March 27, 2017

Ms. Olivia Yu
NMOCD District I
1625 N. French Drive
Hobbs, New Mexico 88240

SUBJECT: SOIL REMEDIATION WORK PLAN FOR INCIDENT 1RP-4547 ATHA SWD (J H DAY #002 30-025-08816), LEA COUNTY, NEW MEXICO

Dear Ms. Yu:

On behalf of Key Energy Services (Key) Souder Miller & Associates (SMA) is pleased to submit the attached Work Plan summarizing the planned soil remediation of the release site located near on the Atha SWD (J H Day #002 30-025-08816) in Lea County, New Mexico. The purpose of the work plan is to obtain approval from the New Mexico Oil Conservation Division for remediation of the release that occurred on December 26, 2016.

At the request of Key, SMA responded to assess and delineate the production fluids release associated with the Atha SWD (J H Day #002 30-025-08816) location. The release was initially reported to NMOCD by Key on December 26, 2016 and was a result of a human error. The table below summarizes information regarding the release. Results of the assessment and delineation follow in the attached report.

Table 1: Release information and Site Ranking

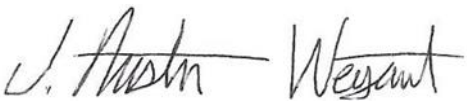
Name	Atha SWD (J H Day #002 30-025-08816)				
Location	Incident Number	API Number	Section, Township, Range		
	1RP-4547	30-025-08816	NE/NW (Unit C)	Section 06	T22S, R36E NMPM
Estimated Date of Release	December 26, 2016				
Date Reported to NMOCD	December 26, 2016				
Reported by	Maren Coligan				
Land Owner	Wilberta R. Tivis				
Reported To	NM Oil Conservation Division (NMOCD)				
Source of Release	Flowline to the injection wells				
Released Material	Produced Water				
Released Volume	50-60 bbls				
Recovered Volume	0 bbls				
Nearest Waterway	Pecos River is greater than 50 miles west of location				
Depth to Groundwater	Estimated to be 195' bgs				
Nearest Domestic Water Source	Greater than 1,000 feet				

NMOCD Ranking	0
SMA Response Dates	Initial: 1/4/2017, 2/16/2017
Estimated Yd^3 Contaminated Soil Excavated and Disposed	1,352

A copy of the C-141 Initial is located in Appendix B. For questions or comments pertaining to the release or the attached Work Plan, please feel free to contact either of us.

Submitted by:

SOUDER, MILLER & ASSOCIATES



Austin Weyant
Project Scientist

Reviewed by:

Cynthia Gray, CHMM
Senior Scientist

SOIL REMEDIATION WORK PLAN FOR INCIDENT 1RP-4547

KEY ENERGY SERVICES, LLC

ATHA SWD (J H DAY #002)
API# 30-025-08816
SECTION 06, T22S R36E, NMPM
LEA COUNTY, NM

Prepared for:
Key Energy Services LLC
6 Desta Dr. Suite 4300
Midland, TX 79705

Prepared by:
Souder, Miller & Associates
201 S. Halagueno
Carlsbad, NM 88221
575-689-7040

March 27, 2017
SMA Reference
5E25783 BG1

Souder, Miller & Associates
Engineering ♦ Environmental ♦ Surveying
201 S. Halagueno ♦ Carlsbad, NM 88221
(575) 689-7040 ♦ www.soudermiller.com

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1.0 Introduction

On behalf of Key Energy Services (Key) Souder Miller & Associates (SMA) has prepared this report that describes the assessment and initial delineation of the release associated with the Atha SWD (J H Day #002 30-025-08816) in Lea County, New Mexico on Wilberta R. Tivis land. Figure 1 illustrates the vicinity and location of the site. This document includes the proposed Work Plan to address the release which occurred December 26, 2016.

2.0 Site Ranking and Land Jurisdiction

The release location is situated in an area owned by Wilberta R. Tivis, with an elevation of approximately 3,590 feet above sea level. The Pecos River is greater than 50 miles west of the release location. After evaluation of the site using aerial photography and topographic maps as well as review of the New Mexico Office of the State Engineer's online Water Rights Reporting System, depth to groundwater is estimated to be approximately 195 feet below ground surface (bgs). Figure 1 depicts the site vicinity and Figure 2 depicts the site details and sample locations.

SMA searched the New Mexico State Engineer's Office online water well database for water wells in the vicinity of the release. No well is located within a 1000 foot radius of the site. The physical location of this release is within the jurisdiction of NMOCD.

This release location has been assigned an NMOCD ranking of 0 which requires a soil remediation standard of 10 parts per million (ppm) benzene, 50 ppm combined benzene, toluene, ethyl-benzene, and total xylenes (BTEX), and 5,000 ppm total petroleum hydrocarbons (TPH). Table 1 illustrates the site ranking rationale.

3.0 Assessment and Initial Results

On January 4, 2017 SMA personnel assessed the release area onsite with a gas powered auger, an Photo Ionization Detector (PID), and a mobile chlorides titration kit. The affected area was found to be 220 feet long and 43-84 feet wide. The release impact area was found to be in the pasture south of the pipeline. Soils were impacted to at least 3 feet bgs in the pasture. Sample locations are noted on Figure 2 Site Details and Sample Location Map. All samples were collected and processed per NMOCD soil sampling procedures. The laboratory samples were sent under chain-of-custody protocols to Hall Environmental Analysis Laboratory for analysis for Benzene and Total BTEX using EPA Method 8021B, DRO and GRO by EPA Method 8015D, and total Chlorides using EPA Method 300.0.

On February 16, 2017 SMA personnel assessed the release area with an air rotatory drill rig to further delineate the site. Delineation occurred to a depth of 20' bgs. Soils were impacted to at least 3 feet bgs in the pasture. Sample locations are noted on Figure 2 Site Details and Sample Location Map. All samples were collected and processed per NMOCD soil sampling procedures. The laboratory samples were sent under chain-of-custody protocols to Hall Environmental Analysis Laboratory for analysis for total Chlorides using EPA Method 300.0.

4.0 Soil Remediation Work Plan

The delineation performed on January 4, 2017 and February 16, 2017 sufficiently mapped the plume of impacted soils in accordance with NMOCD COA guidance. Delineation results from 1/4/2017 and 2/16/2017 show that affected soil is limited to three feet bgs.

To facilitate remediation of the impacted soils on location, the impacted area will be excavated to a depth of three feet bgs, with excavated soils placed on a temporary liner onsite. The excavated area will be graded at a minimum of 2% slope to drain to a sump on the north of the excavation. Small berms will be constructed on the south sides of the affected area to channel water to the sump. A geosynthetic clay liner (GCL) will be installed in the excavation, including the sump, overlain by a 40-mil plastic liner. The GCL and plastic liner will act as a cap above any impacted soil left in-place, ensuring no infiltration into any remaining impacted soils. A drainage layer will be placed on the plastic liner to allow leachate to flow to the drainage sump. Excavated soils will be amended with citric acid, phosphoric acid-based fertilizers and hay or another bulking agent, and placed on the drainage layer above the 40-mil plastic liner and GCL.

Initially, 2.78 acre-inches of fresh water (TDS <1,200 mg/l) will be pumped from a tank on-site and dispersed by an irrigation sprinkler on the affected area. The fresh water will mix with citric acid to flush chloride from the soil and carry it to the lined sump. Effluent from the sump will be immediately pumped to an above ground tank for proper disposal at the New Atha SWD. Calculations (included in Appendix C) indicate the initial water application should flush the chloride sufficiently to reach an average concentration of 1,700 ppm in soil. Additionally, natural precipitation events through the year will allow flushing of chloride and decrease the average predicted chloride concentration to less than 632 ppm. Samples at the base and sidewalls of the soils will be collected periodically and tested to confirm soils have been remediated to required chloride concentrations. After completion of soil remediation, the sump will be backfilled.

5.0 Conclusions and Recommendations

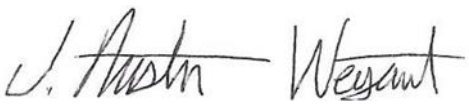
NMOCD Guidelines for Remediation of Leaks, Spills, and Releases have established the following action levels for contaminants of concern for a site with a ranking of 0: 10 ppm (mg/kg) Benzene, 50 ppm total BTEX, and 5,000 ppm TPH. The release consisted of produced water. No evidence of petroleum impact was found during the initial assessment and delineation, confirmed by laboratory analysis.

After the soil remediation work plan is approved by NMOCD, SMA will begin the planned soil remediation activities on site.

If there are any questions regarding this report, please contact either Austin Weyant at 575-689-7040 or Cindy Gray at 505-325-7535.

Submitted by:

SOUDER, MILLER & ASSOCIATES

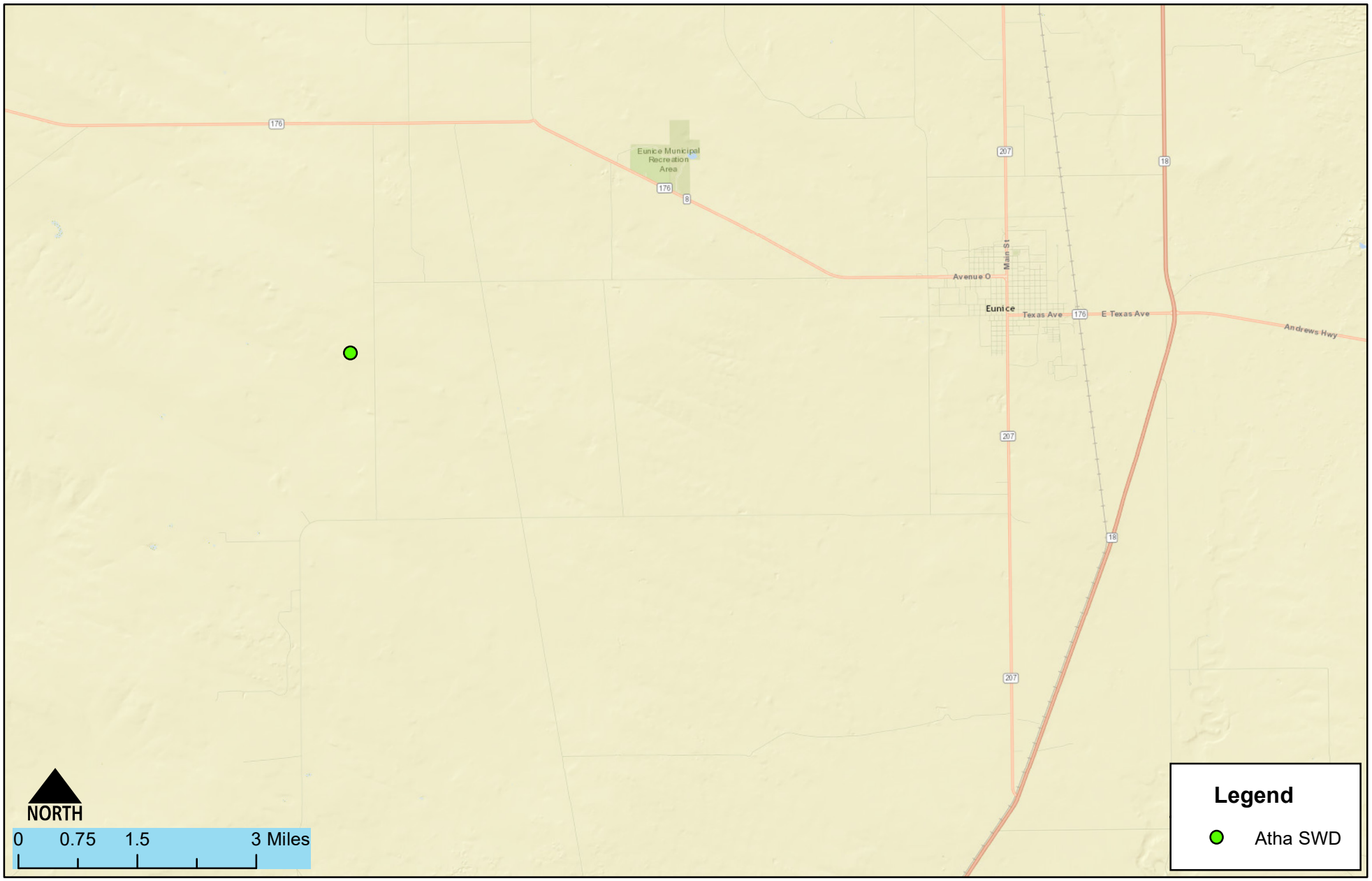


Austin Weyant
Project Scientist

Reviewed by:

Cynthia Gray, CHMM
Senior Scientist

FIGURE 1
VICINITY MAP



Vicinity Map
Key Energy- Atha SWD
UL: C S;6 T22S R36E , New Mexico

Figure 1

Document: C:\Users\lcm.CBO\Documents\GIS DATA\MAPS\AthaFigure 1.mxd

Date Saved: 3/27/2017

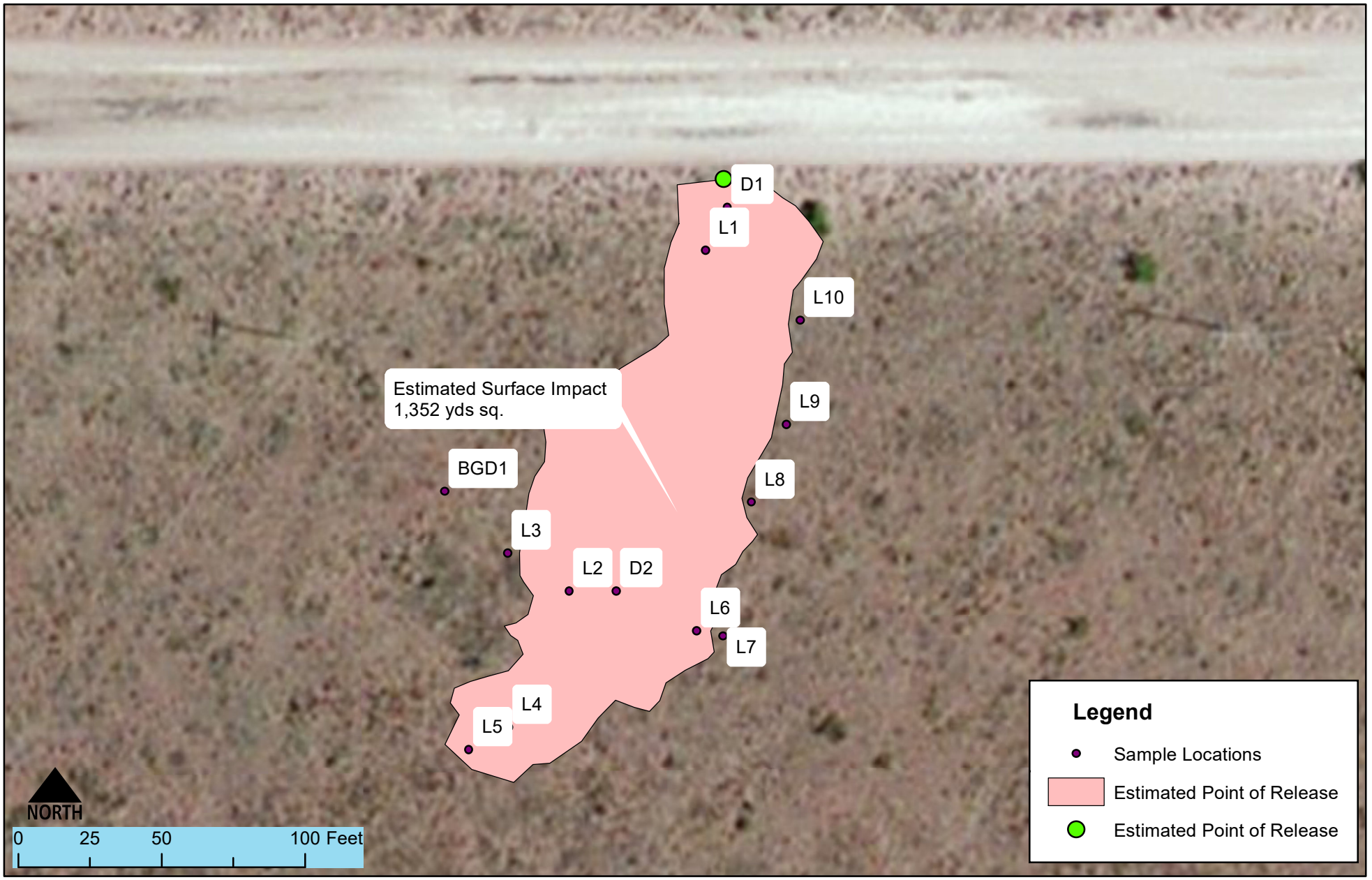
Revisions
By: Date: Descr:
By: Date: Descr:

Drawn Lucas Middleton
Checked
Approved

SMA
201 South Halaguena Street
Carlsbad, New Mexico 88221
(575) 689.7040
www.soudermiller.com
Serving the Southwest & Rocky Mountains

FIGURE 2

SITE MAP



Detailed Site and Sample Map
Key Energy- Atha SWD
C S:6, T22S R36E, New Mexico

Figure 2

Document: C:\Users\lcm.CBO\Documents\GIS DATA\MAPS\Atha new Figure 2.mxd

Date Saved: 3/27/2017

Revisions
By: Date: Descr:
By: Date: Descr:

Drawn Lucas Middleton
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Carlsbad, New Mexico 88221
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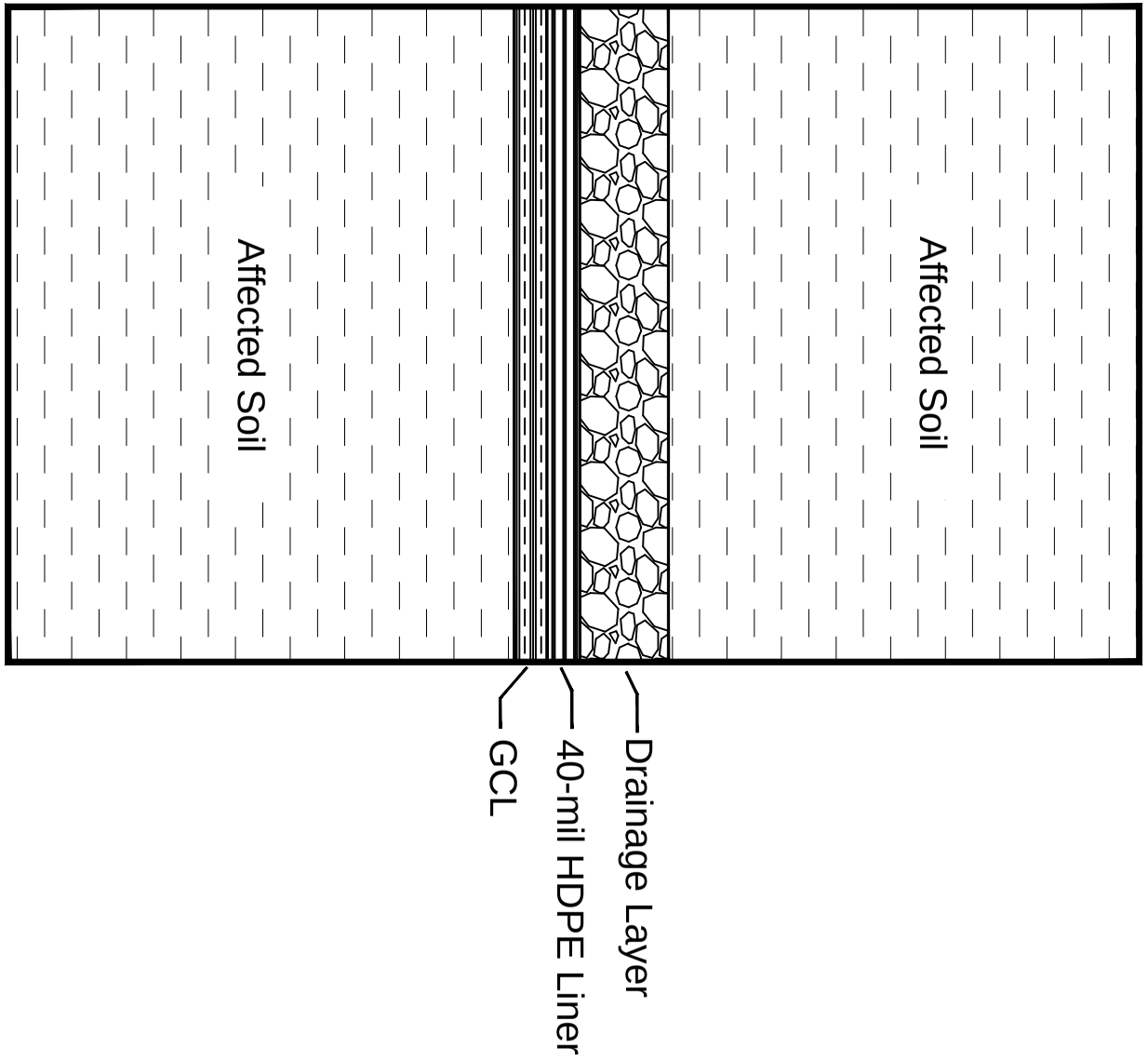
FIGURE 3
IN-SITU CAP DESIGN



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Albuquerque, Farmington, Las Cruces, Roswell, Santa Fe, NM
Cortez - Grand Junction, CO - Safford, AZ - Moab, UT, El Paso, TX
Engineering ♦ Environmental Surveying

IN-SITU CAP & BIOBARRIER DESIGN
ATHA SWD (J H DAY # 002 30-025-08816)
EUNICE, LEA COUNTY, NEW MEXICO

Drawn	Checked	Approved
MAE	SAM	SAM

Date: MARCH, 2017
Scale: Horiz: NA
Vert: NA
Project No: 5E25783
Sheet: Figure 3

C:\Users\mae\Desktop\2017-03 In Situ Cap Drafting.dwg, 3/27/2017 12:45:43 PM mae

TABLE 1

RELEASE INFORMATION AND SITE RANKING

Table 1: Release information and Site Ranking					
Name	Atha SWD (J H Day #002 30-025-08816)				
Location	Incident Number	API Number	Section, Township, Range		
	1RP-4547	30-025-08816	NE/NW (Unit C)	Section 06	T22S, R36E NMPM
Estimated Date of Release	December 26, 2016				
Date Reported to NMOCD	December 26, 2016				
Reported by	Maren Coligan				
Land Owner	Wilberta R. Tivis				
Reported To	NM Oil Conservation Division (NMOCD)				
Source of Release	Flowline to the injection wells				
Released Material	Produced Water				
Released Volume	50-60 bbls				
Recovered Volume	0 bbls				
Nearest Waterway	Pecos River is greater than 50 miles west of location				
Depth to Groundwater	Estimated to be 195' bgs				
Nearest Domestic Water Source	Greater than 1,000 feet				
NMOCD Ranking	0				
SMA Response Dates	Initial: 1/4/2017, 2/16/2017				
Estimated Yd^3 Contaminated Soil Excavated and Disposed	1,352				

TABLE 2

SUMMARY OF CHLORIDE FIELD SCREENING RESULTS

Table 2: Summary of Chloride Field Screen Results					
Date	Time	Field Screening Reference	Sample Depth (Feet BGS)	Chlorides Results	Lab Sample Collected Y/N
1/4/2017	13:00	D1-2	2'	781	Y
1/4/2017	13:00	D1-4	4'	4765	Y
1/4/2017	13:00	D1-5	5'	5336	Y
1/4/2017	13:00	D1-6	6'	3019	Y
1/4/2017	13:00	D1-9	9'	461	Y
2/16/2017	11:00	D1-10	10'	>135	Y
2/16/2017	11:30	D1-12	12'	>135	Y
2/16/2017	12:00	D1- 15,16	15'-16'	>135	Y
2/16/2017	12:30	D1-20	20'	>135	Y
2/21/2017	11:30	D2-20	20'	1400	Y
2/21/2017	12:00	D2-25	25'	>135	Y
2/21/2017	12:30	D2-30	30'	>135	Y

TABLE 3

SUMMARY OF LABORATORY ANALYSES

Table 3: Summary of Laboratory Analyses

Analytical Report- TC97218, 1702A43	Sample Number on Figure 2 Map	Sample Date	Depth	BTEX ppm	Benzene mg/Kg	GRO mg/Kg	DRO mg/Kg	Cl- mg/Kg
TC97218-001	D1	1/4/2017	6'	N/A	N/A	N/A	N/A	4710
TC97218-002	D1	1/4/2017	9'	<12	<7.0	<6.3	<6.3	433
TC97218-003	L3	1/4/2017	1'	N/A	N/A	N/A	N/A	5.3
TC97218-004	L5	1/4/2017	1'	N/A	N/A	N/A	N/A	2050
TC97218-005	L7	1/4/2017	1'	N/A	N/A	N/A	N/A	161
TC97218-006	L8	1/4/2017	1'	N/A	N/A	N/A	N/A	502
TC97218-007	L9	1/4/2017	1'	N/A	N/A	N/A	N/A	115
TC97218-008	L10	1/4/2017	1'	N/A	N/A	N/A	N/A	<2.6
TC97218-009	D2-2	1/4/2017	2'	N/A	N/A	<6.0	<1.4	4900
TC97218-010	D2-3	1/4/2017	3'	<12	<7.1	3.66	3.66	1770
1702A43-001	D1-10	2/16/2017	10'	N/A	N/A	N/A	N/A	72
1702A43-002	D1-15-16	2/16/2017	15'-16'	N/A	N/A	N/A	N/A	44
1702A43-003	D1-20	2/16/2017	20'	N/A	N/A	N/A	N/A	<30
1702A46-001	D1-20	2/21/2017	20'	N/A	N/A	N/A	N/A	1300
1702A46-002	D1-25	2/21/2017	25'	N/A	N/A	N/A	N/A	32
1702A46-003	D1-30	2/21/2017	30'	<0.093	<0.023	<4.7	<9.7	36

N/A-Not Analyzed

APPENDIX A

LABORATORY ANALYTICAL REPORTS

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

March 01, 2017

Austin Weyant
Souder, Miller & Associates
201 S Halagueno
Carlsbad, NM 88221
TEL: (575) 689-7040
FAX

RE: Atha New 45 47 OrderNo.: 1702A43

Dear Austin Weyant:

Hall Environmental Analysis Laboratory received 3 sample(s) on 2/23/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order: **1702A43**
Date Reported: **3/1/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Souder, Miller & Associates
Project: Atha New 45 47
Lab Order: 1702A43

Lab ID: 1702A43-001 **Collection Date:** 2/16/2017 10:00:00 AM
Client Sample ID: D1-10 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Chloride	72	30		mg/Kg	20	2/28/2017 3:48:06 PM	30447

Lab ID: 1702A43-002 **Collection Date:** 2/16/2017 11:00:00 AM
Client Sample ID: D1-15-16 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Chloride	44	30		mg/Kg	20	2/28/2017 4:00:30 PM	30447

Lab ID: 1702A43-003 **Collection Date:** 2/16/2017 12:00:00 PM
Client Sample ID: D1-20 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Chloride	ND	30		mg/Kg	20	2/28/2017 4:12:54 PM	30447

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1702A43**

01-Mar-17

Client: Souder, Miller & Associates

Project: Atha New 45 47

Sample ID	**MB-30447**	SampType:	**mblk**	TestCode:	**EPA Method 300.0: Anions**					
Client ID:	**PBS**	Batch ID:	**30447**	RunNo:	**41047**					
Prep Date:	**2/28/2017**	Analysis Date:	**2/28/2017**	SeqNo:	**1286758**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								

Sample ID	**LCS-30447**	SampType:	**lcs**	TestCode:	**EPA Method 300.0: Anions**					
Client ID:	**LCSS**	Batch ID:	**30447**	RunNo:	**41047**					
Prep Date:	**2/28/2017**	Analysis Date:	**2/28/2017**	SeqNo:	**1286759**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	14	1.5	15.00	0	93.0	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: SMA-CARLSBAD Work Order Number: 1702A43 RcptNo: 1

Received by/date: 02/23/17

Logged By: Andy Jansson 2/23/2017 9:20:00 AM

Completed By: Andy Jansson 02/23/17

Reviewed By: 02/24/17

Chain of Custody

1. Custody seals intact on sample bottles?	Yes	No	Not Present ✓
2. Is Chain of Custody complete?	Yes ✓	No	Not Present
3. How was the sample delivered?	Courier		

Log In

4. Was an attempt made to cool the samples?	Yes ✓	No	NA
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ✓	No	NA
6. Sample(s) in proper container(s)?	Yes ✓	No	
7. Sufficient sample volume for indicated test(s)?	Yes ✓	No	
8. Are samples (except VOA and ONG) properly preserved?	Yes ✓	No	
9. Was preservative added to bottles?	Yes	No ✓	NA
10. VOA vials have zero headspace?	Yes	No	No VOA Vials ✓
11. Were any sample containers received broken?	Yes	No ✓	
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ✓	No	# of preserved bottles checked for pH: (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ✓	No	Adjusted?
14. Is it clear what analyses were requested?	Yes ✓	No	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ✓	No	Checked by:

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes No NA ✓

Person Notified: Date:

By Whom: Via: eMail Phone Fax In Person

Regarding:

Client Instructions:

17. Additional remarks:

18. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.8	Good	Yes			

Chain-of-Custody Record

Client: SMA - Carlsbad

Mailing Address:

Phone #:

email or Fax#:

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☑ Standard ☐ Rush

Project Name: Alpha New 4547

Project #:

Project Manager: Austin Weyant

Sampler: LGM

On Ice: ☑ Yes ☐ No

Sample Temperature: 2.8

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1702443	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F^-, Cl^-, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
2-16-17	1000	Soil	D1-10			-001								X								
	1100		D1-1546			-002								X								
	1210		D1-20			-003								X								

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Date	Time
2-22-17	830			02/23/17	0920
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

March 02, 2017

Austin Weyant
Souder, Miller & Associates
201 S Halagueno
Carlsbad, NM 88221
TEL: (575) 689-7040
FAX

RE: Atha New OrderNo.: 1702A46

Dear Austin Weyant:

Hall Environmental Analysis Laboratory received 3 sample(s) on 2/23/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order **1702A46**
Date Reported: **3/2/2017**

CLIENT: Souder, Miller & Associates
Client Sample ID: D2-20
Project: Atha New
Collection Date: 2/21/2017 11:30:00 AM
Lab ID: 1702A46-001 **Matrix:** SOIL **Received Date:** 2/23/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Chloride	1300	75		mg/Kg	50	3/1/2017 11:25:05 PM	30454

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Souder, Miller & Associates
Client Sample ID: D2-25
Project: Atha New
Collection Date: 2/21/2017 12:00:00 PM
Lab ID: 1702A46-002
Matrix: SOIL
Received Date: 2/23/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Chloride	32	30		mg/Kg	20	2/28/2017 8:58:20 PM	30454

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Souder, Miller & Associates
Client Sample ID: D2-30
Project: Atha New
Collection Date: 2/21/2017 12:40:00 PM
Lab ID: 1702A46-003
Matrix: SOIL
Received Date: 2/23/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Chloride	36	30		mg/Kg	20	2/28/2017 9:10:44 PM	30454
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **TOM**	
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	2/28/2017 2:11:22 PM	30399
Surr: DNOP	119	70-130		%Rec	1	2/28/2017 2:11:22 PM	30399
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	2/27/2017 8:33:12 PM	30385
Surr: BFB	93.6	54-150		%Rec	1	2/27/2017 8:33:12 PM	30385
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.023		mg/Kg	1	2/27/2017 8:33:12 PM	30385
Toluene	ND	0.047		mg/Kg	1	2/27/2017 8:33:12 PM	30385
Ethylbenzene	ND	0.047		mg/Kg	1	2/27/2017 8:33:12 PM	30385
Xylenes, Total	ND	0.093		mg/Kg	1	2/27/2017 8:33:12 PM	30385
Surr: 4-Bromofluorobenzene	102	80-120		%Rec	1	2/27/2017 8:33:12 PM	30385

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1702A46**

02-Mar-17

Client: Souder, Miller & Associates

Project: Atha New

Sample ID	**MB-30454**	SampType:	**mblk**	TestCode:	**EPA Method 300.0: Anions**					
Client ID:	**PBS**	Batch ID:	**30454**	RunNo:	**41047**					
Prep Date:	**2/28/2017**	Analysis Date:	**2/28/2017**	SeqNo:	**1286795**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								

Sample ID	**LCS-30454**	SampType:	**lcs**	TestCode:	**EPA Method 300.0: Anions**					
Client ID:	**LCSS**	Batch ID:	**30454**	RunNo:	**41047**					
Prep Date:	**2/28/2017**	Analysis Date:	**2/28/2017**	SeqNo:	**1286796**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	14	1.5	15.00	0	92.4	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1702A46**

02-Mar-17

Client: Souder, Miller & Associates

Project: Atha New

Sample ID	**LCS-30399**	SampType:	**LCS**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**LCSS**	Batch ID:	**30399**		RunNo:	**41033**				
Prep Date:	**2/27/2017**	Analysis Date:	**2/28/2017**		SeqNo:	**1285372**	Units:	**mg/Kg**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	49	10	50.00	0	98.2	63.8	116			
Surr: DNOP	4.7		5.000		93.9	70	130			

Sample ID	**MB-30399**	SampType:	**MBLK**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**PBS**	Batch ID:	**30399**		RunNo:	**41033**				
Prep Date:	**2/27/2017**	Analysis Date:	**2/28/2017**		SeqNo:	**1285373**	Units:	**mg/Kg**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Surr: DNOP	11		10.00		108	70	130			

Sample ID	**LCS-30440**	SampType:	**LCS**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**LCSS**	Batch ID:	**30440**		RunNo:	**41070**				
Prep Date:	**2/28/2017**	Analysis Date:	**3/1/2017**		SeqNo:	**1286611**	Units:	**%Rec**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.9		5.000		98.6	70	130			

Sample ID	**MB-30440**	SampType:	**MBLK**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**PBS**	Batch ID:	**30440**		RunNo:	**41070**				
Prep Date:	**2/28/2017**	Analysis Date:	**3/1/2017**		SeqNo:	**1286612**	Units:	**%Rec**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	11		10.00		106	70	130			

Sample ID	**1702A46-003AMS**	SampType:	**MS**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**D2-30**	Batch ID:	**30399**		RunNo:	**41070**				
Prep Date:	**2/27/2017**	Analysis Date:	**3/1/2017**		SeqNo:	**1286835**	Units:	**mg/Kg**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	53	9.9	49.46	3.705	98.8	51.6	130			
Surr: DNOP	4.5		4.946		91.7	70	130			

Sample ID	**1702A46-003AMSD**	SampType:	**MSD**		TestCode:	**EPA Method 8015M/D: Diesel Range Organics**				
Client ID:	**D2-30**	Batch ID:	**30399**		RunNo:	**41070**				
Prep Date:	**2/27/2017**	Analysis Date:	**3/1/2017**		SeqNo:	**1286836**	Units:	**mg/Kg**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	50	9.8	49.07	3.705	94.8	51.6	130	4.65	20	
Surr: DNOP	4.3		4.907		87.9	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1702A46**

02-Mar-17

Client: Souder, Miller & Associates

Project: Atha New

Sample ID	**MB-30385**	SampType:	**MBLK**	TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**PBS**	Batch ID:	**30385**	RunNo:	**41013**					
Prep Date:	**2/24/2017**	Analysis Date:	**2/27/2017**	SeqNo:	**1284702**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	830		1000		82.5	54	150			

Sample ID	**LCS-30385**	SampType:	**LCS**	TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**LCSS**	Batch ID:	**30385**	RunNo:	**41013**					
Prep Date:	**2/24/2017**	Analysis Date:	**2/27/2017**	SeqNo:	**1284703**	Units:	**mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	28	5.0	25.00	0	112	76.4	125			
Surr: BFB	1000		1000		103	54	150			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1702A46**

02-Mar-17

Client: Souder, Miller & Associates

Project: Atha New

Sample ID	**MB-30385**	SampType: **MBLK**		TestCode: **EPA Method 8021B: Volatiles**					
Client ID:	**PBS**	Batch ID: **30385**		RunNo: **41013**					
Prep Date:	**2/24/2017**	Analysis Date: **2/27/2017**		SeqNo: **1284760**		Units: **mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	0.89		1.000		89.0	80	120			

Sample ID	**LCS-30385**	SampType: **LCS**		TestCode: **EPA Method 8021B: Volatiles**					
Client ID:	**LCSS**	Batch ID: **30385**		RunNo: **41013**					
Prep Date:	**2/24/2017**	Analysis Date: **2/27/2017**		SeqNo: **1284761**		Units: **mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.96	0.025	1.000	0	96.5	75.2	115			
Toluene	0.99	0.050	1.000	0	99.4	80.7	112			
Ethylbenzene	0.98	0.050	1.000	0	98.3	78.9	117			
Xylenes, Total	3.0	0.10	3.000	0	100	79.2	115			
Surr: 4-Bromofluorobenzene	0.84		1.000		84.4	80	120			

Sample ID	**1702A46-003AMS**	SampType: **MS**		TestCode: **EPA Method 8021B: Volatiles**					
Client ID:	**D2-30**	Batch ID: **30385**		RunNo: **41013**					
Prep Date:	**2/24/2017**	Analysis Date: **2/27/2017**		SeqNo: **1284763**		Units: **mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.78	0.023	0.9328	0	83.9	61.5	138			
Toluene	0.82	0.047	0.9328	0.005587	87.3	71.4	127			
Ethylbenzene	0.86	0.047	0.9328	0.009125	91.0	70.9	132			
Xylenes, Total	2.7	0.093	2.799	0	95.1	76.2	123			
Surr: 4-Bromofluorobenzene	0.95		0.9328		102	80	120			

Sample ID	**1702A46-003AMSD**	SampType: **MSD**		TestCode: **EPA Method 8021B: Volatiles**					
Client ID:	**D2-30**	Batch ID: **30385**		RunNo: **41013**					
Prep Date:	**2/24/2017**	Analysis Date: **2/27/2017**		SeqNo: **1284764**		Units: **mg/Kg**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.85	0.024	0.9634	0	88.6	61.5	138	8.60	20	
Toluene	0.90	0.048	0.9634	0.005587	92.8	71.4	127	9.27	20	
Ethylbenzene	0.93	0.048	0.9634	0.009125	95.9	70.9	132	8.34	20	
Xylenes, Total	2.9	0.096	2.890	0	99.8	76.2	123	8.06	20	
Surr: 4-Bromofluorobenzene	0.95		0.9634		98.8	80	120	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: SMA-CARLSBAD Work Order Number: 1702A46 RcptNo: 1

Received by/date: LM 02/23/17

Logged By: Andy Jansson 2/23/2017 9:20:00 AM

Completed By: Andy Jansson 02/23/17

Reviewed By: 02/24/17

Chain of Custody

1. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?			

Log In

4. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
6. Sample(s) in proper container(s)?	Yes ☑	No ☐	
7. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
9. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10. VOA vials have zero headspace?	Yes ☐	No ☐	No VOA Vials ☑
11. Were any sample containers received broken?	Yes ☐	No ☑	# of preserved bottles checked for pH: (<2 or >12 unless noted)
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted?
14. Is it clear what analyses were requested?	Yes ☑	No ☐	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by:

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☑ NA ☐

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

17. Additional remarks:

18. Cooler Information

Chain-of-Custody Record

Client: SMA Carlsbad

Mailing Address:

Phone #:

email or Fax#:

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☐ Standard ☐ Rush

Project Name: Alma New

Project #:

Project Manager: Austin Weyant

Sampler: HP

On Ice: ☑ Yes ☐ No

Sample Temperature: 2.8

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1702446	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F^-,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Air Bubbles (Y or N)
2-21-17	11:30	Soil	D2-20	4oz		-001								X				
2-21-17	12:00		D2-25			-002								X				
2-21-17	12:20		D2-30			-003	X		X					X				

Date:	Time:	Relinquished by:	Received by:	Date	Time
2-22-17	8:30			02/23/17	0920
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

APPENDIX B
FORM C141 INITIAL

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company Key Energy Services, LLC	Contact Maren Coligan
Address 1301 McKinney Street, Suite 1800, Houston, TX 77010	Telephone No. 713-651-4825
Facility Name Atha SWD	Facility Type SWD

Surface Owner Dasco & McCasland	Mineral Owner Dasco & McCasland	API No. 30-025-08816

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
C	6	22S	36E	660'	North Line	990'	West Line	Lea

Latitude 32° 25' 47.8" N **Longitude** 130° 18' 36.9" W

NATURE OF RELEASE

Type of Release Produced Water	Volume of Release 50-60 bbl.	Volume Recovered 0 bbl.
Source of Release: Flowline to the injection wells	Date and Hour of Occurrence 12/26/2016 - 11:00am	Date and Hour of Discovery 12/26/2016 - 1:30pm
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Maxey Brown	
By Whom? Maren Coligan	Date and Hour: 12/26/2016 - 4:28pm	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. n/a	

If a Watercourse was Impacted, Describe Fully.*

Not applicable.

RECEIVED
By Olivia Yu at 11:29 am, Jan 09, 2017

Describe Cause of Problem and Remedial Action Taken.*

A low discharge pressure alarm was received from the automation system. Attendant was dispatched to check the wells and spotted the flow line leak. The wells and pump were immediately shut in. Disposal supervisor estimated a loss of approximately 50 to 60 BBLS. A crew and equipment was called out to expose the line and start repairs.

Describe Area Affected and Cleanup Action Taken.*

Leak detected in flow line 0.1 miles west of Weaver Road on the lease road north of the tank battery. Produced water ran approximately 150ft south into the pasture. Equipment was dispatched to the location and was waiting on one call clearance to start removing contaminated soils and replace broken flowline.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Maren M. Coligan	OIL CONSERVATION DIVISION
Printed Name: Maren Coligan	Approved by Environmental Specialist:
Title: Environmental Director	Approval Date: 01/09/2017 Expiration Date:
E-mail Address: mcoligan@keyenergy.com	Conditions of Approval: Attached ☐
Date: ~~12/29/2016~~ 1/3/17 Phone: 713-651-4825	

nOY1700941174 pOY1700941455 RP4547

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _01/03/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number __1R-_4547_ has been assigned. **Please refer to this case number in all future correspondence.**

It is the Division's obligation under both the Oil & Gas Act and Water Quality Act to provide for the protection of public health and the environment. Our regulations (19.15.29.11 NMAC) state the following,

> *The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.* [emphasis added]

Release characterization is the first phase of corrective action unless the release is ongoing or is of limited volume and all impacts can be immediately addressed. Proper and cost-effective remediation typically cannot occur without adequate characterization of the impacts of any release. Furthermore, the Division has the ability to impose reasonable conditions upon the efforts it oversees. **As such, the Division is requiring a workplan for the characterization of impacts associated with this release be submitted to the OCD District _1_ office in __Hobbs____ on or before _02/09/2017_. If and when the release characterization workplan is approved, there will be an associated deadline for submittal of the resultant investigation report. Modest extensions of time to these deadlines may be granted, but only with acceptable justification.**

The goals of a characterization effort are: 1) determination of the lateral and vertical extents along with the magnitude of soil contamination. 2) determine if groundwater or surface waters have been impacted. 3) If groundwater or surface waters have been impacted, what are the extents and magnitude of that impact. 4) The characterization of any other adverse impacts that may have occurred (examples: impacts on vegetation, impacts on wildlife, air quality, loss of use of property, etc.). To meet these goals as quickly as possible, the following items must, at a minimum, be addressed in the release characterization workplan and subsequent reporting:

● Horizontal delineation of soil impacts in each of the four cardinal compass directions. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. This is not an exclusive list of potential contaminants. Analyzed parameters should be modified based on the nature of the released substance(s). Soil sampling must be both within the impacted area and beyond.

● Vertical delineation of soil impacts. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. As above, this is not an exclusive list of potential contaminants and can be modified. Vertical characterization samples should be taken at depth intervals no greater than five feet apart. Lithologic description of encountered soils must also be provided. At least ten vertical feet of soils with contaminant concentrations at or below these values must be demonstrated as existing above the water table.

● Nominal detection limits for field and laboratory analyses must be provided.

● Composite sampling is not generally allowed.

● Field screening and assessment techniques are acceptable (headspace, titration, EC [include algorithm for validation purposes], EM, etc.), but the sampling and assay procedures must be clearly defined. Copies of field notes are highly desirable. A statistically significant set of split samples must be submitted for confirmatory laboratory analysis, including the laterally farthest and vertically deepest sets of soil samples. Make sure there are at least two soil samples submitted

for laboratory analysis from each borehole or test pit (highest observed contamination and deepest depth investigated). Copies of the actual laboratory results must be provided including chain of custody documentation.

●Probable depth to shallowest protectable groundwater and lateral distance to nearest surface water. If there is an estimate of groundwater depth, the information used to arrive at that estimate must be provided. If there is a reasonable assumption that the depth to protectable water is 50 feet or less, the responsible party should anticipate the need for at least one groundwater monitoring well to be installed in the area of likely maximum contamination.

● If groundwater contamination is encountered, an additional investigation workplan may be required to determine the extents of that contamination. Groundwater and/or surface water samples, if any, must be analyzed by a competent laboratory for volatile organic hydrocarbons (typically Method 8260 full list), total dissolved solids, pH, major anions and cations including chloride and sulfate, dissolved iron, and dissolved manganese. The investigation workplan must provide the groundwater sampling method(s) and sample handling protocols. To the fullest extent possible, aqueous analyses must be undertaken using nominal method detection limits. As with the soil analyses, copies of the actual laboratory results must be provided including chain of custody documentation.

● Accurately scaled and well-drafted site maps must be provided providing the location of borings, test pits, monitoring wells, potentially impacted areas, and significant surface features including roads and site infrastructure that might limit either the release characterization or remedial efforts. Field sketches may be included in subsequent reporting, but should not be considered stand-alone documentation of the site's layout. Digital photographic documentation of the location and fieldwork is recommended, especially if unusual circumstances are encountered.

Nothing herein should be interpreted to preclude emergency response actions or to imply immediate remediation by removal cannot proceed as warranted. Nonetheless, characterization of impacts and confirmation of the effectiveness of remedial efforts must still be provided to the OCD before any release incident will be closed.

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APPENDIX C
CALCULATIONS

SUBJECT AIHA 4547 LEACHING PROJECT PAGE 1/2

CLIENT KEY ENERGY DATE 3/23/17 BY LCM

CHECKED JAW BY

SOIL TYPE PYOTE FINE SAND 0.0 - 2.0 EC

Ksat 2.00 to 6.00 in/hr

WATER STORAGE 5.1 in

PROFILE A 0" TO 24" FINE SAND
Bt 24 to 50" SAND CLAY LOAM
Btkm 50 to 60" CEMENTED

} NRCS

$$LR = \frac{EC_{iw}}{EC_{dw}} \quad \frac{1.6}{4.01} = 0.39\%$$

EC_{iw} EC OF WATER SOURCE 1.6 ms/cm (FROM FIELD TEST)

EC_{dw} SOIL EC AVE ON SITE (FROM FIELD DATA)

$2.00\ a/in \times 0.39\% + 1 = 2.78\ acre/in$

$2.78\ acre/in \quad 27,154\ gal/acre/in = 75,488\ gal$

$75,488\ gal/acre \times .29$ IMPACTED AREA/acre

$= 21,891\ gal$

WATER NEEDED TO TAKE SOIL DW FROM EC OF 4 TO AN EC OF 1.6

SUBJECT AZHA 4547 RAIN LEACHING PROJECT PAGE 2/2

CLIENT DATE 3/23/17 BY LCM

CHECKED JAW BY

RAIN FALL DATA FROM NOAA.GOV

RAIN FALL EVENTS OVER 0.5 inchs per year (7)

10 INCH AVE 7 EVENTS

= 1.4 inch per event

$LR = EC_{dw} \frac{0.1}{1.6}$ (NOAA UPPER LIMIT) SOIL AFTER INITIAL FLUSH

LR = 0.06%

$1.4 - (0.4 \text{ acre/inch} \times 0.06\%) = 1.30 \text{ acre/inch}$

5.1 WATER STORAGE IN 4' SOIL in inches

$\frac{1.30 \text{ inch}}{5.1 \text{ inch}} = 0.25\%$

$EC_{dw} = 1.6 \quad 1.6 - (1.6 \times 0.25\%)$

RAIN EVENT #1 $EC_{dw} = 1.2$

#2 $EC_{dw} = 0.9$

#3 $EC_{dw} = 0.67$

CONVERT EC TO PPM Cl^- METHOD 300 SMA EC METHOD

$Y = 1411.7(x) - 132.51$

$Y = 1411.7(0.67) - 132.51$

$Y = 632 =$ 632 ppm Cl^-