13/00	12/13/00	12/13/00	12/13/00	12/13/00	12/14/00
H5424-1	MW #1	145	102	0	310	7.50	641
H5424-2	MW #2	79	79	0	205	7.54	455
H5424-3	MW #3	54	69	0	245	7.54	394
H5424-4	PUMPING WELL	66	76	0	250	7.22	429
Quality Control		994	52.62	NR	975	7.04	NR
True Value QC		1000	50.00	NR	1000	7.00	NR
% Recovery		99.4	105	NR	97.5	101	NR
Relative Percent Difference		4.1	0.6	NR	2.6	0	NR
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Chemist

12/19/2000
Date

H5424A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, STE. 103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 12/12/00
Reporting Date: 12/14/00
Project Owner: NOT GIVEN
Project Name: RICE-ABO
Project Location: LOVINGTON, NM

Sampling Date: 12/12/00
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NUMBER	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		12/13/00	12/13/00	12/13/00	12/13/00
H5424-1	MW #1	<0.002	<0.002	<0.002	<0.006
H5424-2	MW #2	<0.002	<0.002	<0.002	<0.006
H5424-3	MW #3	<0.002	<0.002	<0.002	<0.006
H5424-4	PUMPING WELL	<0.002	<0.002	<0.002	<0.006
Quality Control		0.090	0.095	0.093	0.280
True Value QC		0.100	0.100	0.100	0.300
% Recovery		90.0	95.0	93.0	93.2
Relative Percent Difference		14.6	6.3	7.4	5.9

METHOD: EPA SW-846 8260

Chemist

12/14/00
Date

H5424E.XLS

CARDINAL LABORATORIES, INC.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page 1 of 1

Company Name: SESI	BILL TO PO #:
Project Manager:	Company: SAME
Address: 703 E. CLINTON, #103	Attn:
City: HOBBS State: NM Zip: 88240	Address:
Phone #: (505) 397-0510	City:
Fax #: (505) 393-4388	State: Zip:
Project #: Project Owner:	Phone #:
Project Name: Rice - Abo	Fax #:
Project Location: Lovington NM.	

FOR LAB USE ONLY				MATRIX						PRES.			SAMPLING		ANALYSIS REQUEST	
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID:	ICE / COOL	OTHER:	DATE	TIME	BTEX	Cations & Anions
H5424-1	MW#1			X							X		12-12-00		X	X
-2	MW#2			X							X		12-12-00		X	X
-3	MW#3			X							X		12-12-00		X	X
-4	Pumping Well			X							X		12-12-00		X	X

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
	Time:		Fax Result: ☐ Yes ☐ No
Relinquished By:	Date: 12-12-00	Received By: (Lab Staff)	REMARKS:
Sergio Contreras Jr.	Time: 1:10		
Delivered By: (Circle One)	Sample Condition: Cool: Yes / No; Intact: Yes / No	CHECKED BY: (Initials)	
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

Appendix C
Water Analysis Validation

Cations and Anions Calculation Check								
	Sample Name	H5424-1	H5424-2	H5424-3	H5424-4			
	Well Number	MW#1	MW#2	MW#3	PW#4			
	Date	12/12/00	12/12/00	12/12/00	12/12/00			
Equivalent Weight:	**Lab**	Cardinal	Cardinal	Cardinal	Cardinal			
22.99	**Sodium (mg/L)**	150	55	52	36			
20.04	**Calcium (mg/L)**	58	73	73	73			
12.15	**Magnesium (mg/L)**	16	22	16	21			
39.09	**Potassium (mg/L)**	1.5	1.1	1.0	1.3			
35.45	**Chloride (mg/L)**	145	79	54	66			
48.04	**Sulfate (mg/L)**	102	79	69	76			
30.00	**Carbonate (mg/L)**	0.0	0.0	0.0	0.0			
61.01	**Bicarbonate (mg/L)**	310	205	245	250			
50.04	**Alkalinity (mg/L CaCO3)**	254	168	201	205			
62.00	**Nitrate (mg/L)**	0.0	0.0	0.0	0.0			
	Sum Cations (meq/L)	10.8	7.9	7.2	7.0			
	Sum Anions (meq/L)	11.3	7.2	7.0	7.5			
	Percent Difference	2.3	-4.3	-1.9	3.9			
	Measured TDS (evap., mg/L)	641	455	394	429			
	TDS (calc. USGS sum, mg/L)	625	410	386	396			
	TDS (meas.) / TDS (calc. USGS)	1.0	1.1	1.0	1.1			
	TDS (calc. sum, mg/L)	783	514	510	523			
	Elect. Conductivity (umhos/cm)	1,129	740	684	738			
	TDS (C*0.7, mg/L)	790	518	479	517			
	TDS (calc. USGS) / Conductivity	0.55	0.55	0.56	0.54			
Test Criteria								
1. Anion-Cation Balance:			Anion Sum	Max % diff.				
			0 - 3.0	± 0.2				
			3.0 - 10.0	± 2				
			10.0 - 800	± 5				
2. TDS, Measured to Calculated:			1.0 < (measured TDS/calculated TDS) < 1.2					
3. TDS (calculated USGS) to EC Ratio:			Calculated TDS/conductivity = 0.55 - 0.7					

Abo Water Well Oil Removal

Unit L of Section 31, T16S, R37E, Lea County, New Mexico

June 22, 2000

prepared for:

Rice Operating Company
122 W. Taylor
Lea County, New Mexico

By:

Safety & Environmental Solutions, Inc.
703 E. Clinton, Suite 103
Hobbs, New Mexico 88240
(505) 397-0510

TABLE OF CONTENTS

I. Background

Safety & Environmental Solutions, Inc. (SESI) was notified by Rice Operating on June 16, 2000 that some type of oil was in the water well located at the Abo Salt Water Disposal System Jct. L – 31 site. (See Vicinity Map). The Abo system is normally part of the quarterly monitoring performed by SESI however on June 16, 2000 SESI did not have access to this well and sampling was not performed. The water well is located in Unit L of Section 31, Township 16 S Range 37 E in Lea County, New Mexico.

II. Work Performed

SESI arrived at the site on June 22, 2000 and began removal of oil mixture from the water well using a bailer and absorbents. The results are as follows:

Date	Top of Water	Top of Oil	Free Product	Action
6/22/00	85.74	85.10	0.64	Bailer
6/23/00	85.12	85.10	0.02	Absorbents
6/24/00	85.17	85.15	0.02	Absorbents
6/25/00	85.20	0.00	0.00	Absorbents
6/26/00	85.25	0.00	0.00	Absorbents
6/27/00	85.28	0.00	0.00	Absorbents
6/28/00	85.31	0.00	0.00	Absorbents
6/29/00	85.30	0.00	0.00	Absorbents
6/30/00	Not Measured	Not Measured	n/a	Pumped
7/1/00	Not Measured	Not Measured	n/a	Pumped
7/2/00	Not Measured	Not Measured	n/a	Pumped
7/3/00	Not Measured	Not Measured	n/a	Pumped

On June 29, Rice reinstalled the pump and started pumping with the pump inlet 6" - 8" below the top of water. Fluid was pumped from the well from June 29 to July 3, 2000. The volume pumped from the well at a rate of 15 gallons per minute was 86,400 gallons.

III. Analytical Results

A sample was taken at 11:30 a.m. on July 3, 2000 and transported under chain of custody to Cardinal Laboratory for Cation and Anion and BTEX analysis. The analysis of the samples are summarized as follows:

SAMPLE ID	BENZENE (MG/L)	TOLUENE (MG/L)	ETHYL BENZENE (MG/L)	TOTAL XYLENES (MG/L)
WW	<0.002	<0.002	<0.002	<0.006

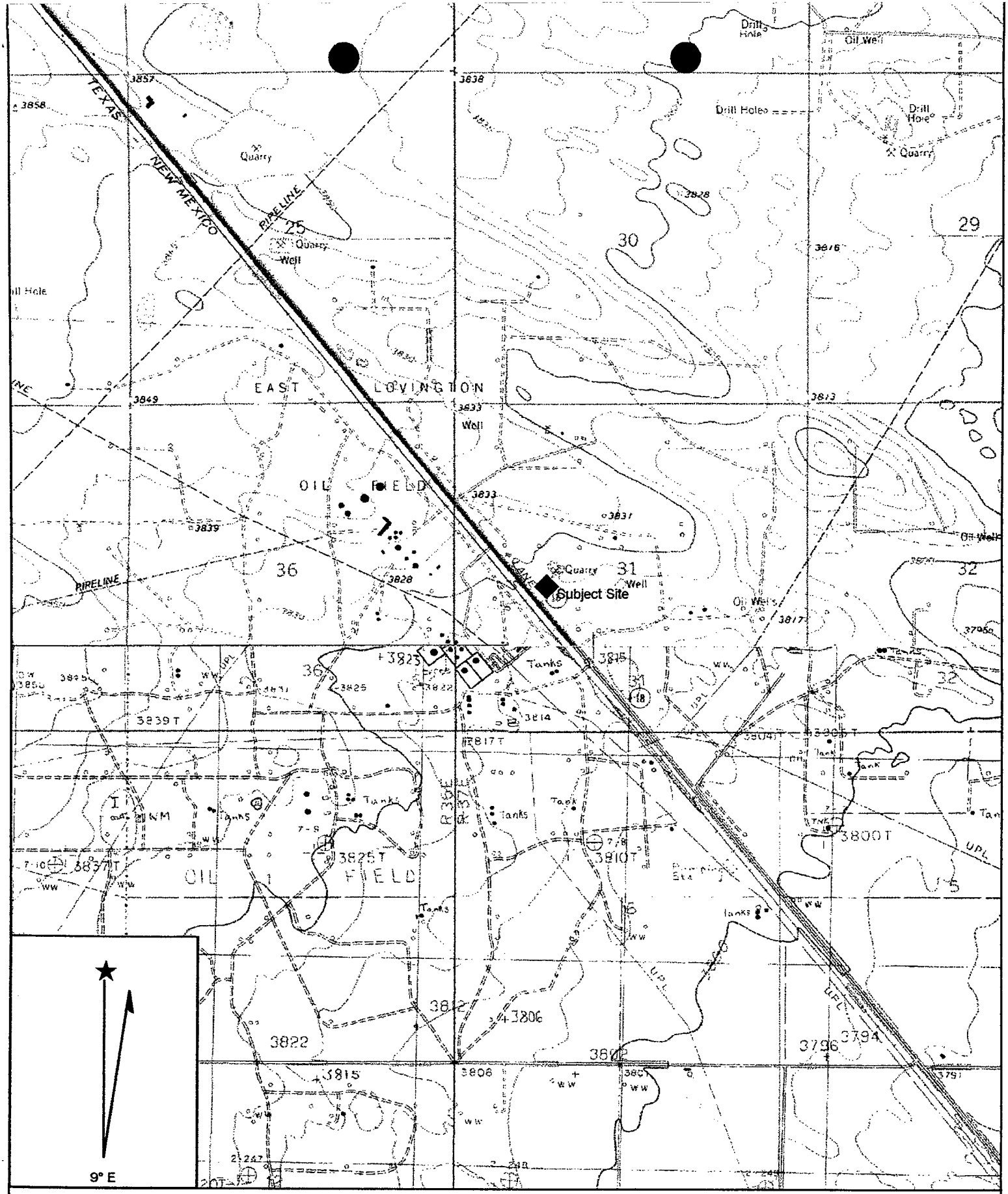
SAMPLE ID	NA (MG/L)	CA (MG/L)	MG (MG/L)	K (MG/L)	CONDUCTIVITY (UMHOS/CM)	T-ALKALINITY ($MGCACO_3/L$)
WW	130 ppm	73 ppm	18 ppm	0.7ppm	849 ppm	197ppm

SAMPLE ID	CL^- (MG/L)	SO_4 (MG/L)	CO_3 (MG/L)	HCO_3 (MG/L)	PH (S.U.)	TDS (MG/L)
WW	128 ppm	138 ppm	0 ppm	240 ppm	7.14	554 ppm

IV. Maps and Appendices

Vicinity Map
Analytical Results
Water Analysis Validation

Figure 1
Vicinity Map



Name: LOVINGTON
Date: 7/17/2000
Scale: 1 inch equals 2000 feet

Location: 032° 52' 37.9" N 103° 17' 46.6" W
Caption: Rice Operating Company
Abo SWD System

Appendix A
Analytical Results

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: DEE WHATLEY
703 E. CLINTON, STE. #103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 07/03/00
Reporting Date: 07/07/00
Project Owner: RICE
Project Name: ABO WELLS
Project Location: LOVINGTON, NM

Sampling Date: 07/03/00
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: AH

LAB NUMBER SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u S/cm)	T-Alkalinity ($mgCaCO_3/L$)
ANALYSIS DATE:	07/06/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00
H4978-1 PUMPING WELL	130	73	18	0.7	849	197
Quality Control	1.068	46	56	5.26	1368	NR
True Value QC	1.000	50	50	5.0	1413	NR
% Recovery	107	92	112	105	96.7	NR
Relative Percent Difference	1.8	8.7	0	11.2	0.1	NR
METHODS:	273.1	3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/06/00
H4978-1 PUMPING WELL	128	138	0	240	7.14	554
Quality Control	990	51.7	NR	1000	7.01	NR
True Value QC	1000	50.0	NR	1000	7.00	NR
% Recovery	99.0	103	NR	100	100	NR
Relative Percent Difference	1.0	0.6	NR	8.5	0.3	NR
METHODS:	SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Amy Hill
Chemist

7/7/00
Date

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: DEE WHATLEY
703 E. CLINTON, STE. #103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 07/03/00
Reporting Date: 07/05/00
Project Owner: RICE
Project Name: ABO WELLS
Project Location: LOVINGTON, NM

Sampling Date: 07/03/00
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		07/05/00	07/05/00	07/05/00	07/05/00
H4978-1	PUMPING WELL	<0.002	<0.002	<0.002	<0.006
Quality Control		0.089	0.099	0.101	0.298
True Value QC		0.100	0.100	0.100	0.300
% Recovery		89.4	99.3	101	99.3
Relative Percent Difference		3.9	4.3	5.4	3.4

METHOD: EPA SW 846-8021B, 5030, 5021 Gas Chromatography

Chemist

7/5/00
Date

H4978A.XLS

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page____ of____

Company Name: SESI	BILL TO PO #:
Project Manager:	Company: SAME
Address: 703 E. CLINTON, #103	Attn:
City: HOBBS State: NM Zip: 88240	Address:
Phone #: (505) 397-0510	City:
Fax #: (505) 393-4388	State: Zip:
Project #: Project Owner: Rice	Phone #:
Project Name: ABO Wells	Fax #:
Project Location: Lovington	

FOR LAB USE ONLY				MATRIX							PRES.			SAMPLING		ANALYSIS REQUEST												
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID:	ICE / COOL	OTHER:	DATE	TIME	BTEX	Cations & Anions												
H4978-1	Pumping Well		3	✓							✓		7-3-00	11:20	✓	✓												

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date: 7-3-00	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
	Time: 11:30 AM		Fax Result: ☐ Yes ☐ No
Relinquished By:	Date:	Received By: (Lab Staff)	REMARKS:
	Time:		
Delivered By: (Circle One)		Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials)
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

Appendix B
Water Analysis Validation

Portrait

Cations and Anions Calculation Check								
	Sample Name	H4978-1						
	Well Number	WW						
	Date	07/03/00						
Equivalent Weight:	**Lab**	Cardinal						
22.99	**Sodium (mg/L)**	130						
20.04	**Calcium (mg/L)**	73						
12.15	**Magnesium (mg/L)**	18						
39.09	**Potassium (mg/L)**	0.7						
35.45	**Chloride (mg/L)**	128						
48.04	**Sulfate (mg/L)**	138						
30.00	**Carbonate (mg/L)**	0.0						
61.01	**Bicarbonate (mg/L)**	240						
50.04	**Alkalinity (mg/L CaCO3)**	197						
62.00	**Nitrate (mg/L)**	0.0						
	Sum Cations (meq/L)	10.8						
	Sum Anions (meq/L)	10.4						
	Percent Difference	-1.8						
	Measured TDS (evap., mg/L)	554						
	TDS (calc. USGS sum, mg/L)	606						
	TDS (meas.) / TDS (calc. USGS)	0.9						
	TDS (calc. sum, mg/L)	728						
	Elect. Conductivity (umhos/cm)	849						
	TDS (C*0.7, mg/L)	594						
	TDS (calc. USGS) / Conductivity	0.71						
Test Criteria								
1. Anion-Cation Balance:			Anion Sum	Max % diff.				
			0 - 3.0	± 0.2				
			3.0 - 10.0	± 2				
			10.0 - 800	± 5				
2. TDS, Measured to Calculated:			1.0 < (measured TDS/calculated TDS) < 1.2					
3. TDS (calculated USGS) to EC Ratio:			Calculated TDS/conductivity = 0.55 - 0.7					

RICE *Operating Company*

122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

CERTIFIED MAIL
RETURN RECEIPT NO. Z 577 009 726

March 8, 2000

Mr. William C. Olson
NM Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
2040 S. Pacheco
Santa Fe, NM 87505

RE: 1999 MONITOR WELL REPORT
GROUNDWATER REMEDIATION/MONITORING
LOVINGTON MUNICIPAL WATER WELL AREA
ABO SWD SYSTEM JCT. L-31, SEC 31, T16S, R37E
LEA COUNTY, NEW MEXICO

Dear Mr. Olson:

Rice Operating Company (ROC) appreciates this opportunity to submit the 1999 Monitor Well Report for the ABO Salt Water Disposal System Junction L-31 Release Site in the SE/4 of Section 31, T16S, R37E, Lea County, NM. This monitoring site is situated within the Lovington Municipal Water Supply Field.

The 1999 quarterly monitoring events were scheduled and conducted by Safety and Environmental Solutions, Inc. (SES) of Hobbs. The 1999 MW Report was compiled by SES.

ROC has contracted with SES for Year 2000 monitor well sampling and SES will schedule all major events with a 48-hour advance notice to the NMOCD. All sampling events will be conducted pursuant to NMOCD guidelines.

The former Lovington Water Well (COL-6) that was included in the 1998 sampling program has not been sampled in the past 4 quarters. ROC regrets this error and has taken action to rectify this mistake for all future monitoring schedules. Well COL-6 is not cased beyond a five-foot surface pipe. A pump has been installed that will adequately purge the well before sampling. The purge water will be disposed into the Abo SWD System. ROC and SES expect to include this well in the year 2000 monitoring schedule. Well COL-6 is no longer connected to the

Lovington Water Supply Unit and will be used solely for the completion of this groundwater monitoring event. At the closure of this project, the well will then be properly plugged.

The monitor well analytical results for this past year are very encouraging. All sample results were within the specifications for Standards for Domestic Water Supply. ROC is anticipating submitting a closure request for this project after the Year 2000 sampling schedule.

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

Thank you for your consideration concerning this yearly summary of groundwater monitoring information. If you have any questions or if I can be of any service, please don't hesitate to call.

RICE OPERATING COMPANY

Carolyn Doran Haynes

Carolyn Doran Haynes
Operations Engineer

Enclosure: 1999 Year Report
Summary Tables

Cc: file, Ms. Donna Williams,
NMOCD, District I Office
1625 N. French Drive
Hobbs, NM 88240

SUMMARY OF WATER SAMPLE BTEX RESULTS
JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Sampled	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	Total BTEX (ppm)	TDS (mg/l)	Chloride (mg/l)
NMWQCC	Standards	0.010	0.750	0.750	0.620	N/A	1,000	250
MW-1	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	865	**250**
MW-1	11/25/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	782	94
MW-1	04/03/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1042**	**258**
MW-1	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1066**	250
MW-1	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	449	80
MW-1	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	**1091**	144
MW-1	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	573	94
MW-1	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	640	149
MW-1	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		646	135
MW-1	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		745	131
MW-1	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		850	126
MW-1	12/09/99	<0.0020	<0.0020	<0.0020	<0.0060		613	113
MW-2	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	394	46
MW-2	11/25/96	0.0013	<0.0010	<0.0010	<0.0030	<0.0030	408	52
MW-2	04/03/97	0.0020	<0.0010	<0.0010	<0.0030	<0.0030	617	92
MW-2	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	464	96
MW-2	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	857	180
MW-2	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	600	36
MW-2	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	418	76
MW-2	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	436	94
MW-2	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		374	60
MW-2	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		458	56
MW-2	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		444	57
MW-2	12/09/99	<0.0020	<0.0020	<0.0020	<0.0060		392	81
MW-3	04/17/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	389	52
MW-3	11/25/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	424	52
MW-3	04/03/97	**0.5070**	0.0020	0.0020	0.0090	0.5200	515	58
MW-3	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	454	58
MW-3	12/06/97	<0.0020	<0.0020	<0.0020	<0.0060	<0.0030	364	48
MW-3 (SPL)	12/06/97	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	N/A	N/A
MW-3	02/18/98	<0.0010	<0.0010	<0.0010	<0.0060	<0.0060	954	48
MW-3	08/16/98	<0.0020	<0.0020	<0.0020	<0.0020	<0.0060	317	42
MW-3	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	343	47
MW-3	05/03/99	<0.0020	<0.0020	<0.0020	<0.0060		336	48
MW-3	06/30/99	<0.0020	<0.0020	<0.0020	<0.0060		454	58
MW-3	09/13/99	<0.0020	<0.0020	<0.0020	<0.0060		431	45
MW-3	12/09/99	<0.0010	<0.0010	<0.0010	0.007		383	45
COL-6	03/22/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	863	282
COL-6	04/19/96	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	**1205**	**530**
COL-6	11/25/96	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	04/03/97	0.0010	<0.0010	<0.0010	<0.0030	<0.0030	780	**276**
COL-6	07/02/97	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	836	246
COL-6	12/06/97	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	02/14/98	<0.0010	<0.0010	<0.0010	<0.0060	<0.0060	571	128
COL-6	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	442	69
COL-6	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	453	86

Analysis was performed by Cardinal Laboratories in Hobbs, New Mexico.
Benzene, toluene, eythlbenzene, and xylene (BTEX); total dissolved solids (TDS); chloride analyses were conducted using EPA Methods 8020, 160.1, and 352.3, respectively.
Results presented in bold print exceed NMWQCC human health standards for ground water.

SUMMARY OF WATER SAMPLE ANALYTICAL RESULTS
JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Sampled	Total Dissolved Solids (TDS)	pH (S. U.)	Chloride (Cl)	Sodium (Na)	Calcium (Ca)	Sulfate (SO_4)	Magnesium (Mg)	Carbonate (CO_3)	Bicarbonate (HCO_3)
NMWQCC Standards		1,000 mg/l		250 mg/l	N/A	N/A	600 mg/l	N/A	N/A	N/A
MW-1	04/17/96	865	7.88	**250**	223.9	57.9	123.4	12	0	200
MW-1	11/25/96	782	N/A	94	190	37.6	217	16	0	268
MW-1	04/03/97	**1,042**	7.44	**258**	250	83	200	25	0	346
MW-1	07/02/97	**1,066**	N/A	**250**	N/A	N/A	N/A	N/A	N/A	N/A
MW-1	12/06/97	449	N/A	80	N/A	N/A	N/A	N/A	N/A	N/A
MW-1	02/14/98	**1,091**	6.98	144	188	78	136	9	0	361
MW-1	08/16/98	573	N/A	94	N/A	N/A	N/A	N/A	N/A	N/A
MW-1	11/22/98	640	N/A	149	N/A	N/A	N/A	N/A	N/A	N/A
MW-1	05/03/99	646	7.40	135	140	50	92	23	0	293
MW-1	06/30/99	745	7.21	131	144	64	98.1	12	0	293
MW-1	09/13/99	850	7.54	126	141	46	78	16	0	283
MW-1	12/09/99	613	7.57	113	139	32	16.3	10	0	307
MW-2	04/17/96	394	7.96	46	35.4	71.7	57.4	16.1	0	160
MW-2	11/25/96	408	N/A	52	26.8	66.4	90.8	25.8	0	200
MW-2	04/03/97	617	7.25	92	52	64	87	24	64	185
MW-2	07/02/97	464	N/A	96	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	12/06/97	857	N/A	180	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	02/14/98	600	N/A	36	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	08/16/98	418	N/A	76	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	11/22/98	436	N/A	94	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	05/03/99	374	7.42	60	22	66	77	23	0	176
MW-2	06/30/99	458	7.35	56	24	75	77.8	14	0	171
MW-2	09/13/99	444	7.51	57	37	62	77	18	0	185
MW-2	12/09/99	392	7.67	81	52	46	16.9	12	0	181
MW-3	04/17/96	389	7.87	52	31.5	76.1	54.3	16.4	0	140
MW-3	11/25/96	424	N/A	52	34.1	69.6	90.8	17.5	0	205
MW-3	04/03/97	515	7.36	58	63	69	106	18	0	234
MW-3	07/02/97	454	N/A	58	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	12/06/97	364	N/A	48	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	02/14/98	954	N/A	48	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	08/16/98	317	N/A	42	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	11/22/98	343	N/A	47	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	05/03/99	336	7.21	48	23	66	68	22	0	205
MW-3	06/30/99	454	7.34	58	13	83	74.9	16	0	176
MW-3	09/13/99	431	7.55	45	29	66	66	17	0	205
MW-3	12/09/99	383	7.53	45	48	42	18.2	14	0	229
COL-6	04/17/96	**1,231**	N/A	**545**	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	11/25/96									
COL-6	04/03/97	780	7.65	276	166	88	126	29	0	224
COL-6	07/02/97	836	N/A	246	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	12/06/97									
COL-6	02/14/98	571	7.48	128	87	80	15	0.3	83	224
COL-6	08/16/98	442	N/A	69	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	11/22/98	453	N/A	86	N/A	N/A	N/A	N/A	N/A	

Analysis was performed by Cardinal Laboratories in Hobbs, New Mexico.
COL-6 = City of Lovington Well No. 6.
All results are reported in milligrams per liter (mg/l): parts per million (ppm).
Results presented in bold print exceed NMWQCC human health standards for ground water.

SUMMARY OF GROUNDWATER MEASUREMENTS

JCT L-31 SPILL SITE, ABO SWD SYSTEM

	MONITOR WELL #1 casing elevation 100.00 surface elevation 97.6		MONITOR WELL # 2 casing elevation 99.83 surface elevation 97.2		MONITOR WELL # 3 casing elevation 99.88 surface elevation 97.4		COL - 6 casing elevation 100.31 surface elevation 97.6	
Date Gauged	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**	Depth to Water*	Water Elevation**
04/17/96	79.25	20.75	79.25	20.58	79.50	20.38	85.50	14.81
09/19/96	79.20	20.80	79.10	20.73	79.20	20.68	80.00	20.31
10/03/96	78.84	21.16	78.78	21.05	78.90	20.98	79.21	21.10
10/16/96	78.70	21.30	78.60	21.23	78.70	21.18	79.04	21.27
10/30/96	78.39	21.61	78.70	21.13	79.00	20.88	79.01	21.30
11/25/96	78.38	21.62	78.65	21.18	78.76	21.12	78.73	21.58
04/23/97	79.36	20.64	79.25	20.58	79.37	20.51	79.70	20.61
07/02/97	80.21	19.79	80.17	19.66	80.28	19.60		
12/06/97	81.79	18.21	81.65	18.18	81.76	18.12		
12/23/97	81.30	18.70	81.10	18.73	81.20	18.68	81.60	18.71
02/14/98	81.22	18.78	81.15	18.68	81.27	18.61	81.58	18.73
08/16/98	83.13	16.87	83.44	16.39	83.58	16.30	83.82	16.49
11/22/98	83.02	16.98	83.11	16.72	83.25	16.63	83.38	16.93
05/03/99	82.15	17.85	82.10	17.73	82.18	17.70		
06/30/99	82.73	17.27	82.68	17.15	82.81	17.07		
09/13/99	84.07	15.93	83.93	15.90	84.10	15.78		
12/09/99	83.99	16.01	83.84	15.99	83.93	15.95		

* Well casings are marked to provide consistent reference points for gauging operations.

** Calculated from survey plat performed by Rice Operating Company.

COL-6 = City of Lovington Well No. 6. All measurements are in feet.

Safety & Environmental Solutions, Inc.

Rice Operating Company

Abo SWD System
Jct. L - 31
Monitor Well Report
Lea County, New Mexico

For Calendar Year ending December 31, 1999

Safety & Environmental Solutions, Inc.
703 E. Clinton Suite 103
Hobbs, New Mexico 88240
(505) 397-0510

TABLE OF CONTENTS

I. Background

Safety & Environmental Solutions, Inc. (SESI) was engaged to perform sampling and data collection of the three (3) ground water monitor wells at the Abo Salt Water Disposal System Jct. L – 31 site. (See Vicinity Map). The subject area is located in Unit L of Section 31, Township 16 S Range 37 E in Lea County, New Mexico. The casing size in all wells is 2".

II. Work Performed

SESI environmental technicians performed monitor well sampling on a quarterly basis beginning in the second quarter of 1999. Ground water samples were taken from each well after a hand bailer was used to develop the wells. Three to five casing volumes of water were removed from each well until pH and temperature of the water were stabilized. The development water was stored onsite in plastic drums. The drums were secured to the well heads with rope. The samples were obtained and placed in appropriate containers, preserved and transported under chain of custody to Cardinal Laboratories of Hobbs, New Mexico for analysis. The analyses requested by Rice Operating Company included Benzene, Toluene, Ethyl Benzene, and Xylenes (BTEX) and Major Cations and Anions. (See Analytical Data)

In addition to the sampling, SESI also measured the depth to the top of ground water at each visit using a Solinst water level indicator. The total depth of each well was measured in order to compute the proper casing volumes. (See Ground Water Elevation Tables)

III. Summary

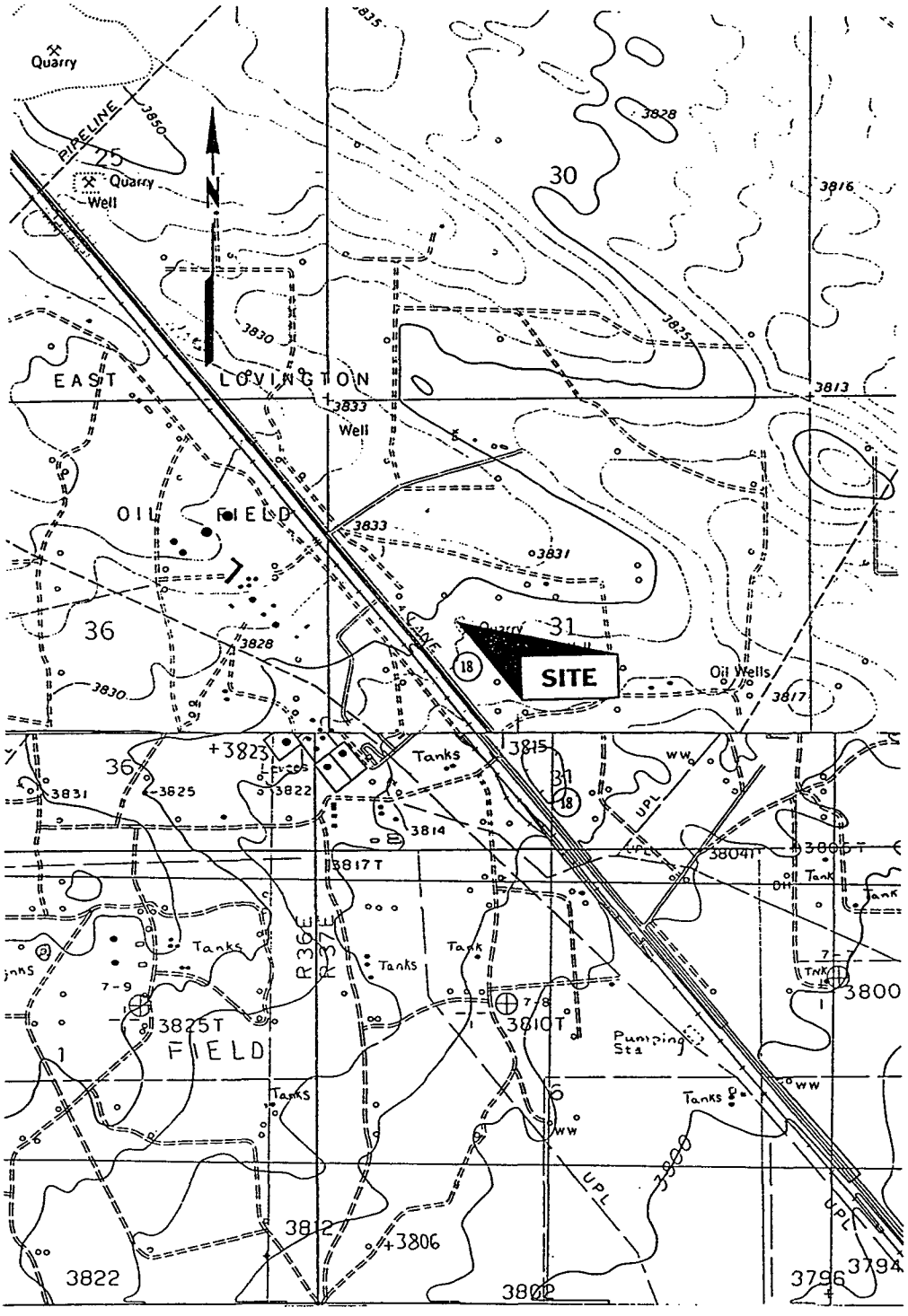
Analysis of the groundwater samples indicated no elevated levels of any of the tested analytes throughout the scope of sampling in 1999, following the standards set by the State of New Mexico Water Quality Control Commission.

The ground water elevation fluctuated slightly throughout the sampling period but the gradient for the path of flow remained constant throughout this same period, trending in a southwestern direction.

IV. Maps and Figures

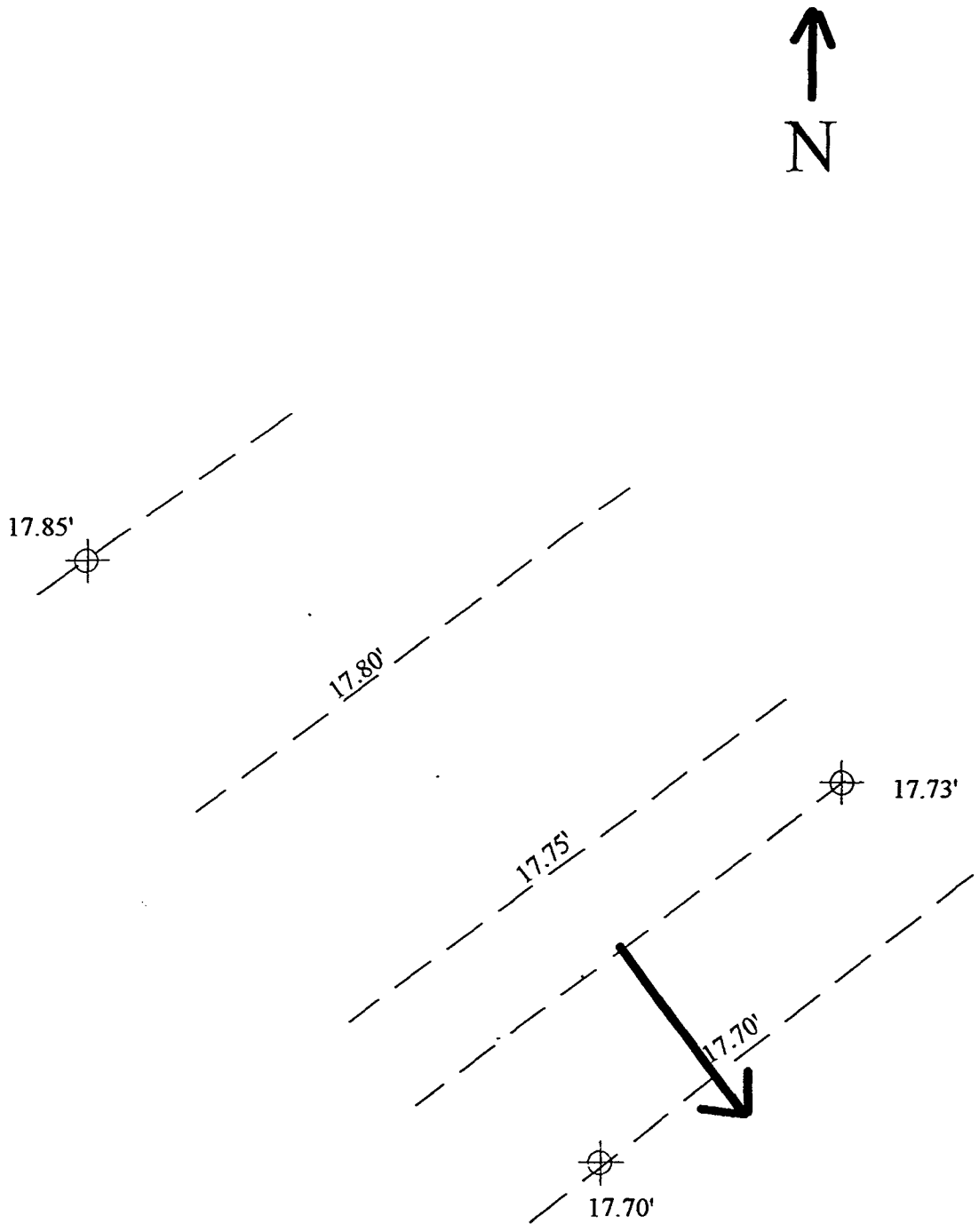
Vicinity Map
Potentiometric Surface Maps
Cumulative Well Data Results
Cumulative Ground Water Elevation Tables
Laboratory Analytical Results

Figure 1
Vicinity Map



Rice Operating Company.	**Abo SWD System Vicinity Map**	*Safety & Environmental Solutions, Inc. Hobbs, NM*

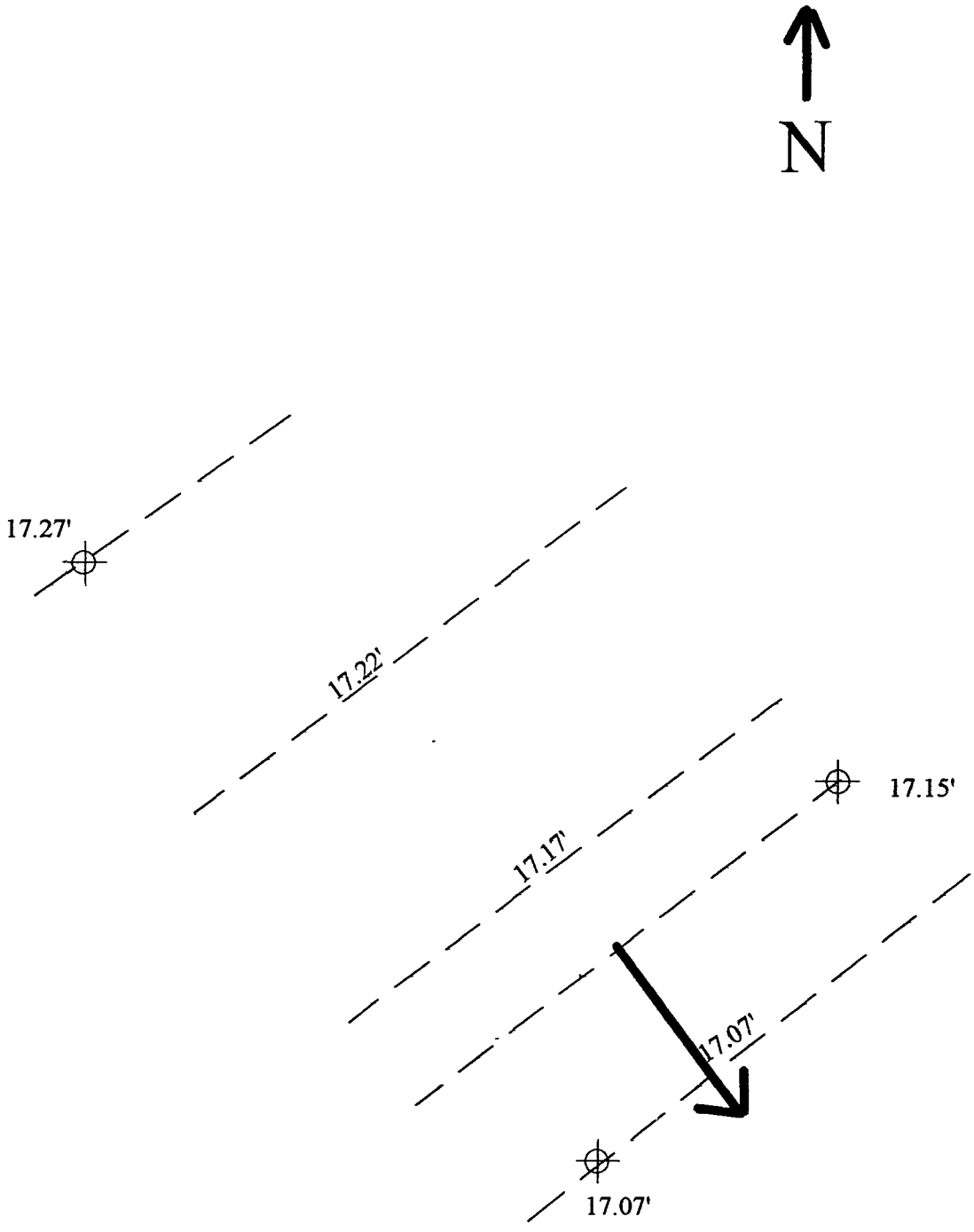
Figure 2
Potentiometric Surface Maps



Rice Operating Company

Potentiometric Surface Map
Abo SWD System Jct. L - 31
Unit L Section 31, T 16S, R 37E
:Lea County, New Mexico
May 22, 1999

Scale: 1" = 40'

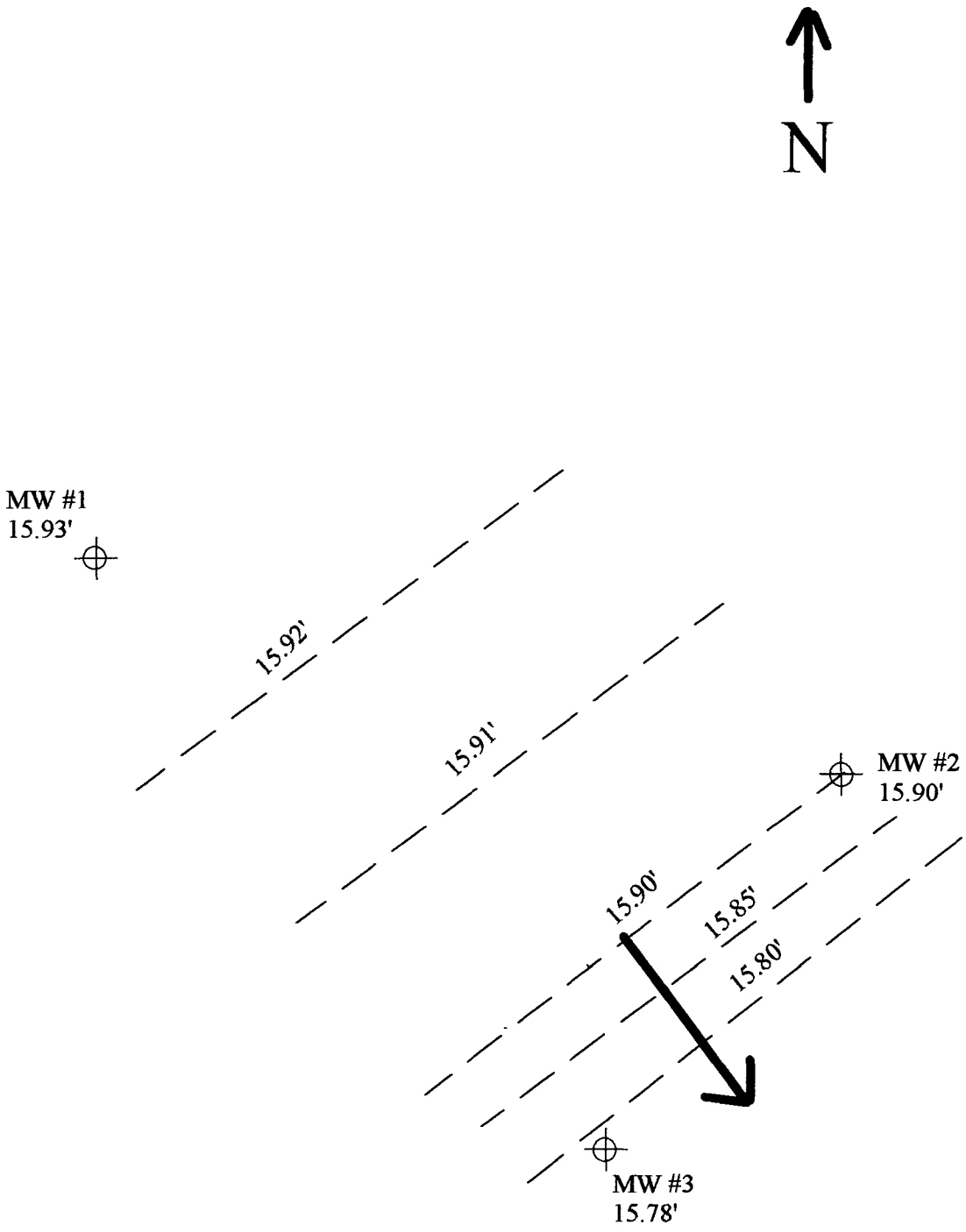


Rice Operating Company
Potentiometric Surface Map

Abo SWD System Jct. L - 31
Unit L Section 31, T 16S, R 37E
Lea County, New Mexico

June 30, 1999

Scale: 1" = 40'

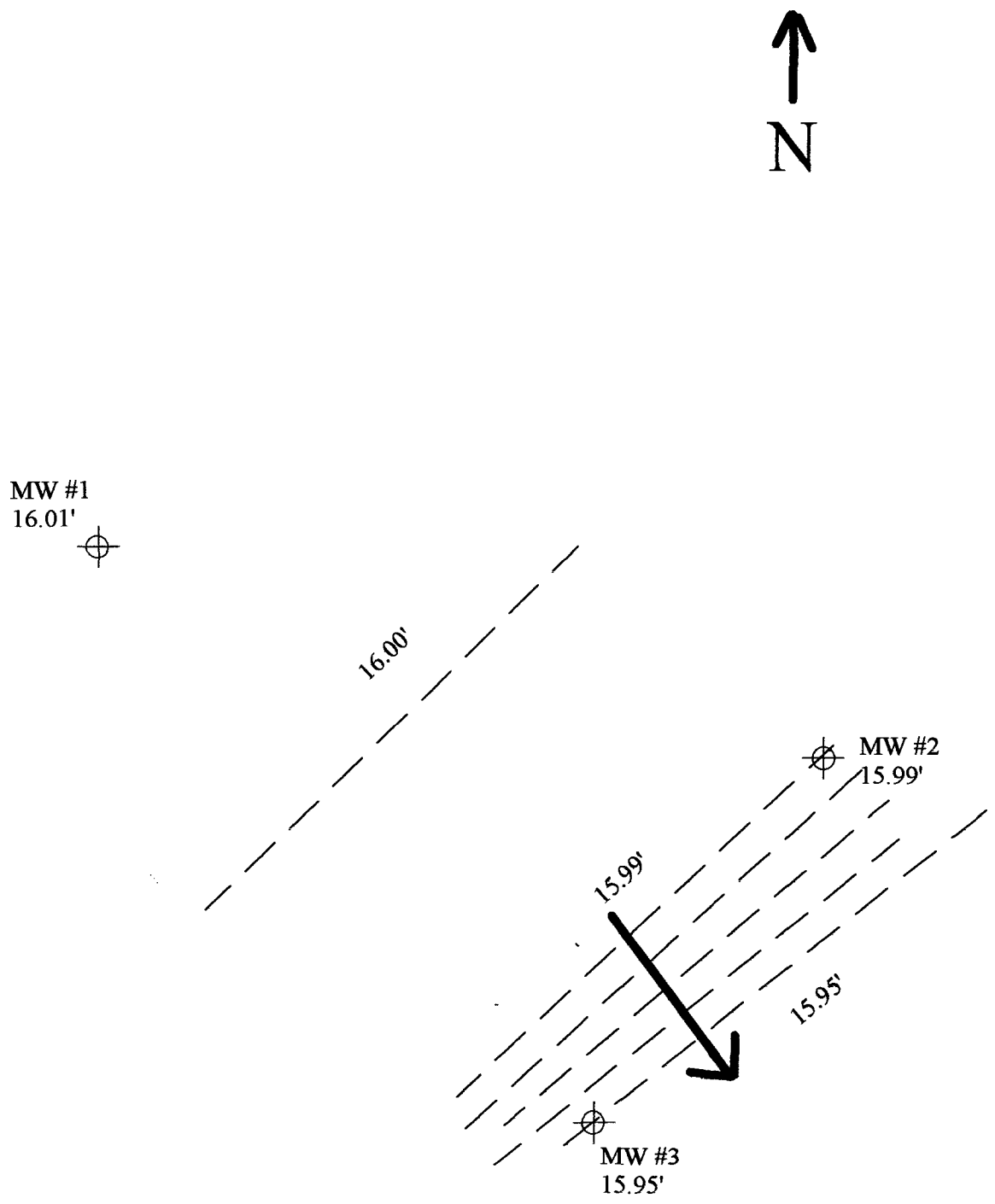


Rice Operating Company
Potentiometric Surface Map

Abo SWD System Jct. L - 31
Unit L Section 31, T 16S, R 37E
Lea County, New Mexico

September 23, 1999

Scale: 1" = 40'



Rice Operating Company
Potentiometric Surface Map

Abo SWD System Jct. L - 31
Unit L Section 31, T 16S, R 37E
Lea County, New Mexico

December 9, 1999

Scale: 1" = 40'

Figure 3
Cumulative Well Data Results

Cumulative Data on Abo Monitor Wells

Monitor Well #1

Contaminant	WQCC Standard	Initial Test 5/03/99	Test Date 6/30/99	Test Date 9/13/99	Test Date 12/09/99
Sodium	N/A	140 ppm	144 ppm	141 ppm	139 ppm
Calcium	N/A	50 ppm	64 ppm	46 ppm	32 ppm
Magnesium	N/A	23 ppm	12 ppm	16 ppm	10 ppm
Potassium	N/A	2.38 ppm	3.0 ppm	1.96 ppm	3.1 ppm
Conductivity	N/A	1263 ppm	1220 ppm	1021 ppm	1095 ppm
T-Alkalinity	N/A	240 ppm	240 ppm	232 ppm	252 ppm
Chlorides	250 ppm	135 ppm	131 ppm	126 ppm	113 ppm
Sulfate (SO_4)	600 ppm	92 ppm	98.1 ppm	78 ppm	16.3 ppm
Carbonate (CO_3)	N/A	0 ppm	0 ppm	0 ppm	0 ppm
HCO_3	N/A	293 ppm	293 ppm	283 ppm	307 ppm
TDS	1000.0 ppm	646 ppm	745 ppm	850 ppm	613 ppm
PH	> 6 & <9	7.40	7.21	7.54	7.57
Benzene	0.01 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Toluene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Ethyl Benzene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Total Xylenes	0.62 ppm	<0.006ppm	<0.006 ppm	<0.006 ppm	<0.006 ppm

Monitor Well #2

Contaminant	WQCC Standard	Initial Test 5/03/99	Test Date 6/30/99	Test Date 9/13/99	Test Date 12/09/99
Sodium	N/A	22 ppm	24 ppm	37 ppm	52 ppm
Calcium	N/A	66 ppm	75 ppm	62 ppm	46 ppm
Magnesium	N/A	23 ppm	14 ppm	18 ppm	12 ppm
Potassium	N/A	2.02 ppm	1.6 ppm	1.58 ppm	2.8 ppm
Conductivity	N/A	707 ppm	660 ppm	638 ppm	686 ppm
T-Alkalinity	N/A	144 ppm	140 ppm	152 ppm	148 ppm
Chlorides	250 ppm	60 ppm	56 ppm	57 ppm	81 ppm
Sulfate (SO_4)	600 ppm	77 ppm	77.8 ppm	77 ppm	16.9 ppm
Carbonate (CO_3)	N/A	0 ppm	0 ppm	0 ppm	0 ppm
HCO_3	N/A	176 ppm	171 ppm	185 ppm	181 ppm
TDS	1000.0 ppm	374 ppm	458 ppm	444 ppm	392 ppm
PH	> 6 & <9	7.42	7.35	7.51	7.67
Benzene	0.01 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Toluene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Ethyl Benzene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Total Xylenes	0.62 ppm	<0.006ppm	<0.006 ppm	<0.006 ppm	<0.006 ppm

Monitor Well #3

Contaminant	WQCC Standard	Initial Test 5/03/99	Test Date 6/30/99	Test Date 9/13/99	Test Date 12/09/99
Sodium	N/A	23 ppm	13ppm	29 ppm	48 ppm
Calcium	N/A	66 ppm	83 ppm	66 ppm	42 ppm
Magnesium	N/A	22 ppm	16 ppm	17 ppm	14 ppm
Potassium	N/A	1.56 ppm	2.1 ppm	1.73 ppm	2.3 ppm
Conductivity	N/A	692 ppm	710 ppm	614 ppm	570 ppm
T-Alkalinity	N/A	168 ppm	144 ppm	168 ppm	229 ppm
Chlorides	250 ppm	48 ppm	58 ppm	45 ppm	45 ppm
Sulfate (SO_4)	600 ppm	68 ppm	74.9 ppm	66 ppm	18.2 ppm
Carbonate (CO_3)	N/A	0 ppm	0 ppm	0 ppm	0 ppm
HCO_3	N/A	205 ppm	176 ppm	205 ppm	229 ppm
TDS	1000.0 ppm	336 ppm	454 ppm	431 ppm	383 ppm
PH	> 6 & <9	7.21	7.34	7.55	7.53
Benzene	0.01 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Toluene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Ethyl Benzene	0.75 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Total Xylenes	0.62 ppm	<0.006ppm	<0.006 ppm	<0.006 ppm	0.007 ppm

Figure 4
Cumulative Ground Water Elevation Tables

Cumulative Ground Water Elevation Tables on Abo Monitor Wells

Monitor Well	Casing Elevation	Elevation 5/03/99	Elevation 6/30/99	Elevation 9/13/99	Elevation 12/09/99
#1	100.0'	17.85'	17.27'	15.93'	16.01'
#2	99.83'	17.73'	17.15'	15.90'	15.99'
#3	99.88'	17.70'	17.07'	15.78'	15.95'

Figure 5
Laboratory Analytical Results

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO:

Receiving Date: 05/03/99
Reporting Date: 05/05/99
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: RO-ABO

Sampling Date: 05/03/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u mhos/cm)	T-Alkalinity ($mgCaCO_3/L$)
ANALYSIS DATE:		05/04/99	05/04/99	05/04/99	05/04/99	05/04/99	05/04/99
H4133-1	MW-1	140	50	23	2.38	1263	240
H4133-2	MW-2	22	66	23	2.02	707	144
H4133-3	MW-3	23	66	22	1.56	692	168
Quality Control		NR	48	51	4.96	1402	NR
True Value QC		NR	50	50	5.00	1413	NR
% Accuracy		NR	96	102	99	99	NR
Relative Percent Difference		NR	0	9.8	0	0.1	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		05/04/99	05/04/99	05/04/99	05/04/99	05/04/99	05/05/99
H4133-1	MW-1	135	92	0	293	7.40	646
H4133-2	MW-2	60	77	0	176	7.42	374
H4133-3	MW-3	48	68	0	205	7.21	336
Quality Control		1225	47.69	112	221	6.99	NR
True Value QC		1319	50.00	124	259	7.00	NR
% Accuracy		93	95	90	85	100	NR
Relative Percent Difference		2.4	2.5	-	-	0	1.2
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Gayle A. Potter, Chemist

05/05/99
Date

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO:

Receiving Date: 05/03/99
Reporting Date: 05/04/99
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: RO-ABO

Sampling Date: 05/03/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		05/03/99	05/03/99	05/03/99	05/03/99
H4133-1	MW-1	<0.002	<0.002	<0.002	<0.006
H4133-2	MW-2	<0.002	<0.002	<0.002	<0.006
H4133-3	MW-3	<0.002	<0.002	<0.002	<0.006
Quality Control		0.089	0.092	0.094	0.284
True Value QC		0.100	0.100	0.100	0.300
% Recovery		89.0	91.9	94.1	94.8
Relative Percent Difference		3.1	10.1	8.4	7.7

METHOD: EPA SW-846 8260

Burgett J.R. Cooke
Chemist

5/4/99
Date

H4133A.XLS

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page 1 of 1

Company Name: SESI		BILL TO	PO #:
Project Manager: BAILEY		Company:	
Address: 703 E. CLINTON, #103		Attn:	
City:	State: Zip: 88240	Address:	
Phone #:		City:	
Fax #:		State:	Zip:
Project #:	Project Owner:	Phone #:	
Project Name:		Fax #:	
Project Location: RO-ABO			

FOR LAB USE ONLY				MATRIX							PRES.			SAMPLING		ANALYSIS REQUEST												
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID:	ICE / COOL	OTHER :	DATE	TIME	BTEX	Major Cations & Anions	TDS											
H4133-1	MW-1	G	1	✓							✓		5-3-99	3:20	—	—	—											
-2	MW-2	G	1	✓							✓		5-3-99	2:43	—	—	—											
-3	MW-3	G	2	✓							✓		5-3-99	2:02	—	—	—											

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequental damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date: 5-3-99	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
	Time: 4:10 PM		Fax Result: ☐ Yes ☐ No
Relinquished By:	Date:	Received By: (Lab Staff)	REMARKS:
	Time:		
Delivered By: (Circle One)	Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials)	
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 06/30/99
Reporting Date: 07/02/99
Project Number: NOT GIVEN
Project Name: RO-ABO
Project Location: NOT GIVEN

Sampling Date: 06/30/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: JP
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		06/30/99	06/30/99	06/30/99	06/30/99
H4219-1	MW #1	<0.002	<0.002	<0.002	<0.006
H4219-2	MW #2	<0.002	<0.002	<0.002	<0.006
H4219-3	MW #3	<0.002	<0.002	<0.002	<0.006
Quality Control		0.086	0.100	0.101	0.303
True Value QC		0.100	0.100	0.100	0.300
% Recovery		86.0	99.9	101	101
Relative Percent Difference		2.6	2.3	5.5	4.4

METHOD: EPA SW 846-8021B, 5030, 5021 Gas Chromatography

Burgess J. A. Cooke
Chemist

7/2/99
Date

H4219B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 06/30/99
Reporting Date: 07/06/99
Project Number: NOT GIVEN
Project Name: RO-ABO
Project Location: NOT GIVEN

Sampling Date: 06/30/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: JP
Analyzed By: AH/GP

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u mhos/cm)	T-Alkalinity (mgCaCO3/L)
ANALYSIS DATE:		07/06/99	07/06/99	07/06/99	07/01/99	07/01/99	07/02/99
H4219-1	MW #1	144	64	12	3.0	1220	240
H4219-2	MW #2	24	75	14	1.6	660	140
H4219-3	MW #3	13	83	16	2.1	710	144
Quality Control		NR	50	49	4.96	1402	NR
True Value QC		NR	50	50	5.00	1413	NR
% Accuracy		NR	100	98	99	99.2	NR
Relative Percent Difference		NR	-	-	0	0.1	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl⁻ (mg/L)	SO4 (mg/L)	CO3 (mg/L)	HCO3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		07/02/99	07/01/99	07/02/99	07/02/99	07/01/99	07/03/99
H4219-1	MW #1	131	98.1	0	293	7.21	745
H4219-2	MW #2	56	77.8	0	171	7.35	458
H4219-3	MW #3	58	74.9	0	176	7.34	454
Quality Control		1295	48.48	112	221	6.86	NR
True Value QC		1319	50.00	124	259	7.00	NR
% Accuracy		98	97	90.3	85.4	98	NR
Relative Percent Difference		2.3	4.4	-	-	1.5	0.4
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Chemist

07/06/99
Date

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page____ of____

Company Name:	Safety & Environmental Solutions	BILL TO	PO #:
Project Manager:	Allen	Company:	
Address:	703 E Clinton Suite 103	Attn:	
City:	Hobbs State: NM Zip: 88240	Address:	
Phone #:	505-397-0510	City:	
Fax #:		State:	Zip:
Project #:	Project Owner:	Phone #:	
Project Name:	~~[illegible]~~ RO-ABO	Fax #:	
Project Location:			

FOR LAB USE ONLY				MATRIX							PRES.			SAMPLING		ANALYSIS REQUEST		
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID:	ICE / COOL	OTHER:	DATE	TIME	BTEX	Maj Cations & Anions	TDS
H4219-1	MW#1	G	1	X									6-30-99	1:20	X	X	X
H4219-2	MW#2	G	1	X									6-30-99	2:10	X	X	X
H4219-3	MW#3	G	1	X									6-30-99	3:00	X	X	X

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date: 6-30-99	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
	Time: 4:06		Fax Result: ☐ Yes ☐ No
Relinquished By:	Date:	Received By: (Lab Staff)	REMARKS:
	Time:		
Delivered By: (Circle One)	Sample Condition: Cool ☐ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials)	
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: DEE WHATLEY
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO:

Receiving Date: 09/13/99
Reporting Date: 09/14/99
Project Owner: RICE
Project Name: ABO MONITOR WELLS
Project Location: RICE OPERATING ABO

Sampling Date: 09/13/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u mhos/cm)	T-Alkalinity (mgCaCO3/L)
ANALYSIS DATE:		09/13/99	09/13/99	09/13/99	09/13/99	09/13/99	09/13/99
H4325-1	MW #1	141	46	16	1.96	1021	232
H4325-2	MW #2	37	62	18	1.58	638	152
H4325-3	MW #3	29	66	17	1.73	614	168
Quality Control		NR	50.5	50.6	4.96	1443	NR
True Value QC		NR	50.0	50.0	5.00	1413	NR
% Accuracy		NR	101	101	99	102	NR
Relative Percent Difference		NR	4.9	3.7	0	0.4	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl⁻ (mg/L)	SO4 (mg/L)	CO3 (mg/L)	HCO3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		09/13/99	09/13/99	09/13/99	09/13/99	09/13/99	09/14/99
H4325-1	MW #1	126	78	0	283	7.54	850
H4325-2	MW #2	57	77	0	185	7.51	444
H4325-3	MW #3	45	66	0	205	7.55	431
Quality Control		1024	49.93	124	221	6.99	NR
True Value QC		1000	50.00	112	259	7.00	NR
% Accuracy		102	100	90	85	100	NR
Relative Percent Difference		9.8	2.6	-	-	0	0.4
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Chemist

9/14/99
Date

H4326A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: DEE WHATLEY
703 E. CLINTON, SUITE 103
HOBBS, NM 88240
FAX TO:

Receiving Date: 09/13/99
Reporting Date: 09/14/99
Project Owner: RICE
Project Name: ABO MONITOR WELLS
Project Location: RICE OPERATING ABO

Sampling Date: 09/08/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		09/13/99	09/13/99	09/13/99	09/13/99
H4325-1	MW #1	<0.002	<0.002	<0.002	<0.006
H4325-2	MW #2	<0.002	<0.002	<0.002	<0.006
H4325-3	MW #3	<0.002	<0.002	<0.002	<0.006
Quality Control		0.098	0.100	0.094	0.285
True Value QC		0.100	0.100	0.100	0.300
% Recovery		98.4	100	94.0	94.9
Relative Percent Difference		6.8	0.2	2.0	0.7

METHOD: EPA SW-846 8260

Chemist

9/14/99
Date

H4325B.XLS

CARDINAL LABORATORIES, INC.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page____ of____

Company Name:	SESI	BILL TO	PO #:
Project Manager:	Dee Whitlock		
Address:		Company:	
City:	State: Zip:	Attn:	
Phone #:		Address:	
Fax #:		City:	
Project #:	Project Owner: Rice	State:	Zip:
Project Name:	Abo Monitor Wells	Phone #:	
Project Location:	Rice Operating Abo	Fax #:	

ANALYSIS REQUEST: BTEX; Maj. Cations & Anions

FOR LAB USE ONLY LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRES.: ACID:	ICE / COOL	OTHER :	SAMPLING: DATE	TIME	BTEX	Maj. Cations & Anions
H4325-1	MW #1		3	✓							✓		9-13-99	1:00	✓	✓
H4325-2	MW #2		3	✓							✓		9-13-99	1:00	✓	✓
H4325-3	MW #3		3	✓							✓		9-13-99	1:00	✓	✓

Sampler Relinquished: Dee Whitlock	Date: 9-13-99 Time: 1:00pm	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
Relinquished By:	Date: 9/13/99 Time: 1:00	Received By: (Lab Staff) Amy Hill	Fax Result: ☐ Yes ☐ No REMARKS:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: ☐ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BETH ALDRICH
703 E. CLINTON, SUITE #103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 12/09/99
Reporting Date: 12/13/99
Project Owner: RICE
Project Name: RICE ABO
Project Location: LOVINGTON, NM

Sampling Date: 12/09/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u mhos/cm)	T-Alkalinity (mgCaCO3/L)
ANALYSIS DATE:		12/13/99	12/10/99	12/10/99	12/10/99	12/10/99	12/10/99
H4503-1	MW #1	139	32	10	3.1	1095	252
H4503-2	MW #2	52	46	12	2.8	686	148
H4503-3	MW #3	48	42	14	2.3	570	229
Quality Control		NR	48	49	4.96	1392	NR
True Value QC		NR	50	50	5.00	1413	NR
% Accuracy		NR	96	98	99	99	NR
Relative Percent Difference		NR	6.3	5.1	0	0.2	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl (mg/L)	SO4 (mg/L)	CO3 (mg/L)	HCO3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		12/10/99	12/10/99	12/10/99	12/10/99	12/10/99	12/13/99
H4503-1	MW #1	113	16.3	0	307	7.57	613
H4503-2	MW #2	81	16.9	0	181	7.67	392
H4503-3	MW #3	45	18.2	0	229	7.53	383
Quality Control		978	50.1	124	221	7.02	NR
True Value QC		1000	50.0	112	259	7.00	NR
% Accuracy		98	100	110	85	100	NR
Relative Percent Difference		2.2	5.2	-	-	0.1	NR
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Gayle A. Potter, Chemist

12/14/99
Date

H4503B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BETH ALDRICH
703 E. CLINTON, SUITE #103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 12/09/99
Reporting Date: 12/13/99
Project Owner: RICE
Project Name: RICE ABO
Project Location: LOVINGTON, NM

Sampling Date: 12/09/99
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		12/09/99	12/09/99	12/09/99	12/09/99
H4503-1	MW #1	<0.002	<0.002	<0.002	<0.006
H4503-2	MW #2	<0.002	<0.002	<0.002	<0.006
H4503-3	MW #3	<0.002	<0.002	<0.002	0.007
Quality Control		0.088	0.091	0.092	0.285
True Value QC		0.100	0.100	0.100	0.300
% Recovery		87.6	90.8	91.9	95.0
Relative Percent Difference		0.8	3.9	2.5	1.7

METHOD: EPA SW-846 8260

Chemist

12/13/99
Date

H4503A.XLS

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page____ of____

Company Name: SESI	BILL TO PO #:
Project Manager:	
Address: 703 E. CLINTON, #103	Company: SAME
City: HOBBS State: NM Zip: 88240	Attn:
Phone #: (505) 397-0510	Address:
Fax #: (505) 393-4388	City:
Project #: Project Owner: RICE	State: Zip:
Project Name: RICE ABO	Phone #:
Project Location: Lovington	Fax #:

FOR LAB USE ONLY				MATRIX							PRES.			SAMPLING		ANALYSIS REQUEST	
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID:	ICE / COOL	OTHER:	DATE	TIME	BTEX	CATIONS & ANIONS
H4503-1	MW #1	C	4	X							X		12-9-99	2:55 pm	X	X
-2	MW #2	C	4	X							X		1	3:15 pm	X	X
-3	MW #3	C	4	X							X		1	3:30 pm	X	X

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	Phone Result ☐ Yes ☐ No Additional Fax #:
	Time:		Fax Result: ☐ Yes ☐ No
Relinquished By: Sergio Contreras	Date: 12/9/99 Time: 4:05	Received By: (Lab Staff) Amy Hill	REMARKS:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

RICE *Operating Company*

122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

December 15, 1998

Mr. Roger Anderson
New Mexico Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505

RE: Groundwater Monitoring Event
Pipeline Leak, Junction L-31, ABO SWD System
SE 1/4 of Section 31, T16S, R37E, Lea County
Lovington, New Mexico

Mr. Anderson:

Rice Operating Company (Rice) recently completed a groundwater monitoring event at the above-referenced site. Monitor wells MW-1, MW-2, MW-3, and former city of Lovington municipal well (COL-6) were gauged, developed, and sampled on November 22, 1998 by Mr. Jerry Brian with Quest Personnel Inc

Sampling and Analytical Procedures

Prior to development and sampling the monitor wells were gauged to obtain water level measurements. Depth to the top of the water table measured approximately 83 feet below ground surface. A table summarizing 1998 groundwater measurements and a potentiometric surface map constructed from the November 22, 1998 measurements is enclosed.

Prior to collecting groundwater samples for laboratory analysis, the monitor wells were purged by manual bailing to remove any fine granulated materials and to ensure that the sample represented aquifer conditions.

After purging, a water sample was obtained from each well and placed into two one-liter glass jars and two 40-milliliter sample vials with zero headspace. The containers were labeled for sample identification, sealed with QA/QC seals, and preserved at 4 °C in accordance with EPA Method 600/4-82-029. A chain-of-custody documenting the sample collection times and delivery time to the laboratory was completed. The samples were transported to Cardinal Laboratories in Hobbs, New Mexico for analysis. The samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), total dissolved solids (TDS), and chloride using EPA Methods SW 846-8260, 600/4-79-02-160.1, and 600/4-79-02-325.3, respectively.

Analytical Results

Analytical results from the water samples recorded BTEX levels below method detection limits for all wells (MW-1, MW-2, MW-3, and COL-6).

TDS and Chloride analysis recorded concentrations below the New Mexico Water Quality Control Commission (WQCC) human health standards for groundwater (TDS < 1,000 ppm; Chloride < 250 ppm).

A summary table of the 1998 analytical results and a copy of the laboratory report, including chain-of-custody, from the November 22, 1998 sampling event is enclosed.

Summary

The apparent direction of groundwater flow is toward the east-southeast, which is consistent with previous flow measurements at the site. BTEX, TDS, and chloride concentrations from the November 22, 1998 samples were significantly below WQCC standards and confirm that the site has been successfully remediated.

As in our Groundwater Remediation Report, dated October 6, 1998, Rice Operating requests that the OCD issue a letter requiring no further action.

Please contact me at (505) 393-9174 if you have any questions.

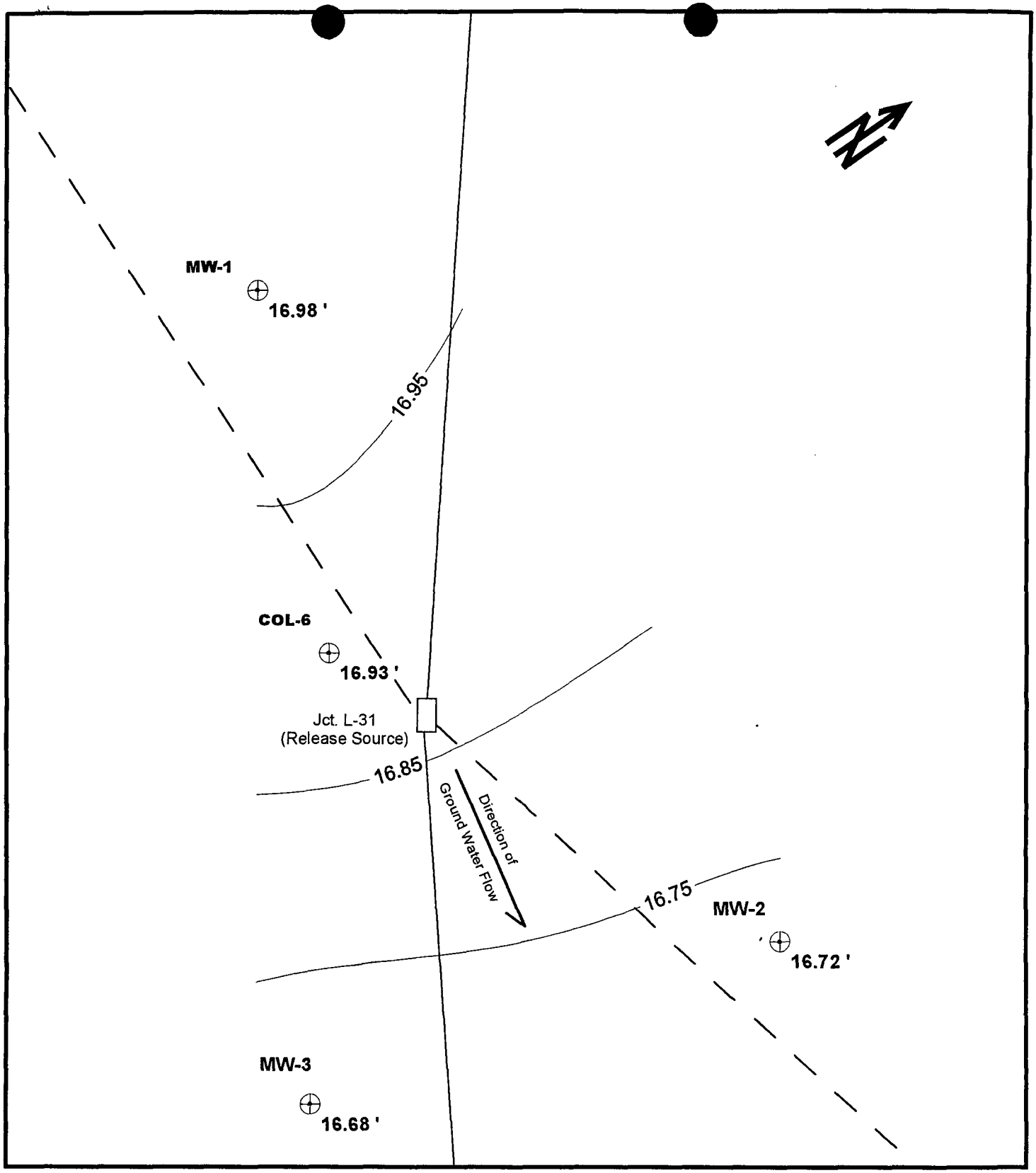
Sincerely,

F. Wesley Root

F. Wesley Root
Projects Manager

Enclosures:
Summary of Groundwater Measurements
Potentiometric Surface Map
Summary of Water Sample Analytical Results
Chain-of-Custody and Laboratory Analytical Results

cc.
Mr. Chris Williams, NMOCD Hobbs Office
File



POTENTIOMETRIC SURFACE MAP OF THE TOP OF THE WATER TABLE

Jct. L-31 Release Site
31-T16S-R37E, Abo SWD System
Lea County, New Mexico

Rice Operating Company
122 W. Taylor
Hobbs, NM 88240

Legend

Contour interval = 0.10 feet
Constructed from gauging measurements obtained on 11/22/98
Relative BM = 100 feet, top of casing on MW-1
——— Rice Operating 4" AC pipeline
- — — City of Lovington 6" AC pipeline

Map Scale

0 feet 15 feet 30 feet

1998
SUMMARY OF GROUNDWATER MEASUREMENTS
JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Gauged	Depth to Water*	Water Elevation**	Casing Elevation**	Surface Elevation**	LNAPL Thickness
MW-1	02/14/98	81.22	18.78	100.00	97.6	0.00
MW-1	08/16/98	83.13	16.87	100.00	97.6	0.00
MW-1	11/22/98	83.02	16.98	100.00	97.6	0.00
MW-2	02/14/98	81.15	18.68	99.83	97.2	0.00
MW-2	08/16/98	83.44	16.39	99.83	97.2	0.00
MW-2	11/22/98	83.11	16.72	99.83	97.2	0.00
MW-3	02/14/98	81.27	18.66	99.93	97.4	0.00
MW-3	08/16/98	83.58	16.35	99.93	97.4	0.00
MW-3	11/22/98	83.25	16.68	99.93	97.4	0.00
COL-6	02/14/98	81.58	18.73	100.31	97.6	0.00
COL-6	08/16/98	83.82	16.49	100.31	97.6	0.00
COL-6	11/22/98	83.38	16.93	100.31	97.6	0.00

* Well casings are marked to provide consistent reference points for gauging operations.
** Calculated from survey plat performed by Rice Operating Company.
Correction equation for the water elevation suppression effect caused by the presence of LNAPLs.
Corrected water elevation = Elevation - (Depth to water - (Specific gravity * LNAPL thickness))
where specific gravity = 0.82 for crude oil.
COL-6 = City of Lovington Well No. 6. All measurements are in feet.

1998

SUMMARY OF WATER SAMPLE ANALYTICAL RESULTS
BTEX, TDS, AND CHLORIDES
JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Sampled	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	Total BTEX (ppm)	TDS (mg/l)	Chloride (mg/l)
NMWQCC	Standards	0.010	0.750	0.750	0.620	N/A	1,000	250
MW-1	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	**1091**	144
MW-1	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	573	94
MW-1	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	640	149
MW-2	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	600	36
MW-2	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	418	76
MW-2	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	436	94
MW-3	02/18/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	954	48
MW-3	08/16/98	<0.0020	<0.0020	<0.0020	<0.0020	<0.0060	317	42
MW-3	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	343	47
COL-6	02/14/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	571	128
COL-6	08/16/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	442	69
COL-6	11/22/98	<0.0020	<0.0020	<0.0020	<0.0060	<0.0060	453	86

Analysis was performed by Cardinal Laboratories in Hobbs, New Mexico.

Benzene, toluene, eythlbenzene, and xylene (BTEX), total dissolved solids (TDS), and chloride analyses were conducted using EPA Methods 8020, 160.1, and 352.3, respectively.

Results presented in bold print exceed NMWQCC human health standards for ground water.

COL-6 = City of Lovington Well No. 6.

All results are reported in milligrams per liter (mg/l); parts per million (ppm).

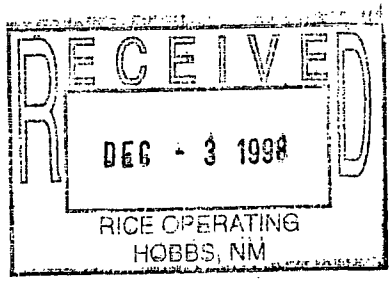
1998
SUMMARY OF WATER SAMPLE ANALYTICAL RESULTS
WATER QUALITY DATA
JCT L-31 SPILL SITE, ABO SWD SYSTEM

Well Name	Date Sampled	Total Dissolved Solids (TDS)	pH (S. U.)	Chloride (Cl)	Sodium (Na)	Calcium (Ca)	Magnesium (Mg)	Potassium (K)	Sulfate (SO4)	Carbonate (CO3)	Bicarbonate (HCO3)
NMWQCC	Standards	1,000 mg/l	6 to 9	250 mg/l	N/A	N/A	N/A	N/A	600 mg/l	N/A	N/A
MW-1	02/14/98	**1,091**	6.98	144	188.0	78.0	9.0	0.2	136.0	0	361
MW-1	08/16/98	573	N/A	94	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-1	11/22/98	640	N/A	149	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	02/14/98	600	N/A	36	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	08/16/98	418	N/A	76	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-2	11/22/98	436	N/A	94	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	02/14/98	954	N/A	48	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	08/16/98	317	N/A	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-3	11/22/98	343	N/A	47	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	02/14/98	571	7.48	128	87.0	80.0	15.0	0.3	83.0	0.0	224
COL-6	08/16/98	442	N/A	69	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COL-6	11/22/98	453	N/A	86	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Analysis was performed by Cardinal Laboratories in Hobbs, New Mexico.
COL-6 = City of Lovington Well No. 6.
All results are reported in milligrams per liter (mg/l): parts per million (ppm).
Results presented in bold print exceed NMWQCC human health standards for ground water.

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240



ANALYTICAL RESULTS FOR
RICE OPERATING CO.
ATTN: F. WESLEY ROOT
122 WEST TAYLOR
HOBBS, NM 88240
FAX TO: (505) 397-1471

Receiving Date: 11/23/98
Reporting Date: 11/30/98
Project Owner: ABO SWD SYSTEM
Project Name: ABO SPILL SITE
Project Location: ABO SWD SYSTEM, LEA CO. NM

Sampling Date: 11/22/98
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TDS (mg/L)	Cl (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE:		11/23/98	11/23/98	11/23/98	11/23/98	11/23/98	11/23/98
H3938-1	MW-3	343	47	<0.002	<0.002	<0.002	<0.006
H3938-2	MW-1	640	149	<0.002	<0.002	<0.002	<0.006
H3938-3	COL-6	453	86	<0.002	<0.002	<0.002	<0.006
H3938-4	MW-2	436	94	<0.002	<0.002	<0.002	<0.006
Quality Control		NR	1301	0.095	0.101	0.093	0.282
True Value QC		NR	1319	0.100	0.100	0.100	0.300
% Recovery		NR	98.6	95.1	101	93.4	94.1
Relative Percent Difference		0.7	0.2	6.3	3.3	12.5	10.6

METHODS: TDS-EPA 600/4-79-020, 160.1;Cl-EPA 600/4-79-020 325.3 BTEX-EPA SW-846-8260

Burgess J. A. Cooke, Ph. D.

11/30/98
Date

H3938-1.XLS

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page____ of____

Company Name:	Rice Operating Company	BILL TO	PO #:
Project Manager:	F. Wesley Root	Company:	ROC
Address:	122 West Taylor	Attn:	F. Wesley Root
City:	Hobbs State: NM Zip: 88240	Address:	122 W. Taylor
Phone #:	505-393-9174	City:	Hobbs
Fax #:	505-397-1471	State:	NM Zip: 88240
Project #:	Project Owner: Abo SWD System	Phone #:	505-393-9174
Project Name:	Abo Spill Site	Fax #:	505-397-1471
Project Location:	Abo SWD System, Lea Co. NM		

FOR LAB USE ONLY LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRES.: ACID:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX	TDS	Chloride
H3938-1	MW-3	G	4	V							V		11-22-98	11:30	V	V	V
-2	MW-1	G	4	V							V		11-22-98	12:00	V	V	V
-3	COL-6	G	4	V							V		11-22-98	12:30	V	V	V
-4	MW-2	G	4	V							V		11-22-98	14:45	V	V	V

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished: Brian	Date: 11/22/98 Time: 3:30 PM	Received By: F. Wesley Root	Phone Result ☐ Yes ☐ No Additional Fax #:
Relinquished By: F. Wesley Root	Date: 11/23/98 Time: 11:20	Received By: (Lab Staff)	Fax Result: ☐ Yes ☐ No
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials)

REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.