

# 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 16, 2017

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

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

Dear Mr. Billings:

On behalf of Lime Rock Resources and in accordance with NMAC 19.15.29.8, R.T. Hicks Consultants submits this notice of groundwater impact at the above-referenced location.

**B.** The person operating or controlling either the release or the location of the release shall notify the division in accordance with 19.15.29 NMAC with respect to a release from a facility of oil or other water contaminant, in such quantity as may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

On February 8, 2017, a 2-inch monitoring well was installed at the release location within the excavation footprint and as close as possible to 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 guidelines<sup>1</sup> after modification of the screen length pursuant to OCD recommendations.



**3/23/2017: LNAPL at MW-1**

The well was developed and then sampled in accordance with EPA protocol; however, light non-aqueous phase liquids (LNAPL) was observed on the water surface during the first sampling event and since installation. On March 23, 2017 Hicks Consultants measured approximately 6 inches of LNAPL in the well as shown in the photograph above.

<sup>1</sup> [www.env.nm.gov/gwb/documents/MonitoringWellGuidelinesFINAL-March2011.pdf](http://www.env.nm.gov/gwb/documents/MonitoringWellGuidelinesFINAL-March2011.pdf)

Evaluation of nearby wells suggests an east-southeast groundwater gradient as depicted on Figure 1. On May 2, 2017 Hicks Consultants performed a baildown test<sup>2</sup> 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 options. Initial assessment of the test suggests that LNAPL in the well returns to equilibrium thickness in approximately 2 hours.

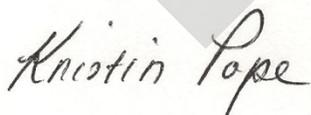
We propose the following path forward to determine an appropriate remedy:

1. Installation of two down-gradient monitoring wells approximately 50 feet from MW-1 as shown on Figure 2.
2. MW-1 and additional wells will be surveyed to determine the elevation of the top of casing relative to a known elevation, such as the adjacent oil well.
3. MW-2 and MW-3 are not expected to exhibit LNAPL on groundwater and will be sampled for two quarters; Samples will be analyzed for BTEX, TDS, Chloride, and Sulfate.
4. Water elevations and LNAPL thickness will also be determined during each sampling event.
5. One additional LNAPL baildown tests will be performed during the monitor well installation program.
6. After completion of the second baildown test, we will provide the results of both tests to OCD and the results of the first groundwater sampling event. At that time we propose a meeting with OCD to discuss how these data affect the path forward for this project.

Thank you for your help regarding this release. Upon OCD's concurrence, we will schedule the drilling of the monitoring wells, using the same standards and construction specifications as MW-1. OCD will be notified at least 48 hours prior to the commencement of significant events. Should you have any questions or comments regarding this proposed work, please contact me.

Sincerely,

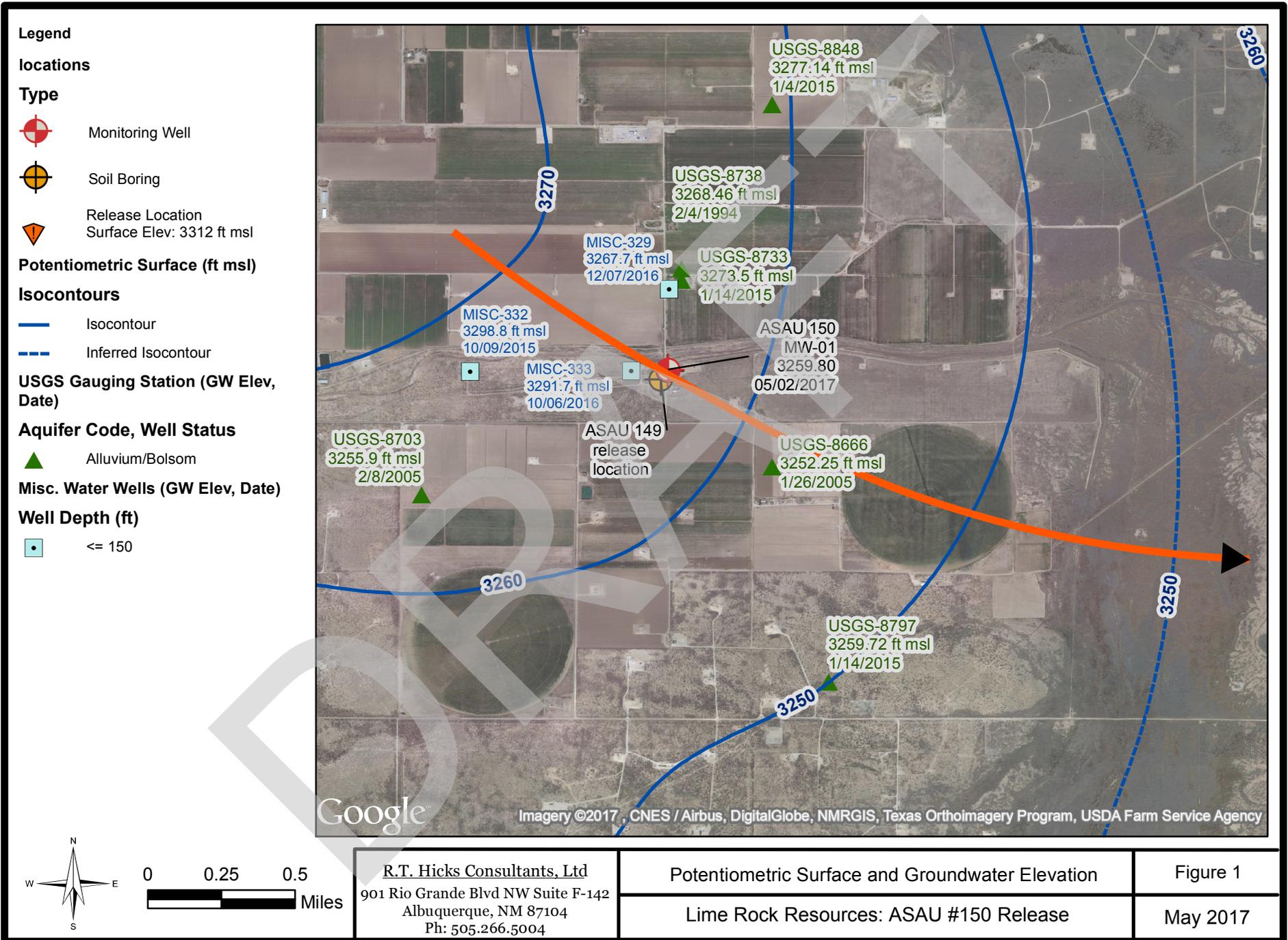
R.T. Hicks Consultants

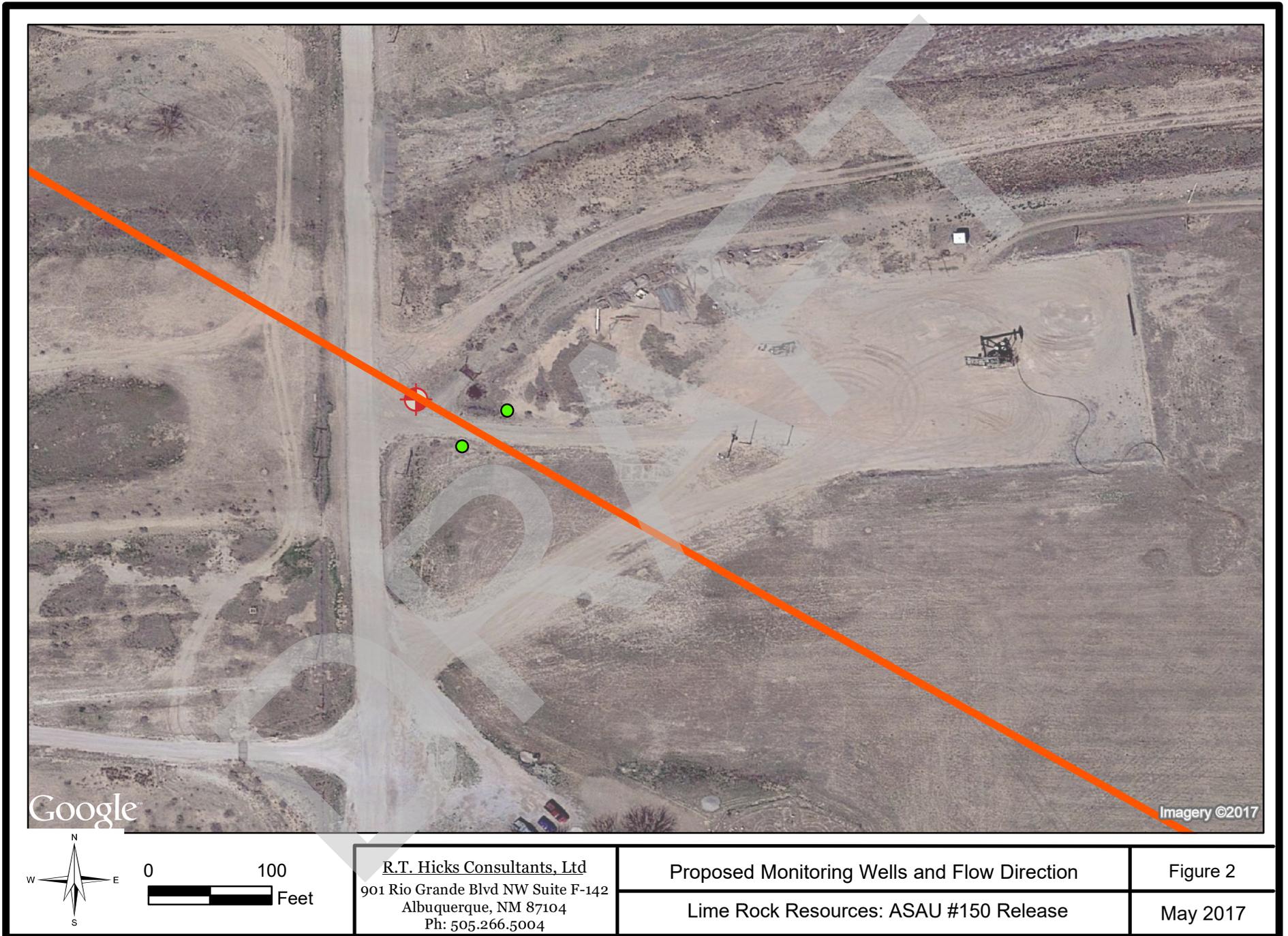


Kristin Pope

Enclosures: Figures, lab report  
Copy: Lime Rock

<sup>2</sup> [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)





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/ga/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/ga/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
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Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S-1 MONITOR WELL	H700605-01	Water	08-Mar-17 11:37	08-Mar-17 16:55

DRAFT

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	

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

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 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
<b>Batch 7022210 - General Prep - Wet Chem</b>										
<b>Blank (7022210-BLK1)</b>										
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							
<b>LCS (7022210-BS1)</b>										
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			
<b>LCS Dup (7022210-BSD1)</b>										
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	
<b>Batch 7022808 - Filtration</b>										
<b>Blank (7022808-BLK1)</b>										
Prepared: 28-Feb-17 Analyzed: 02-Mar-17										
TDS	ND	5.00	mg/L							
<b>LCS (7022808-BS1)</b>										
Prepared: 28-Feb-17 Analyzed: 02-Mar-17										
TDS	215	5.00	mg/L	213		101	80-120			
<b>Duplicate (7022808-DUP1)</b>										
Source: H700474-04 Prepared: 28-Feb-17 Analyzed: 02-Mar-17										
TDS	992	5.00	mg/L		1010			2.19	20	
<b>Batch 7030902 - General Prep - Wet Chem</b>										
<b>Blank (7030902-BLK1)</b>										
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
<b>Batch 7030902 - General Prep - Wet Chem</b>										
<b>LCS (7030902-BS1)</b>										
Prepared & Analyzed: 09-Mar-17										
Chloride	100	4.00	mg/L	100		100	80-120			
<b>LCS Dup (7030902-BSD1)</b>										
Prepared & Analyzed: 09-Mar-17										
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
<b>Batch 7030903 - General Prep - Wet Chem</b>										
<b>LCS (7030903-BS1)</b>										
Prepared & Analyzed: 09-Mar-17										
pH	7.11		pH Units	7.00		102	90-110			
<b>Duplicate (7030903-DUP1)</b>										
Source: H700605-01 Prepared & Analyzed: 09-Mar-17										
pH	7.12	0.100	pH Units	7.10				0.281	20	
<b>Batch 7030904 - General Prep - Wet Chem</b>										
<b>LCS (7030904-BS1)</b>										
Prepared: 09-Mar-17 Analyzed: 10-Mar-17										
Conductivity	491		uS/cm	500		98.2	80-120			
<b>Duplicate (7030904-DUP1)</b>										
Source: H700605-01 Prepared: 09-Mar-17 Analyzed: 10-Mar-17										
Conductivity	3060	1.00	uS/cm	3070				0.326	20	
<b>Batch 7031002 - General Prep - Wet Chem</b>										
<b>Blank (7031002-BLK1)</b>										
Prepared & Analyzed: 10-Mar-17										
Sulfate	ND	10.0	mg/L							

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Celey D. Keene, Lab Director/Quality Manager

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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

**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 &amp; Analyzed: 10-Mar-17

Sulfate	23.4	10.0	mg/L	20.0		117	80-120			
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**LCS Dup (7031002-BSD1)**

Prepared &amp; Analyzed: 10-Mar-17

Sulfate	24.4	10.0	mg/L	20.0		122	80-120	4.18	20	BS1
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 Project: ASAU 150 TRUNK LINE RELEASE  
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 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			

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 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							
<i>Surrogate: 1-Chlorooctane</i>	4.16		mg/L	5.00		83.2	37.1-138			
<i>Surrogate: 1-Chlorooctadecane</i>	4.82		mg/L	5.00		96.3	44.6-151			

**LCS (7031302-BS1)**

Prepared &amp; 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			
<i>Surrogate: 1-Chlorooctane</i>	5.03		mg/L	5.00		101	37.1-138			
<i>Surrogate: 1-Chlorooctadecane</i>	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	
<i>Surrogate: 1-Chlorooctane</i>	5.16		mg/L	5.00		103	37.1-138			
<i>Surrogate: 1-Chlorooctadecane</i>	5.26		mg/L	5.00		105	44.6-151			

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\*=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

**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 &amp; 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 &amp; 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 &amp; 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 &amp; 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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Celey D. Keene, Lab Director/Quality Manager

