SITE INFORMATION

Report Type: Work Plan 1RP-5018

General Site Information:						
Site:	**McKay West Federal #1**					
Company:	**Marathon Oil Company**					
Section, Township and Range	**Unit F**	**Sec. 34**	**T 18S**	**R 32E**		
Lease Number:	**API No. 30-025-24931**					
County:	**Lea County**					
GPS:	**32.70564º N**			**103.75589º W**		
Surface Owner:	Federal					
Mineral Owner:	Federal					
Directions:	FRM INTERSECTION OF US-82 AND CR-89, GO S ON CR-89 4.5MI, TRN E ON MIDWAY RD 1.86MI, TRN N 0.25MI, TRN W 0.5MI TO LOCATION.					

Release Data:		
Date Released:	3/30/2018	
Type Release:	Crude Oil	
Source of Contamination:	Water Tank	
Fluid Released:	86 bbls	
Fluids Recovered:	60 bbls	

Official Communication:			
Name:	Callie Karrigan		Ike Tavarez
Company:	Martathon Oil Company		Tetra Tech
Address:	2423 Bonita Street		4000 N. Big Spring
			Ste 401
City:	Carlsbad, New Mexico		Midland, Texas
Phone number:	405-202-1028		(432) 687-8110
Fax:			
Email:	cnkarrigan@marathonoil.com		Ike.Tavarez@tetratech.com

Ranking Criteria		
Depth to Groundwater:	***Ranking Score***	***Site Data***
<50 ft	*20*	
50-99 ft	*10*	
>100 ft.	**0**	
WellHead Protection:	***Ranking Score***	***Site Data***
Water Source <1,000 ft., Private <200 ft.	*20*	
Water Source >1,000 ft., Private >200 ft.	***0***	*0*
Surface Body of Water:	***Ranking Score***	***Site Data***
<200 ft.	*20*	
200 ft - 1,000 ft.	10	
>1,000 ft.	***0***	*0*
Total Ranking Score:	***0***	

Acceptable Soil RRAL (mg/kg)		
Benzene	***Total BTEX***	***TPH***
10	50	5,000

TETRA TECH

May 22, 2018

Ms. Olivia Yu
Environmental Engineer Specialist
Oil Conservation Division, District 1
1625 North French Drive
Hobbs, New Mexico 88240

Re: Work Plan for the Marathon Oil Company, McKay West Federal #1 Tank Battery, Unit F, Section 34, Township 18 South, Range 32 East, Lea County, New Mexico. 1RP-5018.

Ms. Yu:

Tetra Tech, Inc. (Tetra Tech) was contacted by Marathon Oil Company(Marathon) to evaluate and assess a release that occurred at the McKay West Federal #1 Tank Battery, Unit F, Section 34, Township 18 South, Range 32 East, Lea County, New Mexico (Site). The spill site coordinates are N 32.70564º, W 103.75589º. The site location is shown on Figures 1 and 2.

Background

The release occurred at the site on March 30, 2018. The operator had shut-in the well and was recycling and circulating the oil. During the process, the casing valve was left closed. The heater treater lost pressure, transferring oil to the water tank, and resulted in 86 barrels fluids overflowing into the unlined secondary containment. A vacuum truck was used to removal all freestanding fluids, recovering approximately 60 barrels of oil. The initial C-141 form is included in Appendix A.

Groundwater

There were no wells listed in Section 34 on the New Mexico Office of the State Engineers database. According to the Chevron Texaco Groundwater Trend map, the average depth to groundwater in the area is around 175' below surface. The groundwater data is shown in Appendix B.

Regulatory

A risk-based evaluation was performed for the Site in accordance with the New Mexico Oil Conservation Division (NMOCD) Guidelines for Remediation of Leaks, Spills and Releases, dated August 13, 1993. The guidelines require a risk-based evaluation of the site to determine

Tetra Tech
4000 North Big Spring, Suite 401, Midland, TX 79705
Tel 432.682.4559 Fax 432.682.3946 www.tetratech.com

recommended remedial action levels (RRAL) for benzene, toluene, ethylbenzene and xylene (collectively referred to as BTEX) and total petroleum hydrocarbons (TPH) in soil. The proposed RRAL for benzene was determined to be 10 parts per million (ppm) or milligrams per kilogram (mg/kg) and 50 ppm for total BTEX (sum of benzene, toluene, ethylbenzene, and xylene). Based upon the depth to groundwater, the proposed RRAL for TPH is 5,000 mg/kg.

Soil Assessment and Analytical Results

On April 13, 2018, an emergency excavation was performed to remove the heavy oil saturated soil to a depth of 1.0' to 2.0' from inside the facility firewall. Once excavated, the area was sampled for evaluation. The material was stockpile on plastic onsite until disposal can be arranged.

A total of three (3) auger holes (AH-1 through AH-3) were installed in the release area to total depths of 3.0' below the excavation bottom to assess and vertically define extents. Selected samples were analyzed for TPH analysis by EPA method 8015 modified, BTEX by EPA Method 8021B and chloride by EPA method 300.0. Copies of laboratory analysis and chain-of-custody documentation are included in Appendix C. The sampling results are summarized in Table 1. The sample locations and excavation depths are depicted on Figure 3.

Referring to Table 1, samples analyzed from AH-1 did not report any benzene or total BTEX concentrations above RRALs. Auger hole (AH-2) showed a total BTEX concentration of 168 mg/kg at 0-1' but declined below the RRAL at 1-2' below excavation bottom. The area of AH-3 did show a deeper impact to the area with elevated TPH and total BTEX concentrations above the RRAL but also declined below the RRAL at 2-3' below excavation bottom.

Work Plan

Based on the laboratory results, Marathon Oil Company proposes to remove the impacted material as highlighted (green) on Table 1 and shown on Figure 4. The area of auger hole (AH-3) showed the deepest TPH and total BTEX impact to the area. This area will be excavated to a maximum depth of 2.0'- 3.0' below excavation bottom to remove the TPH and total BTEX impacted soil above the RRALs. Once excavated, confirmation samples will be collected from the bottom of the excavation and sidewalls and analyzed for TPH and total BTEX.

Once excavated to the appropriate depth, the excavation will be backfilled with clean material to surface grade. All of the excavated material will be transported offsite for proper disposal.

The proposed excavation depths may not be reached due to wall cave ins and safety concerns for onsite personnel. In addition, impacted soil around oil and gas equipment, structures or lines may not be feasible or practicable to be removed due to safely concerns for onsite personnel. As such, Marathon Oil Company will excavate the impacted soils to the maximum extent practicable. In inaccessible areas, the hydrocarbon impacted area will be treated with a Micro-blaze product will be used to aid in the degradation of the hydrocarbons. If a Micro-blaze product is used, periodic samples will be collected from the remediation area to monitor the progress of the remediation and apply additional treatments as needed.

TETRA TECH

Conclusion

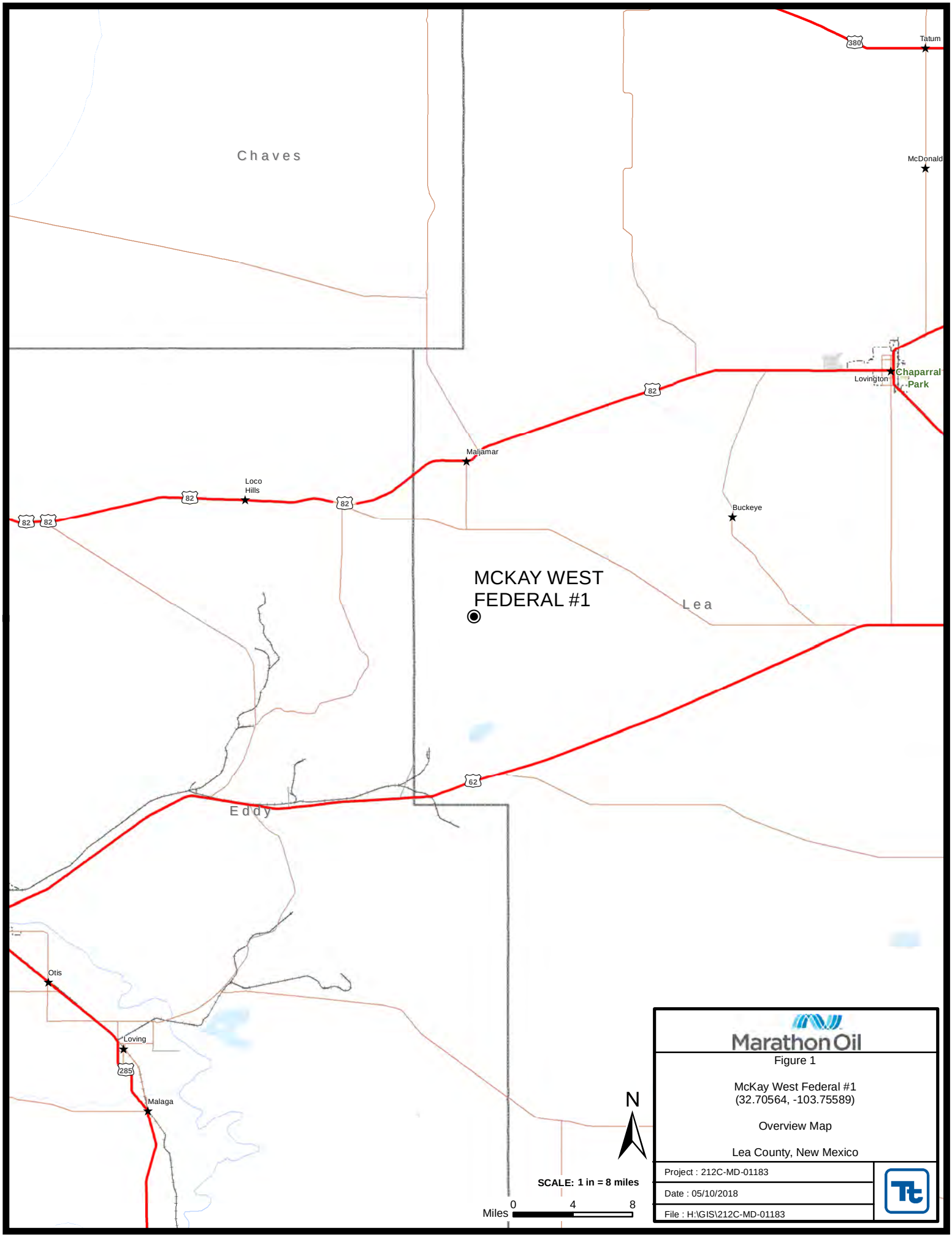
Upon completion, a final report detailing the remediation activities will be submitted to the NMOCD. If you have any questions or comments concerning the assessment or the proposed remediation activities for this site, please call at (432) 682-4559.

Respectfully submitted,
TETRA TECH

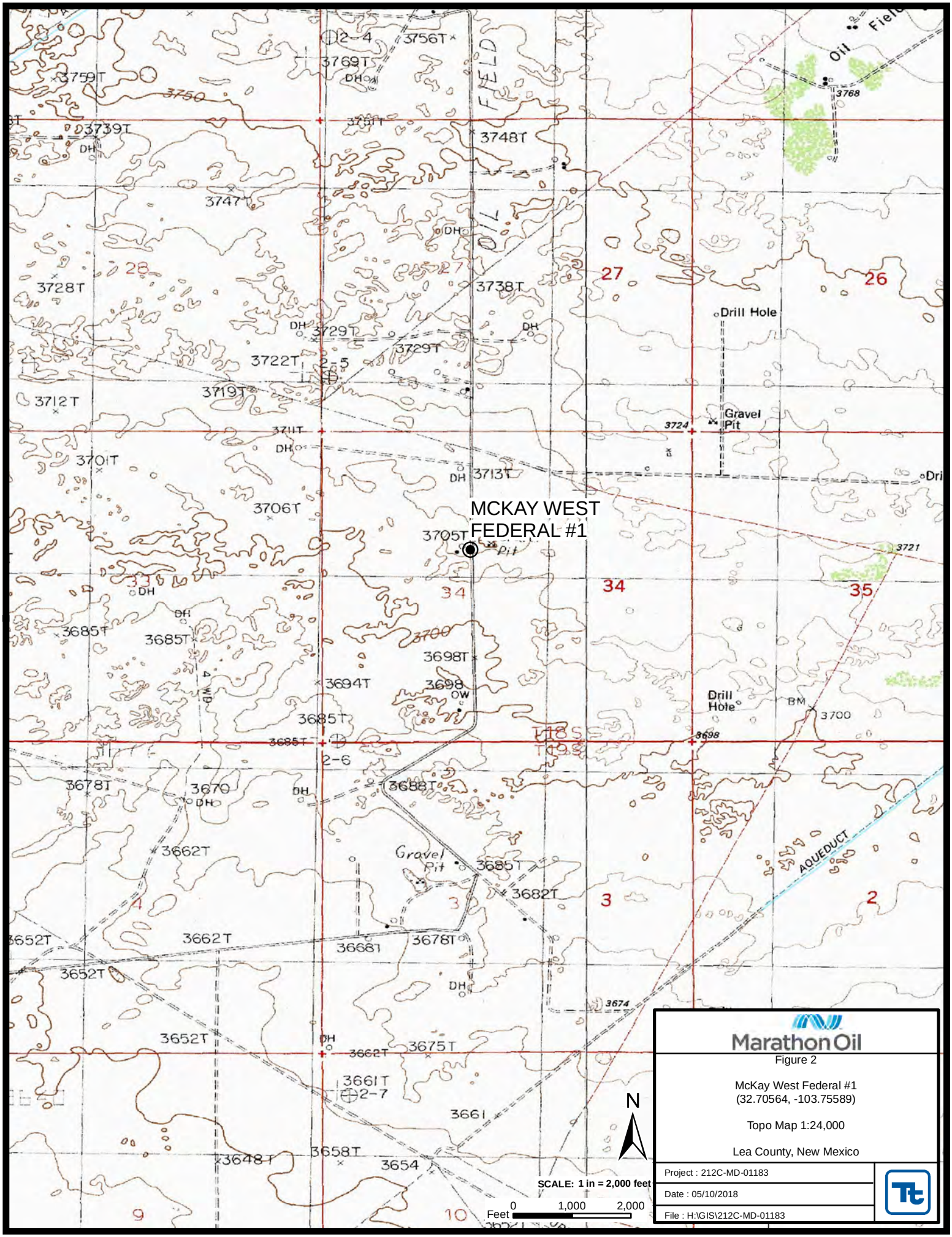
Clair Gonzales,
Project Manager

Ike Tavarez,
Senior Project Manager, P.G.

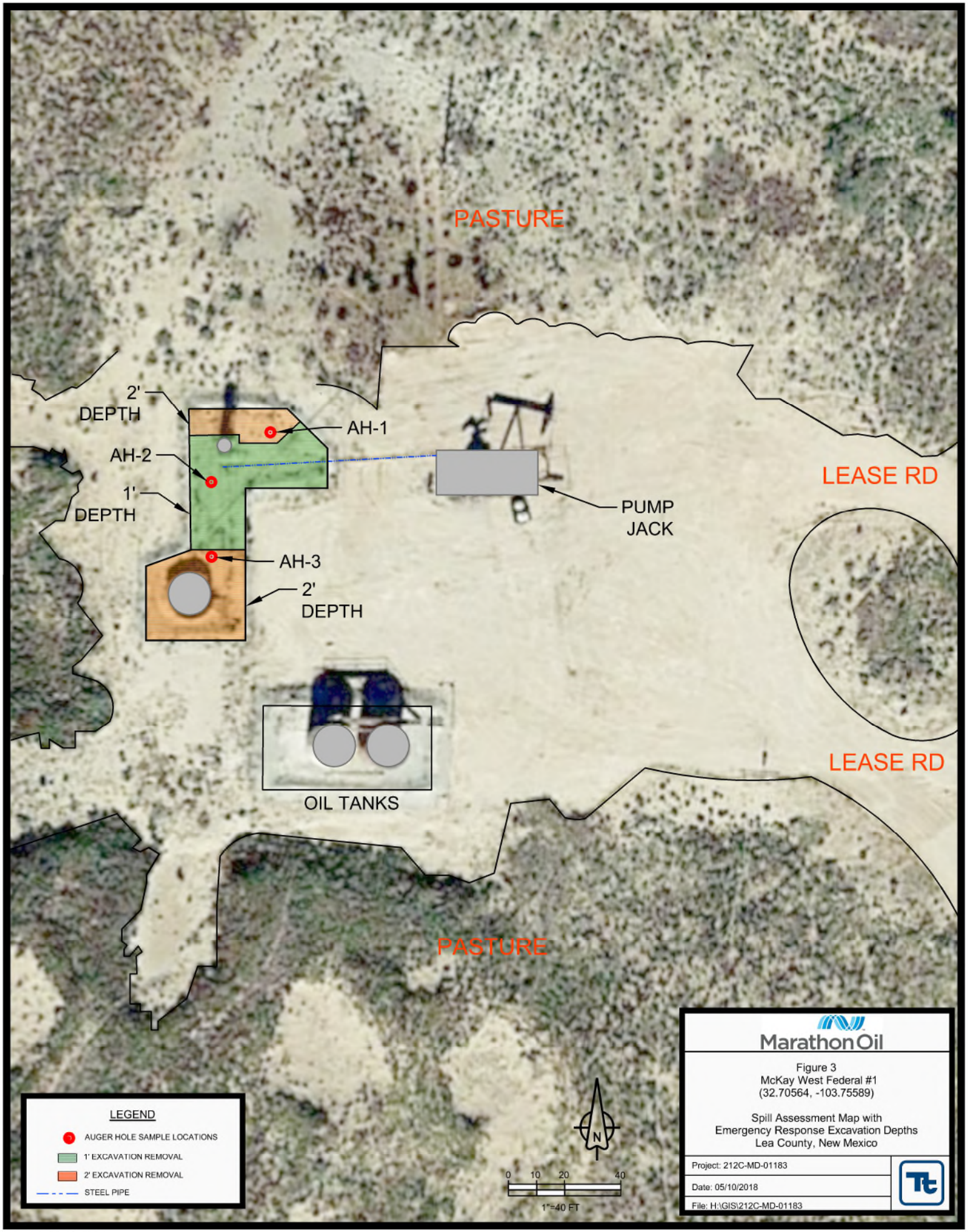
Figures



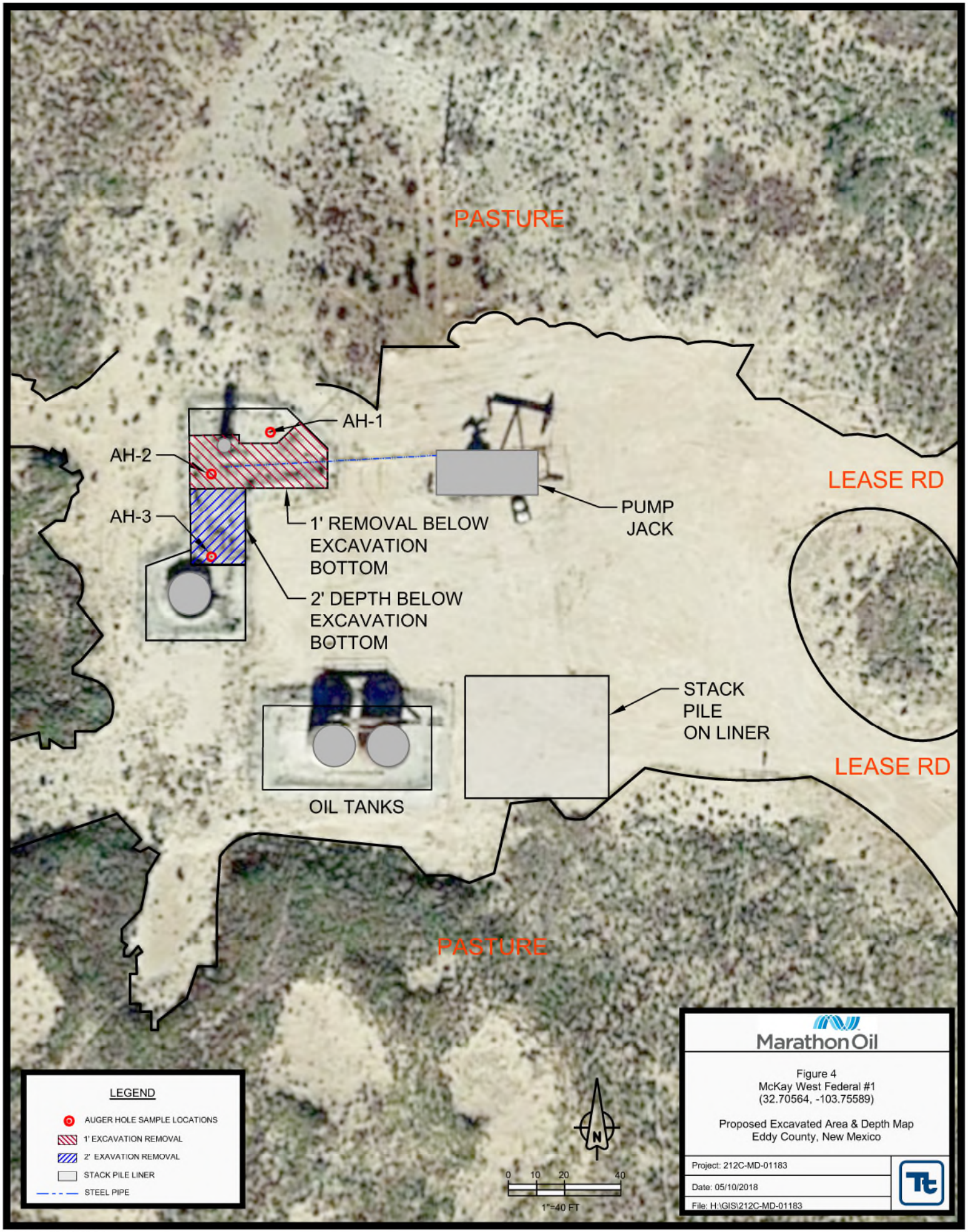
Mapped By: Isabel Marmolejo



Mapped By: Isabel Marmolejo



Drawn By: MISTI MORGAN



Drawn By: MISTI MORGAN

Tables

Table 1
Marathon Oil Company
McKay West Federal #1
Lea County, New Mexico

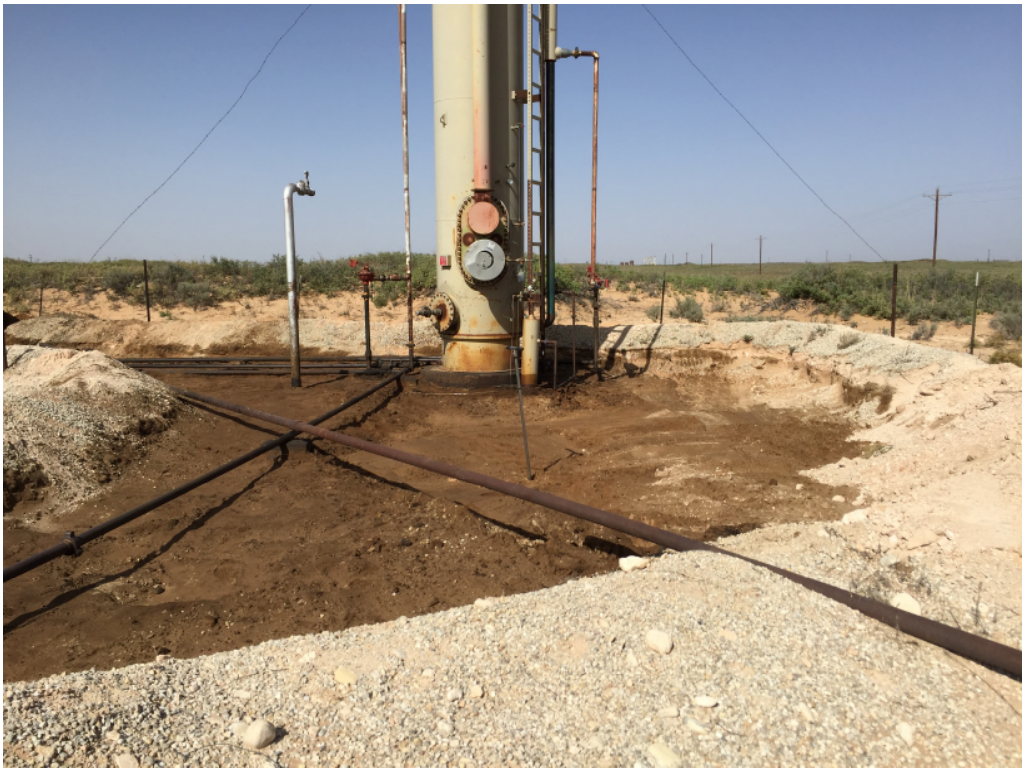
Sample ID	Sample Date	Sample Depth (ft)	BEB	Soil Status		TPH (mg/kg)				Benzene (mg/kg)	Toluene (mg/kg)	Ethlybenzene (mg/kg)	Xylene (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)
				In-Situ	Removed	C6-C10	C10-C28	C28-C35	Total						
AH-1	4/13/2018	0-1	2	X		476	1,390	164	2,030	<0.401	1.17	4.30	4.58	10.1	22.5
	"	1-2	2	X		23.8	181	23.1	228	<0.00198	<0.00198	0.0201	0.0377	0.0578	<4.96
	"	2-3	2	X		-	-	-	-	-	-	-	-	-	10.1
AH-2	4/13/2018	0-1	1	X		1,570	2,680	303	4,550	2.75	43.7	64.7	56.7	**168**	<4.90
	"	1-2	1	X		243	671	86.5	1,000	0.0110	0.366	1.86	2.18	4.42	<4.95
	"	2-3	1	X		-	-	-	-	-	-	-	-	-	<4.92
AH-3	4/13/2018	0-1	1	X		3,690	9500	1,820	**15,000**	**53.0**	219	204	166	**642**	<5.00
	"	1-2	1	X		1,990	3970	562	**6,520**	**14.5**	88.8	96.0	81.8	**281**	6.42
	"	2-3	1	X		18.1	18.4	<15.0	36.5	<0.00202	<0.00202	<0.00202	<0.00202	<0.00202	<5.00

Proposed Excavation Depths
BEB Below Excavation Bottom
(-) Not Analyzed

Photos

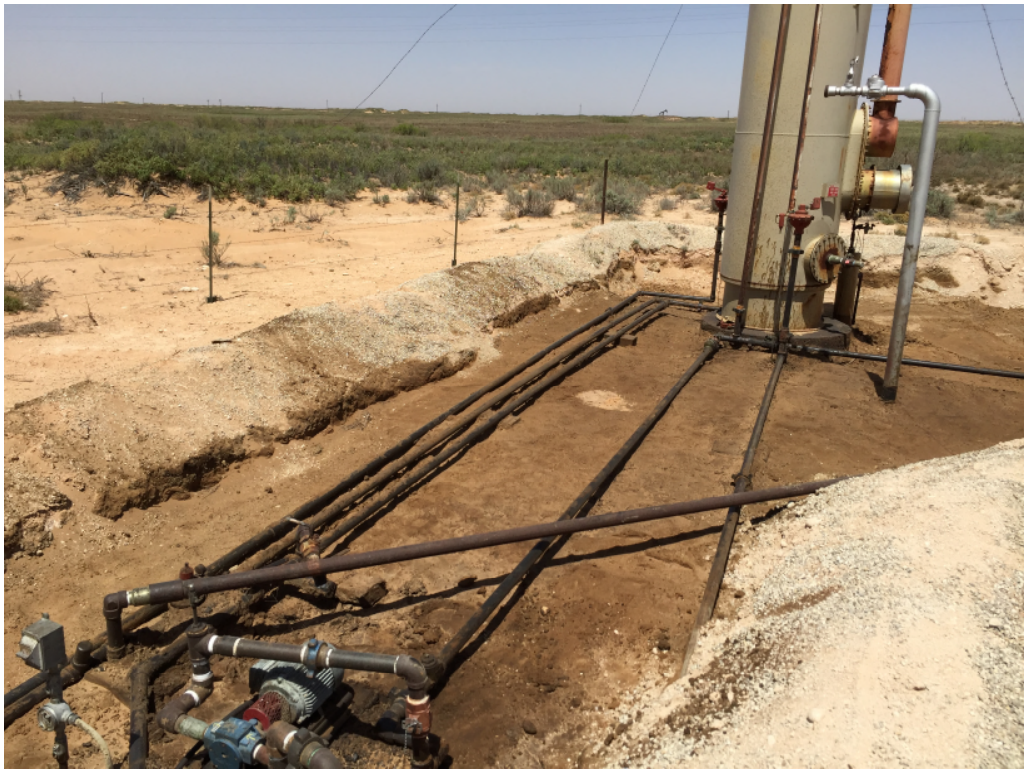
Marathon Oil Company
McKay West Federal #1
Lea County, New Mexico

View North – Secondary containment before excavation activities



View West– Area of AH-1

Marathon Oil Company
McKay West Federal #1
Lea County, New Mexico



View Northwest – Area of AH-2

View North – Area of AH-3

Marathon Oil Company
McKay West Federal #1
Lea County, New Mexico

View North – View of secondary containment after excavation activities

Appendix A

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

State of New Mexico
Energy Minerals and Natural Resources

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

Form C-141
Revised April 3, 2017

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

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company Marathon Oil Permian LLC	Contact Callie Karrigan
Address 5555 San Felipe Street, Houston, Texas 77056	Telephone No. 405-202-1028 (cell) 575-297-0956 (office)
Facility Name: McKay West Federal #1	Facility Type Oil and gas production facilities

Surface: Owner: federal	Mineral: Owner: federal	API No. : 30-025-24931

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
F	34	18S	32E	1980	North	1980	West	Lea

Latitude 32.70564 **Longitude** -103.75589

NATURE OF RELEASE

Type of Release: oil	Volume of Release: 86 barrels	Volume Recovered: 60 bbls
Source of Release: water tank	Date and Hour of Occurrence 03/30/2018 unknown	Date and Hour of Discovery 03/30/2018 02:00 pm
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Crystal Weaver and Mike Bratcher – Eddy County	
By Whom? Callie Karrigan	Date and Hour 03/31/2018 10:58 am	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.*
Not applicable.

RECEIVED
By Olivia Yu at 3:28 pm, Apr 11, 2018

Describe Cause of Problem and Remedial Action Taken.*
Operator had shut-in well and began the process of recycling and circulating oil. During the process, the casing valve was left closed instead of open. The treater began to run out of gas and lose pressure, dumping oil to the water tank and overfilling into containment. Approximately 86 barrels of oil was released into unlined containment.

Describe Area Affected and Cleanup Action Taken.*
The entirety of the containment was affected (~360 ft). A vac truck recovered standing fluids. Tetratech will be assessing spill site.

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.

Callie Karrigan Signature:	OIL CONSERVATION DIVISION Approved by Environmental Specialist: gy	
Printed Name: Callie Karrigan		
Title: HES Environmental Professional	Approval Date: 4/11/2018	Expiration Date:
E-mail Address: cnkarrigan@marathonoil.com	Conditions of Approval: see attached directive	Attached ☑
Date: 4/4/18 Phone: 405-202-1028(cell) 575-297-0956 (office)		

* Attach Additional Sheets If Necessary

1RP-5018 nOY1810156106

pOY1810156472

Appendix B

Water Well Data
Average Depth to Groundwater (ft)
Marathon-McKay West Federal #1
Lea County, New Mexico

17 South 31 East

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34 271	35	36

17 South 32 East

6	5	4 82 Maljamar	3 175	2 60	1 225
7	8	9	10 132	11 70 88	12 120
18	17	16	15	14	13
19	20	21	22	23	24
30 180 dry	29	28	27	26	25
31	32	33	34	35	36

17 South 33 East

6 90	5	4	3 155	2 158	1 150
7 167	8 173	9 161	10	11	12
18 188	17 180	16	15	14	13 165
19	20 190	21	22	23 115	24
30 69	29 60	28	27	26	25
31	32	33 120	34	35 155	36

18 South 31 East

6	5	4	3	2	1
7	8	9	10	11	12 400
18	17	16	15 98	14 317	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35 261	36

18 South 32 East

6	5	4 65	3	2	1
7 460 82	8	9	10	11	12
18	17	16 84	15	14	13
19	20 164	21	22 429	23	24
30	29	28	27	26	25
31	32	33	34 117	35	36

18 South 33 East

6	5	4	3 60	2	1
7	8 100	9	10 62	11 46	12 143 140
18	17 85	16	15	14 36	13 60
19 >140	20	21	22	23	24 195
30 35	29	28	27	26	25
31	32	33 177	34	35	36

19 South 31 East

6	5 SITE	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19 180	20	21	22	23	24
30	29	28 180	27	26	25
31	32	33 101 140	34	35	36 130

19 South 32 East

6	5	4	3	2	1
7	8 365	9	10	11	12
18	17	16	15	14	13 135 dry
19 102	20 345	21	22	23	24
30	29	28	27	26	25
31	32	33	34 250	35	36

19 South 33 East

6	5	4	3	2	1
7	8	9	10	11	12
18 340	17 116	16	15	14	13
19	20	21	22	23	24
30	29	28 130 dry	27	26 92 85	25
31	32 185	33	34	35	36

88 New Mexico State Engineers Well Reports

105 USGS Well Reports

90 Geology and Groundwater Conditions in Southern Lea, County, NM (Report 6)

Geology and Groundwater Resources of Eddy County, NM (Report 3)

34 NMOCD - Groundwater Data

123 Tetra Tech installed temporary wells and field water level

143 NMOCD Groundwater map well location

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	Twn	Rng	X	Y	Depth Well	Depth Water	Water Column
L 03240		L	LE	2	4		35	15S	37E	671534	3649681*	120	45	75

Average Depth to Water: **45 feet**

Minimum Depth: **45 feet**

Maximum Depth: **45 feet**

Record Count: 1

PLSS Search:

Section(s): 35 **Township:** 15S **Range:** 37E

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

National Water Information System: Web Interface

Click to hideNews Bulletins

- Please see news on new formats
- Full News

Groundwater levels for New Mexico

Click to hide state-specific text

Search Results -- 1 sites found

site_no list =

- 325839103095201

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

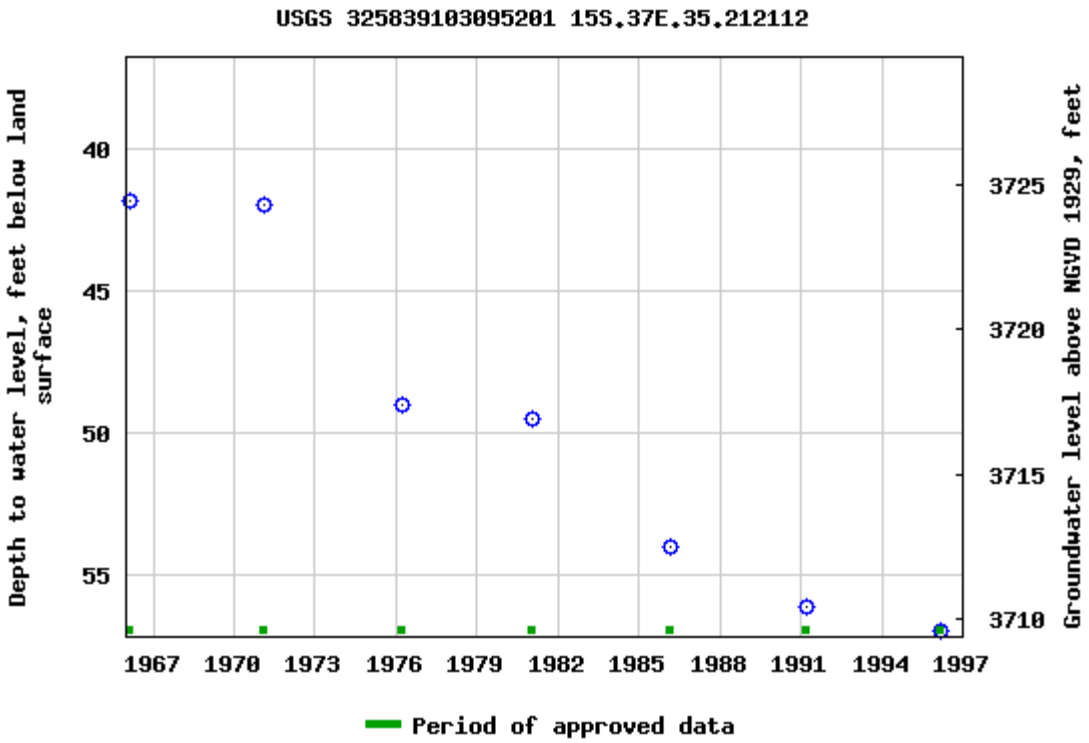
USGS 325839103095201 15S.37E.35.212112

Available data for this site Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 12080003
Latitude 32°58'51", Longitude 103°10'05" NAD27
Land-surface elevation 3,766.40 feet above NGVD29
This well is completed in the Ogallala Formation (121OGLL) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



Breaks in the plot represent a gap of at least one year between field measurements.
Download a presentation-quality graph

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility Plug-Ins FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

Title: Groundwater for New Mexico: Water Levels
URL: https://nwis.waterdata.usgs.gov/nm/nwis/gwlevels?

Page Contact Information: New Mexico Water Data Maintainer
Page Last Modified: 2018-03-01 11:21:56 EST
1.02 0.88 nadww01

Appendix C

Analytical Report 582593

for

Tetra Tech- Midland

Project Manager: Ike Tavarez

Mckay West Federal

212C-MD-01183

23-APR-18

Collected By: Client

1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab Code: TX00122):
Texas (T104704215-18-24), Arizona (AZ0765), Florida (E871002-24), Louisiana (03054)
Oklahoma (2017-142)

Xenco-Dallas (EPA Lab Code: TX01468):
Texas (T104704295-17-16), Arizona (AZ0809), Arkansas (17-063-0)

Xenco-El Paso (EPA Lab Code: TX00127): Texas (T104704221-17-12)
Xenco-Lubbock (EPA Lab Code: TX00139): Texas (T104704219-17-16)
Xenco-Odessa (EPA Lab Code: TX00158): Texas (T104704400-18-14)
Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-17-3)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona (AZ0757)
Xenco-Phoenix Mobile (EPA Lab Code: AZ00901): Arizona (AZM757)
Xenco-Atlanta (LELAP Lab ID #04176)
Xenco-Tampa: Florida (E87429)
Xenco-Lakeland: Florida (E84098)

23-APR-18

Project Manager: **Ike Tavarez**
Tetra Tech- Midland
4000 N. Big Spring Suite 401
Midland, TX 79705

Reference: XENCO Report No(s): **582593**
Mckay West Federal
Project Address:

Ike Tavarez:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 582593. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 582593 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Kelsey Brooks
Project Manager

Sample Cross Reference 582593

Tetra Tech- Midland, Midland, TX

Mckay West Federal

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
AH-1 (0-1') BEB, 2'	S	04-13-18 09:50		582593-001
AH-1 (0-2') BEB, 2'	S	04-13-18 09:52		582593-002
AH-1 (2-3') BEB, 2'	S	04-13-18 11:24		582593-003
AH-2 (0-1') BEB, 1'	S	04-13-18 10:05		582593-006
AH-2 (1-2') BEB, 1'	S	04-13-18 10:10		582593-007
AH-2 (2-3') BEB, 1'	S	04-13-18 10:40		582593-008
AH-3 (0-1') BEB, 1'	S	04-13-18 11:50		582593-012
AH-3 (1-2') BEB, 1'	S	04-13-18 11:58		582593-013
AH-3 (2-3') BEB, 1'	S	04-13-18 12:04		582593-014
AH-1 (3-4') BEB, 2'	S	04-13-18 11:25		Not Analyzed
AH-1 (4-5') BEB, 2'	S	04-13-18 11:27		Not Analyzed
AH-2 (3-4') BEB, 1'	S	04-13-18 10:43		Not Analyzed
AH-2 (4-5') BEB, 1'	S	04-13-18 10:45		Not Analyzed
AH-2 (5-6') BEB, 1'	S	04-13-18 11:15		Not Analyzed
AH-3 (3-4') BEB, 1'	S	04-13-18 12:14		Not Analyzed
AH-3 (4-5') BEB, 1'	S	04-13-18 12:20		Not Analyzed
AH-3 (5-6') BEB, 1'	S	04-13-18 12:28		Not Analyzed

Sample receipt non conformances and comments:

None

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3047326 BTEX by EPA 8021B
Soil samples were not received in Terracore kits and therefore were prepared by method 5030.
Dilutions due to poor resolution of internal standard caused by matrix interference.

Batch: LBA-3047447 BTEX by EPA 8021B
Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3047448 BTEX by EPA 8021B
Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3047482 BTEX by EPA 8021B
Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Certificate of Analysis Summary 582593

Tetra Tech- Midland, Midland, TX

Project Name: Mckay West Federal

Project Id: 212C-MD-01183
Contact: Ike Tavarez
Project Location:

Date Received in Lab: Mon Apr-16-18 01:15 pm
Report Date: 23-APR-18
Project Manager: Kelsey Brooks

Analysis Requested																	
	Lab Id:	582593-001		582593-002		582593-003		582593-006		582593-007		582593-008					
	Field Id:	AH-1 (0-1') BEB, 2'		AH-1 (0-2') BEB, 2'		AH-1 (2-3') BEB, 2'		AH-2 (0-1') BEB, 1'		AH-2 (1-2') BEB, 1'		AH-2 (2-3') BEB, 1'					
	Depth:																
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL					
	Sampled:	Apr-13-18 09:50		Apr-13-18 09:52		Apr-13-18 11:24		Apr-13-18 10:05		Apr-13-18 10:10		Apr-13-18 10:40					
BTEX by EPA 8021B	***Extracted:***	Apr-19-18 17:00		Apr-19-18 17:00				Apr-20-18 14:00		Apr-19-18 17:00							
	Analyzed:	Apr-20-18 02:29		Apr-20-18 00:34				Apr-20-18 22:03		Apr-20-18 02:10							
	Units/RL:	mg/kg	RL	mg/kg	RL			mg/kg	RL	mg/kg	RL						
Benzene		<0.0401	0.0401	<0.00198	0.00198			2.75	0.502	0.0110	0.0101						
Toluene		1.17	0.0401	<0.00198	0.00198			43.7	0.502	0.366	0.0101						
Ethylbenzene		4.30	0.0401	0.0201	0.00198			64.7	0.502	1.86	0.0101						
m,p-Xylenes		3.12	0.0802	0.0253	0.00397			40.1	1.00	1.49	0.0202						
o-Xylene		1.46	0.0401	0.0124	0.00198			16.6	0.502	0.694	0.0101						
Total Xylenes		4.58	0.0401	0.0377	0.00198			56.7	0.502	2.18	0.0101						
Total BTEX		10.1	0.0401	0.0578	0.00198			168	0.502	4.42	0.0101						
Inorganic Anions by EPA 300/300.1	***Extracted:***	Apr-18-18 10:00		Apr-18-18 10:00		Apr-18-18 10:00		Apr-18-18 10:00		Apr-18-18 10:00		Apr-18-18 10:00					
	Analyzed:	Apr-18-18 18:04		Apr-18-18 18:10		Apr-18-18 18:28		Apr-18-18 18:34		Apr-18-18 18:40		Apr-18-18 18:46					
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL				
Chloride		22.5	4.97	<4.96	4.96	10.1	4.94	<4.90	4.90	<4.95	4.95	<4.92	4.92				
TPH By SW8015 Mod	***Extracted:***	Apr-18-18 07:00		Apr-18-18 07:00				Apr-18-18 07:00		Apr-18-18 07:00							
	Analyzed:	Apr-18-18 11:37		Apr-18-18 11:56				Apr-18-18 12:16		Apr-18-18 12:37							
	Units/RL:	mg/kg	RL	mg/kg	RL			mg/kg	RL	mg/kg	RL						
Gasoline Range Hydrocarbons (GRO)		476	74.7	23.8	15.0			1570	74.7	243	15.0						
Diesel Range Organics (DRO)		1390	74.7	181	15.0			2680	74.7	671	15.0						
Oil Range Hydrocarbons (ORO)		164	74.7	23.1	15.0			303	74.7	86.5	15.0						
Total TPH		2030	74.7	228	15.0			4550	74.7	1000	15.0						

Kelsey Brooks
Project Manager

Certificate of Analysis Summary 582593

Tetra Tech- Midland, Midland, TX

Project Name: Mckay West Federal

Project Id: 212C-MD-01183
Contact: Ike Tavarez
Project Location:

Date Received in Lab: Mon Apr-16-18 01:15 pm
Report Date: 23-APR-18
Project Manager: Kelsey Brooks

Analysis Requested									
	Lab Id:	582593-012		582593-013		582593-014			
	Field Id:	AH-3 (0-1') BEB, 1'		AH-3 (1-2') BEB, 1'		AH-3 (2-3') BEB, 1'			
	Depth:								
	Matrix:	SOIL		SOIL		SOIL			
	Sampled:	Apr-13-18 11:50		Apr-13-18 11:58		Apr-13-18 12:04			
BTEX by EPA 8021B	***Extracted:***	Apr-20-18 16:30		Apr-20-18 14:00		Apr-23-18 08:00			
	Analyzed:	Apr-21-18 08:17		Apr-20-18 22:23		Apr-23-18 10:34			
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL		
Benzene		53.0	2.00	14.5	0.499	<0.00202	0.00202		
Toluene		219	2.00	88.8	0.499	<0.00202	0.00202		
Ethylbenzene		204	2.00	96.0	0.499	<0.00202	0.00202		
m,p-Xylenes		113	4.01	58.1	0.998	<0.00403	0.00403		
o-Xylene		53.0	2.00	23.7	0.499	<0.00202	0.00202		
Total Xylenes		166	2.00	81.8	0.499	<0.00202	0.00202		
Total BTEX		642	2.00	281	0.499	<0.00202	0.00202		
Inorganic Anions by EPA 300/300.1	***Extracted:***	Apr-18-18 10:00		Apr-18-18 10:00		Apr-18-18 10:00			
	Analyzed:	Apr-18-18 18:52		Apr-18-18 18:58		Apr-18-18 19:04			
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL		
Chloride		<5.00	5.00	6.42	4.99	<5.00	5.00		
TPH By SW8015 Mod	***Extracted:***	Apr-18-18 07:00		Apr-18-18 07:00		Apr-19-18 16:00			
	Analyzed:	Apr-18-18 12:57		Apr-18-18 13:17		Apr-20-18 10:51			
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL		
Gasoline Range Hydrocarbons (GRO)		3690	74.9	1990	74.9	18.1	15.0		
Diesel Range Organics (DRO)		9500	74.9	3970	74.9	18.4	15.0		
Oil Range Hydrocarbons (ORO)		1820	74.9	562	74.9	<15.0	15.0		
Total TPH		15000	74.9	6520	74.9	36.5	15.0		

Kelsey Brooks
Project Manager

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

SMP Client Sample **BLK** Method Blank

BKS/LCS Blank Spike/Laboratory Control Sample **BKSD/LCSD** Blank Spike Duplicate/Laboratory Control Sample Duplicate

MD/SD Method Duplicate/Sample Duplicate **MS** Matrix Spike **MSD:** Matrix Spike Duplicate

+ NELAC certification not offered for this compound.

***** (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047233 **Sample:** 582593-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 11:37

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	87.4	99.6	88	70-135	
o-Terphenyl	46.7	49.8	94	70-135	

Lab Batch #: 3047233 **Sample:** 582593-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 11:56

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	94.1	99.7	94	70-135	
o-Terphenyl	49.3	49.9	99	70-135	

Lab Batch #: 3047233 **Sample:** 582593-006 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 12:16

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	117	99.6	117	70-135	
o-Terphenyl	64.1	49.8	129	70-135	

Lab Batch #: 3047233 **Sample:** 582593-007 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 12:37

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	100	100	100	70-135	
o-Terphenyl	49.1	50.0	98	70-135	

Lab Batch #: 3047233 **Sample:** 582593-012 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 12:57

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	97.8	99.8	98	70-135	
o-Terphenyl	43.9	49.9	88	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047233 **Sample:** 582593-013 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 13:17

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	115	99.8	115	70-135	
o-Terphenyl	58.9	49.9	118	70-135	

Lab Batch #: 3047326 **Sample:** 582593-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 00:34

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0278	0.0300	93	70-130	
4-Bromofluorobenzene	0.0303	0.0300	101	70-130	

Lab Batch #: 3047326 **Sample:** 582593-007 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 02:10

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0242	0.0300	81	70-130	
4-Bromofluorobenzene	0.0369	0.0300	123	70-130	

Lab Batch #: 3047326 **Sample:** 582593-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 02:29

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0250	0.0300	83	70-130	
4-Bromofluorobenzene	0.0300	0.0300	100	70-130	

Lab Batch #: 3047364 **Sample:** 582593-014 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 10:51

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	96.8	99.7	97	70-135	
o-Terphenyl	48.6	49.9	97	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047447 **Sample:** 582593-006 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 22:03

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0244	0.0300	81	70-130	
4-Bromofluorobenzene	0.0263	0.0300	88	70-130	

Lab Batch #: 3047447 **Sample:** 582593-013 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 22:23

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0244	0.0300	81	70-130	
4-Bromofluorobenzene	0.0238	0.0300	79	70-130	

Lab Batch #: 3047448 **Sample:** 582593-012 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/21/18 08:17

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0281	0.0300	94	70-130	
4-Bromofluorobenzene	0.0264	0.0300	88	70-130	

Lab Batch #: 3047482 **Sample:** 582593-014 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/23/18 10:34

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0274	0.0300	91	70-130	
4-Bromofluorobenzene	0.0281	0.0300	94	70-130	

Lab Batch #: 3047233 **Sample:** 7642935-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/18/18 08:38

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	103	100	103	70-135	
o-Terphenyl	55.7	50.0	111	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047326 **Sample:** 7643021-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/19/18 23:17

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0284	0.0300	95	70-130	
4-Bromofluorobenzene	0.0252	0.0300	84	70-130	

Lab Batch #: 3047364 **Sample:** 7643028-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 05:15

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	98.3	100	98	70-135	
o-Terphenyl	50.1	50.0	100	70-135	

Lab Batch #: 3047447 **Sample:** 7643115-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 13:52

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0281	0.0300	94	70-130	
4-Bromofluorobenzene	0.0235	0.0300	78	70-130	

Lab Batch #: 3047448 **Sample:** 7643121-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/21/18 01:15

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0290	0.0300	97	70-130	
4-Bromofluorobenzene	0.0229	0.0300	76	70-130	

Lab Batch #: 3047482 **Sample:** 7643162-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/23/18 09:55

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0271	0.0300	90	70-130	
4-Bromofluorobenzene	0.0255	0.0300	85	70-130	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047233 **Sample:** 7642935-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/18/18 08:58

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod

Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	109	100	109	70-135	
o-Terphenyl	53.4	50.0	107	70-135	

Lab Batch #: 3047326 **Sample:** 7643021-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/19/18 21:21

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B

Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0304	0.0300	101	70-130	
4-Bromofluorobenzene	0.0299	0.0300	100	70-130	

Lab Batch #: 3047364 **Sample:** 7643028-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 05:41

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod

Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	116	100	116	70-135	
o-Terphenyl	57.8	50.0	116	70-135	

Lab Batch #: 3047447 **Sample:** 7643115-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 11:58

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B

Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0303	0.0300	101	70-130	
4-Bromofluorobenzene	0.0275	0.0300	92	70-130	

Lab Batch #: 3047448 **Sample:** 7643121-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 23:20

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B

Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0300	0.0300	100	70-130	
4-Bromofluorobenzene	0.0270	0.0300	90	70-130	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047482 **Sample:** 7643162-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/23/18 07:58

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0292	0.0300	97	70-130	
4-Bromofluorobenzene	0.0304	0.0300	101	70-130	

Lab Batch #: 3047233 **Sample:** 7642935-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/18/18 09:19

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	111	100	111	70-135	
o-Terphenyl	52.7	50.0	105	70-135	

Lab Batch #: 3047326 **Sample:** 7643021-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/19/18 21:41

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0286	0.0300	95	70-130	
4-Bromofluorobenzene	0.0292	0.0300	97	70-130	

Lab Batch #: 3047364 **Sample:** 7643028-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 06:08

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	113	100	113	70-135	
o-Terphenyl	58.0	50.0	116	70-135	

Lab Batch #: 3047447 **Sample:** 7643115-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 12:17

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0309	0.0300	103	70-130	
4-Bromofluorobenzene	0.0280	0.0300	93	70-130	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047448 **Sample:** 7643121-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/20/18 23:40

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0300	0.0300	100	70-130	
4-Bromofluorobenzene	0.0296	0.0300	99	70-130	

Lab Batch #: 3047482 **Sample:** 7643162-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 04/23/18 08:17

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0299	0.0300	100	70-130	
4-Bromofluorobenzene	0.0306	0.0300	102	70-130	

Lab Batch #: 3047233 **Sample:** 582464-004 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 09:58

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	99.0	99.9	99	70-135	
o-Terphenyl	43.6	50.0	87	70-135	

Lab Batch #: 3047326 **Sample:** 582908-007 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/19/18 22:00

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0310	0.0300	103	70-130	
4-Bromofluorobenzene	0.0292	0.0300	97	70-130	

Lab Batch #: 3047364 **Sample:** 582908-001 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 06:59

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	110	100	110	70-135	
o-Terphenyl	52.9	50.0	106	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047447 **Sample:** 583094-001 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 12:35

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	70-130	
4-Bromofluorobenzene	0.0265	0.0300	88	70-130	

Lab Batch #: 3047448 **Sample:** 582929-001 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 23:59

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0307	0.0300	102	70-130	
4-Bromofluorobenzene	0.0300	0.0300	100	70-130	

Lab Batch #: 3047482 **Sample:** 583105-006 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/23/18 08:36

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0288	0.0300	96	70-130	
4-Bromofluorobenzene	0.0307	0.0300	102	70-130	

Lab Batch #: 3047233 **Sample:** 582464-004 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/18/18 10:18

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	117	99.7	117	70-135	
o-Terphenyl	41.1	49.9	82	70-135	

Lab Batch #: 3047326 **Sample:** 582908-007 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/19/18 22:19

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0297	0.0300	99	70-130	
4-Bromofluorobenzene	0.0304	0.0300	101	70-130	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: Mckay West Federal

Work Orders : 582593,

Project ID: 212C-MD-01183

Lab Batch #: 3047364 **Sample:** 582908-001 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 07:24

SURROGATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	107	99.8	107	70-135	
o-Terphenyl	53.3	49.9	107	70-135	

Lab Batch #: 3047447 **Sample:** 583094-001 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/20/18 12:54

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0275	0.0300	92	70-130	
4-Bromofluorobenzene	0.0255	0.0300	85	70-130	

Lab Batch #: 3047448 **Sample:** 582929-001 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/21/18 00:19

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0312	0.0300	104	70-130	
4-Bromofluorobenzene	0.0272	0.0300	91	70-130	

Lab Batch #: 3047482 **Sample:** 583105-006 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 04/23/18 08:57

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0302	0.0300	101	70-130	
4-Bromofluorobenzene	0.0308	0.0300	103	70-130	

* Surrogate outside of Laboratory QC limits
** Surrogates outside limits; data and surrogates confirmed by reanalysis
*** Poor recoveries due to dilution
Surrogate Recovery [D] = 100 * A / B
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: Mckay West Federal

Work Order #: 582593 **Project ID:** 212C-MD-01183

Analyst: ALJ **Date Prepared:** 04/19/2018 **Date Analyzed:** 04/19/2018

Lab Batch ID: 3047326 **Sample:** 7643021-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.0998	0.119	119	0.100	0.118	118	1	70-130	35	
Toluene	<0.00200	0.0998	0.113	113	0.100	0.113	113	0	70-130	35	
Ethylbenzene	<0.00200	0.0998	0.113	113	0.100	0.111	111	2	70-130	35	
m,p-Xylenes	<0.00399	0.200	0.230	115	0.201	0.228	113	1	70-130	35	
o-Xylene	<0.00200	0.0998	0.117	117	0.100	0.113	113	3	70-130	35	

Analyst: ALJ **Date Prepared:** 04/20/2018 **Date Analyzed:** 04/20/2018

Lab Batch ID: 3047447 **Sample:** 7643115-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00202	0.101	0.113	112	0.100	0.120	120	6	70-130	35	
Toluene	<0.00202	0.101	0.109	108	0.100	0.115	115	5	70-130	35	
Ethylbenzene	<0.00202	0.101	0.110	109	0.100	0.115	115	4	70-130	35	
m,p-Xylenes	<0.00403	0.202	0.224	111	0.201	0.236	117	5	70-130	35	
o-Xylene	<0.00202	0.101	0.110	109	0.100	0.115	115	4	70-130	35	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

BS / BSD Recoveries

Project Name: Mckay West Federal

Work Order #: 582593 **Project ID:** 212C-MD-01183

Analyst: ALJ **Date Prepared:** 04/20/2018 **Date Analyzed:** 04/20/2018

Lab Batch ID: 3047448 **Sample:** 7643121-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.0998	0.115	115	0.101	0.112	111	3	70-130	35	
Toluene	<0.00200	0.0998	0.108	108	0.101	0.107	106	1	70-130	35	
Ethylbenzene	<0.00200	0.0998	0.109	109	0.101	0.107	106	2	70-130	35	
m,p-Xylenes	<0.00399	0.200	0.221	111	0.201	0.218	108	1	70-130	35	
o-Xylene	<0.00200	0.0998	0.111	111	0.101	0.109	108	2	70-130	35	

Analyst: ALJ **Date Prepared:** 04/23/2018 **Date Analyzed:** 04/23/2018

Lab Batch ID: 3047482 **Sample:** 7643162-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00199	0.0996	0.118	118	0.100	0.117	117	1	70-130	35	
Toluene	<0.00199	0.0996	0.113	113	0.100	0.112	112	1	70-130	35	
Ethylbenzene	<0.00199	0.0996	0.118	118	0.100	0.116	116	2	70-130	35	
m,p-Xylenes	<0.00398	0.199	0.243	122	0.200	0.240	120	1	70-130	35	
o-Xylene	<0.00199	0.0996	0.120	120	0.100	0.117	117	3	70-130	35	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

BS / BSD Recoveries

Project Name: Mckay West Federal

Work Order #: 582593 **Project ID:** 212C-MD-01183

Analyst: OJS **Date Prepared:** 04/18/2018 **Date Analyzed:** 04/18/2018

Lab Batch ID: 3047178 **Sample:** 7642856-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<5.00	250	245	98	250	255	102	4	90-110	20	

Analyst: ARM **Date Prepared:** 04/18/2018 **Date Analyzed:** 04/18/2018

Lab Batch ID: 3047233 **Sample:** 7642935-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	1000	979	98	1000	942	94	4	70-135	20	
Diesel Range Organics (DRO)	<15.0	1000	1020	102	1000	1030	103	1	70-135	20	

Analyst: ARM **Date Prepared:** 04/19/2018 **Date Analyzed:** 04/20/2018

Lab Batch ID: 3047364 **Sample:** 7643028-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	1000	1030	103	1000	1030	103	0	70-135	20	
Diesel Range Organics (DRO)	<15.0	1000	1070	107	1000	1090	109	2	70-135	20	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: Mckay West Federal

Work Order # : 582593 **Project ID:** 212C-MD-01183

Lab Batch ID: 3047326 **QC- Sample ID:** 582908-007 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/19/2018 **Date Prepared:** 04/19/2018 **Analyst:** ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00201	0.100	0.107	107	0.101	0.117	116	9	70-130	35	
Toluene	<0.00201	0.100	0.0995	100	0.101	0.110	109	10	70-130	35	
Ethylbenzene	<0.00201	0.100	0.0961	96	0.101	0.109	108	13	70-130	35	
m,p-Xylenes	<0.00402	0.201	0.197	98	0.202	0.225	111	13	70-130	35	
o-Xylene	<0.00201	0.100	0.0987	99	0.101	0.113	112	14	70-130	35	

Lab Batch ID: 3047447 **QC- Sample ID:** 583094-001 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/20/2018 **Date Prepared:** 04/20/2018 **Analyst:** ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.100	0.0645	65	0.0998	0.0771	77	18	70-130	35	X
Toluene	<0.00200	0.100	0.0546	55	0.0998	0.0657	66	18	70-130	35	X
Ethylbenzene	<0.00200	0.100	0.0467	47	0.0998	0.0582	58	22	70-130	35	X
m,p-Xylenes	<0.00401	0.200	0.0943	47	0.200	0.117	59	21	70-130	35	X
o-Xylene	<0.00200	0.100	0.0476	48	0.0998	0.0588	59	21	70-130	35	X

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable

N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.

Form 3 - MS / MSD Recoveries

Project Name: Mckay West Federal

Work Order # : 582593 **Project ID:** 212C-MD-01183

Lab Batch ID: 3047448 **QC- Sample ID:** 582929-001 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/20/2018 **Date Prepared:** 04/20/2018 **Analyst:** ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00199	0.0996	0.0945	95	0.100	0.108	108	13	70-130	35	
Toluene	<0.00199	0.0996	0.0869	87	0.100	0.0957	96	10	70-130	35	
Ethylbenzene	<0.00199	0.0996	0.0820	82	0.100	0.0865	87	5	70-130	35	
m,p-Xylenes	<0.00398	0.199	0.166	83	0.200	0.175	88	5	70-130	35	
o-Xylene	<0.00199	0.0996	0.0858	86	0.100	0.0883	88	3	70-130	35	

Lab Batch ID: 3047482 **QC- Sample ID:** 583105-006 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/23/2018 **Date Prepared:** 04/23/2018 **Analyst:** ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.0998	0.106	106	0.100	0.0972	97	9	70-130	35	
Toluene	<0.00200	0.0998	0.101	101	0.100	0.0918	92	10	70-130	35	
Ethylbenzene	<0.00200	0.0998	0.102	102	0.100	0.0917	92	11	70-130	35	
m,p-Xylenes	<0.00399	0.200	0.210	105	0.201	0.189	94	11	70-130	35	
o-Xylene	<0.00200	0.0998	0.103	103	0.100	0.0936	94	10	70-130	35	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.

Form 3 - MS / MSD Recoveries

Project Name: Mckay West Federal

Work Order # : 582593 **Project ID:** 212C-MD-01183

Lab Batch ID: 3047178 **QC- Sample ID:** 582592-005 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/18/2018 **Date Prepared:** 04/18/2018 **Analyst:** OJS

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	488	249	719	93	249	728	96	1	90-110	20	

Lab Batch ID: 3047178 **QC- Sample ID:** 582600-004 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/18/2018 **Date Prepared:** 04/18/2018 **Analyst:** OJS

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	184	249	420	95	249	416	93	1	90-110	20	

Lab Batch ID: 3047233 **QC- Sample ID:** 582464-004 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/18/2018 **Date Prepared:** 04/18/2018 **Analyst:** ARM

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	999	826	83	997	870	87	5	70-135	20	
Diesel Range Organics (DRO)	<15.0	999	857	86	997	875	88	2	70-135	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable

N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.

Form 3 - MS / MSD Recoveries

Project Name: Mckay West Federal

Work Order # : 582593 **Project ID:** 212C-MD-01183

Lab Batch ID: 3047364 **QC- Sample ID:** 582908-001 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 04/20/2018 **Date Prepared:** 04/19/2018 **Analyst:** ARM

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH By SW8015 Mod Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	1000	943	94	998	945	95	0	70-135	20	
Diesel Range Organics (DRO)	<15.0	1000	972	97	998	974	98	0	70-135	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable

N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.

582593

Analysis Request of Chain of Custody Record

PAGE: 1 OF: 2

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

CLIENT NAME: Marathon

SITE MANAGER: Ike Tervarez

PROJECT NO.: 212C-MD-01183

PROJECT NAME: McKay West Federal

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8021B	TPH TX1005 (Ext. to C35)	TPH 8015 MOD.	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS
	4-13-18	0950			X	AH-1 (0-1') BEB, 2'	1				✓		X	X												X				
		0955			X	AH-1 (1-2') BEB 2'	1				✓		X	X												X				
		1124			X	AH-1 (2-3') BEB, 2'	1				✓															X				
		1125			X	AH-1 (3-4') BEB, 2'	1				✓															X				
		1127			X	AH-1 (4-5') BEB, 2'	1				✓																			
		1005			X	AH-2 (0-1') BEB, 1'	1				✓		X	X												X				
		1010			X	AH-2 (1-2') BEB, 1'	1				✓		X	X												X				
		1040			X	AH-2 (2-3') BEB, 1'	1				✓															X				
		1043			X	AH-2 (3-4') BEB, 1'	1				✓															X				
	↓	1045			X	AH-2 (4-5') BEB, 1'	1				✓																			

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature) Kayla Taylor — Date: 4-16-18 Time: 1310

RECEIVED BY: (Signature) — Date: 4/16/18 Time: 1315

RELINQUISHED BY: (Signature) — Date: Time:

RECEIVED BY: (Signature) — Date: Time:

RELINQUISHED BY: (Signature) — Date: Time:

RECEIVED BY: (Signature) — Date: Time:

RECEIVING LABORATORY: Xenco Labs
ADDRESS:
CITY: Midland STATE: TX ZIP:
CONTACT: PHONE: DATE: TIME:

RECEIVED BY: (Signature)

SAMPLED BY: (Print & Initial) Date: Time:

SAMPLE CONDITION WHEN RECEIVED:

REMARKS: Run deep Dayles if TPH exceeds 5,000 mg/kg
Run deep Dayles if benzene exceeds 10 mg/kg a total BTEX

Temp: 5.2 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.0

No

Please fill out all copies - Laboratory retains Yellow copy - Return Orginal copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy

Final 1.000

Page 24 of 26

587593

Analysis Request of Chain of Custody Record

PAGE: 2 OF: 2

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

CLIENT NAME: Marathon

SITE MANAGER: Ike Tervarez

PROJECT NO.: 212C-MD-01183

PROJECT NAME: McKay West Federal

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS
	4-13-18	1115			\	AH-2 (5-6') BEB, 1'	1				✓																	
		1150			\	AH-3 (0-1') BEB, 1'	1				✓		X	X											X				
		1158			\	AH-3 (1-2') BEB, 1'	1				✓		X	X											X				
		1204			\	AH-3 (2-3') BEB, 1'	1				✓														X				
		1214			\	AH-3 (3-4') BEB, 1'	1				✓																		
		1220			\	AH-3 (4-5') BEB, 1'	1				✓																		
		1228			\	AH-3 (5-6') BEB, 1'	1				✓																		

Kaylea Taylor 4-13-18

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature) Kaylea Taylor	Date: 4-16-18 Time: 1310	RECEIVED BY: (Signature)	Date: 4/16/18 Time: 1315
RELINQUISHED BY: (Signature)	Date: Time:	RECEIVED BY: (Signature)	Date: Time:
RELINQUISHED BY: (Signature)	Date: Time:	RECEIVED BY: (Signature)	Date: Time:

SAMPLED BY: (Print & Initial) Date: Time:

SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS AIRBILL #: OTHER:

RECEIVING LABORATORY: RECEIVED BY: (Signature)
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE: DATE: TIME:

Temp: 5.2 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.0

SAMPLE CONDITION WHEN RECEIVED:

REMARKS:

Please fill out all copies - Laboratory retains Yellow copy - Return Orginal copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy.

Final 1.000

Page 25 of 26

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: Tetra Tech- Midland

Date/ Time Received: 04/16/2018 01:15:00 PM

Work Order #: 582593

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R8

Sample Receipt Checklist	Comments
#1 *Temperature of cooler(s)?	5
#2 *Shipping container in good condition?	**Yes**
#3 *Samples received on ice?	**Yes**
#4 *Custody Seals intact on shipping container/ cooler?	**N/A**
#5 Custody Seals intact on sample bottles?	**N/A**
#6*Custody Seals Signed and dated?	**N/A**
#7 *Chain of Custody present?	**Yes**
#8 Any missing/extra samples?	**No**
#9 Chain of Custody signed when relinquished/ received?	**Yes**
#10 Chain of Custody agrees with sample labels/matrix?	**Yes**
#11 Container label(s) legible and intact?	**Yes**
#12 Samples in proper container/ bottle?	**Yes**
#13 Samples properly preserved?	**Yes**
#14 Sample container(s) intact?	**Yes**
#15 Sufficient sample amount for indicated test(s)?	**Yes**
#16 All samples received within hold time?	**Yes**
#17 Subcontract of sample(s)?	**N/A**
#18 Water VOC samples have zero headspace?	**N/A**

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: PH Device/Lot#:

Checklist completed by: Brianna Teel Date: 04/17/2018

Brianna Teel

Checklist reviewed by: Kelsey Brooks Date: 04/18/2018

Kelsey Brooks