APPROVED
By Olivia Yu at 1:01 pm, Apr 04, 2017

RICE *Operating Company*

112 West Taylor · Hobbs, New Mexico 88240
Phone: (575) 393-9174 · Fax: (575) 397-1471

January 6, 2017

Ms. Kristen Lynch
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1625 N French Drive
Hobbs, New Mexico 88240

RE: **Corrective Action**
Rice Operating Company – Justis SWD System
Justis K-36 AD (1RP-4248): UL/K, Sec. 36, T25S, R37E

Ms. Lynch:

The site is located approximately 4 miles southwest of Jal, New Mexico at UL/K, Sec. 36 T25S, R37E (Figure 1). Soil bore installation at the site has proven there is no groundwater located beneath the site.

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

On April 4, 2016, a 5 in PVC pipeline cracked and produced water was released, affecting approximately 552 sq ft of pasture. A vacuum truck was immediately dispatched to collect and properly dispose of the standing water. The impacted pasture area was scraped to remove the wet soil. Jamie Keyes of the NMOCD was notified of the accidental discharge, and an initial C-141 was submitted to NMOCD District 1 Office on April 14, 2016.

On April 11, 2016, two verticals were installed to determine the depth of impact and samples were field tested for chlorides and hydrocarbons. Representative samples were taken to a commercial laboratory for analysis. Chloride concentrations in Vertical 1 decreased from 4,455 mg/kg (field) at 2 ft bgs to 144 mg/kg (lab) at 7 ft bgs. TPH concentrations were below detectable limit. Elevated concentrations in Vertical 2 (4,027 mg/kg at 15 ft bgs) warranted the installation of a soil bore (SB-1) on June 16, 2016. Chloride concentrations in SB-1 decreased from 3,520 mg/kg at 30 ft bgs to 176 mg/kg at 105 ft bgs. TPH concentrations were below detectable limit. The soil bore was plugged with bentonite to ground surface. Five points were hand augered outside the leak area, resulting in low concentrations throughout to a depth of 8 ft bgs in auger points 2-5.

Elevated chloride concentration in auger point 1 warranted a sixth point to be sampled, resulting in low concentrations throughout to a depth of 8 ft bgs.

On August 5, 2016, a second accidental discharge occurred when a 5 in PVC pipeline collar broke, releasing approximately 300 barrels of produced water. The line was shut in and isolated and a vacuum truck was immediately dispatched to collect and properly dispose of the standing water. This accidental discharged followed the path of the first and affected approximately 2,034 sq ft of pasture. Immediate notice was given to Jamie Keyes of the NMOCD, and an initial C-141 was submitted to NMOCD District 1 Office on August 10, 2016.

Two additional verticals were installed, resulting in elevated chloride concentrations and warranting the installation of two additional soil bores. SB-2 and SB-3 were installed on October 19, 2016. SB-2 was installed just north of the second source on a non-ROC lease pad. Chloride concentrations in SB-2 decreased from 4,160 mg/kg at 25 ft to 352 mg/kg at 180 ft bgs. TPH (DRO) was detected in this soil bore but nowhere else on site, indicating possible contribution of constituents from the non-ROC lease pad. GRO concentrations were below detectable limit throughout. DRO resulted in a concentration of 917 mg/kg at 5 ft bgs, 103 mg/kg at 25 ft bgs, and a concentration below detectable limit at 115 ft and 180 ft bgs. The 5 ft sample was also analyzed for BTEX, resulting in an ethylbenzene concentration of 0.117 mg/kg. The other constituents were below detectable limit. SB-3 resulted in a chloride concentration of 4,800 mg/kg at 60 ft bgs and 144 mg/kg at 105 ft bgs. TPH concentrations were below detectable limit. Both soil bores were plugged with bentonite to ground surface. The soil bore logs are attached.

Groundwater was not encountered at the site and there was no indication of groundwater in any of the soil bores. A hard sandstone layer was encountered at an approximate depth of 50 ft bgs, and it was determined that soil beneath the sandstone was very dry red bed clay that continued to a depth of 180 ft bgs. There was no indication of moisture in any of the bores drilled at the site.

To inhibit the downward migration of residual chloride through the vadose zone, ROC proposes installing a 20-mil reinforced poly liner at the site measuring 97 ft x 18 ft at a depth of 4-5 ft bgs, covering SB-1 and SB-3. SB-2 is located on a non-ROC lease pad built with compacted caliche which will aide in shedding water away from the area. The top 4 inches of the surrounding sand dunes will be scraped and stockpiled on site to be used as a nutritive layer after the site is backfilled. The surrounding dunes will then be folded in and incorporated into the site as backfill. If necessary, additional soil will be imported and used as backfill. Soil used as backfill will have laboratory chloride concentration below 500 mg/kg and a field PID reading below 100 ppm. The excavated soil will be evaluated for use as backfill and any soil not meeting the requirement will be properly disposed of at a NMOCD approved facility. The scraped nutritive layer will be spread over the backfilled site and the disturbed area will be seed with a blend of native vegetation. Vegetation provides an additional infiltration barrier for the site since plants capture water through their roots thereby reducing the amount of water traveling through the vadose zone to groundwater.

To determine if residual chloride in the vadose zone pose a threat to groundwater quality, BEST ran the U.S. Environmental Protection Agency Exposure Assessment Multimedia Model (MULTIMED Version 1.5, 2005). The model prediction concludes that the peak concentration of chloride in groundwater contributed by the vadose zone soils would be approximately 132 mg/L in 295 years with the installation of the 20-mil reinforced liner. The multimed output file and graph are attached.

ROC appreciates the opportunity to work with you on this project. Please call me at (575) 393-9174 if you have any questions or wish to discuss the site.

Sincerely,

Katie Jones Davis

Katie Jones Davis
Environmental Manager
Rice Operating Company
(575) 393-9174

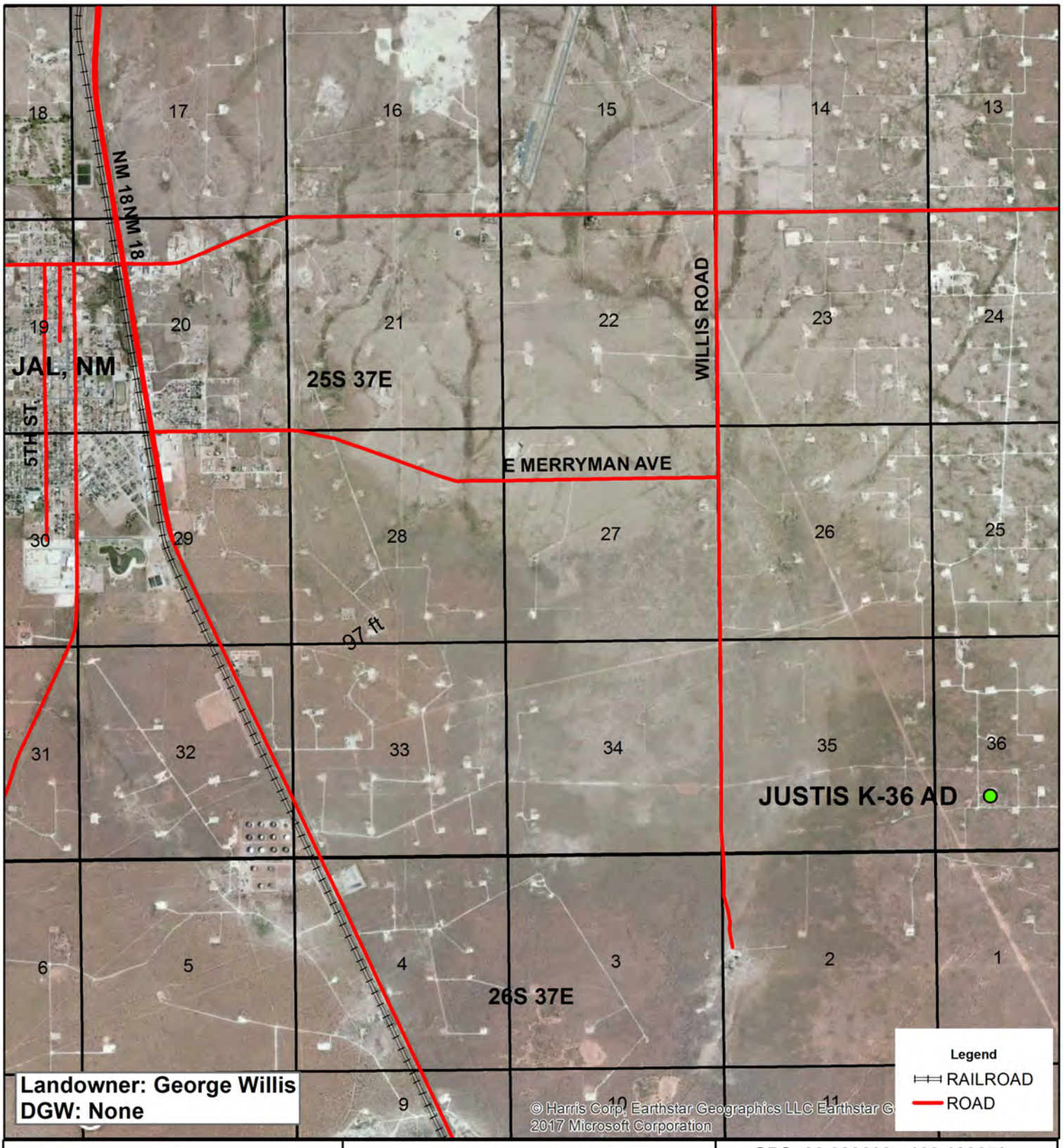
Attachments:

- Site Location Map
- Proposed Liner
- Soil Bore Logs
- Multimed Output File and Graph

Figures

Basin Environmental Service Technologies
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Geographic Location



Basin Environmental Service Technologies
Effective Solutions

JUSTIS K-36 AD

1RP-4248

UL K, M & N SECTION 36
T-25-S R-37-E
LEA COUNTY, NM

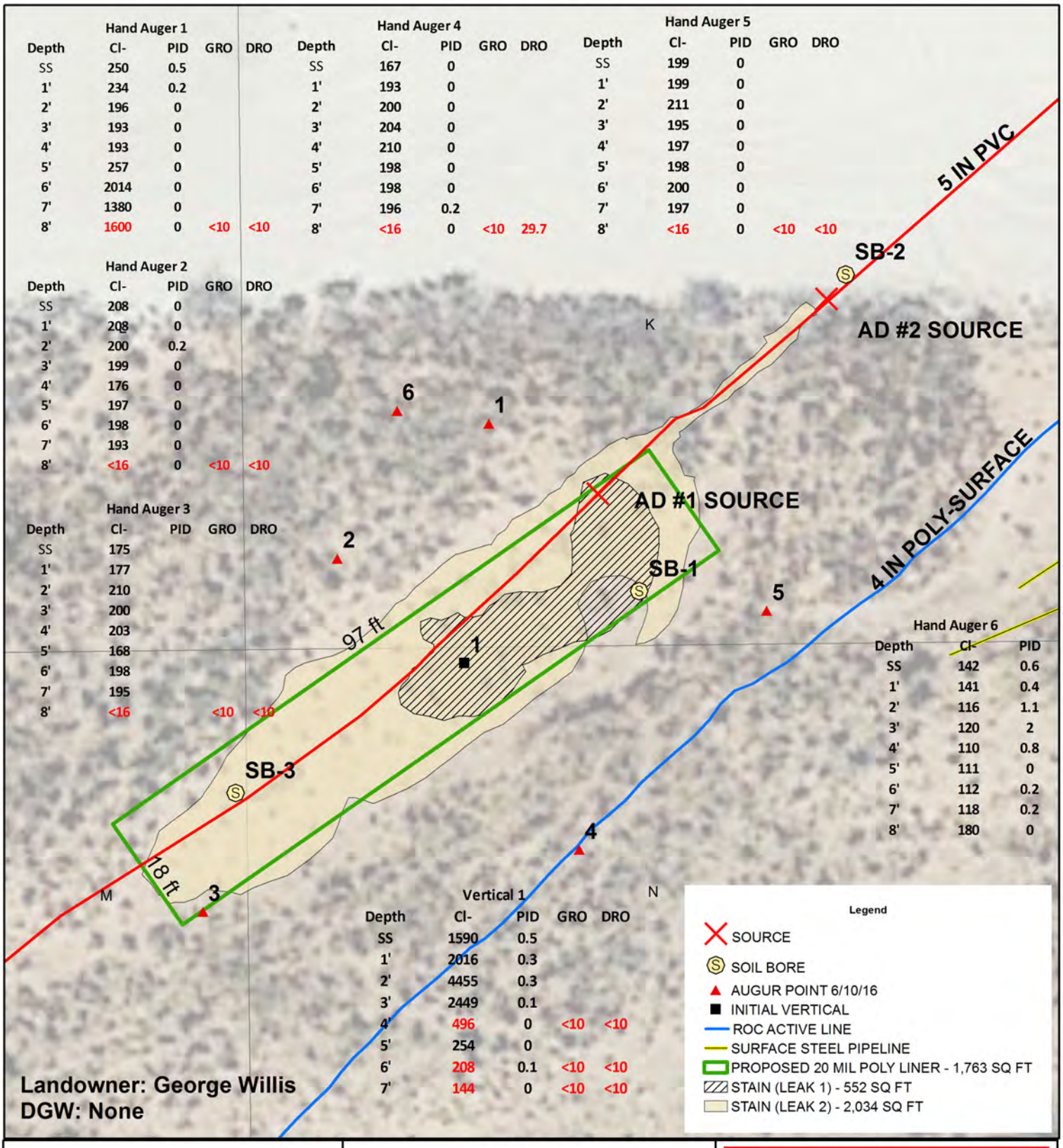
GPS: 32.083298 -103.120650

0 0.5 1 Miles

N W E S

Drawing date: 1/2/17
Drafted by: T. Grieco

Soil Bores



Hand Auger 1

Depth	Cl-	PID	GRO	DRO
SS	250	0.5		
1'	234	0.2		
2'	196	0		
3'	193	0		
4'	193	0		
5'	257	0		
6'	2014	0		
7'	1380	0		
8'	1600	0	<10	<10

Hand Auger 2

Depth	Cl-	PID	GRO	DRO
SS	208	0		
1'	208	0		
2'	200	0.2		
3'	199	0		
4'	176	0		
5'	197	0		
6'	198	0		
7'	193	0		
8'	<16	0	<10	<10

Hand Auger 3

Depth	Cl-	PID	GRO	DRO
SS	175			
1'	177			
2'	210			
3'	200			
4'	203			
5'	168			
6'	198			
7'	195			
8'	<16		<10	<10

Hand Auger 4

Depth	Cl-	PID	GRO	DRO
SS	167	0		
1'	193	0		
2'	200	0		
3'	204	0		
4'	210	0		
5'	198	0		
6'	198	0		
7'	196	0.2		
8'	<16	0	<10	29.7

Hand Auger 5

Depth	Cl-	PID	GRO	DRO
SS	199	0		
1'	199	0		
2'	211	0		
3'	195	0		
4'	197	0		
5'	198	0		
6'	200	0		
7'	197	0		
8'	<16	0	<10	<10

Hand Auger 6

Depth	Cl-	PID
SS	142	0.6
1'	141	0.4
2'	116	1.1
3'	120	2
4'	110	0.8
5'	111	0
6'	112	0.2
7'	118	0.2
8'	180	0

Vertical 1

Depth	Cl-	PID	GRO	DRO
SS	1590	0.5		
1'	2016	0.3		
2'	4455	0.3		
3'	2449	0.1		
4'	496	0	<10	<10
5'	254	0		
6'	208	0.1	<10	<10
7'	144	0	<10	<10

Basin Environmental Service Technologies
Effective Solutions

JUSTIS K-36 AD

1RP-4248

UL K, M & N SECTION 36
T-25-S R-37-E
LEA COUNTY, NM

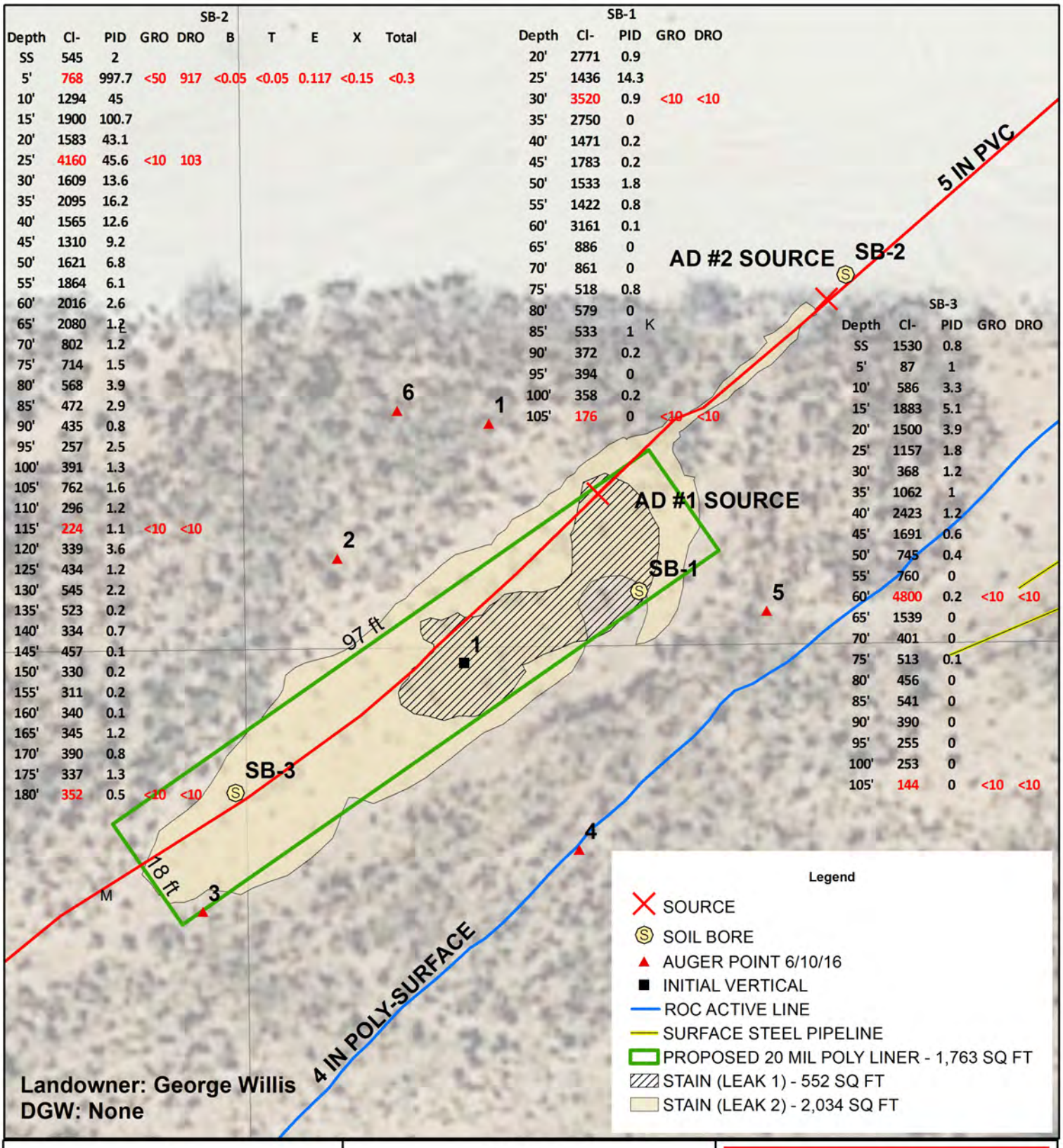
Underground facilities are spatially projected and need to be field verified.

GPS: 32.083298 -103.120650

0 10 20 Feet

GPS date: 8/5/16 TG
Drawing date: 11/29/16
Drafted by: T. Grieco

Soil Bores



Basin Environmental Service Technologies
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JUSTIS K-36 AD

1RP-4248

UL K, M & N SECTION 36
T-25-S R-37-E
LEA COUNTY, NM

Underground facilities are spatially projected and need to be field verified.

GPS: 32.083298 -103.120650

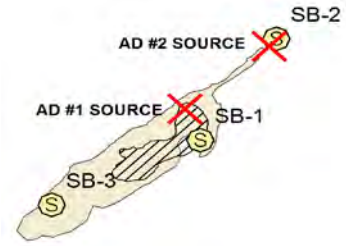
0 10 20 Feet

GPS date: 8/5/16 TG
Drawing date: 11/29/16
Drafted by: T. Grieco

N W E S

Soil Bore Installation

Basin Environmental Service Technologies
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Logger:	Karanja Lewis		**Company: ROC**
Driller:	Harrison & Cooper, Inc		**Project Name:** Justis K-36 AD **Well ID:** SB-1
Drilling Method:	Air Rotary		**Project Consultant:** Basin Environmental
Start Date:	6/15/2016		
End Date:	6/16/2016		

Comments: SB 1 is located 15 FT south of the leak source. All samples taken from cuttings.
DRAFTED BY: T. Grieco
TD = 105 FT GW = NONE

Location: UL/K, Sec. 36, T25S, R37E
Lat: 32°04'59.444" N **County**: Lea
Long: 103°07'14.671" W **State**: NM

Depth (feet)	Chloride field test	LAB	PID	Description	Lithology	Well Construction
20 ft	2,771		0.0	Tan caliche		
25 ft	1,436		14.3			
30 ft	3,520	Cl- 3,520	0.9			
		GRO <10				
		DRO <10				
35 ft	2,750		0.0	Red caliche		
40 ft	1,471		0.2	Beige caliche		
45 ft	1,783		0.2	Sandstone layer encountered at 49' bgs Red soil		
50 ft	1,533		1.8			
55 ft	1,422		0.8			
60 ft	3,161		0.1			

Bentonite Seal

Depth (feet)	Chloride field test	LAB	PID	Description	Lithology	Well Construction
65 ft	886		0.0			
70 ft	861		0.0			
75 ft	518		0.8	Red soil		
80 ft	579		0.0			
85 ft	533		1.0			
90 ft	372		0.2			
95 ft	394		0.0			
100 ft	358		0.2	Brownish soil		
105 ft	228	Cl-176	0.0			
		GRO <10				
		DRO <10				

Bentonite Seal

CARDINAL Laboratories

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

June 23, 2016

KATIE JONES

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: JUSTIS K-36 AD

Enclosed are the results of analyses for samples received by the laboratory on 06/17/16 15:55.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-15-7. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

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

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

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

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	06/17/2016	Sampling Date:	06/16/2016
Reported:	06/23/2016	Sampling Type:	Soil
Project Name:	JUSTIS K-36 AD	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB #1 @ 30' (H601338-01)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**3520**	16.0	06/21/2016	ND	416	104	400	3.92	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/20/2016	ND	184	92.0	200	3.08	
DRO >C10-C28	<10.0	10.0	06/20/2016	ND	178	89.2	200	3.58	

Surrogate: 1-Chlorooctane	*89.7 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*92.6 %*	*28-171*

Sample ID: SB #1 @ 105' (H601338-02)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**176**	16.0	06/21/2016	ND	416	104	400	3.92	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/20/2016	ND	184	92.0	200	3.08	
DRO >C10-C28	<10.0	10.0	06/20/2016	ND	178	89.2	200	3.58	

Surrogate: 1-Chlorooctane	*84.5 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*89.3 %*	*28-171*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

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

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES
101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: RICE Operating	BILL TO
Project Manager: Katie Jones	P.O. #:
Address: 122 W. Tayler	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name:	State: Zip:
Project Location: Justis K-36 AD (25-37)	Phone #:
Sampler Name: KARANJA LEWIS	Fax #:

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRESERV.: ACID/BASE:	ICE / COOL	OTHER :	SAMPLING: DATE	TIME	ANALYSIS REQUEST: Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS
H601338 -1	SB#1 @ 30'	G	1			X					X		6-16-16		X	X				
-2	SB#1 @ 105'	G	1			X					X		6-16-16		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.

Relinquished By:	Date: 6-17-16	Received By: Angela Cabrera	Phone Result: ☐ Yes ☑ No Add'l Phone #:
Relinquished By:	Time: 15:55	Received By:	Fax Result: ☐ Yes ☑ No Add'l Fax #:
	Date:		REMARKS: email results: knorman@basinenv.com; kjones@riceswd.com tgreico@basinenv.com; klewis@basinenv.com
	Time:		
Delivered By: (Circle One) Sampler - UPS - Bus - Other: 0.8°C	Sample Condition Cool: ☑ Yes ☐ No Intact: ☐ Yes ☐ No	CHECKED BY: (Initials)	

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

#75

BASIN ENVIRONMENTAL SERVICE TECHNOLOGIES

419 W. Cain Hobbs, NM 88240
PHONE: (575) 393-2967 FAX: (575) 393-0293
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM _____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR; BALANCE

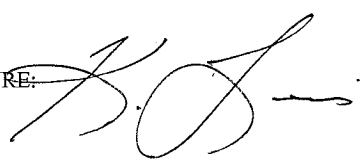
LOT NO : IAN 242-100-5	EXPIRATION DATE: 8/2017
METER READING ACCURACY: 100%	

ACCURACY : +/- 2%

COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
JUSTIS K-36 AD	K	36	25S	37E

SAMPLE ID	PID	SAMPLE ID	PID
SB#1@20'	0.0		
SB#1@25'	14.3		
SB#1@30'	0.9		

SIGNATURE: 

DATE: 6-15-16

BASIN ENVIRONMENTAL SERVICE TECHNOLOGIES

419 W. Cain Hobbs, NM 88240
PHONE: (575) 393-2967 FAX: (575) 393-0293
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.			
		MODEL: PGM 7300	SERIAL NO: 590-000508
	X	MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM _____	SERIAL NO: _____

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : IAN 242-100-5	EXPIRATION DATE: 8/2017
METER READING ACCURACY: 100%	

ACCURACY : +/- 2%

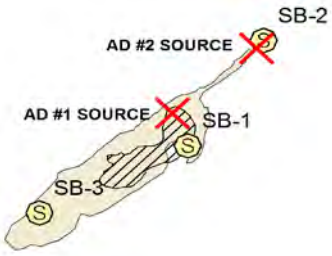
COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
JUSTIS K-36 AD	K	36	25S	37E

SAMPLE ID	PID	SAMPLE ID	PID
SB#1@35'	0.0	SB#1@95'	0.0
SB#1@40'	0.2	SB#1@100'	0.2
SB#1@45'	0.2	SB#1@105'	0.0
SB#1@50'	1.8		
SB#1@55'	0.8		
SB#1@60'	0.1		
SB#1@65'	0.0		
SB#1@70'	0.0		
SB#1@75'	0.8		
SB#1@80'	0.0		
SB#1@85'	1.0		
SB#1@90'	0.2		

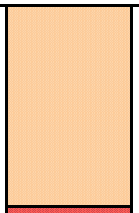
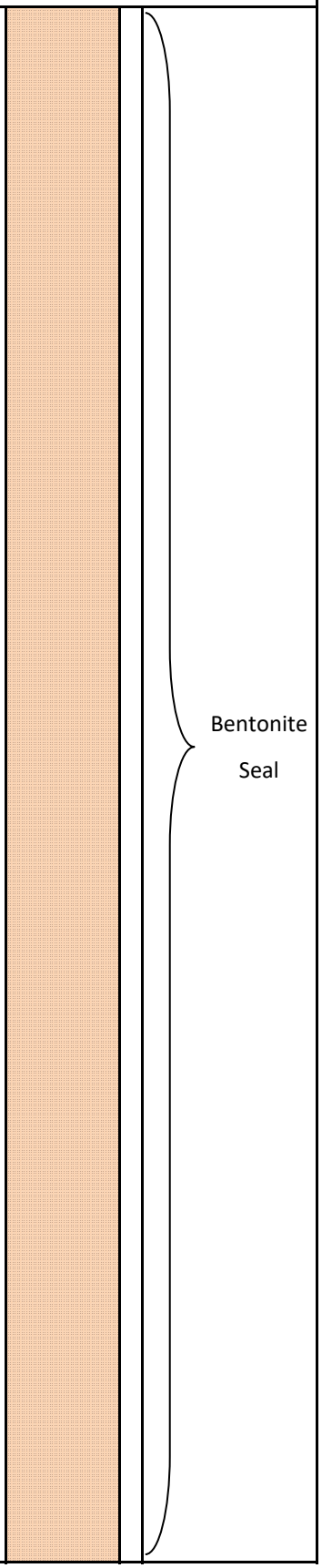
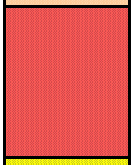
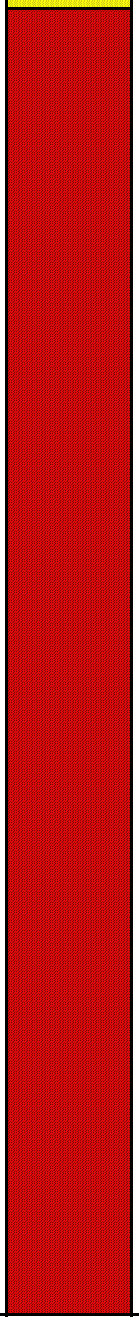
SIGNATURE: 

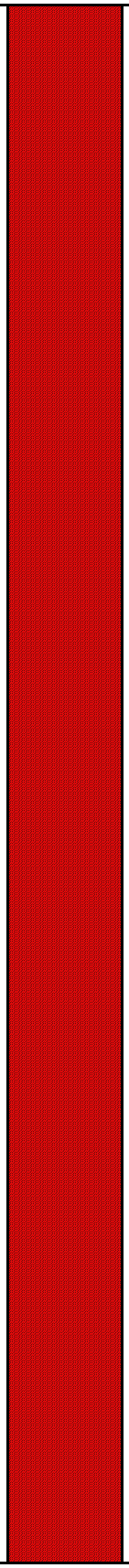
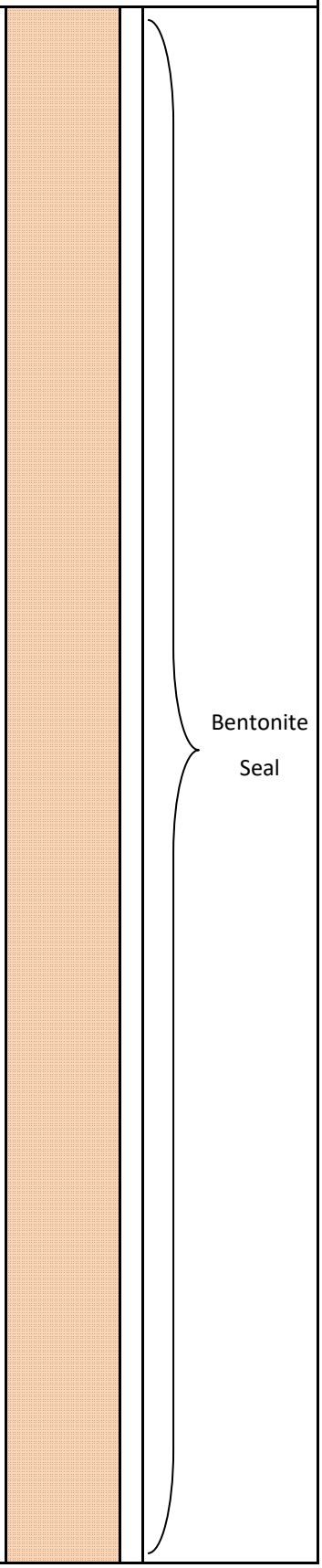
DATE: 6-16-16

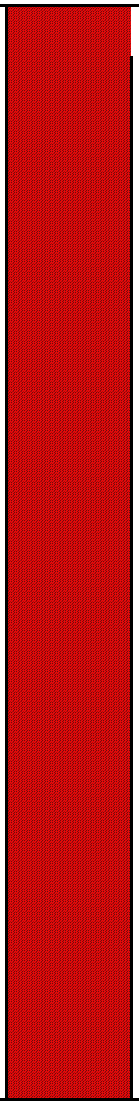
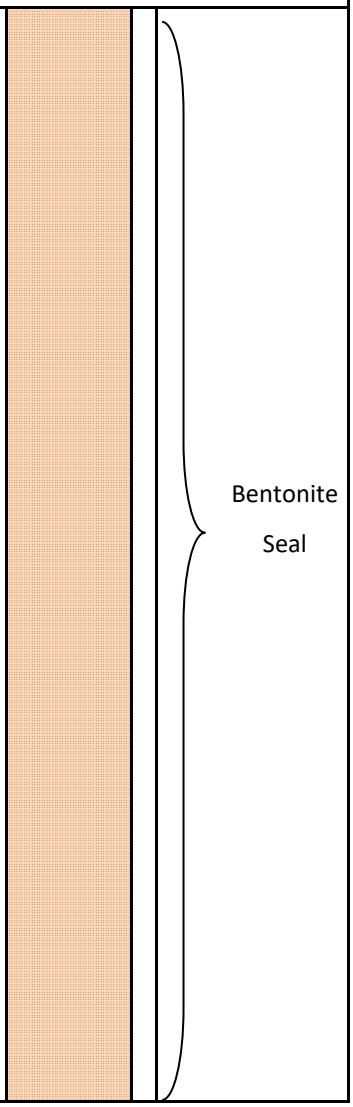
Logger:	Karanja Lewis		Basin Environmental Service Technologies, Effective Solutions
Driller:	Harrison & Cooper, Inc		**Company: ROC**
Drilling Method:	Air Rotary		**Project Name:** Justis K-36 AD **Well ID:** SB-2
Start Date:	6/15/2016		**Project Consultant:** Basin Environmental
End Date:	6/15/2016		**Location:** UL/K, Sec. 36, T25S, R37E
Comments: SB-2 is 56 ft northeast of SB-1. All samples taken from cuttings. **DRAFTED BY: T. Grieco**			**Lat:** 32°4'59.908" N **County**: Lea
TD = 145 ft	GW = NONE		**Long:** 103°7'14.309" W **State**: NM

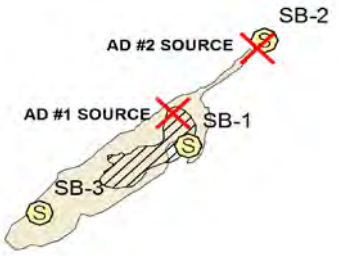
Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
SS	545		2.0	biege sand		
5 ft	575	Cl- 768	997.7	blk sand		
	B <0.05 T <0.05 E 0.117 X <0.15 TOTAL <0.15	GRO <50				
		DRO 917				
10 ft	1,294		45.0	black/grey caliche		
15 ft	1,900		100.7			
20 ft	1,583		43.1	grey caliche		
25 ft	2,793	Cl- 4,160	45.6	biege soil		
		GRO <10				
		DRO 103				
30 ft	1,609		13.6			
35 ft	2,095		16.2			

Bentonite Seal

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				biege soil		
40 ft	1,565		12.6			
45 ft	1,310		9.2	red soil		
50 ft	1,621		6.8	sand stone		
				red clay		
55 ft	1,864		6.1			
60 ft	2,016		2.6			
65 ft	2,080		1.2			
70 ft	802		1.2			
75 ft	714		1.5			
80 ft	568		3.9			
85 ft	472		2.9			
90 ft	435		0.8			

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
95 ft	257		2.5	red clay		
100 ft	391		1.3			
105 ft	762		1.6			
110 ft	296		1.2			
115 ft	270	Cl-224	1.1			
		GRO <10				
		DRO <10				
120 ft	339		3.6			
125 ft	434		1.2			
130 ft	545		2.2			
135 ft	523		0.2			
140 ft	334		0.7			
145 ft	457		0.1			

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
150 ft	330		0.2	red clay		
155 ft	311		0.2			
160 ft	340		0.2			
165 ft	345		1.2			
170 ft	390		0.8			
175 ft	337		1.3			
180 ft	286	Cl-352	0.5			
		GRO <10				
		DRO <10				

Logger:	Karanja Lewis		**Company: ROC**
Driller:	Harrison & Cooper, Inc		**Project Name:** Justis K-36 AD **Well ID:** SB-3
Drilling Method:	Air Rotary		**Project Consultant:** Basin Environmental
Start Date:	6/16/2016		
End Date:	6/16/2016		

Comments: SB-3 is 67 ft southwest of SB-1. All samples taken from cuttings.

DRAFTED BY: T. Grieco

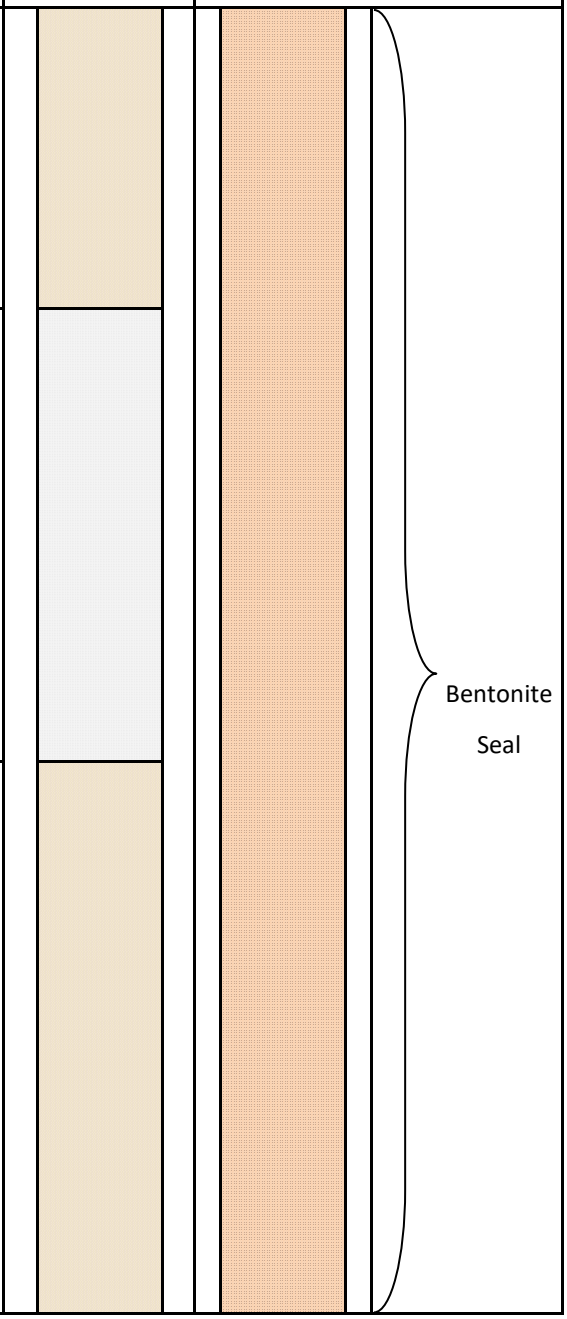
TD = 110 ft GW = NONE

Location: UL/M, Sec. 36, T25S, R37E

Lat: 32°4'59.157" N **County**: Lea

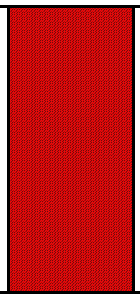
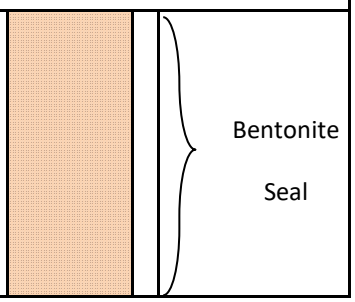
Long: 103°7'15.371" W **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description
SS	1,530		0.8	beige sand
5 ft	87		1.0	
10 ft	586		3.3	white caliche
15 ft	1,883		5.1	
20 ft	1,500		3.9	
25 ft	1,157		1.8	beige sand
30 ft	368		1.2	
35 ft	1,062		1.0	
40 ft	2,423		1.2	



Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
45 ft	1,691		0.6	red sand		
50 ft	745		0.4	sand stone		
55 ft	760		0.0			
60 ft	3,403	Cl- 4,800	0.2	red clay		
		GRO <10				
		DRO <10				
65 ft	1,539		0.0			
70 ft	401		0.0			
75 ft	513		0.1			
80 ft	456		0.0			
85 ft	541		0.0			
90 ft	390		0.0			
95 ft	255		0.0			
100 ft	253		0.0			

Bentonite Seal

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				red clay		
105 ft	**167**	**Cl-144**	**0.0**			
		GRO <10				
		DRO <10				

CARDINAL Laboratories

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

November 02, 2016

KATIE JONES

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: JUSTIS K-36 AD

Enclosed are the results of analyses for samples received by the laboratory on 10/26/16 16:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

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

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

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

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	10/26/2016	Sampling Date:	10/18/2016
Reported:	11/02/2016	Sampling Type:	Soil
Project Name:	JUSTIS K-36 AD	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB #2 @ 25' (H602406-01)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**4160**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	**103**	10.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane	*91.3 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*120 %*	*28-171*

Sample ID: SB #2 @ 115' (H602406-02)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**224**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	<10.0	10.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane	*92.2 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*112 %*	*28-171*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	10/26/2016	Sampling Date:	10/18/2016
Reported:	11/02/2016	Sampling Type:	Soil
Project Name:	JUSTIS K-36 AD	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB #2 @ 180' (H602406-03)

Chloride, SM4500Cl-B **mg/kg** **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**352**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M **mg/kg** **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	<10.0	10.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane	*82.7 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*97.9 %*	*28-171*

Sample ID: SB #3 @ 60' (H602406-04)

Chloride, SM4500Cl-B **mg/kg** **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**4800**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M **mg/kg** **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	<10.0	10.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane	*78.5 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*97.7 %*	*28-171*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	10/26/2016	Sampling Date:	10/19/2016
Reported:	11/02/2016	Sampling Type:	Soil
Project Name:	JUSTIS K-36 AD	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB #3 @ 105' (H602406-05)

Chloride, SM4500Cl-B **mg/kg** **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**144**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M **mg/kg** **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	<10.0	10.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane	*87.9 %*	*35-147*
Surrogate: 1-Chlorooctadecane	*107 %*	*28-171*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	10/26/2016	Sampling Date:	10/18/2016
Reported:	11/02/2016	Sampling Type:	Soil
Project Name:	JUSTIS K-36 AD	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: SB #2 @ 5' (H602406-06)

BTEX 8021B mg/kg **Analyzed By: CK**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	10/31/2016	ND	2.36	118	2.00	1.89	
Toluene*	<0.050	0.050	10/31/2016	ND	2.44	122	2.00	2.33	
Ethylbenzene*	**0.117**	0.050	10/31/2016	ND	2.38	119	2.00	2.83	
Total Xylenes*	<0.150	0.150	10/31/2016	ND	7.17	119	6.00	2.57	
Total BTEX	<0.300	0.300	10/31/2016	ND					

Surrogate: 4-Bromofluorobenzene (PID *115 %* *73.6-140*

Chloride, SM4500Cl-B mg/kg **Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**768**	16.0	10/27/2016	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<50.0	50.0	10/28/2016	ND	179	89.7	200	3.58	
DRO >C10-C28	**917**	50.0	10/28/2016	ND	211	105	200	5.64	

Surrogate: 1-Chlorooctane *92.3 %* *35-147*

Surrogate: 1-Chlorooctadecane *121 %* *28-171*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

QR-03	The RPD value for the sample duplicate or MS/MSD was outside if QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
BS1	Blank spike recovery above laboratory acceptance criteria. Results for analyte potentially biased high.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES
101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: RICE Operating	**BILL TO** P.O. #:
Project Manager: Katie Jones	Company:
Address: 122 W. Tayler	Attn:
City: Hobbs State: NM Zip: 88240	Address:
Phone #: Fax #:	City:
Project #: Project Owner:	State: Zip:
Project Name:	Phone #:
Project Location: Justis K-36 AD	Fax #:
Sampler Name: Karanje Lewis	

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRESERV.: ACID/BASE:	ICE / COOL	OTHER :	SAMPLING: DATE	TIME	ANALYSIS REQUEST: Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS
H602406																				
1	SB# 2 @ 25'	G	1			✓					✓		10-18-16		✓	✓				
2	SB# 2 @ 115'	G	1			✓					✓		10-18-16		✓	✓				
3	SB# 2 @ 180'	G	1			✓					✓		10-18-16		✓	✓				
4	SB# 3 @ 60'	G	1			✓					✓		10-19-16		✓	✓				
5	SB# 3 @ 105'	G	1			✓					✓		10-19-16		✓	✓				
6	SB# 2 @ 5'	G	1			✓					✓		10-18-16		✓	✓	✓			

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.

Relinquished By:	Date: 10/20/16 Time: 4:30	Received By: Jodi Henson
Relinquished By:	Date: Time:	Received By:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	4.7°c	Sample Condition Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No
		CHECKED BY: (Initials)

Phone Result: ☐ Yes ☑ No Add'l Phone #:
Fax Result: ☐ Yes ☑ No Add'l Fax #:
REMARKS:
email results: jkamplain@basinenv.com
~~knorman@basinenv.com~~; kjones@riceswd.com
tgreico@basinenv.com; klewis@basinenv.com

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

#75

BASIN ENVIRONMENTAL SERVICE TECHNOLOGIES

419 W. Cain Hobbs, NM 88240
PHONE: (575) 393-2967 FAX: (575) 393-0293
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM 7300	SERIAL NO: 590-000183

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

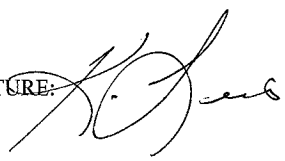
LOT NO : IAN 242-100-5	EXPIRATION DATE: 8/2017
METER READING ACCURACY: 100%	

ACCURACY : +/- 2%

COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
JUSTIS K-36 AD	K	36	25	37

SAMPLE ID	PID	SAMPLE ID	PID
SB#2@S	2	SB#2@60'	2.6
SB#2@5'	997.7	SB#2@65'	1.2
SB#2@10'	45	SB#2@70'	1.2
SB#2@15'	100.7	SB#2@75'	1.5
SB#2@20'	43.1	SB#2@80'	3.9
SB#2@25'	45.6	SB#2@85'	2.9
SB#2@30'	13.6	SB#2@90'	0.8
SB#2@35'	16.2	SB#2@95'	2.5
SB#2@40'	12.6	SB#2@100'	1.3
SB#2@45'	9.2	SB#2@105'	1.6
SB#2@50'	6.8	SB#2@110'	1.2
SB#2@55'	6.1	SB#2@115'	1.1

SIGNATURE: 

DATE: 10-18-16

BASIN ENVIRONMENTAL SERVICE TECHNOLOGIES

419 W. Cain Hobbs, NM 88240
PHONE: (575) 393-2967 FAX: (575) 393-0293
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM 7300	SERIAL NO: 590-000183

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : IAN 242-100-5	EXPIRATION DATE: 8/2017
METER READING ACCURACY: 100%	

ACCURACY : +/- 2%

COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
JUSTIS K-36 AD	K	36	25	37

SAMPLE ID	PID	SAMPLE ID	PID
SB#2@120'	3.6	SB#2@180'	0.5
SB#2@125'	1.2		
SB#2@130'	2.2		
SB#2@135'	0.2		
SB#2@140'	0.7		
SB#2@145'	0.1		
SB#2@150'	0.2		
SB#2@155'	0.2		
SB#2@160'	0.1		
SB#2@165'	1.2		
SB#2@170'	0.8		
SB#2@175'	1.3		

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

SIGNATURE: 

DATE: 10-18-16

BASIN ENVIRONMENTAL SERVICE TECHNOLOGIES

419 W. Cain Hobbs, NM 88240
PHONE: (575) 393-2967 FAX: (575) 393-0293
PID METER CALIBRATION & FIELD REPORT FORM

CK.		MODEL: PGM 7300	SERIAL NO: 590-000508
MODEL	X	MODEL: PGM 7300	SERIAL NO: 590-000504
NO.		MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM 7300	SERIAL NO: 590-000183

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : IAN 242-100-5	EXPIRATION DATE: 8/2017
METER READING ACCURACY: 100%	

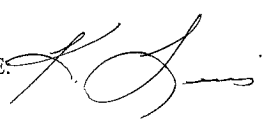
ACCURACY : +/- 2%

COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
JUSTIS K-36 AD	K	36	25	37

SAMPLE ID	PID	SAMPLE ID	PID
SB#3@S	0.8	SB#3@60'	0.2
SB#3@5'	1	SB#3@65'	0
SB#3@10'	3.3	SB#3@70'	0
SB#3@15'	5.1	SB#3@75'	0.1
SB#3@20'	3.9	SB#3@80'	0
SB#3@25'	1.8	SB#3@85'	0
SB#3@30'	1.2	SB#3@90'	0
SB#3@35'	1	SB#3@95'	0
SB#3@40'	1.2	SB#3@100'	0
SB#3@45'	0.6	SB#3@105'	0
SB#3@50'	0.4		
SB#3@55'	0		

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

SIGNATURE: 

DATE: 10-19-16

Multimed Output File

Basin Environmental Service Technologies
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

MULTIMED V1.01 DATE OF CALCULATIONS: 29-NOV-2016 TIME: 17:15:55

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

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

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

MULTIMED (Version 1.50, 2005)

1
Run options
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Rice Justis K-36 AD

1R-4248
Chemical simulated is Chloride

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration Specified By User: 1.524E-02 m/yr
Run was transient
Well Times: Find Maximium Concentration
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1
UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)
NP - Total number of nodal points 240
NMAT - Number of different porous materials 1
KPROP - Van Genuchten or Brooks and Corey 1
IMSHGN - Spatial discretization option 1
NVFLAYR - Number of layers in flow model 1

OPTIONS CHOSEN
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Van Genuchten functional coefficients
User defined coordinate system
1

Layer information

LAYER NO. LAYER THICKNESS MATERIAL PROPERTY
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1 18.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	3.60	-999.	-999.	-999.
Unsaturated zone porosity	--	CONSTANT	0.250	-999.	-999.	-999.
Air entry pressure head	m	CONSTANT	0.700	-999.	-999.	-999.
Depth of the unsaturated zone	m	CONSTANT	18.0	0.000	0.000	0.000

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

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

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

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

OPTIONS CHOSEN

Convolution integral approach

Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	18.0	-999.	-999.	-999.
Longitudinal dispersivity of layer	m	DERIVED	-999.	-999.	-999.	-999.
Percent organic matter	--	CONSTANT	0.000	-999.	-999.	-999.
Bulk density of soil for layer	g/cc	CONSTANT	1.99	-999.	-999.	-999.
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.	-999.

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CHEMICAL SPECIFIC VARIABLES

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

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SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.152E-01	-999.	-999.	-999.
Area of waste disposal unit	m^2	CONSTANT	186.	-999.	-999.	-999.
Duration of pulse	yr	DERIVED	0.100E-08	-999.	-999.	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	-999.	-999.
Recharge rate	m/yr	CONSTANT	0.000	-999.	-999.	-999.
Source decay constant	1/yr	CONSTANT	0.250E-01	0.000	0.000	0.000
Initial concentration at landfill	mg/l	CONSTANT	0.177E+04	-999.	-999.	-999.
Length scale of facility	m	DERIVED	-999.	-999.	-999.	-999.
Width scale of facility	m	DERIVED	-999.	-999.	-999.	-999.
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

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AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	-999.	-999.	-999.	-999.
Aquifer porosity	--	CONSTANT	0.300	-999.	-999.	-999.
Bulk density	g/cc	CONSTANT	1.86	-999.	-999.	-999.
Aquifer thickness	m	CONSTANT	6.10	-999.	-999.	-999.
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	-999.	-999.
Conductivity (hydraulic)	m/yr	CONSTANT	315.	-999.	-999.	-999.
Gradient (hydraulic)		CONSTANT	0.300E-02	-999.	-999.	-999.
Groundwater seepage velocity	m/yr	DERIVED	-999.	-999.	-999.	-999.
Retardation coefficient	--	DERIVED	-999.	-999.	-999.	-999.
Longitudinal dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Transverse dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Vertical dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Temperature of aquifer	C	CONSTANT	20.0	-999.	-999.	-999.
pH	--	CONSTANT	7.00	-999.	-999.	-999.
Organic carbon content (fraction)		CONSTANT	0.000	-999.	-999.	-999.
Well distance from site	m	CONSTANT	1.00	-999.	-999.	-999.
Angle off center	degree	CONSTANT	0.000	-999.	-999.	-999.
Well vertical distance	m	CONSTANT	0.000	-999.	-999.	-999.

MAXIMUM WELL CONCENTRATION IS 132.2 AT 0.295E+03 YEARS

Chloride Concentration At The Receptor Well

Rice Justis K-36 AD