Souder, Miller & Associates♦201 S. Halagueno St.♦Carlsbad, NM 88220
(575) 689-8801

APPROVED
By Olivia Yu at 9:04 am, Oct 10, 2017

September 11, 2017

NMOCD considers delineation completed for 1RP-4700, 1RP-4806, 1RP4807. The proposed remediation plan is approved with these conditions: 1) Laboratory analyses (BTEX, TPH, and chlorides) of bottom and sidewall samples. 2) On site bioremediation of affected soil must be tested every 25 yd3 at 90 days and 180 days. 3) Provide scaled map with locations of confirmation samples and bioremediated soil.

#5E26281-BG1

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

SUBJECT: SOIL REMEDIATION WORK PLAN FOR INCIDENT 1RP-4700 Christmas SWD (30-025-10500), LEA COUNTY, NEW MEXICO

Dear Ms. Yu:

On behalf of Key Energy Services (Key), Souder, Miller & Associates (SMA) has prepared this WORK PLAN that describes the assessment, initial delineation and proposed response action for a release associated with the Christmas SWD location API# 30-025-10500 (site). The site is located in UNIT B, SECTION 28, TOWNSHIP 22S, RANGE 37E, NMPM, Lea County, New Mexico, on fee land. Figure 1 illustrates the vicinity and location of the site. Table 1, below, summarizes information regarding the release.

Table 1: Release information and Site Ranking

Name	Christmas SWD
Company	Key Energy Services
Incident Number	1RP-4700
API Number	30-025-10500
Location	32.36935, -103.167142
Estimated Date of Release	5/5/2017
Date Reported to NMOCD	5/5/2017
Land Owner	State
Reported To	NM Oil Conservation Division (NMOCD)
Source of Release	Gun Barrel Tank
Released Material	Produced water and sludge
Released Volume	50 bbls
Recovered Volume	45 bbls
Net Release	5 bbls
Nearest Waterway	Pecos River is greater than 50 miles west
Depth to Groundwater	Estimated to be greater than 50 feet
Nearest Domestic Water Source	Greater than 1,000 feet
NMOCD Ranking	10
SMA Response Dates	Initial: 9/6/17

1.0 Background

On May 5, 2017, a gun barrel tank within the Christmas SWD tank battery overflowed, causing 50 barrels (bbls) of produced water and crude sludge to spill. The impacted area was limited to the containment of the tank battery. A vacuum truck was called onto the scene, and recovered 45 bbls of fluid. The initial C-141 forms are included in Appendix A.

2.0 Site Ranking and Land Jurisdiction

The Pecos River is greater than 50 miles west of the release location. The elevation of the release site is approximately 3,356 feet above sea level. After evaluation of the site using aerial photography and topographic maps, depth to groundwater is estimated to be 65 feet below ground surface (bgs).

Recommended Remediation Action Levels (RRALs) are determined by the site ranking according to the NMOCD *Guidelines for Remediation of Leaks, Spills, and Releases* (1993). Below in Table 2 are the remediation standards and the site ranking for this location. Justification for this site ranking is found in Figure 1 and Appendix B.

Table 2: Soil Remediation Standards

Soil Remediation Standards	0 to 9	10 to 19	>19
Benzene	10 PPM	10 PPM	10 PPM
BTEX	50 PPM	50 PPM	50 PPM
TPH	5000 PPM	1000 PPM	100 PPM

Depth to Groundwater	NMOCD Numeric Rank
< 50 BGS = 20	
50' to 99' = 10	10
>100' = 0	
Distance to Nearest Surface Water	**NMOCD Numeric Rank**
< 200' = 20	
200' - 1000' = 10	
>1000' = 0	0
Well Head Protection	**NMOCD Numeric Rank**
<1000' (or <200' domestic) = 20	
> 1000' = 0	0
Total Site Ranking	**10**

3.0 Release Characterization and Assessment

On May 25, 2017, Key personnel assessed the release area. Five sample locations were augered by hand to a total depth of 5 feet bgs. All samples were collected and processed according to NMOCD soil sampling procedures. The samples were shipped under chain-of-custody protocols to SGS Accutest Laboratory in Houston, Texas for analysis of total chloride using EPA Method 300.0, benzene, toluene, ethylbenzene, xylenes (BTEX) by EPA Method 8021B, and Motor Oil Range Organics (MRO), Diesel Range Organics (DRO), and Gasoline Range Organics (GRO) by EPA Method 8015D. Sample locations are depicted on Figure 2. All field screening and laboratory results are summarized in Table 3. Laboratory reports are included in Appendix C.

4.0 Proposed Soil Remediation Work Plan

SMA proposes to remove the affected soils by hand excavation methods with approval from area utilities owners via 811 utility notification system. The proposed area for excavation is shown in Figure 2, and associated soil sample locations are highlighted in Table 3. Excavation will occur to depths of approximately one to three feet bgs to remove the impacted soils. Closure samples will be collected at the final depths of excavation. Approximately 120 cubic yards of impacted soil are projected to be removed. Of this, 30 cubic yards of the highly impacted soils will be transported to an NMOCD approved facility. The remaining 90 cubic yards will be placed on a 40 mil. plastic liner in 6" lifts and bioremediated utilizing soil oxidizers and fertilizers. Composite confirmation samples will be collected from the bioremediation stockpiles at 90 days and at 180 days to ensure successful treatment. Upon confirmation that soil remediation goals have been met, SMA will submit a closure report to NMOCD.

5.0 Scope and Limitations

The scope of SMA's services consisted of the performance of assessment sampling, verification of release stabilization, regulatory liaison, and preparation of this work plan. All work has been performed in accordance with generally accepted professional environmental consulting practices for oil and gas releases in the Permian Basin in New Mexico.

If there are any questions regarding this report, please contact either Austin Weyant at 575-689-8801 or Shawna Chubbuck at 505-325-7535.

Submitted by:

SOUDER, MILLER & ASSOCIATES

J. Austin Weyant

Austin Weyant
Project Scientist

Reviewed by:

Jennifer Knowlton

Jennifer Knowlton, PE
Senior Engineer II

ATTACHMENTS:

Figures:

Figure 1: Vicinity and Well Head Protection Map
Figure 2: Site and Soil Sample Location Map

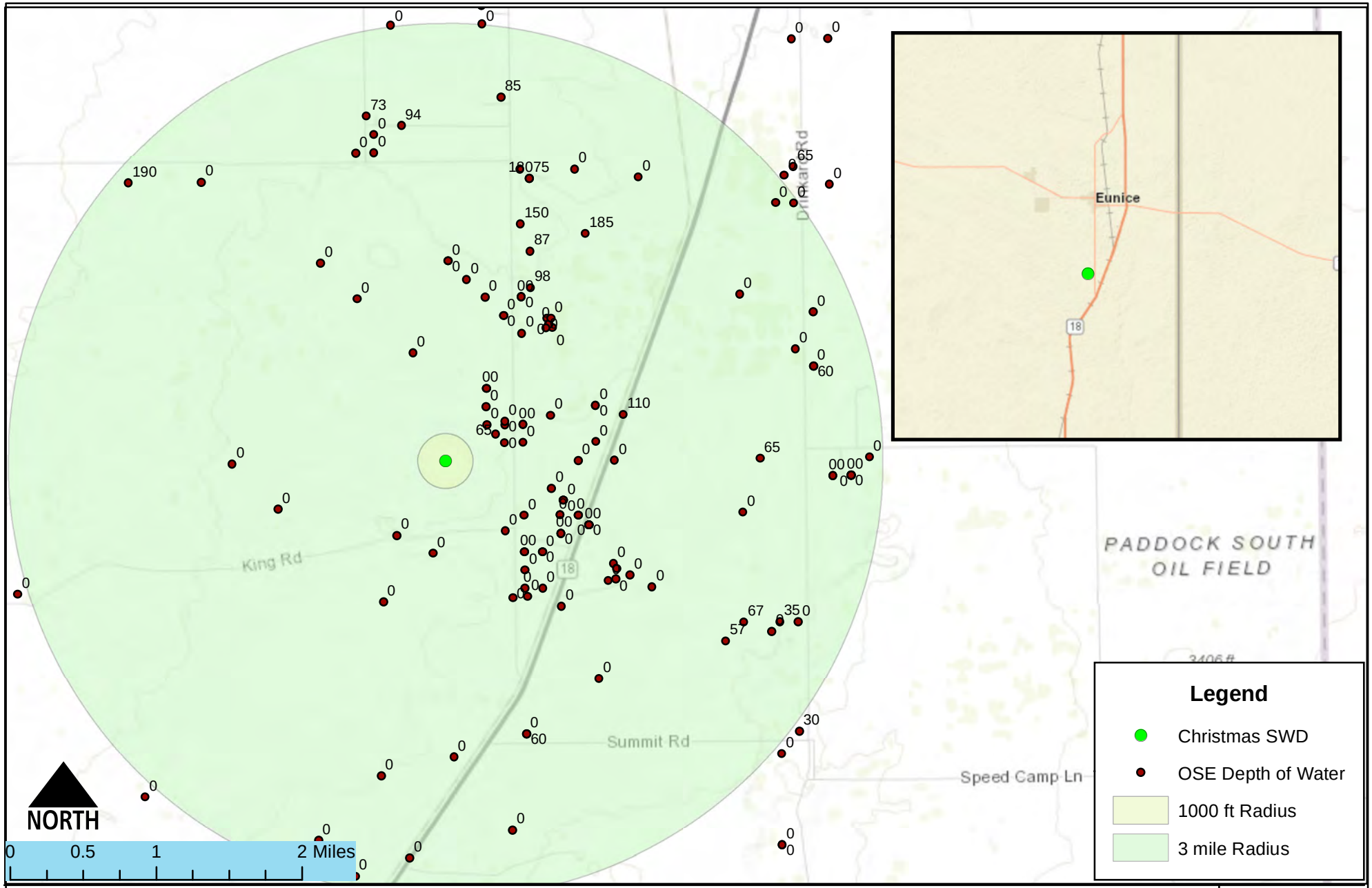
Tables:

Table 3: Summary of Soil Sample Results

Appendices:

Appendix A: Form C141 Initial
Appendix B: NMOSE Wells Report
Appendix C: Laboratory Analytical Reports

FIGURE 1
VICINITY AND WELL HEAD PROTECTION MAP



Vicinity and Well Head Protection Map
Christmas SWD - Key Energy Services
S28-T22S-R37E, New Mexico

Figure 1

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

Date Saved: 9/8/2017

Drawn Heather Patterson
Checked
Approved

SMA
201 South Halagueña Street
Carlsbad, New Mexico 88221
(575) 689-7040
www.soudermiller.com
Serving the Southwest & Rocky Mountains

FIGURE 2
SITE AND SOIL SAMPLE LOCATION MAP

Site and Soil Sample Location Map
Christmas SWD - Key Energy Services
S28-T22S-R37E, New Mexico

Figure 2

Date Saved: 9/19/2017

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

Drawn Heather Patterson
Checked
Approved

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TABLE 3
SUMMARY OF SOIL SAMPLE RESULTS

TABLE 3
Summary of Soil Sample Results
Christmas SWD
Key Energy Services, Lea County, NM

Sample Number on Figure 2	Sample Date	Depth (feet bgs)	Proposed Action	BTEX mg/Kg	Benzene mg/Kg	GRO mg/Kg	DRO mg/Kg	MRO mg/Kg	**Total TPH** mg/Kg	Total Chloride mg/Kg
NMOCD RRAL's for Site Ranking 10				50 ppm	10 ppm				1000 ppm	
L1	5/25/2017	0.5	in-situ	<0.0051	<0.0013	<10	18.6	23.3	41.9	35
	5/25/2017	2	in-situ	<0.0053	<0.0014	<10	<12	<12	<10	18.6
	5/25/2017	3	in-situ	<0.0055	<0.0014	<10	<12	<12	<10	28.7
L2	5/25/2017	0.5	excavate	<0.0050	<0.0013	869	10900	5060	**16800**	195
	5/25/2017	1	excavate	3.77	0.183	2680	20700	8070	**31500**	169
	5/25/2017	3	excavate	0.162	<0.0014	113	884	287	**1280**	350
	5/25/2017	5	in-situ	0.223	0.0024	<11	52.3	20.1	72.4	250
L3	5/25/2017	0.5	excavate	<0.0052	<0.0014	68.2	3460	1760	**5290**	308
	5/25/2017	2	excavate	0.155	0.005	590	7620	3170	**11400**	163
	5/25/2017	4	in-situ	<0.0051	<0.0013	<11	<12	<12	<11	167
L4	5/25/2017	0.5	in-situ	0.0082	<0.0013	<9.9	21.3	51	72.3	104
	5/25/2017	2	in-situ	<0.0053	<0.0014	<11	<13	<13	<11	50.3
	5/25/2017	4	in-situ	<0.0052	<0.0014	<11	<12	<12	<11	487
L5	5/25/2017	0.5	excavate	27.8	0.015	2060	10000	4460	**16500**	235
	5/25/2017	2	excavate	8.29	<0.092	760	3480	1200	**5440**	402
	5/25/2017	4	in-situ	7.77	<0.089	43.6	159	45.1	248	341
BG	5/25/2017	0.5	background	<0.0052	<0.0014	<10	<12	<12	<10	34.3

Notes:
ppm = parts per million
mg/Kg = milligrams per kilogram
Shaded areas are to be excavated
Red font indicates constituants that are above NMOCD RRAL's

APPENDIX A
FORM C141 INITIAL

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, 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 October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company Key Energy Services, LLC	Contact: Maren Coligan
Address 1301 McKinney St, Suite 1800, Houston TX 77010	Telephone No. 713-651-4825
Facility Name Christmas SWD	Facility Type Class II Injection well - SWD

Surface Owner Millard Deck Testamentary Trust	Mineral Owner Millard Deck Testamentary	API No. 30-025-10500

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
B	28	22S	37E	330	N	2310	E	Lea

Latitude 32.36935 **Longitude** -103.167142

NATURE OF RELEASE

Type of Release: Salt water and sludge	Volume of Release 50 BBLS	Volume Recovered: 45 BBLS
Source of Release Gun barrel Tank	Date and Hour of Occurrence 05/05/2017 8:00 am	Date and Hour of Discovery 05/05/2017 8:00 am
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu	
By Whom? Ana Ramirez	Date and Hour 05/05/2017 9:40am	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. Not applicable	

If a Watercourse was Impacted, Describe Fully.*

Not applicable

RECEIVED
By Olivia Yu at 1:30 pm, May 15, 2017

Describe Cause of Problem and Remedial Action Taken.*
Gun barrel tank overflowed. The gun barrel line was clogged up causing 50 bbls pf produced water to spill onto the ground.

Describe Area Affected and Cleanup Action Taken.*
The spill was 100% contained inside the earthen berm. Clean up process started immediately by picking up standing fluids with vacuum trucks.

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 N Coligan	OIL CONSERVATION DIVISION
Printed Name: Maren Coligan	Approved by District Supervisor: OY
Title: Environmental Director	Approval Date: 5/15/2017 Expiration Date:
E-mail Address: mcoligan@keyenergy.com	Conditions of Approval: see attached directive Attached ☑
Date: 05/08/2017 Phone: 713-651-4825	

* Attach Additional Sheets If Necessary

1RP-4700 nOY1713548928 pOY1713549112

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _5/8/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number __1R-_4700_ 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 _6/15/2017_. 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.

Jim Griswold
OCD Environmental Bureau Chief
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
505-476-3465
jim.griswold@state.nm.us

APPENDIX B
NMOSE WELLS REPORT

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
CP 00503		CP	LE		4	4	21	22S	37E	672965	3583144*	639	115	65	50
CP 00911		CP	LE	4	4	4	21	22S	37E	673064	3583043*	691	153		
CP 00081 POD1		CP	LE	2	4	4	21	22S	37E	673064	3583243*	775	120		
CP 01101 POD1		CP	LE	2	4	4	21	22S	37E	673064	3583281	795	142		
CP 00257 POD1		CP	LE	3	3	3	22	22S	37E	673266	3583050*	888	136		
CP 00396 POD1		CP	LE	1	2	4	28	22S	37E	672886	3582037*	934	100	59	41
CP 00256 POD1	R	CP	LE	1	3	3	22	22S	37E	673266	3583250*	956	146		
CP 01657 POD1		CP	LE	2	2	4	28	22S	37E	673077	3582073	1018	123		
CP 00395 POD1		CP	LE	4	2	3	28	22S	37E	672282	3581822*	1022	90		
CP 00243 POD1		CP	LE	3	3	1	27	22S	37E	673281	3582246*	1058	106		
CP 00747 POD1		CP	LE			1	27	22S	37E	673583	3582548*	1214	410		
CP 00231 POD1		CP	LE	3	1	3	27	22S	37E	673288	3581844*	1330	145		
CP 00234 POD1		CP	LE	3	1	3	27	22S	37E	673288	3581844*	1330	135		
CP 00244 POD2		CP	LE	3	4	1	27	22S	37E	673683	3582253*	1406	87		
CP 00232 POD1		CP	LE	4	1	3	27	22S	37E	673488	3581844*	1471	150		
CP 00233 POD1		CP	LE	4	1	3	27	22S	37E	673488	3581844*	1471	182		
CP 00247 POD1		CP	LE	1	3	3	27	22S	37E	673295	3581642*	1491	100		
CP 00233 POD2		CP	LE	1	2	3	27	22S	37E	673690	3582051*	1508	90		
CP 00243 POD2		CP	LE	1	2	3	27	22S	37E	673690	3582051*	1508	90	54	36
CP 00009 POD2		CP	LE	4	4	1	27	22S	37E	673883	3582253*	1591	90	52	38
CP 00231 POD2		CP	LE	4	4	1	27	22S	37E	673883	3582253*	1591	97		
CP 01657 POD2		CP	LE	2	2	2	33	22S	37E	673162	3581337	1681	75		
CP 00007 POD1		CP	LE				27	22S	37E	673999	3582146*	1739	182		
CP 00009 POD1		CP	LE				27	22S	37E	673999	3582146*	1739	150		
CP 00010 POD1		CP	LE				27	22S	37E	673999	3582146*	1739	135		
CP 00011 POD1		CP	LE				27	22S	37E	673999	3582146*	1739	148		

***UTM location was derived from PLSS - see Help**

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
CP 01157 POD1	CP	LE	1	1	1	34	22S	37E	673325	3581348	1751	143		
CP 00244 POD1	CP	LE	4	3	3	27	22S	37E	673495	3581442*	1771	150		
CP 00245 POD1	CP	LE	3	4	4	16	22S	37E	672835	3584652*	1864	136		
CP 00149 POD1	CP	LE		4	1	29	22S	37E	670568	3582296*	1913			
CP 00313 POD1	CP	LE	3	3	3	15	22S	37E	673237	3584659*	2003	100		
CP 00246 POD1	CP	LE	2	3	4	16	22S	37E	672633	3584845*	2020	135		
CP 00391 POD1	CP	LE	4	4	4	17	22S	37E	671426	3584623*	2035	96		
CP 00003 POD1	CP	LE			4	22	22S	37E	674372	3583367*	2038	142	110	32
CP 00142 POD1	CP	LE	1	2	1	34	22S	37E	673704	3581247*	2054	350		
CP 00277 POD1	CP	LE	1	3	4	27	22S	37E	674099	3581656*	2066	95	50	45
CP 00679	CP	LE		3	3	15	22S	37E	673338	3584760*	2137	164	98	66
CP 00277 POD3	CP	LE	3	3	4	27	22S	37E	674099	3581456*	2187	94	50	44
CP 01177 POD1	CP	LE	2	2	4	04	23S	37E	674308	3581663	2237	60	41	19
CP 00709	CP	LE		1	3	15	22S	37E	673331	3585163*	2503	200	87	113
CP 00141 POD1	CP	LE	4	4	4	27	22S	37E	674701	3581464*	2677	41		
CP 00662	CP	LE	3	3	1	15	22S	37E	673223	3585464*	2751	180	150	30
CP 00143 POD1	CP	LE	1	1	4	34	22S	37E	674121	3580450*	2941	140		
CP 00708	CP	LE				15	22S	37E	673941	3585363*	2956	200	185	15
CP 00561	CP	LE	3	3	3	34	22S	37E	673324	3579834*	3141	137	60	77
CP 00674	CP	LE		1	1	15	22S	37E	673316	3585967*	3259	100	75	25
CP 00684	CP	LE		1	1	15	22S	37E	673316	3585967*	3259	200	180	20
CP 00699	CP	LE	1	1	1	15	22S	37E	673215	3586066*	3328	163	100	63
CP 00470	CP	LE	2	1	2	26	22S	37E	675886	3582892*	3483	99	65	34
CP 00154 POD2	CP	LE	3	3	3	09	22S	37E	671600	3586239*	3494	172		
CP 00675	CP	LE	2	2	1	15	22S	37E	673817	3586073*	3530	100		
CP 00389 POD1	CP	LE	3	1	1	04	23S	37E	671723	3579362*	3541	100		
CP 00144 POD1	CP	LE	2	4	1	35	22S	37E	675520	3580874*	3683	73	57	16
CP 00871	CP	LE			3	09	22S	37E	671902	3586541*	3737	167	94	73
CP 00146 POD1	CP	LE	3	1	2	35	22S	37E	675715	3581083*	3747	75	67	8

***UTM location was derived from PLSS - see Help**

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters) (In feet)

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
CP 01353 POD1		CP	LE	3	1	3	09	22S	37E	671514	3586640	3905	93	73	20
CP 00756		CP	LE	2	2	4	09	22S	37E	672999	3586863*	4069	125	85	40
CP 00547		CP	LE		2	2	18	22S	37E	669696	3585901*	4088	200		
CP 00545		CP	LE	3	2	2	35	22S	37E	676117	3581091*	4103	70	35	35
CP 01104 POD1		CP								673178	3578773	4137	21		
CP 00187	O	CP	LE	3	3	1	24	22S	37E	676468	3583912*	4204	70		
CP 00706		CP	LE	3	3	1	24	22S	37E	676468	3583912*	4204	96	60	36
CP 00816		CP	LE			3	04	23S	37E	672043	3578457*	4395	250		
CP 00628		CP	LE		2	1	18	22S	37E	668892	3585888*	4651	525	190	335
CP 00199 POD1		CP	LE	2	4	2	14	22S	37E	676237	3585714*	4792	75		
CP 00560 POD1		CP	LE	2	1	1	09	22S	37E	671778	3587646*	4848	350		
C 00496 POD2		CUB	ED	4	4	4	35	22S	37E	676339	3579884*	4920	172	30	142
CP 00394 POD1		CP	LE	3	3	4	25	22S	36E	667696	3581341*	4939	160		
CP 00397 POD1		CP	LE	3	3	4	25	22S	36E	667696	3581341*	4939	180	118	62
CP 00390 POD1		CP	LE	2	4	1	06	23S	37E	669120	3579111*	4966	100		

Average Depth to Water: **84 feet**

Minimum Depth: **30 feet**

Maximum Depth: **190 feet**

Record Count: 70

UTMNAD83 Radius Search (in meters):

Easting (X): 672403.33 **Northing (Y):** 3582837.71 **Radius:** 5000

***UTM location was derived from PLSS - see Help**

APPENDIX C

LABORATORY ANALYTICAL REPORTS

e-Hardcopy 2.0
Automated Report

Technical Report for

Key Energy

Christmas SWD

Eunice, New Mexico

SGS Accutest Job Number: TD4051

Sampling Date: 05/25/17

Report to:

heather.patterson@soudermiller.com

Total number of pages in report: **86**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Richard Rodriguez
Laboratory Director

Client Service contact: Electa Brown 713-271-4700

Certifications: TX (T104704220-17-27) AR (14-016-0) AZ (AZ0769) FL (E87628) KS (E-10366) LA (85695/04004) NJ (TX010) OK (2017-002) VA (8999)

Sections: 1 2 3 4 5 6 7

Table of Contents

Sample Summary

Key Energy

Job No: TD4051

Christmas SWD
Project No: Eunice, New Mexico

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
TD4051-1	05/25/17	09:30		05/26/17	SO	Soil	SS#1 NE-SURFACE
TD4051-2	05/25/17	09:35		05/26/17	SO	Soil	SS#2 NE-2FT
TD4051-3	05/25/17	09:40		05/26/17	SO	Soil	SS#3 NE-3FT
TD4051-4	05/25/17	09:50		05/26/17	SO	Soil	SS#4 NW-SURFACE
TD4051-5	05/25/17	09:55		05/26/17	SO	Soil	SS#5 NW
TD4051-6	05/25/17	09:58		05/26/17	SO	Soil	SS#6 NW
TD4051-7	05/25/17	10:00		05/26/17	SO	Soil	SS#7
TD4051-8	05/25/17	10:10		05/26/17	SO	Soil	SS#8
TD4051-9	05/25/17	10:20		05/26/17	SO	Soil	SS#9
TD4051-10	05/25/17	10:25		05/26/17	SO	Soil	SS#10
TD4051-11	05/25/17	10:35		05/26/17	SO	Soil	SS#11
TD4051-12	05/25/17	10:40		05/26/17	SO	Soil	SS#12
TD4051-13	05/25/17	11:15		05/26/17	SO	Soil	SS#13

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Key Energy

Job No: TD4051

Christmas SWD
Project No: Eunice, New Mexico

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
TD4051-14	05/25/17	11:30		05/26/17	SO	Soil	SS#14
TD4051-15	05/25/17	11:35		05/26/17	SO	Soil	SS#15
TD4051-16	05/25/17	11:45		05/26/17	SO	Soil	SS#16
TD4051-17	05/25/17	12:00		05/26/17	SO	Soil	SS#17 BACKGROUND

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Summary of Hits

Job Number: TD4051
Account: Key Energy
Project: Christmas SWD
Collected: 05/25/17

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
TD4051-1	**SS#1 NE-SURFACE**					
TPH (> C12-C28) [a]		18.6 J	26	12	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		23.3 J	26	12	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		41.9 J	26	10	mg/kg	TNRCC 1005
Chloride		35.0	5.2		mg/kg	EPA 300
TD4051-2	**SS#2 NE-2FT**					
Chloride		18.6	5.3		mg/kg	EPA 300
TD4051-3	**SS#3 NE-3FT**					
Chloride		28.7	11		mg/kg	EPA 300
TD4051-4	**SS#4 NW-SURFACE**					
TPH (C6-C12) [a]		869	680	260	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		10900	680	310	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		5060	680	310	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		16800	680	260	mg/kg	TNRCC 1005
Chloride		195	11		mg/kg	EPA 300
TD4051-5	**SS#5 NW**					
Benzene [b]		0.183 J	0.25	0.083	mg/kg	SW846 8260C
Ethylbenzene [b]		2.00	0.25	0.10	mg/kg	SW846 8260C
Xylene (total) [b]		3.77	0.75	0.32	mg/kg	SW846 8260C
TPH (C6-C12) [a]		2680	710	270	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		20700	710	320	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		8070	710	320	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		31500	710	270	mg/kg	TNRCC 1005
Chloride		169	11		mg/kg	EPA 300
TD4051-6	**SS#6 NW**					
Toluene [b]		0.0016 J	0.0042	0.0016	mg/kg	SW846 8260C
Ethylbenzene [b]		0.0555	0.0042	0.0017	mg/kg	SW846 8260C
Xylene (total) [b]		0.162	0.013	0.0053	mg/kg	SW846 8260C
TPH (C6-C12) [a]		113	29	11	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		884	29	13	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		287	29	13	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		1280	29	11	mg/kg	TNRCC 1005
Chloride		350	29		mg/kg	EPA 300

Summary of Hits

Job Number: TD4051
Account: Key Energy
Project: Christmas SWD
Collected: 05/25/17

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
TD4051-7	**SS#7**					
Benzene [b]		0.0024 J	0.0046	0.0015	mg/kg	SW846 8260C
Ethylbenzene [b]		0.0310	0.0046	0.0019	mg/kg	SW846 8260C
Xylene (total) [b]		0.223	0.014	0.0058	mg/kg	SW846 8260C
TPH (> C12-C28) [a]		52.3	29	13	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		20.1 J	29	13	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		72.4	29	11	mg/kg	TNRCC 1005
Chloride		250	29		mg/kg	EPA 300
TD4051-8	**SS#8**					
TPH (C6-C12) [a]		68.2 J	130	51	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		3460	130	59	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		1760	130	59	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		5290	130	51	mg/kg	TNRCC 1005
Chloride		308	26		mg/kg	EPA 300
TD4051-9	**SS#9**					
Benzene [c]		0.0050	0.0042	0.0014	mg/kg	SW846 8260C
Toluene [c]		0.0102	0.0042	0.0016	mg/kg	SW846 8260C
Ethylbenzene [c]		0.0802	0.0042	0.0017	mg/kg	SW846 8260C
Xylene (total) [c]		0.155	0.013	0.0053	mg/kg	SW846 8260C
TPH (C6-C12) [a]		590	270	100	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		7620	270	120	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		3170	270	120	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		11400	270	100	mg/kg	TNRCC 1005
Chloride [d]		163	27		mg/kg	EPA 300
TD4051-10	**SS#10**					
Chloride [d]		167	27		mg/kg	EPA 300
TD4051-11	**SS#11**					
Xylene (total) [b]		0.0082 J	0.012	0.0051	mg/kg	SW846 8260C
TPH (> C12-C28) [a]		21.3 J	26	11	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		51.0	26	11	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		72.3	26	9.9	mg/kg	TNRCC 1005
Chloride		104	5.1		mg/kg	EPA 300
TD4051-12	**SS#12**					
Chloride [d]		50.3	11		mg/kg	EPA 300

Summary of Hits

Job Number: TD4051
Account: Key Energy
Project: Christmas SWD
Collected: 05/25/17

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
TD4051-13	**SS#13**					
Chloride		487	55		mg/kg	EPA 300
TD4051-14	**SS#14**					
Benzene [b]		0.150 J	0.23	0.078	mg/kg	SW846 8260C
Toluene [b]		2.21	0.23	0.088	mg/kg	SW846 8260C
Ethylbenzene [b]		2.61	0.23	0.095	mg/kg	SW846 8260C
Xylene (total) [b]		27.8	0.70	0.30	mg/kg	SW846 8260C
TPH (C6-C12) [a]		2060	700	270	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		10000	700	310	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		4460	700	310	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		16500	700	270	mg/kg	TNRCC 1005
Chloride		235	28		mg/kg	EPA 300
TD4051-15	**SS#15**					
Toluene [b]		0.777	0.27	0.10	mg/kg	SW846 8260C
Ethylbenzene [b]		1.02	0.27	0.11	mg/kg	SW846 8260C
Xylene (total) [b]		8.29	0.82	0.35	mg/kg	SW846 8260C
TPH (C6-C12) [a]		760	150	57	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		3480	150	67	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		1200	150	67	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		5440	150	57	mg/kg	TNRCC 1005
Chloride		402	30		mg/kg	EPA 300
TD4051-16	**SS#16**					
Xylene (total) [b]		7.77	0.79	0.34	mg/kg	SW846 8260C
TPH (C6-C12) [a]		43.6	30	12	mg/kg	TNRCC 1005
TPH (> C12-C28) [a]		159	30	14	mg/kg	TNRCC 1005
TPH (> C28-C35) [a]		45.1	30	14	mg/kg	TNRCC 1005
TPH (C6-C35) [a]		248	30	12	mg/kg	TNRCC 1005
Chloride		341	30		mg/kg	EPA 300
TD4051-17	**SS#17 BACKGROUND**					
Chloride		34.3	5.4		mg/kg	EPA 300

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.
(b) Sample collected in bulk. All results are considered estimated values.
(c) Internal standard 1,4-Dichlorobenzene-d4 is not within control limits biaesd low due to matrix interference. No target compounds are associated with this ISTD . Sample collected in bulk. All results are considered

Summary of Hits

Job Number: TD4051
Account: Key Energy
Project: Christmas SWD
Collected: 05/25/17

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method

estimated values.

(d) Elevated reporting limit due to matrix interference.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	SS#1 NE-SURFACE		
Lab Sample ID:	TD4051-1	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	95.3
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089553.D	1	05/31/17 13:02	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.27 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0040	0.0013	mg/kg	
108-88-3	Toluene	ND	0.0040	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0040	0.0016	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0051	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		59-126%
2037-26-5	Toluene-D8	105%		70-139%
460-00-4	4-Bromofluorobenzene	97%		63-138%
17060-07-0	1,2-Dichloroethane-D4	95%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#1 NE-SURFACE		
Lab Sample ID:	TD4051-1	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	95.3
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78587.D	1	05/31/17 15:41	DP	05/31/17 08:30	OP43721	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	26	10	mg/kg	
	TPH (> C12-C28)	18.6	26	12	mg/kg	J
	TPH (> C28-C35)	23.3	26	12	mg/kg	J
	TPH (C6-C35)	41.9	26	10	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	111%		70-130%
98-08-8	aaa-Trifluorotoluene	86%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#1 NE-SURFACE		
Lab Sample ID:	TD4051-1	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	95.3
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	35.0	5.2	mg/kg	1	05/30/17 11:50	SM	EPA 300
Solids, Percent	95.3		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#2 NE-2FT		
Lab Sample ID:	TD4051-2	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	93.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089554.D	1	05/31/17 13:30	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.19 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0041	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0041	0.0016	mg/kg	
100-41-4	Ethylbenzene	ND	0.0041	0.0017	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0053	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		59-126%
2037-26-5	Toluene-D8	108%		70-139%
460-00-4	4-Bromofluorobenzene	95%		63-138%
17060-07-0	1,2-Dichloroethane-D4	92%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#2 NE-2FT		
Lab Sample ID:	TD4051-2	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	93.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78588.D	1	05/31/17 15:41	DP	05/31/17 08:30	OP43721	GJF1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	27	10	mg/kg	
	TPH (> C12-C28)	ND	27	12	mg/kg	
	TPH (> C28-C35)	ND	27	12	mg/kg	
	TPH (C6-C35)	ND	27	10	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	111%		70-130%
98-08-8	aaa-Trifluorotoluene	90%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#2 NE-2FT		
Lab Sample ID:	TD4051-2	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	93.2
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	18.6	5.3	mg/kg	1	05/30/17 12:37	SM	EPA 300
Solids, Percent	93.2		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#3 NE-3FT		
Lab Sample ID:	TD4051-3	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	91.4
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089555.D	1	05/31/17 13:58	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.10 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0043	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0043	0.0016	mg/kg	
100-41-4	Ethylbenzene	ND	0.0043	0.0017	mg/kg	
1330-20-7	Xylene (total)	ND	0.013	0.0055	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	123%		59-126%
2037-26-5	Toluene-D8	105%		70-139%
460-00-4	4-Bromofluorobenzene	95%		63-138%
17060-07-0	1,2-Dichloroethane-D4	97%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#3 NE-3FT		
Lab Sample ID:	TD4051-3	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	91.4
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78589.D	1	05/31/17 16:07	DP	05/31/17 08:30	OP43721	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	27	10	mg/kg	
	TPH (> C12-C28)	ND	27	12	mg/kg	
	TPH (> C28-C35)	ND	27	12	mg/kg	
	TPH (C6-C35)	ND	27	10	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	109%		70-130%
98-08-8	aaa-Trifluorotoluene	80%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#3 NE-3FT		
Lab Sample ID:	TD4051-3	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	91.4
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	28.7	11	mg/kg	2	05/30/17 12:53	SM	EPA 300
Solids, Percent	91.4		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#4 NW-SURFACE		
Lab Sample ID:	TD4051-4	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	90.9
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089556.D	1	05/31/17 14:26	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.56 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0040	0.0013	mg/kg	
108-88-3	Toluene	ND	0.0040	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0040	0.0016	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0050	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	95%		59-126%
2037-26-5	Toluene-D8	109%		70-139%
460-00-4	4-Bromofluorobenzene	107%		63-138%
17060-07-0	1,2-Dichloroethane-D4	98%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#4 NW-SURFACE		
Lab Sample ID:	TD4051-4	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	90.9
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78593.D	25	05/31/17 16:58	DP	05/31/17 08:30	OP43721	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	869	680	260	mg/kg	
	TPH (> C12-C28)	10900	680	310	mg/kg	
	TPH (> C28-C35)	5060	680	310	mg/kg	
	TPH (C6-C35)	16800	680	260	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		70-130%
98-08-8	aaa-Trifluorotoluene	0% [b]		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.
(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#4 NW-SURFACE		
Lab Sample ID:	TD4051-4	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	90.9
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	195	11	mg/kg	2	05/30/17 13:09	SM	EPA 300
Solids, Percent	90.9		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#5 NW		
Lab Sample ID:	TD4051-5	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	87.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089607.D	1	06/01/17 14:11	FI	n/a	n/a	VY4466
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.22 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	0.183	0.25	0.083	mg/kg	J
108-88-3	Toluene	ND	0.25	0.094	mg/kg	
100-41-4	Ethylbenzene	2.00	0.25	0.10	mg/kg	
1330-20-7	Xylene (total)	3.77	0.75	0.32	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		59-126%
2037-26-5	Toluene-D8	113%		70-139%
460-00-4	4-Bromofluorobenzene	93%		63-138%
17060-07-0	1,2-Dichloroethane-D4	88%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#5 NW		
Lab Sample ID:	TD4051-5	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	87.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78595.D	25	05/31/17 17:24	DP	05/31/17 08:30	OP43721	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	2680	710	270	mg/kg	
	TPH (> C12-C28)	20700	710	320	mg/kg	
	TPH (> C28-C35)	8070	710	320	mg/kg	
	TPH (C6-C35)	31500	710	270	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		70-130%
98-08-8	aaa-Trifluorotoluene	0% [b]		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.
(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#5 NW		
Lab Sample ID:	TD4051-5	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	87.2
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	169	11	mg/kg	2	05/30/17 13:25	SM	EPA 300
Solids, Percent	87.2		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#6 NW		
Lab Sample ID:	TD4051-6	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	85.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089605.D	1	06/01/17 13:16	FI	n/a	n/a	VY4466
Run #2							

	Initial Weight	Final Volume
Run #1	5.61 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0042	0.0014	mg/kg	
108-88-3	Toluene	0.0016	0.0042	0.0016	mg/kg	J
100-41-4	Ethylbenzene	0.0555	0.0042	0.0017	mg/kg	
1330-20-7	Xylene (total)	0.162	0.013	0.0053	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	112%		59-126%
2037-26-5	Toluene-D8	118%		70-139%
460-00-4	4-Bromofluorobenzene	114%		63-138%
17060-07-0	1,2-Dichloroethane-D4	96%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#6 NW		
Lab Sample ID:	TD4051-6	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	85.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78594.D	1	05/31/17 16:58	DP	05/31/17 08:30	OP43721	GJF1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	113	29	11	mg/kg	
	TPH (> C12-C28)	884	29	13	mg/kg	
	TPH (> C28-C35)	287	29	13	mg/kg	
	TPH (C6-C35)	1280	29	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	122%		70-130%
98-08-8	aaa-Trifluorotoluene	91%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#6 NW		
Lab Sample ID:	TD4051-6	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	85.2
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	350	29	mg/kg	5	05/30/17 13:41	SM	EPA 300
Solids, Percent	85.2		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#7		
Lab Sample ID:	TD4051-7	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	84.9
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089559.D	1	05/31/17 15:50	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.15 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	0.0024	0.0046	0.0015	mg/kg	J
108-88-3	Toluene	ND	0.0046	0.0017	mg/kg	
100-41-4	Ethylbenzene	0.0310	0.0046	0.0019	mg/kg	
1330-20-7	Xylene (total)	0.223	0.014	0.0058	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		59-126%
2037-26-5	Toluene-D8	125%		70-139%
460-00-4	4-Bromofluorobenzene	109%		63-138%
17060-07-0	1,2-Dichloroethane-D4	93%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#7		
Lab Sample ID:	TD4051-7	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	84.9
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78590.D	1	05/31/17 16:07	DP	05/31/17 08:30	OP43721	GJF1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	29	11	mg/kg	
	TPH (> C12-C28)	52.3	29	13	mg/kg	
	TPH (> C28-C35)	20.1	29	13	mg/kg	J
	TPH (C6-C35)	72.4	29	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	107%		70-130%
98-08-8	aaa-Trifluorotoluene	80%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#7		
Lab Sample ID:	TD4051-7	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	84.9
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	250	29	mg/kg	5	05/30/17 14:29	SM	EPA 300
Solids, Percent	84.9		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#8		
Lab Sample ID:	TD4051-8	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	94.6
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089560.D	1	05/31/17 16:18	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.21 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0041	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0041	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0041	0.0017	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		59-126%
2037-26-5	Toluene-D8	111%		70-139%
460-00-4	4-Bromofluorobenzene	122%		63-138%
17060-07-0	1,2-Dichloroethane-D4	96%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#8		
Lab Sample ID:	TD4051-8	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	94.6
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78645.D	5	06/01/17 11:46	DP	05/31/17 08:30	OP43721	GJB1383
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	68.2	130	51	mg/kg	J
	TPH (> C12-C28)	3460	130	59	mg/kg	
	TPH (> C28-C35)	1760	130	59	mg/kg	
	TPH (C6-C35)	5290	130	51	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	111%		70-130%
98-08-8	aaa-Trifluorotoluene	91%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#8		
Lab Sample ID:	TD4051-8	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	94.6
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	308	26	mg/kg	5	05/30/17 14:44	SM	EPA 300
Solids, Percent	94.6		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#9		
Lab Sample ID:	TD4051-9	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	92.1
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089606.D	1	06/01/17 13:43	FI	n/a	n/a	VY4466
Run #2							

	Initial Weight	Final Volume
Run #1	5.20 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	0.0050	0.0042	0.0014	mg/kg	
108-88-3	Toluene	0.0102	0.0042	0.0016	mg/kg	
100-41-4	Ethylbenzene	0.0802	0.0042	0.0017	mg/kg	
1330-20-7	Xylene (total)	0.155	0.013	0.0053	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	123%		59-126%
2037-26-5	Toluene-D8	136%		70-139%
460-00-4	4-Bromofluorobenzene	84%		63-138%
17060-07-0	1,2-Dichloroethane-D4	95%		54-123%

(a) Internal standard 1,4-Dichlorobenzene-d4 is not within control limits biaesd low due to matrix interference. No target compounds are associated with this ISTD . Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#9		
Lab Sample ID:	TD4051-9	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	92.1
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78646.D	10	06/01/17 11:46	DP	05/31/17 11:00	OP43721	GJF1383
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	590	270	100	mg/kg	
	TPH (> C12-C28)	7620	270	120	mg/kg	
	TPH (> C28-C35)	3170	270	120	mg/kg	
	TPH (C6-C35)	11400	270	100	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	128%		70-130%
98-08-8	aaa-Trifluorotoluene	94%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#9		
Lab Sample ID:	TD4051-9	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	92.1
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride [a]	163	27	mg/kg	5	05/30/17 19:17	SM	EPA 300
Solids, Percent	92.1		%	1	05/26/17	NM	SM 2540 G

(a) Elevated reporting limit due to matrix interference.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#10		
Lab Sample ID:	TD4051-10	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	89.8
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089562.D	1	05/31/17 17:14	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.53 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0040	0.0013	mg/kg	
108-88-3	Toluene	ND	0.0040	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0040	0.0016	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0051	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		59-126%
2037-26-5	Toluene-D8	103%		70-139%
460-00-4	4-Bromofluorobenzene	92%		63-138%
17060-07-0	1,2-Dichloroethane-D4	94%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#10		
Lab Sample ID:	TD4051-10	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	89.8
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78591.D	1	05/31/17 16:32	DP	05/31/17 11:00	OP43721	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	28	11	mg/kg	
	TPH (> C12-C28)	ND	28	12	mg/kg	
	TPH (> C28-C35)	ND	28	12	mg/kg	
	TPH (C6-C35)	ND	28	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	113%		70-130%
98-08-8	aaa-Trifluorotoluene	87%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#10		
Lab Sample ID:	TD4051-10	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	89.8
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride [a]	167	27	mg/kg	5	05/30/17 17:42	SM	EPA 300
Solids, Percent	89.8		%	1	05/26/17	NM	SM 2540 G

(a) Elevated reporting limit due to matrix interference.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#11		
Lab Sample ID:	TD4051-11	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	97.4
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089563.D	1	05/31/17 17:42	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.10 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0040	0.0013	mg/kg	
108-88-3	Toluene	ND	0.0040	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0040	0.0016	mg/kg	
1330-20-7	Xylene (total)	0.0082	0.012	0.0051	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	145% [b]		59-126%
2037-26-5	Toluene-D8	99%		70-139%
460-00-4	4-Bromofluorobenzene	94%		63-138%
17060-07-0	1,2-Dichloroethane-D4	108%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.
(b) Outside control limits biased high. This surrogate is not associated with target compounds.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#11		
Lab Sample ID:	TD4051-11	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	97.4
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78607.D	1	05/31/17 19:57	DP	05/31/17 11:00	OP43731	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	26	9.9	mg/kg	
	TPH (> C12-C28)	21.3	26	11	mg/kg	J
	TPH (> C28-C35)	51.0	26	11	mg/kg	
	TPH (C6-C35)	72.3	26	9.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	126%		70-130%
98-08-8	aaa-Trifluorotoluene	98%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#11		
Lab Sample ID:	TD4051-11	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	97.4
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	104	5.1	mg/kg	1	05/30/17 19:33	SM	EPA 300
Solids, Percent	97.4		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#12		
Lab Sample ID:	TD4051-12	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	89.3
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089564.D	1	05/31/17 18:10	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.20 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0043	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0043	0.0016	mg/kg	
100-41-4	Ethylbenzene	ND	0.0043	0.0018	mg/kg	
1330-20-7	Xylene (total)	ND	0.013	0.0055	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	88%		59-126%
2037-26-5	Toluene-D8	109%		70-139%
460-00-4	4-Bromofluorobenzene	93%		63-138%
17060-07-0	1,2-Dichloroethane-D4	91%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#12		
Lab Sample ID:	TD4051-12	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	89.3
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78625.D	1	05/31/17 23:47	DP	05/31/17 11:00	OP43731	GJB1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	28	11	mg/kg	
	TPH (> C12-C28)	ND	28	13	mg/kg	
	TPH (> C28-C35)	ND	28	13	mg/kg	
	TPH (C6-C35)	ND	28	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	134% [b]		70-130%
98-08-8	aaa-Trifluorotoluene	103%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.
(b) Outside control limits biased high.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#12		
Lab Sample ID:	TD4051-12	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	89.3
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride [a]	50.3	11	mg/kg	2	05/30/17 21:25	SM	EPA 300
Solids, Percent	89.3		%	1	05/26/17	NM	SM 2540 G

(a) Elevated reporting limit due to matrix interference.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#13		
Lab Sample ID:	TD4051-13	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	89.6
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089565.D	1	05/31/17 18:38	FI	n/a	n/a	VY4464
Run #2							

	Initial Weight	Final Volume
Run #1	5.43 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0041	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0041	0.0016	mg/kg	
100-41-4	Ethylbenzene	ND	0.0041	0.0017	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		59-126%
2037-26-5	Toluene-D8	107%		70-139%
460-00-4	4-Bromofluorobenzene	92%		63-138%
17060-07-0	1,2-Dichloroethane-D4	97%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#13		
Lab Sample ID:	TD4051-13	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	89.6
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78626.D	1	05/31/17 23:47	DP	05/31/17 11:00	OP43731	GJF1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.1 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	28	11	mg/kg	
	TPH (> C12-C28)	ND	28	12	mg/kg	
	TPH (> C28-C35)	ND	28	12	mg/kg	
	TPH (C6-C35)	ND	28	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	122%		70-130%
98-08-8	aaa-Trifluorotoluene	92%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#13		
Lab Sample ID:	TD4051-13	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	89.6
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	487	55	mg/kg	10	05/30/17 21:40	SM	EPA 300
Solids, Percent	89.6		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#14		
Lab Sample ID:	TD4051-14	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	89.5
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089608.D	1	06/01/17 14:39	FI	n/a	n/a	VY4466
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.30 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	0.150	0.23	0.078	mg/kg	J
108-88-3	Toluene	2.21	0.23	0.088	mg/kg	
100-41-4	Ethylbenzene	2.61	0.23	0.095	mg/kg	
1330-20-7	Xylene (total)	27.8	0.70	0.30	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%		59-126%
2037-26-5	Toluene-D8	118%		70-139%
460-00-4	4-Bromofluorobenzene	98%		63-138%
17060-07-0	1,2-Dichloroethane-D4	84%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#14		
Lab Sample ID:	TD4051-14	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	89.5
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78598.D	25	05/31/17 17:49	DP	05/31/17 11:00	OP43731	GJF1382
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	2060	700	270	mg/kg	
	TPH (> C12-C28)	10000	700	310	mg/kg	
	TPH (> C28-C35)	4460	700	310	mg/kg	
	TPH (C6-C35)	16500	700	270	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		70-130%
98-08-8	aaa-Trifluorotoluene	0% [b]		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.
(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#14		
Lab Sample ID:	TD4051-14	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	89.5
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	235	28	mg/kg	5	05/30/17 21:56	SM	EPA 300
Solids, Percent	89.5		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#15		
Lab Sample ID:	TD4051-15	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	84.0
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089609.D	1	06/01/17 15:07	FI	n/a	n/a	VY4466
Run #2 [b]	Y1089649.D	2	06/02/17 09:52	FI	n/a	n/a	VY4468

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2	5.03 g	5.0 ml	100 ul

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.27	0.092	mg/kg	
108-88-3	Toluene	0.777	0.27	0.10	mg/kg	
100-41-4	Ethylbenzene	1.02	0.27	0.11	mg/kg	
1330-20-7	Xylene (total)	8.29	0.82	0.35	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	110%	59-126%
2037-26-5	Toluene-D8	114%	109%	70-139%
460-00-4	4-Bromofluorobenzene	96%	96%	63-138%
17060-07-0	1,2-Dichloroethane-D4	85%	96%	54-123%

(a) Sample collected in bulk. All results are considered estimated values.
(b) Sample used for QC purposes only.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#15		
Lab Sample ID:	TD4051-15	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	84.0
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78643.D	5	06/01/17 11:20	DP	05/31/17 11:00	OP43731	GJB1383
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	760	150	57	mg/kg	
	TPH (> C12-C28)	3480	150	67	mg/kg	
	TPH (> C28-C35)	1200	150	67	mg/kg	
	TPH (C6-C35)	5440	150	57	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	116%		70-130%
98-08-8	aaa-Trifluorotoluene	86%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#15		
Lab Sample ID:	TD4051-15	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	84.0
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	402	30	mg/kg	5	05/30/17 22:12	SM	EPA 300
Solids, Percent	84		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#16		
Lab Sample ID:	TD4051-16	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	82.0
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089610.D	1	06/01/17 15:34	FI	n/a	n/a	VY4466
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.52 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.26	0.089	mg/kg	
108-88-3	Toluene	ND	0.26	0.10	mg/kg	
100-41-4	Ethylbenzene	ND	0.26	0.11	mg/kg	
1330-20-7	Xylene (total)	7.77	0.79	0.34	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	94%		59-126%
2037-26-5	Toluene-D8	111%		70-139%
460-00-4	4-Bromofluorobenzene	94%		63-138%
17060-07-0	1,2-Dichloroethane-D4	90%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#16		
Lab Sample ID:	TD4051-16	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	82.0
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JB78641.D	1	06/01/17 10:55	DP	05/31/17 11:00	OP43731	GJB1383
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	43.6	30	12	mg/kg	
	TPH (> C12-C28)	159	30	14	mg/kg	
	TPH (> C28-C35)	45.1	30	14	mg/kg	
	TPH (C6-C35)	248	30	12	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	114%		70-130%
98-08-8	aaa-Trifluorotoluene	92%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#16		
Lab Sample ID:	TD4051-16	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	82.0
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	341	30	mg/kg	5	05/30/17 22:28	SM	EPA 300
Solids, Percent	82		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS#17 BACKGROUND		
Lab Sample ID:	TD4051-17	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	SW846 8260C	**Percent Solids:**	92.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Y1089577.D	1	06/01/17 00:13	FI	n/a	n/a	VY4465
Run #2							

	Initial Weight	Final Volume
Run #1	5.35 g	5.0 ml
Run #2		

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.0041	0.0014	mg/kg	
108-88-3	Toluene	ND	0.0041	0.0015	mg/kg	
100-41-4	Ethylbenzene	ND	0.0041	0.0017	mg/kg	
1330-20-7	Xylene (total)	ND	0.012	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		59-126%
2037-26-5	Toluene-D8	105%		70-139%
460-00-4	4-Bromofluorobenzene	89%		63-138%
17060-07-0	1,2-Dichloroethane-D4	92%		54-123%

(a) Sample collected in bulk. All results are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#17 BACKGROUND		
Lab Sample ID:	TD4051-17	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
Method:	TNRCC 1005 TX1005	**Percent Solids:**	92.2
Project:	Christmas SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	JF78642.D	1	06/01/17 10:55	DP	05/31/17 11:00	OP43731	GJF1383
Run #2							

	Initial Weight	Final Volume
Run #1	10.0 g	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	27	10	mg/kg	
	TPH (> C12-C28)	ND	27	12	mg/kg	
	TPH (> C28-C35)	ND	27	12	mg/kg	
	TPH (C6-C35)	ND	27	10	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	123%		70-130%
98-08-8	aaa-Trifluorotoluene	97%		70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS#17 BACKGROUND		
Lab Sample ID:	TD4051-17	**Date Sampled:**	05/25/17
Matrix:	SO - Soil	**Date Received:**	05/26/17
		Percent Solids:	92.2
Project:	Christmas SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	34.3	5.4	mg/kg	1	05/30/17 22:44	SM	EPA 300
Solids, Percent	92.2		%	1	05/26/17	NM	SM 2540 G

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS ACCUTEST

CHAIN OF CUSTODY

PAGE 1 OF 2

10165 Harwin Dr, Ste 150 Houston, TX 77036
TEL. 713-271-4700 FAX: 713-271-4770
www.accutest.com

FED-EX Tracking #:
Bottle Order Control #:
SGS Accutest Quote #:
SGS Accutest Job #: TD4051

Client / Reporting Information

Company Name: Key Energy Services
Street Address: 6 Desta DR
City: Midland State: TX Zip: 79706
Project Contact / E-mail: aramirez01@keyenergy.com
Phone #: 432-571-7203
Fax #:
Sampler(s) Name(s): Ana Ramirez
Phone #:

Project Information

Project Name: Christmas SWD
Street:
City: Eunice State: NM
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)

Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analyses: TPH 8020; BTEX 8260; Chlorides EPA 300

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank

SGS Accutest Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	# of bottles	HCl	NaOH	ZA/NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	TSP	NaHSO4	ENCORE	OTHER	TPH 8020	BTEX 8260	Chlorides EPA 300	LAB USE ONLY
-1	SS #1 NE-Surface	02/25/17	9:30	AR	S	1												X	X	X	X	
-2	SS #2 NE-2ft	"	9:35	AR	"	1												X	X	X	X	
-3	SS #3 NE-3ft	"	9:40	AR	"	1												X	X	X	X	
-4	SS #4 NW-surface	"	9:50	AR	"	1												X	X	X	X	
-5	SS #5 NW	"	9:55	AR	"	1												X	X	X	X	
-6	SS # 6 NW	"	9:58	AR	"	1												X	X	X	X	
-7	SS # 7	"	10:00	AR	"	1												X	X	X	X	
-8	SS # 8	"	10:10	AR	"	1												X	X	X	X	
-9	SS # 9	"	10:20	AR	"	1												X	X	X	X	
-10	SS # 10	"	10:25	AR	"	1												X	X	X	X	
-11	SS # 11	"	10:35	AR	"	1												X	X	X	X	
-12	SS # 12	"	10:40	AR	"	1												X	X	X	X	

VERIFIED BY:
TAGGED BY:

Turnaround Time (Business days)

- [ ] Standard
- [ ] 5 Day RUSH
- [ ] 4 Day RUSH
- [ ] 3 Day RUSH
- [ ] 2 Day RUSH
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (SGS Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULT1 (Level 3+4)
- [ ] REDT1 (Level 3+4)
- [ ] Commercial "C"
- [ ] TRRP
- [ ] EDD Format
- [ ] Other ______

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC & Surrogate Summary

Form: SM021-0

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler: 1 Ana R	Date Time: 02/25/17 2:30	Received By: 1 Jason Fisher	Date Time: 5/25/17 14:30	Relinquished By: 2 Jason Fisher	Date Time: 2/25/17 16:00	Received By: 2 Fed Ex	Date Time:
Relinquished by Sampler: 3 Fedex	Date Time:	Received By: 3 Jessica	Date Time: 1000 5/26/17	Relinquished By: 4	Date Time:	Received By: 4	Date Time:
Relinquished by: 5	Date Time:	Received By: 5	Date Time:	Custody Seal #: ☑ Intact ☐ Not intact	Preserved where applicable ☐	On Ice ☑	Cooler Temp. 3.8

TD4051: Chain of Custody
Page 1 of 6

SGS ACCUTEST — CHAIN OF CUSTODY

PAGE 2 OF 2

10165 Harwin Dr, Ste 150 Houston, TX 77036
TEL. 713-271-4700 FAX: 713-271-4770
www.accutest.com

FED-EX Tracking #: | Bottle Order Control #:
SGS Accutest Quote #: | SGS Accutest Job #:

Client / Reporting Information

Company Name: Key Energy Services
Street Address: 6 Pesta Dr
City: Midland State: TX Zip: 79706
Project Contact: gramirez@keyenergy.com E-mail:
Phone #: 432-579-7203 Fax #:
Sampler(s) Name(s): Jm Ramirez Phone #:

Project Information

Project Name: Christmas SWD
Street:
City: Eunice State: NM
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)

Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analyses

8021 BTEX
8260 VOC
EPA 300 Chlorides

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank

LAB USE ONLY

SGS Accutest Sample #	Field ID / Point of Collection	Collection: Date	Time	Sampled By	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	Zn Ac/NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	TSP	NaHSO4	ENCORE	OTHER	8021 BTEX	8260 VOC	EPA 300 Chlorides
13	SS #13	05/25/17	11:15	AR	S	1												X	X	X	X
14	SS #14	"	11:30	AR	S	1												X	X	X	X
15	SS #15	"	11:35	AR	S	1												X	X	X	X
16	SS #16	"	11:45	AR	S	1												X	X	X	X
17	SS #17 Background	"	12:00pm	AR	S	1												X	X	X	X

Turnaround Time (Business days)

- [ ] Standard
- [ ] 5 Day *RUSH*
- [ ] 4 Day *RUSH*
- [ ] 3 Day *RUSH*
- [ ] 2 Day *RUSH*
- [ ] 1 Day *EMERGENCY*

Emergency & Rush T/A data available VIA Lablink

Approved By (SGS Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULT1 (Level 3+4)
- [ ] REDT1 (Level 3+4)
- [ ] Commercial "C"
- [ ] TRRP
- [ ] EDD Format
- [ ] Other _____

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial "C" = Results + QC & Surrogate Summary

Form: SM021-0

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:
1	JM Ramirez	05/25/17 2:30pm	Jason Fisher	5/25/17 14:20	2 Jason Fisher	5/25/17 14:00	2 EJ Fo	
3	Fedex	1000 5/26/17	3		4		4	
5	Relinquished by:	Date Time:	Received By: 5	Date Time:	Custody Seal #	[x] Intact [ ] Not intact	Preserved where applicable [ ]	On Ice [x] Cooler Temp: 3.8

ACCUTEST

COOLER TEMP FORM

TC# TD4051

Delivered by (circle one): FedEx UPS ALGC Driver Client

Date: 5/26/17

Client: Key Energy

Cooler Number: FES

Thermometer ID: CF, °C 0.0 Corrected Temp, °C 3.8

SAMPLES CONTAINED IN COOLER

SS#10, 9, 11, 5, 7, 8, 13, 14, 6, 12

ORIGIN ID:SGRA (432) 234-3079
JASON FISHER
SGS ACCUTEST
3385 N I-20 SERVICE ROAD
STANTON, TX 79782
UNITED STATES US

SHIP DATE: 15NOV16
ACTWGT: 35.0 LB
CAD: 0243296/CAFE2816

BILL

TO SAMPLE MANAGEMENT
SGS ACCUTEST
10165 HARWIN DRIVE
SUITE 150
HOUSTON TX 77036
(713) 271-4700
REF: SUPPLIES

FedEx
TRK# 6746 8797 4025
0221

FRI - 26
PRIORITY O

TX-

AB SGRA

ACCUTEST LABORATORIES 1 of 2
CUSTODY SEAL
CUSTODY SEAL
DATE / TIME SEALED: 5/25/17 15:45

Form: SM027-06

4.1.4

SGS ACCUTEST

COOLER TEMP FORM

TC# TD4051

Delivered by (circle one): FedEx (circled) / UPS ALGC Driver Client

Date: 5-26-17

Client: Key Energy

Cooler Number:

Thermometer ID: IR-5 CF, °C 0.0 Corrected Temp, °C 5.3

SAMPLES CONTAINED IN COOLER

6746 8797 4014

Form: SM027-06 Rev 10/24/2016

SGS Accutest Sample Receipt Summary

Job Number: TD4051 **Client:** KEY ENERGY **Project:** CHRISTMAS SWD

Date / Time Received: **Delivery Method:** **Airbill #'s:** 674687974025,674687974014

No. Coolers: 2 **Therm ID:** IR-5; **Temp Adjustment Factor:** 0;

Cooler Temps (Initial/Adjusted): #1: (3.8/3.8); 5.3

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:			
3. Cooler media:	Ice (Bag)		

Quality Control Preservation	Y	or	N	N/A	WTB	STB
1. Trip Blank present / cooler:	☐		☐	☑	☐	☐
2. Trip Blank listed on COC:	☐		☐	☑		
3. Samples preserved properly:	☑		☐			
4. VOCs headspace free:	☐		☐	☑		

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

Sample Receipt Log

Job #: TD4051 **Date / Time Received:** 5/26/2017 10:00:00 AM **Initials:** DS

Client: KEY ENERGY

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	TD4051-1	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-2	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-3	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-4	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-5	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-6	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-7	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-8	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-9	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-10	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-11	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-12	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-13	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-14	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-15	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-16	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8
1	TD4051-17	8oz	1	2-53	N/P	Note #2 - Preservative check not applicable.	IR-5	3.8	0	3.8

MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4464-MB	Y1089548.D	1	05/31/17	FI	n/a	n/a	VY4464

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-7, TD4051-8, TD4051-10, TD4051-11, TD4051-12, TD4051-13

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	4.0	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	4.0	1.6	ug/kg	
108-88-3	Toluene	ND	4.0	1.5	ug/kg	
1330-20-7	Xylene (total)	ND	12	5.1	ug/kg	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	102%	59-126%
2037-26-5	Toluene-D8	106%	70-139%
460-00-4	4-Bromofluorobenzene	98%	63-138%
17060-07-0	1,2-Dichloroethane-D4	98%	54-123%

Method Blank Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4465-MB	Y1089574.D	1	05/31/17	FI	n/a	n/a	VY4465

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-17

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	4.0	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	4.0	1.6	ug/kg	
108-88-3	Toluene	ND	4.0	1.5	ug/kg	
1330-20-7	Xylene (total)	ND	12	5.1	ug/kg	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	98%	59-126%
2037-26-5	Toluene-D8	103%	70-139%
460-00-4	4-Bromofluorobenzene	90%	63-138%
17060-07-0	1,2-Dichloroethane-D4	92%	54-123%

Method Blank Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4466-MB	Y1089597.D	1	06/01/17	FI	n/a	n/a	VY4466

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-5, TD4051-6, TD4051-9, TD4051-14, TD4051-15, TD4051-16

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	4.0	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	4.0	1.6	ug/kg	
108-88-3	Toluene	ND	4.0	1.5	ug/kg	
1330-20-7	Xylene (total)	ND	12	5.1	ug/kg	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	99%	59-126%
2037-26-5	Toluene-D8	104%	70-139%
460-00-4	4-Bromofluorobenzene	91%	63-138%
17060-07-0	1,2-Dichloroethane-D4	91%	54-123%

Blank Spike Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4466-BS	Y1089595.D	1	06/01/17	FI	n/a	n/a	VY4466

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-5, TD4051-6, TD4051-9, TD4051-14, TD4051-15, TD4051-16

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	50	49.2	98	58-124
100-41-4	Ethylbenzene	50	49.3	99	57-124
108-88-3	Toluene	50	47.9	96	67-119
1330-20-7	Xylene (total)	150	140	93	62-120

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	59-126%
2037-26-5	Toluene-D8	97%	70-139%
460-00-4	4-Bromofluorobenzene	96%	63-138%
17060-07-0	1,2-Dichloroethane-D4	95%	54-123%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4464-BS	Y1089544.D	1	05/31/17	FI	n/a	n/a	VY4464
VY4464-BSD [a]	Y1089546.D	1	05/31/17	FI	n/a	n/a	VY4464

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-7, TD4051-8, TD4051-10, TD4051-11, TD4051-12, TD4051-13

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	50	53.0	106	49.5	99	7	58-124/30
100-41-4	Ethylbenzene	50	50.5	101	52.6	105	4	57-124/30
108-88-3	Toluene	50	48.9	98	50.2	100	3	67-119/30
1330-20-7	Xylene (total)	150	146	97	151	101	3	62-120/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
1868-53-7	Dibromofluoromethane	142%* [b]	99%	59-126%
2037-26-5	Toluene-D8	94%	100%	70-139%
460-00-4	4-Bromofluorobenzene	99%	100%	63-138%
17060-07-0	1,2-Dichloroethane-D4	105%	97%	54-123%

(a) Insufficient sample available for MS/MSD.
(b) Outside control limits biased high. There are no detects associated with this surrogate.

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VY4465-BS [a]	Y1089571.D	1	05/31/17	FI	n/a	n/a	VY4465
VY4465-BSD	Y1089572.D	1	05/31/17	FI	n/a	n/a	VY4465

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-17

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	50	50.5	101	48.6	97	4	58-124/30
100-41-4	Ethylbenzene	50	50.4	101	47.1	94	7	57-124/30
108-88-3	Toluene	50	49.1	98	46.6	93	5	67-119/30
1330-20-7	Xylene (total)	150	143	95	135	90	6	62-120/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
1868-53-7	Dibromofluoromethane	93%	95%	59-126%
2037-26-5	Toluene-D8	97%	97%	70-139%
460-00-4	4-Bromofluorobenzene	96%	94%	63-138%
17060-07-0	1,2-Dichloroethane-D4	93%	93%	54-123%

(a) Insufficient sample available for MS/MSD.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
TD3948-1MS	Y1089601.D	1	06/01/17	FI	n/a	n/a	VY4466
TD3948-1MSD	Y1089602.D	1	06/01/17	FI	n/a	n/a	VY4466
TD3948-1 [a]	Y1089600.D	1	06/01/17	FI	n/a	n/a	VY4466

The QC reported here applies to the following samples: **Method:** SW846 8260C

TD4051-5, TD4051-6, TD4051-9, TD4051-14, TD4051-15, TD4051-16

CAS No.	Compound	TD3948-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	150	J	3350	3520	101	3350	3430	98	3	58-124/26
100-41-4	Ethylbenzene	3800		3350	7930	123	3350	7620	114	4	57-124/29
108-88-3	Toluene	303		3350	3980	110	3350	3840	106	4	67-119/28
1330-20-7	Xylene (total)	679	J	10000	11700	110	10000	11300	106	3	62-120/27

CAS No.	Surrogate Recoveries	MS	MSD	TD3948-1	Limits
1868-53-7	Dibromofluoromethane	98%	95%	100%	59-126%
2037-26-5	Toluene-D8	112%	111%	112%	70-139%
460-00-4	4-Bromofluorobenzene	102%	102%	102%	63-138%
17060-07-0	1,2-Dichloroethane-D4	91%	88%	87%	54-123%

(a) Sample collected in bulk. All results are considered estimated values.

* = Outside of Control Limits.

GC/LC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43721-MB	JF78574.D	1	05/31/17	DP	05/31/17	OP43721	GJF1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	25	9.6	mg/kg	
	TPH (> C12-C28)	ND	25	11	mg/kg	
	TPH (> C28-C35)	ND	25	11	mg/kg	
	TPH (C6-C35)	ND	25	9.6	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	116%	70-130%
98-08-8	aaa-Trifluorotoluene	96%	70-130%

Method Blank Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43731-MB	JF78608.D	1	05/31/17	DP	05/31/17	OP43731	GJF1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C6-C12)	ND	25	9.6	mg/kg	
	TPH (> C12-C28)	ND	25	11	mg/kg	
	TPH (> C28-C35)	ND	25	11	mg/kg	
	TPH (C6-C35)	ND	25	9.6	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	118%	70-130%
98-08-8	aaa-Trifluorotoluene	94%	70-130%

Blank Spike/Blank Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43721-BS	JF78576.D	1	05/31/17	DP	05/31/17	OP43721	GJF1382
OP43721-BSD	JF78572.D	1	05/31/17	DP	05/31/17	OP43721	GJF1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH (C6-C12)	250	236	94	236	94	0	75-125/20
	TPH (> C12-C28)	250	259	104	247	99	5	75-125/20
	TPH (C6-C35)	500	496	99	483	97	3	75-125/20

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
84-15-1	o-Terphenyl	113%	104%	70-130%
98-08-8	aaa-Trifluorotoluene	90%	92%	70-130%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43731-BS	JF78600.D	1	05/31/17	DP	05/31/17	OP43731	GJF1382
OP43731-BSD	JF78612.D	1	05/31/17	DP	05/31/17	OP43731	GJF1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH (C6-C12)	250	255	102	248	99	3	75-125/20
	TPH (> C12-C28)	250	271	108	269	108	1	75-125/20
	TPH (C6-C35)	500	526	105	517	103	2	75-125/20

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
84-15-1	o-Terphenyl	118%	115%	70-130%
98-08-8	aaa-Trifluorotoluene	98%	96%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43721-MS	JB78569.D	1	05/31/17	DP	05/31/17	OP43721	GJB1382
OP43721-MSD	JB78571.D	1	05/31/17	DP	05/31/17	OP43721	GJB1382
TD4015-1 [a]	JB78567.D	1	05/31/17	DP	05/31/17	OP43721	GJB1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10

CAS No.	Compound	TD4015-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH (C6-C12)	ND		323	335	104	323	318	98	5	75-125/20
	TPH (> C12-C28)	28.7	J	323	372	106	323	364	104	2	75-125/20
	TPH (C6-C35)	28.7	J	647	707	105	646	681	101	4	75-125/20

CAS No.	Surrogate Recoveries	MS	MSD	TD4015-1	Limits
84-15-1	o-Terphenyl	117%	117%	114%	70-130%
98-08-8	aaa-Trifluorotoluene	93%	86%	83%	70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: TD4051
Account: KEYETXM Key Energy
Project: Christmas SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP43731-MS	JB78609.D	1	05/31/17	DP	05/31/17	OP43731	GJB1382
OP43731-MSD	JB78611.D	1	05/31/17	DP	05/31/17	OP43731	GJB1382
TD4051-11 [a]	JB78607.D	1	05/31/17	DP	05/31/17	OP43731	GJB1382

The QC reported here applies to the following samples: **Method:** TNRCC 1005

TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17

CAS No.	Compound	TD4051-11 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH (C6-C12)	ND		257	312	122	256	243	95	25*	75-125/20
	TPH (> C12-C28)	21.3	J	257	270	97	256	245	87	10	75-125/20
	TPH (C6-C35)	72.3		513	632	109	512	539	91	16	75-125/20

CAS No.	Surrogate Recoveries	MS	MSD	TD4051-11	Limits
84-15-1	o-Terphenyl	124%	109%	126%	70-130%
98-08-8	aaa-Trifluorotoluene	82%	77%	98%	70-130%

(a) Sample collected in bulk. All results for nC6 to nC12 boiling point range are considered estimated values.

* = Outside of Control Limits.

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD4051
Account: KEYETXM - Key Energy
Project: Christmas SWD

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chloride	GP42531/GN82166	5.0	0.0	mg/kg	100	91.0	91.0	90-110%
Chloride	GP42542/GN82166	5.0	0.0	mg/kg	100	98.0	98.0	90-110%

Associated Samples:
Batch GP42531: TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10
Batch GP42542: TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD4051
Account: KEYETXM - Key Energy
Project: Christmas SWD

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chloride	GP42531/GN82166	TD4051-1	mg/kg	35.0	33.6	4.1	0-20%
Chloride	GP42542/GN82166	TD4051-11	mg/kg	104	112	7.4	0-20%
Solids, Percent	GN82117	TD4051-1	%	95.3	95.6	0.3	0-5%

Associated Samples:
Batch GN82117: TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10, TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17
Batch GP42531: TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10
Batch GP42542: TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD4051
Account: KEYETXM - Key Energy
Project: Christmas SWD

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chloride	GP42531/GN82166	TD4051-1	mg/kg	35.0	105	142	102.4	80-120%
Chloride	GP42542/GN82166	TD4051-11	mg/kg	104	102	205	99.4	80-120%

Associated Samples:
Batch GP42531: TD4051-1, TD4051-2, TD4051-3, TD4051-4, TD4051-5, TD4051-6, TD4051-7, TD4051-8, TD4051-9, TD4051-10
Batch GP42542: TD4051-11, TD4051-12, TD4051-13, TD4051-14, TD4051-15, TD4051-16, TD4051-17
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits