

R. T. HICKS CONSULTANTS, LTD.

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

May 30, 2017

Mr. Bradford Billings
NMOCD District 2
811 S. First Street
Artesia, New Mexico 88210
VIA EMAIL to bradford.billing@state.nm.us

RE: Lime Rock Resources – ASAU 150 Trunkline Release, #2RP-3893

Dear Mr. Billings:

On behalf of Lime Rock Resources, thank you for your feedback after our submission of a draft on May 16 and subsequent phone call and meeting between OCD, Lime Rock, and Hicks Consultants regarding this release to groundwater. In accordance with NMAC 19.15.29.8, we now submit this notice of groundwater impact and propose three additional wells to reflect our discussions.

On February 8, 2017, a 2-inch monitoring well was installed at the release location within the excavation footprint and in the same location as the investigative soil boring installation last year. Total depth of the well is 61.54 feet and the top of screen is at 46 feet. The surface completion is flush-mount and the construction was completed by Adkins Engineering in accordance with New Mexico Environment Department guidelines¹ after modification of the screen length pursuant to OCD recommendations.



3/23/2017: LNAPL at MW-1

The well was developed and then sampled; however, light non-aqueous phase liquids (LNAPL) was observed on the water surface during the first sampling event and since installation. On March 23 Hicks Consultants measured approximately 6 inches of LNAPL in the well as shown in the photograph above. Evaluation of nearby wells suggests an east-southeast groundwater gradient as depicted on Figure 1. On May 2 Hicks Consultants performed a baildown test² at the monitoring well to determine LNAPL transmissivity within the well and the surrounding groundwater. At the time of the test, we used an electronic oil/water indicator and found the depth to LNAPL was 51.1 feet below surface and depth to water was 51.62 feet. Thus, equilibrium LNAPL thickness is 0.52 feet or 6.24 inches. Results of this test will be used to evaluate treatment/remediation

¹ www.env.nm.gov/gwb/documents/MonitoringWellGuidelinesFINAL-March2011.pdf

² [www.api.org/~media/4762%20LNAPL%20Tn%20wkbk%20Baildown%20userguide%20Apr2016%20\(2\).pdf](http://www.api.org/~media/4762%20LNAPL%20Tn%20wkbk%20Baildown%20userguide%20Apr2016%20(2).pdf)

options. Initial assessment of the test suggests that LNAPL in the well returns to equilibrium thickness in approximately 2 hours.

We propose the installation of 3 additional wells to determine an appropriate remedy:

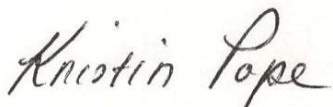
- Install an initial down-gradient monitoring well (MW-2) approximately 50 feet from MW-1 as shown on Figure 2 on June 9, 2017. The exact location of all wells will be determined in the field and based upon the distance from MW-1, logistics such as steep slopes or pipelines, OCD guidance, and more accurate groundwater flow vectors based upon site data.
- If LNAPL or elevated aromatics resulting from heated headspace analysis using a photoionization detector (PID>100 ppm) are present on groundwater or capillary fringe of MW-2, two additional wells will be installed down gradient during the week of June 26. The approximate location of MW-3 in this scenario is shown on Figure 2. The location of MW-4 is dependent on the presence or absence of impact observed in MW-3 during installation and will be determined jointly with the District.
- If MW-2 shows no obvious signs of impact (odor or LNAPL), then the well will be developed, sampled, and surveyed to determine the placement of 2 additional wells (MW-3, MW-4) to be installed the week of June 26, 2017. The locations of MW-3, -4 will be proposed to NMOCD after analytical results are returned and before installation.

The 2-inch monitoring wells will be drilled by Atkins Engineering using the same standards and construction specifications as MW-1. We will employ low-flow sampling in accordance with the EPA procedure. Water elevations and LNAPL thickness will also be determined during each sampling event. Samples will be analyzed for BTEX, TDS, chloride, and sulfate. MW-1 will now only be monitored for LNAPL thickness and will only be sampled as needed.

Thank you for your help regarding this release. Upon OCD's concurrence, the outlined work will begin during the first week of June. OCD will be notified at least 48 hours prior to the commencement of significant events and we will maintain real-time contact with the District during field programs. Should you have any questions or comments regarding this proposed work, please contact me.

Sincerely,

R.T. Hicks Consultants

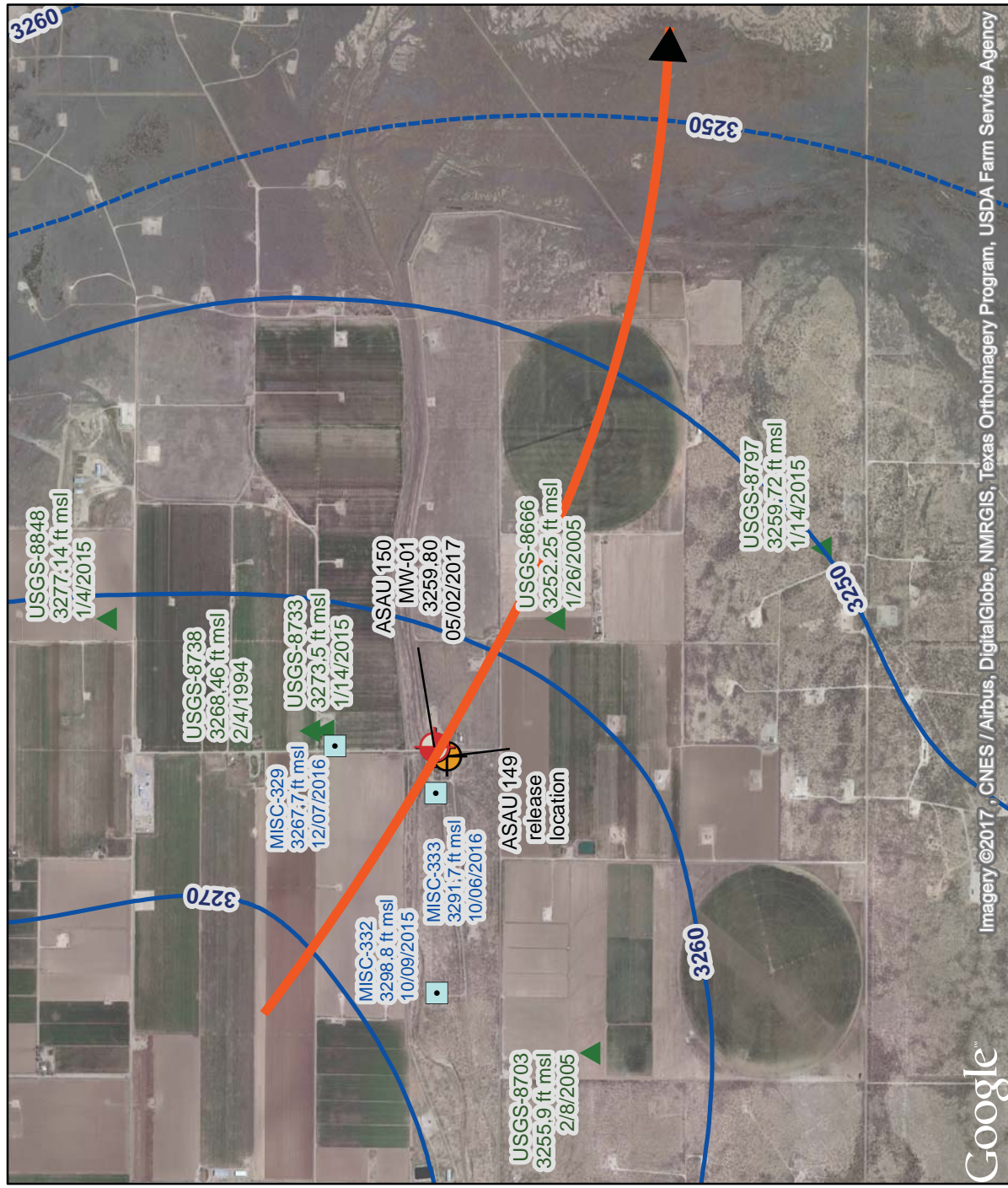
A handwritten signature in cursive script that reads "Kristin Pope". The ink is dark and the signature is written on a light-colored background.

Kristin Pope

Enclosures: Figures, lab report

Copy:

Lime Rock



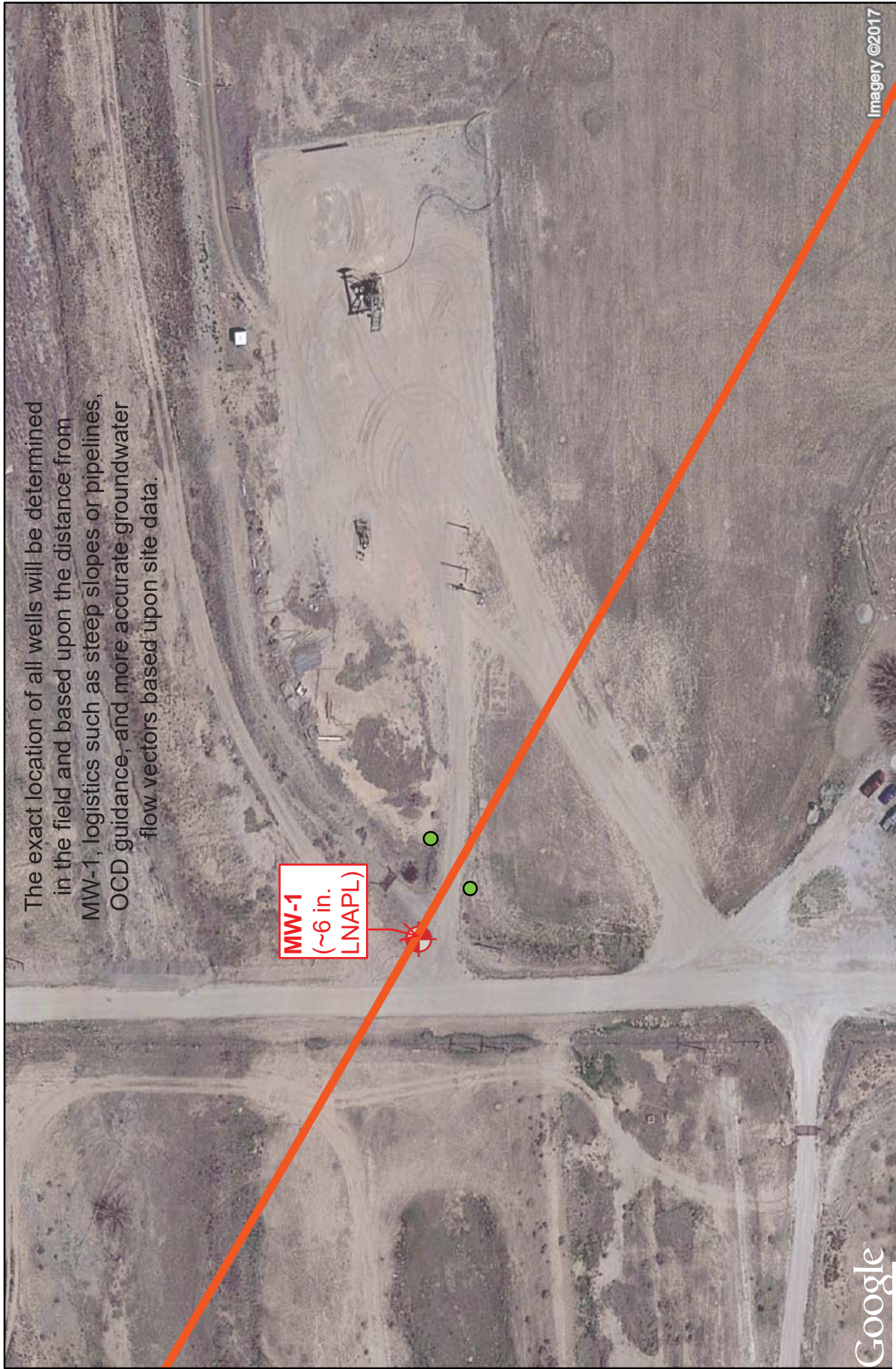
R. T. Hicks Consultants, Ltd
 901 Rio Grande Blvd NW Suite F-142
 Albuquerque, NM 87104
 Ph: 505.266.5004

Potentiometric Surface and Groundwater Elevation

Lime Rock Resources: ASAU #150 Release

Figure 1

May 2017



R. T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Proposed Monitoring Wells and Flow Direction
Lime Rock Resources: ASAU #150 Release

Figure 2
May 2017

March 21, 2017

MIKE STUBBLEFIELD

R T HICKS CONSULTANTS

901 RIO GRANDE BLVD SUITE F-142

ALBUQUERQUE, NM 87104

RE: ASAU 150 TRUNK LINE RELEASE

Enclosed are the results of analyses for samples received by the laboratory on 03/08/17 16:55.

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 accredited through the State of Colorado Department of Public Health and Environment for:

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

Cardinal Laboratories is accredited through the State of New Mexico Environment Department for:

Method SM 9223-B	Total Coliform and E. coli (Colilert MMO-MUG)
Method EPA 524.2	Regulated VOCs and Total Trihalomethanes (TTHM)
Method EPA 552.2	Total Haloacetic Acids (HAA-5)

Accreditation applies to public drinking water matrices for State of Colorado and New Mexico.

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

Lab Director/Quality Manager

Analytical Results For:

R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
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S-1 MONITOR WELL	H700605-01	Water	08-Mar-17 11:37	08-Mar-17 16:55
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Cardinal Laboratories

*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:

R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

S-1 MONITOR WELL H700605-01 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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Cardinal Laboratories

Inorganic Compounds

Alkalinity, Bicarbonate	573		5.00	mg/L	1	7022210	AC	10-Mar-17	310.1	
Alkalinity, Carbonate	<1.00		1.00	mg/L	1	7022210	AC	10-Mar-17	310.1	
Chloride*	188		4.00	mg/L	1	7030902	AC	09-Mar-17	4500-Cl-B	
Conductivity*	3070		1.00	uS/cm	1	7030904	AC	10-Mar-17	120.1	
pH*	7.10		0.100	pH Units	1	7030903	AC	09-Mar-17	150.1	
Sulfate*	1460		250	mg/L	25	7031002	AC	10-Mar-17	375.4	QM-07
TDS*	2800		5.00	mg/L	1	7022808	AC	13-Mar-17	160.1	
Alkalinity, Total*	470		4.00	mg/L	1	7022210	AC	10-Mar-17	310.1	

Volatile Organic Compounds by EPA Method 8021

Benzene*	19.2		0.500	mg/L	500	7030901	MS	10-Mar-17	8021B	
Toluene*	8.50		0.500	mg/L	500	7030901	MS	10-Mar-17	8021B	
Ethylbenzene*	2.31		0.500	mg/L	500	7030901	MS	10-Mar-17	8021B	
Total Xylenes*	5.17		1.50	mg/L	500	7030901	MS	10-Mar-17	8021B	
Total BTEX	35.2		3.00	mg/L	500	7030901	MS	10-Mar-17	8021B	

Surrogate: 4-Bromofluorobenzene (PID) 101 % 81.3-128 7030901 MS 10-Mar-17 8021B

Petroleum Hydrocarbons by GC FID

S-04

GRO C6-C10	274		1.00	mg/L	0.1	7031302	MS	14-Mar-17	8015B	
DRO >C10-C28	435		1.00	mg/L	0.1	7031302	MS	14-Mar-17	8015B	
EXT DRO >C28-C36	73.7		1.00	mg/L	0.1	7031302	MS	14-Mar-17	8015B	

Surrogate: 1-Chlorooctane 143 % 37.1-138 7031302 MS 14-Mar-17 8015B

Surrogate: 1-Chlorooctadecane 148 % 44.6-151 7031302 MS 14-Mar-17 8015B

Green Analytical Laboratories

Total Recoverable Metals by ICP (E200.7)

Calcium*	1600		2.50	mg/L	25	B703116	LLG	15-Mar-17	EPA200.7	
Magnesium*	240		2.50	mg/L	25	B703116	LLG	15-Mar-17	EPA200.7	

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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONEReported:
21-Mar-17 11:52**S-1 MONITOR WELL****H700605-01 (Water)**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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Green Analytical Laboratories**Total Recoverable Metals by ICP (E200.7)**

Potassium*	<25.0		25.0	mg/L	25	B703116	LLG	15-Mar-17	EPA200.7	
Sodium*	150		25.0	mg/L	25	B703116	LLG	15-Mar-17	EPA200.7	

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Analytical Results For:

R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 7022210 - General Prep - Wet Chem

Blank (7022210-BLK1)

Prepared & Analyzed: 22-Feb-17

Alkalinity, Carbonate	ND	1.00	mg/L							
Alkalinity, Bicarbonate	5.00	5.00	mg/L							
Alkalinity, Total	4.00	4.00	mg/L							

LCS (7022210-BS1)

Prepared & Analyzed: 22-Feb-17

Alkalinity, Carbonate	ND	1.00	mg/L				80-120			
Alkalinity, Bicarbonate	127	5.00	mg/L				80-120			
Alkalinity, Total	104	4.00	mg/L	100		104	80-120			

LCS Dup (7022210-BSD1)

Prepared & Analyzed: 22-Feb-17

Alkalinity, Carbonate	ND	1.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	127	5.00	mg/L				80-120	0.00	20	
Alkalinity, Total	104	4.00	mg/L	100		104	80-120	0.00	20	

Batch 7022808 - Filtration

Blank (7022808-BLK1)

Prepared: 28-Feb-17 Analyzed: 02-Mar-17

TDS	ND	5.00	mg/L							
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LCS (7022808-BS1)

Prepared: 28-Feb-17 Analyzed: 02-Mar-17

TDS	215	5.00	mg/L	213		101	80-120			
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Duplicate (7022808-DUP1)

Source: H700474-04

Prepared: 28-Feb-17 Analyzed: 02-Mar-17

TDS	992	5.00	mg/L		1010			2.19	20	
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Batch 7030902 - General Prep - Wet Chem

Blank (7030902-BLK1)

Prepared & Analyzed: 09-Mar-17

Chloride	ND	4.00	mg/L							
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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:

R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 7030902 - General Prep - Wet Chem

LCS (7030902-BS1)

Prepared & Analyzed: 09-Mar-17

Chloride	100	4.00	mg/L	100	100	80-120			
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LCS Dup (7030902-BSD1)

Prepared & Analyzed: 09-Mar-17

Chloride	100	4.00	mg/L	100	100	80-120	0.00	20	
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Batch 7030903 - General Prep - Wet Chem

LCS (7030903-BS1)

Prepared & Analyzed: 09-Mar-17

pH	7.11		pH Units	7.00	102	90-110			
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Duplicate (7030903-DUP1)

Source: H700605-01

Prepared & Analyzed: 09-Mar-17

pH	7.12	0.100	pH Units	7.10			0.281	20	
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Batch 7030904 - General Prep - Wet Chem

LCS (7030904-BS1)

Prepared: 09-Mar-17 Analyzed: 10-Mar-17

Conductivity	491		uS/cm	500	98.2	80-120			
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Duplicate (7030904-DUP1)

Source: H700605-01

Prepared: 09-Mar-17 Analyzed: 10-Mar-17

Conductivity	3060	1.00	uS/cm	3070			0.326	20	
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Batch 7031002 - General Prep - Wet Chem

Blank (7031002-BLK1)

Prepared & Analyzed: 10-Mar-17

Sulfate	ND	10.0	mg/L						
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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONEReported:
21-Mar-17 11:52**Inorganic Compounds - Quality Control****Cardinal Laboratories**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 7031002 - General Prep - Wet Chem**LCS (7031002-BS1)**

Prepared & Analyzed: 10-Mar-17

Sulfate	23.4	10.0	mg/L	20.0		117	80-120			
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LCS Dup (7031002-BS1)

Prepared & Analyzed: 10-Mar-17

Sulfate	24.4	10.0	mg/L	20.0		122	80-120	4.18	20	BS1
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R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Volatile Organic Compounds by EPA Method 8021 - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 7030901 - Volatiles

Blank (7030901-BLK1)

Prepared: 09-Mar-17 Analyzed: 10-Mar-17

Benzene	ND	0.001	mg/L							
Toluene	ND	0.001	mg/L							
Ethylbenzene	ND	0.001	mg/L							
Total Xylenes	ND	0.003	mg/L							
Total BTEX	ND	0.006	mg/L							
Surrogate: 4-Bromofluorobenzene (PID)	0.0500		mg/L	0.0500		100	81.3-128			

LCS (7030901-BS1)

Prepared: 09-Mar-17 Analyzed: 10-Mar-17

Benzene	0.020	0.001	mg/L	0.0200		101	86.6-118			
Toluene	0.020	0.001	mg/L	0.0200		97.5	84.5-122			
Ethylbenzene	0.020	0.001	mg/L	0.0200		101	83.9-122			
Total Xylenes	0.059	0.003	mg/L	0.0600		98.5	81.8-124			
Surrogate: 4-Bromofluorobenzene (PID)	0.0507		mg/L	0.0500		101	81.3-128			

LCS Dup (7030901-BSD1)

Prepared: 09-Mar-17 Analyzed: 10-Mar-17

Benzene	0.020	0.001	mg/L	0.0200		101	86.6-118	0.0298	7.71	
Toluene	0.020	0.001	mg/L	0.0200		97.6	84.5-122	0.0769	8.86	
Ethylbenzene	0.020	0.001	mg/L	0.0200		101	83.9-122	0.391	11.8	
Total Xylenes	0.059	0.003	mg/L	0.0600		97.9	81.8-124	0.602	11.9	
Surrogate: 4-Bromofluorobenzene (PID)	0.0504		mg/L	0.0500		101	81.3-128			

Cardinal Laboratories

*=Accredited Analyte

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R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Petroleum Hydrocarbons by GC FID - Quality Control
Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 7031302 - General Prep - Organics
Blank (7031302-BLK1)

Prepared: 13-Mar-17 Analyzed: 14-Mar-17

GRO C6-C10	ND	1.00	mg/L							
DRO >C10-C28	ND	1.00	mg/L							
EXT DRO >C28-C35	ND	1.00	mg/L							
EXT DRO >C28-C36	ND	1.00	mg/L							
Surrogate: 1-Chlorooctane	4.16		mg/L	5.00		83.2	37.1-138			
Surrogate: 1-Chlorooctadecane	4.82		mg/L	5.00		96.3	44.6-151			

LCS (7031302-BS1)

Prepared & Analyzed: 13-Mar-17

GRO C6-C10	45.1	1.00	mg/L	50.0		90.2	72.8-108			
DRO >C10-C28	46.6	1.00	mg/L	50.0		93.1	77.5-117			
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0			
Surrogate: 1-Chlorooctane	5.03		mg/L	5.00		101	37.1-138			
Surrogate: 1-Chlorooctadecane	4.78		mg/L	5.00		95.7	44.6-151			

LCS Dup (7031302-BSD1)

Prepared: 13-Mar-17 Analyzed: 14-Mar-17

GRO C6-C10	46.2	1.00	mg/L	50.0		92.5	72.8-108	2.42	12	
DRO >C10-C28	48.0	1.00	mg/L	50.0		96.0	77.5-117	2.98	12.1	
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0		20	
Surrogate: 1-Chlorooctane	5.16		mg/L	5.00		103	37.1-138			
Surrogate: 1-Chlorooctadecane	5.26		mg/L	5.00		105	44.6-151			

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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:

R T HICKS CONSULTANTS
901 RIO GRANDE BLVD SUITE F-142
ALBUQUERQUE NM, 87104

Project: ASAU 150 TRUNK LINE RELEASE
Project Number: NONE GIVEN
Project Manager: MIKE STUBBLEFIELD
Fax To: NONE

Reported:
21-Mar-17 11:52

Total Recoverable Metals by ICP (E200.7) - Quality Control

Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B703116 - EPA 200.2 Total Rec.

Blank (B703116-BLK1)

Prepared & Analyzed: 15-Mar-17

Magnesium	ND	0.100	mg/L							
Calcium	ND	0.100	mg/L							
Potassium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							

LCS (B703116-BS1)

Prepared & Analyzed: 15-Mar-17

Magnesium	19.0	0.100	mg/L	20.0		94.8	85-115			
Potassium	7.40	1.00	mg/L	8.00		92.5	85-115			
Calcium	3.69	0.100	mg/L	4.00		92.2	85-115			
Sodium	6.21	1.00	mg/L	6.48		95.9	85-115			

LCS Dup (B703116-BSD1)

Prepared & Analyzed: 15-Mar-17

Sodium	6.12	1.00	mg/L	6.48		94.4	85-115	1.54	20	
Potassium	7.21	1.00	mg/L	8.00		90.2	85-115	2.56	20	
Magnesium	18.6	0.100	mg/L	20.0		93.2	85-115	1.72	20	
Calcium	3.62	0.100	mg/L	4.00		90.6	85-115	1.78	20	

Matrix Spike (B703116-MS2)

Source: 1703076-01

Prepared & Analyzed: 15-Mar-17

Calcium	18.6	0.100	mg/L	4.00	14.9	92.1	70-130			
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Celey D. Keene, Lab Director/Quality Manager

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
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

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ANALYSIS REQUEST

Page 12 of 12