October 11, 2019 Vertex Project #: 19E-00614-010

Spill Closure Report: **Ender Wiggins 14 WA Federal Com #001H** (Section 14, Township 25 South, Range 34 East)

API: 30-025-45187
County: Lea
Incident Report: 1RP-5634

Prepared For: **Marathon Oil Permian LLC**
4111 South Tidwell Road
Carlsbad, New Mexico 88220

New Mexico Oil Conservation Division - District 2 Artesia, NM
811 S. 1st Street
Artesia, New Mexico 88210

Marathon Oil Permian LLC retained Vertex Resource Services Inc. (Vertex) to conduct a Spill Assessment for a release of oil-based mud which was discharged from a rotating head assembly as the head was being removed from the borehole. This release, Incident 1RP-5634, occurred at Ender Wiggins 14 WA Federal Com #001H, API 30-025-45187, (hereafter referred to as "Ender Wiggins") on July 16, 2019. This closure report provides a description of the Spill Assessment and includes a request for Spill Closure. The spill area is located at N 32.13102489, W -103.44741084.

Background

Ender Wiggins is located on private property approximately 57 miles southeast of Carlsbad, New Mexico. The legal location for the site is Section 14, Township 25 South, Range 34 East in Lea County, New Mexico. This location is within the Permian Basin in southeast New Mexico and has historically been used for oil and gas exploration and production, and rangeland. An aerial photograph and site schematic are included as Attachment 1.

The Geological Map of New Mexico (New Mexico Bureau of Geology and Mineral Resources, 2014 – 2017) indicates the site's surface geology is comprised of a combination of Pyote and maljamar fine sands and Wink fine sand ---- Eolian and piedmont deposits from the Holocene to middle Pleistocene ages of interlayed eolian sand and piedmont. Soils on the site are well-drained with low runoff and a predominant soil texture of fine sand.

Incident Description

The release occurred on July 16, 2019, in which the rotating head assembly discharged approximately eight (8) barrels (bbls) of oil-based mud onto the pad as the rotating head was pulled from the borehole. Approximately 8 bbls of drilling mud were recovered during initial spill clean-up. The release was reported to New Mexico Oil Conservation Division (NM OCD) on July 18, 2019 and a copy of the initial C-141 Report for 1RP-5634 is included as Attachment 2. Daily Field Reports (DFRs) and site photographs from the spill assessment and subsequent remediation are included as Attachment 3.

Closure Criteria Determination

The release at Ender Wiggins is subject to New Mexico Environmental Department (NMED) regulation as well as that of NM OCD. Remediation levels were determined using NM OCD regulations and the closure criteria for soils impacted by a release outlined in Table I of 19.15.29.12 New Mexico Administrative Code (NMAC), as the more stringent screening level of the two regulatory agencies.

Depth to groundwater at the release site was determined using information from Oil and Gas Drilling records and the New Mexico Office of the State Engineer Water Column/Average Depth to Water report. A 5,000-meter search radius was used to determine groundwater depth. The shallowest recorded depth to groundwater was determined to be 135 feet below ground surface (bgs) at 1,181 feet from the site. Documentation pertaining to Closure Criteria Determination research is included with this report as Attachment 4.

Table 1.				
Site Name: Ender Wiggins 14 WA Fed Com #001h				
Spill Coordinates:		**X: 32.13102489**	**Y: -103.44741084**	
Site Specific Conditions		**Value**	**Unit**	**Reference**
1	**Depth to Groundwater**	**135**	**feet**	**1**
2	**Within 300 feet of any continuously flowing watercourse or any other significant watercourse**	**16,244**	**feet**	**2**
3	**Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)**	**20,122**	**feet**	**3**
4	**Within 300 feet from an occupied residence, school, hospital, institution or church**	**11,944**	**feet**	**4**
5	**i) Within 500 feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes, or**	**1,181**	**feet**	**5**
	ii) Within 1000 feet of any fresh water well or spring	**1,181**	**feet**	**5**

6	**Within incorporated municipal boundaries or within a defined municipal fresh water field covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978 as amended, unless the municipality specifically approves**	**No**	**(Y/N)**	**6**
7	**Within 300 feet of a wetland**	**20,197**	**feet**	**7**
8	**Within the area overlying a subsurface mine**	**No**	**(Y/N)**	**8**
9	**Within an unstable area (Karst Map)**	**Low**	**Critical High Medium Low**	**9**
10	**Within a 100-year Floodplain**	**>100**	**year**	**10**
NMAC 19.15.29.12 E (Table 1) Closure Criteria		**>100'**	**<50' 51-100' >100'**	

The closure criteria determined for the site are associated with the following constituent concentration limits as presented in Table 2.

Table 2. Closure Criteria for Soils Impacted by a Release

Minimum depth below any point within the horizontal boundary of the release to groundwater less than 10,000 mg/l TDS	Constituent	Limit
> 100 feet	Chloride	20,000 mg/kg
	TPH (GRO+DRO+MRO)	2,500 mg/kg
	GRO+DRO	1,000 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg

Remedial Actions Taken

An initial site inspection at Ender Wiggins was completed on August 3, 2019. This site inspection identified the area of the release specified in the initial C-141 Report, estimated the approximate volume of the spill, and white lined the area required for the 811 One Call request. The area impacted by this release was determined to be approximately 48 feet long and 11 feet wide; the total affected area was determined to be 528 square feet. The DFR associated with the site inspection is included in Attachment 3.

Remediation efforts began on August 11, 2019 and were completed that same day. Vertex personnel supervised the excavation of impacted soils. Field screening analyses were completed using a Photo Ionization Detector (volatile hydrocarbons), a Dexsil Petroflag using EPA SW-846 Method 9074 (extractable hydrocarbons) and Quantabs (chlorides). These field screen results were used to differentiate areas requiring

further remediation from those areas showing concentrations below determined closure criteria levels. Soils were removed to a depth of 1 feet bgs from areas determined to have been impacted by this release. Contaminated soil was transported by a licensed waste hauler and disposed of at an approved waste management facility. Field screening results are presented in Attachment 5 and DFRs in Attachment 3.

Notification that confirmatory samples were being collected was provided to NM OCD on August 8, 2019, and on August 11, 2019, following remediation, confirmation sampling was completed. Confirmatory composite samples were collected from the base and walls of the excavation per the alternate sampling method outlined in Subparagraph (c) of Paragraph (1) of Subsection D of 19.15.29.12 NMAC. Two five-point composite samples were collected for laboratory analysis following NM OCD soil sampling procedures. Samples were submitted to Hall Environmental Analysis Laboratory under chain-of-custody protocols and analyzed using Method 300.0/9056A for chlorides, Method 8021B for volatile organics, including Benzene, Toluene, Ethyl benzene and Xylene (BTEX), and EPA Method 8015D for total petroleum hydrocarbons (TPH) including Motor Oil Range Organics (MRO), Diesel Range Organics (DRO), and Gasoline Range Organics (GRO). Laboratory results are presented in Table 3, Attachment 5 and the complete laboratory data report and chain of custody can be found in Attachment 6. Both confirmatory samples collected and analyzed were below closure criteria for the site.

Closure Request

The spill area was fully delineated and remediated on August 11,2019. Confirmatory samples were analyzed by a laboratory and found to be below allowable concentrations as per Table I of 19.15.29.12 NMAC - Closure Criteria for Soils Impacted by a Release for locations greater than 100 feet to groundwater. Contaminated soil was removed from site and the excavated area was backfilled by Marathon representatives during clean-up of drilling activities.

During this assessment and remediation process, Vertex referred to NMED, Risk Assessment Guidance for Site Investigations and Remediation, Volume I Soil Screening Guidance for Human Health Risk Assessments to verify that the release site met all requirements established in the revised version dated, March 2017. Based on the findings presented in this report, Marathon Oil Permian LLC requests that this spill be closed.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at 575-361-1137 or dwilliams@vertex.ca.

Sincerely,

Dennis Williams
ENVIRONMENTAL EARTHWORKS ADVISOR

Attachments

Attachment 1. Site Schematic

Attachment 2. NMOCD C-141 Report
Attachment 3. Daily Field Report(s) with Pictures
Attachment 4. Closure Criteria for Soils Impacted by a Release Research Determination Documentation
Attachment 5. Table 3 - Laboratory Results Table
Attachment 6. Laboratory Data Reports and COCs

References

Water Column/Average Depth to Water Report. New Mexico Water Rights Reporting System, (2019). Retrieved from http://nmwrrs.ose.state.nm.us/nmwrrs/waterColumn.html

Assessed and Impaired Waters of New Mexico. New Mexico Department of Surface Water Quality Bureau, (2019). Retrieved from https://gis.web.env.nm.gov/oem/?map=swqb

Interactive Geologic Map. New Mexico Bureau of Geology and Mineral Resources, (2019). Retrieved from http://geoinfo.nmt.edu

Measured Distance from the Subject Site to Residence. Google Earth Pro, (2019). Retrieved from https://earth.google.com

Point of Diversion Location Report. New Mexico Water Rights Reporting System, (2019). Retrieved from http://nmwrrs.ose.state.nm.us/nmwrrs/wellSurfaceDiversion.html

Measured Distance from the Subject Site to Municipal Boundaries. Google Earth Pro, (2019). Retrieved from https://earth.google.com

National Wetland Inventory Surface Waters and Wetland. United State Fish and Wildlife Service, (2019). Retrieved from https://www.fws.gov/wetlands/data/mapper.html

Coal Mine Resources in New Mexico. NM Mining and Minerals Division, (2019). Retrieved from http://www.emnrd.state.nm.us/MMD/gismapminedata.html

New Mexico Cave/Karsts. United States Department of the Interior, Bureau of Land Management, (2019) Retrieved from https://www.blm.gov/programs/recreation/recreation-programs/caves/new-mexico

Flood Map Number 35015C1875D. United States Department of Homeland Security, FEMA Flood Map Service Center, (2010). Retrieved from https://msc.fema.gov/portal/search?AddressQuery=malaga%20new%20mexico#searchresultsanchor

Well Log/Meter Information Report. NM Office of the State Engineer, New Mexico Water Rights Reporting System. (2019). Retrieved from http://nmwrrs.ose.state.nm.us/nmwrrs/meterReport.html

Natural Resources and Wildlife Oil and Gas Releases. New Mexico Oil Conservation Division, (2019). Santa Fe, New Mexico.

Soil Survey, New Mexico. United States Department of Agriculture, Soil Conservation Service in Cooperation with New Mexico Agricultural Experiment Station. (1971). Retrieved from http://www.wipp.energy.gov/library/Information_Repository_A/Supplemental_Information/Chugg%20et%20al%201971%20w-map.pdf

Limitations

This report has been prepared for the sole benefit of Marathon Oil Company. This document may not be used by any other person or entity, with the exception of the New Mexico Oil Conservation Division, without the express written consent of Vertex Resource Services Inc. and Marathon Oil Company. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report, are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgement of Vertex based on the data collected during the assessment. Due to the nature of the assessment and the data available, Vertex cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

ATTACHMENT 1

LEGEND

- WELLHEAD
- ROAD
- WELL PAD
- SPILL AREA (48' X 11')

0 25 50 100 150 200 ft

SCALE 1:1,500

Notes: Aerial Image from Gogle Earth 2019

Marathon Oil

Initial Site Inspection Ender Wiggins 14 Fed 1H

VERTEX

DRAWN:	NM
APPROVED:	AH
DATE:	JUN 26/19

FIGURE: **1**

VERSATILITY. EXPERTISE.

LEGEND

- WELLHEAD
- SOIL SAMPLE
- ROAD
- WELL PAD

0 25 50 100 150 200 ft

SCALE 1:1,500

Notes: Aerial Image from Gogle Earth 2019

MarathonOil

Characterization
Ender Wiggins 14 Fed 1H

VERTEX

DRAWN:	NM
APPROVED:	AH
DATE:	JUN 26/19

FIGURE: **2**

VERSATILITY. EXPERTISE.

ATTACHMENT 2

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 Department

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

Form C-141
Revised August 24, 2018
Submit to appropriate OCD District office

Incident ID	NDHR1922131644
District RP	1RP-5634
Facility ID	
Application ID	pDHR1922131441

Release Notification

Responsible Party

Responsible Party Marathon Oil Permian LLC	OGRID 372098
Contact Name Misti Johnson	Contact Telephone 210-430-9819
Contact email mjohnson4@marathonoil.com	Incident # *(assigned by OCD)* NDHR1922131644
Contact mailing address 5555 San Felipe Street, Houston, Texas 77056	

Location of Release Source

Latitude 32.13102489 Longitude -103.44741084
(NAD 83 in decimal degrees to 5 decimal places)

Site Name ENDER WIGGINS 14 WA FEDERAL COM #001H	Site Type Oil and gas drilling facility
Date Release Discovered 7/16/19	API# *(if applicable)* 30-025-45187

Unit Letter	Section	Township	Range	County
E	14	25S	34E	Lea

Surface Owner: ☐ State ☑ Federal ☐ Tribal ☐ Private (*Name:* _____)

Nature and Volume of Release

Material(s) Released (Select all that apply and attach calculations or specific justification for the volumes provided below)

☐ Crude Oil	Volume Released (bbls)	Volume Recovered (bbls)
☑ Produced Water	Volume Released (bbls) 8	Volume Recovered (bbls)
	Is the concentration of total dissolved solids (TDS) in the produced water >10,000 mg/l?	☑ Yes ☐ No
☐ Condensate	Volume Released (bbls)	Volume Recovered (bbls)
☐ Natural Gas	Volume Released (Mcf)	Volume Recovered (Mcf)
☐ Other (describe)	Volume/Weight Released (provide units)	Volume/Weight Recovered (provide units)

Cause of Release

While stripping out of the hole against the rotating head, oil based mud was observed out from the rotating head assembly into the ground.

State of New Mexico
Oil Conservation Division

Incident ID	NDHR1922131644
District RP	1RP-5634
Facility ID	
Application ID	pDHR1922131441

Was this a major release as defined by 19.15.29.7(A) NMAC? ☐ Yes ☑ No	If YES, for what reason(s) does the responsible party consider this a major release?
If YES, was immediate notice given to the OCD? By whom? To whom? When and by what means (phone, email, etc)?	

Initial Response

The responsible party must undertake the following actions immediately unless they could create a safety hazard that would result in injury

- ☑ The source of the release has been stopped.
- ☑ The impacted area has been secured to protect human health and the environment.
- ☑ Released materials have been contained via the use of berms or dikes, absorbent pads, or other containment devices.
- ☑ All free liquids and recoverable materials have been removed and managed appropriately.

If all the actions described above have not been undertaken, explain why:

Per 19.15.29.8 B. (4) NMAC the responsible party may commence remediation immediately after discovery of a release. If remediation has begun, please attach a narrative of actions to date. If remedial efforts have been successfully completed or if the release occurred within a lined containment area (see 19.15.29.11(A)(5)(a) NMAC), please attach all information needed for closure evaluation.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD 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 OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD 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.

Printed Name: Misti Johnson Title: Environmental Supervisor

Signature: *Misti Johnson* Date: 7/18/2019

email: mjohnson4@marathonoil.com Telephone: 210-430-9819

OCD Only

Received by: Dylan Rose-Coss Date: 07/25/2019

State of New Mexico
Oil Conservation Division

Incident ID	NDHR1922131644
District RP	1RP-5634
Facility ID	
Application ID	pDHR1922131441

Site Assessment/Characterization

This information must be provided to the appropriate district office no later than 90 days after the release discovery date.

What is the shallowest depth to groundwater beneath the area affected by the release?	135 (ft bgs)
Did this release impact groundwater or surface water?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a wetland?	☐ Yes ☒ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☐ Yes ☒ No

Attach a comprehensive report (electronic submittals in .pdf format are preferred) demonstrating the lateral and vertical extents of soil contamination associated with the release have been determined. Refer to 19.15.29.11 NMAC for specifics.

Characterization Report Checklist: ***Each of the following items must be included in the report.***

- ☒ Scaled site map showing impacted area, surface features, subsurface features, delineation points, and monitoring wells.
- ☒ Field data
- ☒ Data table of soil contaminant concentration data
- ☒ Depth to water determination
- ☒ Determination of water sources and significant watercourses within ½-mile of the lateral extents of the release
- ☒ Boring or excavation logs
- ☒ Photographs including date and GIS information
- ☒ Topographic/Aerial maps
- ☒ Laboratory data including chain of custody

If the site characterization report does not include completed efforts at remediation of the release, the report must include a proposed remediation plan. That plan must include the estimated volume of material to be remediated, the proposed remediation technique, proposed sampling plan and methods, anticipated timelines for beginning and completing the remediation. The closure criteria for a release are contained in Table 1 of 19.15.29.12 NMAC, however, use of the table is modified by site- and release-specific parameters.

State of New Mexico
Oil Conservation Division

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I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD 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 OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD 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.

Printed Name: Isaac Castro Title: Environmental Professional

Signature: Isaac Castro Date: 10/22/19

email: icastro@marathonoil.com. Telephone: 575-988-0561.

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

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Facility ID	
Application ID	pDHR1922131441

Remediation Plan

Remediation Plan Checklist: ***Each of the following items must be included in the plan.***

- [X] Detailed description of proposed remediation technique
- [X] Scaled sitemap with GPS coordinates showing delineation points
- [X] Estimated volume of material to be remediated
- [X] Closure criteria is to Table 1 specifications subject to 19.15.29.12(C)(4) NMAC
- [X] Proposed schedule for remediation (note if remediation plan timeline is more than 90 days OCD approval is required)

Deferral Requests Only: ***Each of the following items must be confirmed as part of any request for deferral of remediation.***

- [ ] Contamination must be in areas immediately under or around production equipment where remediation could cause a major facility deconstruction.
- [ ] Extents of contamination must be fully delineated.
- [ ] Contamination does not cause an imminent risk to human health, the environment, or groundwater.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD 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 OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD 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.

Printed Name: Isaac Castro. Title: Environmental Professional

Signature: Isaac Castro Date: 10/22/19

email: icastro@marathonoil.com Telephone: 575-988-0561

OCD Only

Received by: _____ Date: _____

- [ ] Approved
- [ ] Approved with Attached Conditions of Approval
- [ ] Denied
- [ ] Deferral Approved

Signature: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	NDHR1922131644
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Facility ID	
Application ID	pDHR1922131441

Closure

The responsible party must attach information demonstrating they have complied with all applicable closure requirements and any conditions or directives of the OCD. This demonstration should be in the form of a comprehensive report (electronic submittals in .pdf format are preferred) including a scaled site map, sampling diagrams, relevant field notes, photographs of any excavation prior to backfilling, laboratory data including chain of custody documents of final sampling, and a narrative of the remedial activities. Refer to 19.15.29.12 NMAC.

Closure Report Attachment Checklist: *Each of the following items must be included in the closure report.*

☒ A scaled site and sampling diagram as described in 19.15.29.11 NMAC

☒ Photographs of the remediated site prior to backfill or photos of the liner integrity if applicable (Note: appropriate OCD District office must be notified 2 days prior to liner inspection)

☒ Laboratory analyses of final sampling (Note: appropriate ODC District office must be notified 2 days prior to final sampling)

☒ Description of remediation activities

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD 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 OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD 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. The responsible party acknowledges they must substantially restore, reclaim, and re-vegetate the impacted surface area to the conditions that existed prior to the release or their final land use in accordance with 19.15.29.13 NMAC including notification to the OCD when reclamation and re-vegetation are complete.

Printed Name: Isaac Castro Title: Environmental Professional

Signature: Isaac Castro Date: 10/22/19

email: icastro@marathonoil.com . Telephone: 575-988-0561

OCD Only

Received by: _____ Date: _____

Closure approval by the OCD does not relieve the responsible party of liability should their operations have failed to adequately investigate and remediate contamination that poses a threat to groundwater, surface water, human health, or the environment nor does not relieve the responsible party of compliance with any other federal, state, or local laws and/or regulations.

Closure Approved by: _____ Date: _____

Printed Name: _____ Title: _____

ATTACHMENT 3

Daily Site Visit Report

Client:	Marathon Oil Permian LLC	Inspection Date:	8/3/2019
Site Location Name:	Ender Wiggins 14 WA Federal Com #001H	Report Run Date:	8/3/2019 7:45 PM
Project Owner:	Isaac Castro	File (Project) #:	19E-00614
Project Manager:	Dennis Williams	API #:	30-025-45187
Client Contact Name:	Callie Karrigan	Reference	2019 Spill Projects
Client Contact Phone #:	(405) 202-1028		

Summary of Times

Left Office	8/3/2019 8:30 AM
Arrived at Site	8/3/2019 9:45 AM
Departed Site	8/3/2019 10:41 AM
Returned to Office	8/3/2019 12:15 PM

Summary of Daily Operations

9:48 Fill out arrival and safety forms
Sign in with safety man
Map spill and take pictures
Fill out DFR
Demobilize

Next Steps & Recommendations

1 Begin remediation

Daily Site Visit Report

Site Photos

Viewing Direction: East

Spill area

Viewing Direction: East

Spill area

Viewing Direction: Northwest

Spill area

Viewing Direction: East

Spill area

Daily Site Visit Report

Viewing Direction: East

Spill area under rig

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature: 

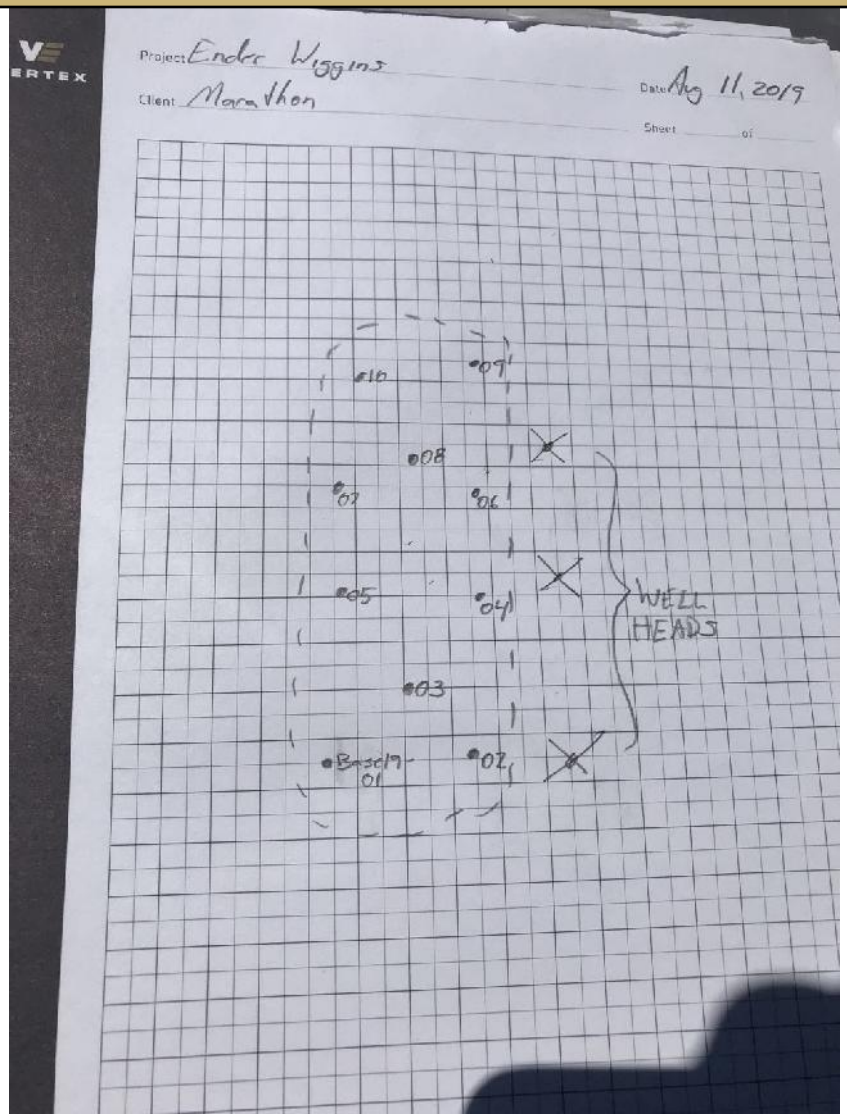
Daily Site Visit Report

Client:	Marathon Oil Permian LLC	Inspection Date:	8/11/2019
Site Location Name:	Ender Wiggins 14 WA Federal Com #001H	Report Run Date:	8/11/2019 7:43 PM
Project Owner:	Isaac Castro	File (Project) #:	19E-00614
Project Manager:	Dennis Williams	API #:	30-025-45187
Client Contact Name:	Callie Karrigan	Reference	NEW Containment Spill
Client Contact Phone #:	(405) 202-1028		

Summary of Times	
Left Office	8/11/2019 7:00 AM
Arrived at Site	8/11/2019 8:15 AM
Departed Site	8/11/2019 11:45 AM
Returned to Office	8/11/2019 1:00 PM

Daily Site Visit Report

Site Sketch



Daily Site Visit Report

Summary of Daily Operations

9:09 Arrive on site.
Complete safety paperwork.
Conduct composite field screening to most stringent and appropriate criteria.
Complete DFR.
Return to office.

11:34 Composite samples taken on site. Composite sample 1 combined from base samples 1-5.
Composite sample 2 combined from base samples 6-10.

Next Steps & Recommendations

1 Send confirmatory samples to lab for analysis.

2 Confirm lab analysis.

3 Backfill excavated area.

4 Close.

Sampling

ES-Base19-01

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
1 ft.	3.4 ppm	136 ppm	Low (30-600 ppm)	522 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (SW-4500 Cl), TPH (EPA SW-846 Method 8015M)		32.13098313, -103.44724914	Yes

ES-Base19-02

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
1 ft.	1.9 ppm	117 ppm	Low (30-600 ppm)	522 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (SW-4500 Cl), TPH (EPA SW-846 Method 8015M)		32.13098531, -103.44733623	Yes

Daily Site Visit Report

Site Photos

Viewing Direction: West

Excavated spill area

Viewing Direction: Northwest

Excavated spill area

Viewing Direction: North

Excavated spill area

Viewing Direction: North

Excavated spill area

Daily Site Visit Report

Viewing Direction: East

Excavated spill area

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: ES-Base19-01	**Sample Point ID**: ES-Base19-02
	
Depth: 1 ft.	**Depth:** 1 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Austin Harris

Signature: 

Signature

ATTACHMENT 4

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	POD Sub-basin Code	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 02314	CUB	LE	2	4	2	15	25S	34E	646170	3556243*	360	175	135	40
C 02315	CUB	LE	2	4	2	15	25S	34E	646170	3556243*	360	175	135	40
C 02299	CUB	LE	4	4	2	24	25S	34E	649417	3554478*	3341	350	300	50
C 02296	CUB	LE	1	3	2	18	25S	35E	650398	3556305*	3959	300	230	70
C 02401	CUB	LE	2	2	1	01	25S	34E	648534	3559896*	4405	275	260	15

Average Depth to Water: **212 feet**

Minimum Depth: **135 feet**

Maximum Depth: **300 feet**

Record Count: 5

UTMNAD83 Radius Search (in meters):

Easting (X): 646449.24 **Northing (Y):** 3556014.46 **Radius:** 5000

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

New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Ownership Information)

(acre ft per annum)

(R=POD has been replaced and no longer serves this file, C=the file is closed)

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

(quarters are smallest to largest)

(NAD83 UTM in meters)

WR File Nbr	Sub basin	Use	Diversion	Owner	County	POD Number	Well Tag	Code	Grant	Source	q q q 6416 4	Sec	Tws	Rng	X	Y	Distance
C 02314	CUB	DOM	3	NGL WATER SOLUTIONS PERMIAM	LE	C 02314					2 4 2	15	25S	34E	646170	3556243*	360
C 02315	CUB	STK	3	NGL WATER SOLUTIONS PERMIAN	LE	C 02315					2 4 2	15	25S	34E	646170	3556243*	360
C 02299	CUB	PLS	3	INTREPID POTASH NEW MEXICO LLC	LE	C 02299					4 4 2	24	25S	34E	649417	3554478*	3341
C 02296	CUB	PLS	3	INTREPID POTASH NEW MEXICO LLC	LE	C 02296					1 3 2	18	25S	35E	650398	3556305*	3959
C 02401	CUB	STK	3	GENERAL COUNSEL	LE	C 02401					2 2 1	01	25S	34E	648534	3559896*	4405

Record Count: 5

UTMNAD83 Radius Search (in meters):

Easting (X): 646449.24 **Northing (Y):** 3556014.46 **Radius:** 5000

Sorted by: Distance

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

U.S. Fish and Wildlife Service
National Wetlands Inventory

Ender Wiggins 14 WA Fed 1 16,244 ft flow

August 5, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Help Using this Tool

Legend | Basemap | Query

1:36,112

Legend

All Layers On/Off

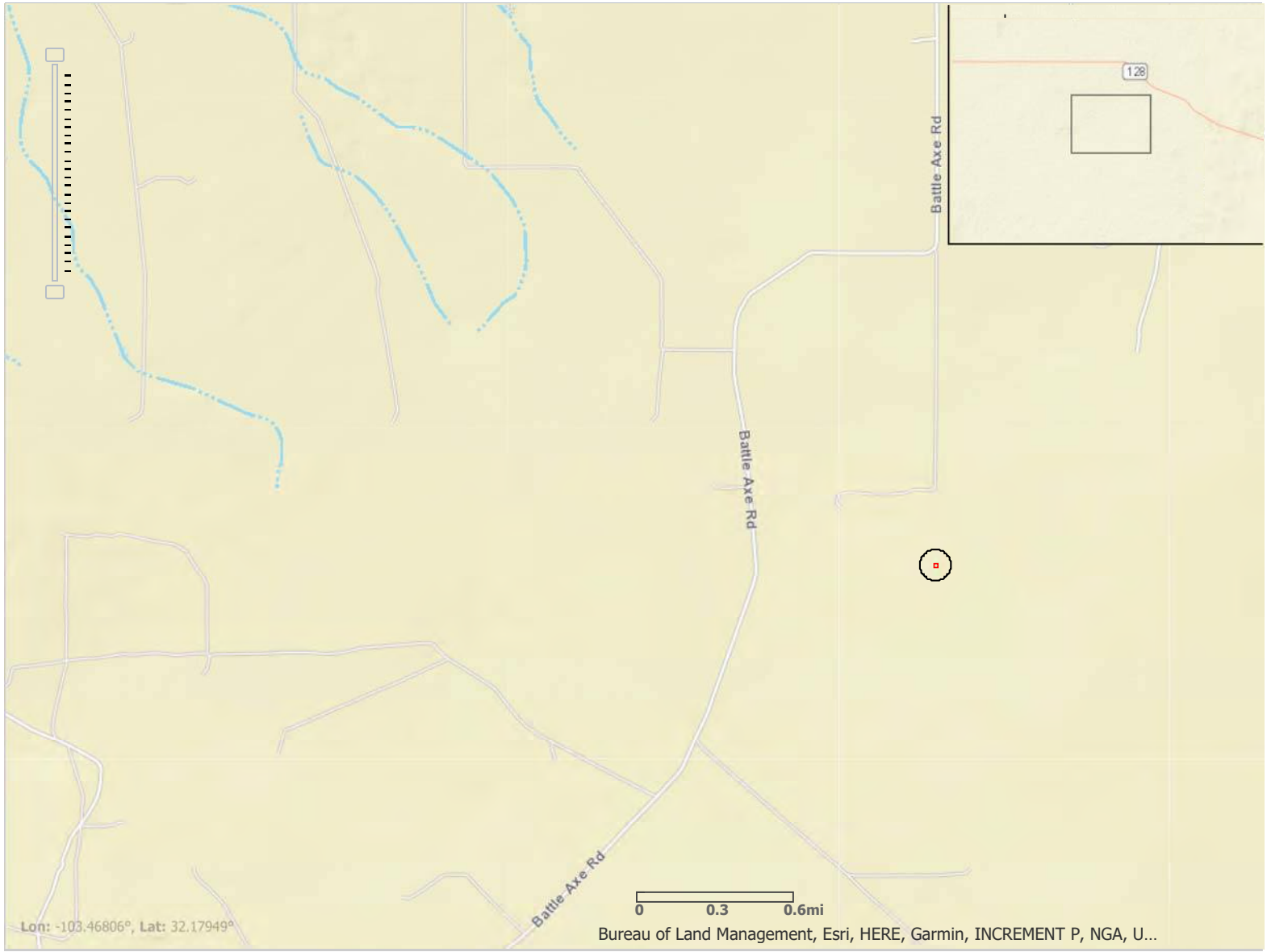
All Layer Transparency

- Roads
- Counties
- Air Emissions
- Air Facilities
- APS Food Facilities
- Dairies
- Brownfields
- Ground Water Discharge Permits
- State Cleanup Program
- Voluntary Remediation Program
- Superfund Sites
- Drinking Water Sources
- Hazardous Waste Facilities
- Landfills
- Petroleum Storage Tanks
- Leaking Tank Sites
- NPDES Permits
- Water Quality Stations
- Nonpoint Source Program
- Impaired Waters
- Assessed Waters
- National Hydrography Dataset

National Hydrography Dataset

Points

- Gaging Station
- Rapids
- Spring/Seep



U.S. Fish and Wildlife Service
National Wetlands Inventory

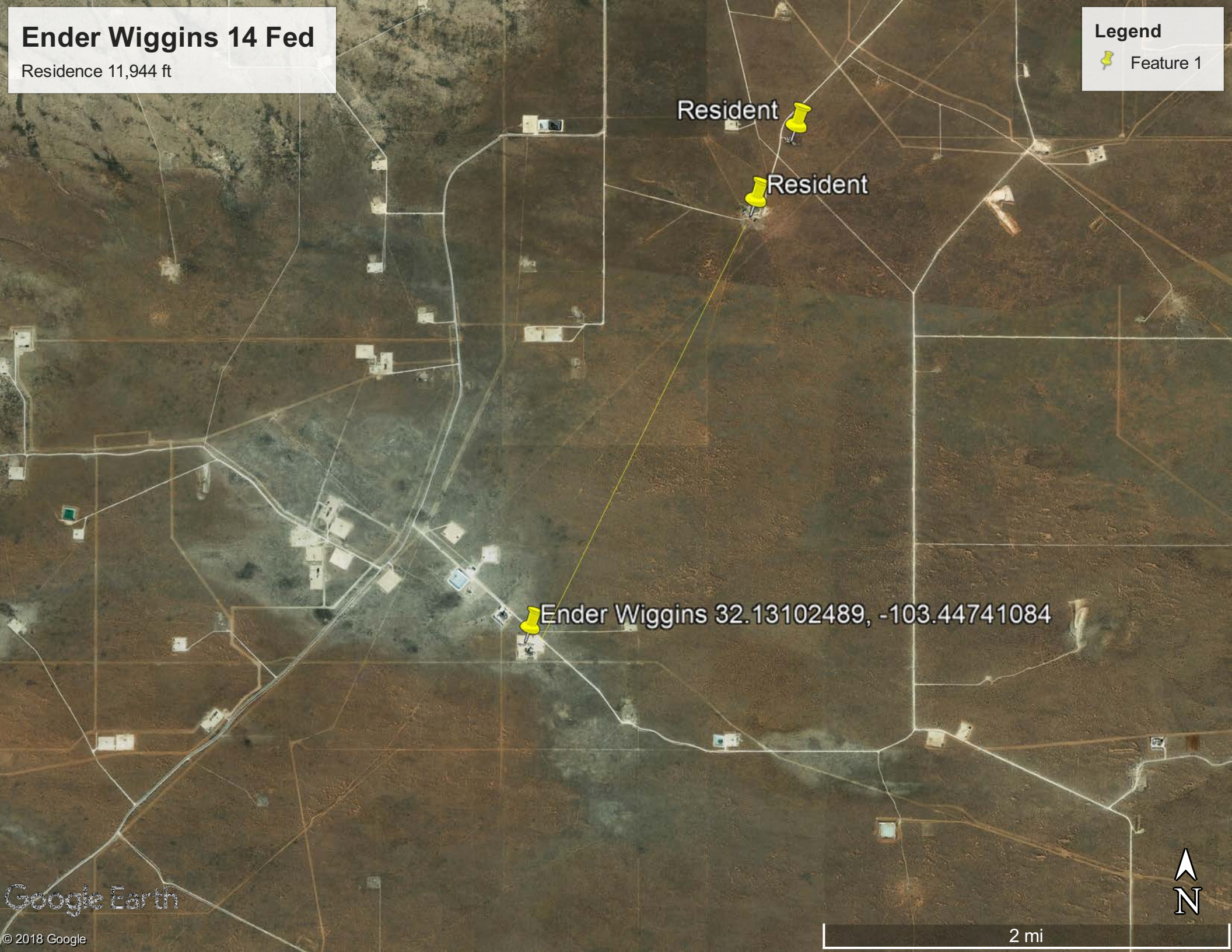
Ender Wiggins 14 20,122 ft pond

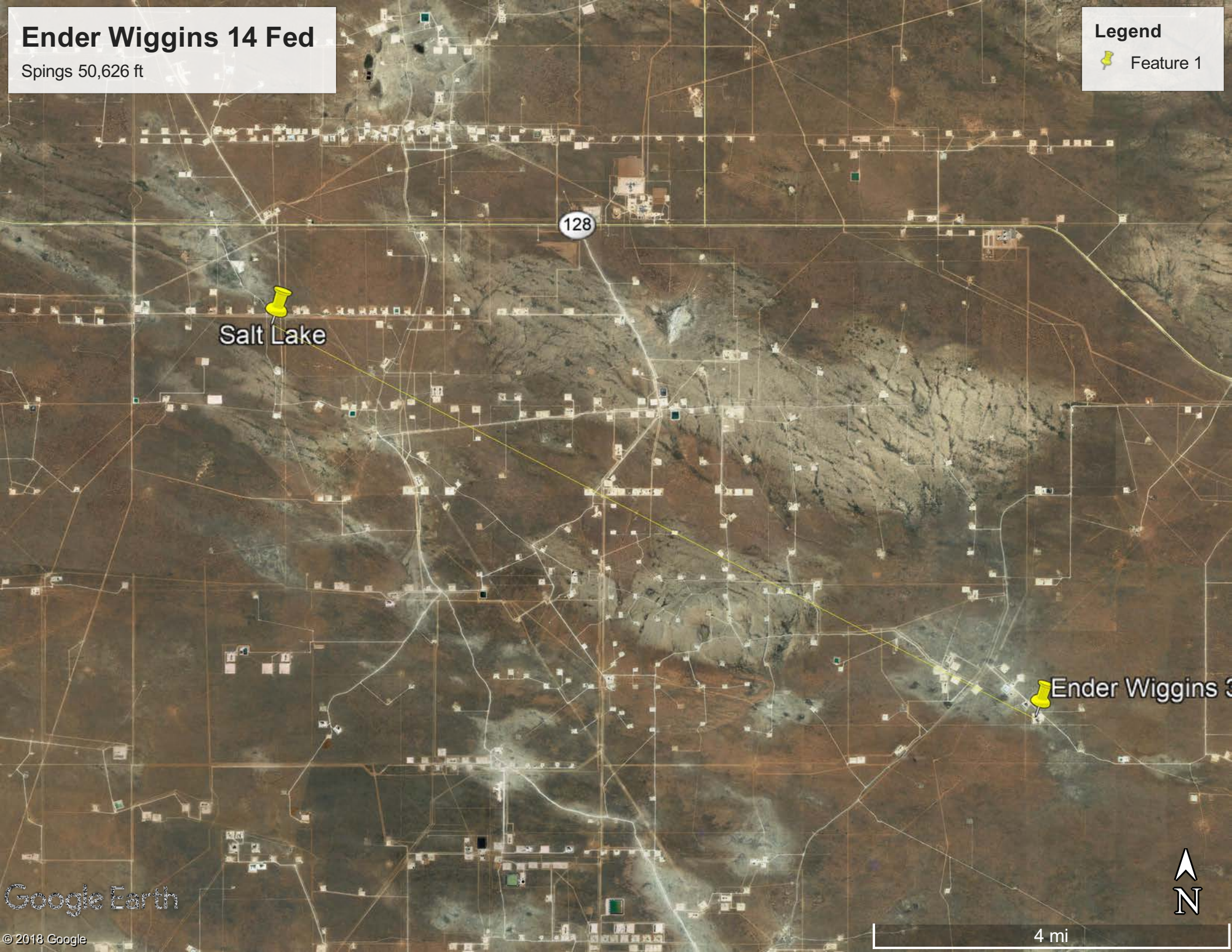
August 5, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.


Ender Wiggins 14 Fed
Residence 11,944 ft
Legend
Feature 1
Resident
Resident
Ender Wiggins 32.13102489, -103.44741084
N
2 mi
Google Earth
© 2018 Google


Ender Wiggins 14 Fed
Spings 50,626 ft
Legend
Feature 1
128
Salt Lake
Ender Wiggins 3
Google Earth
© 2018 Google
N
4 mi

New Mexico Office of the State Engineer
Wells with Well Log Information

No wells found.

UTMNAD83 Radius Search (in meters):

Easting (X): 646449.24 **Northing (Y):** 3556014.46 **Radius:** 5000

U.S. Fish and Wildlife Service
National Wetlands Inventory

Ender Wiggins 14 WA Fed 1 20,197 ft wetla

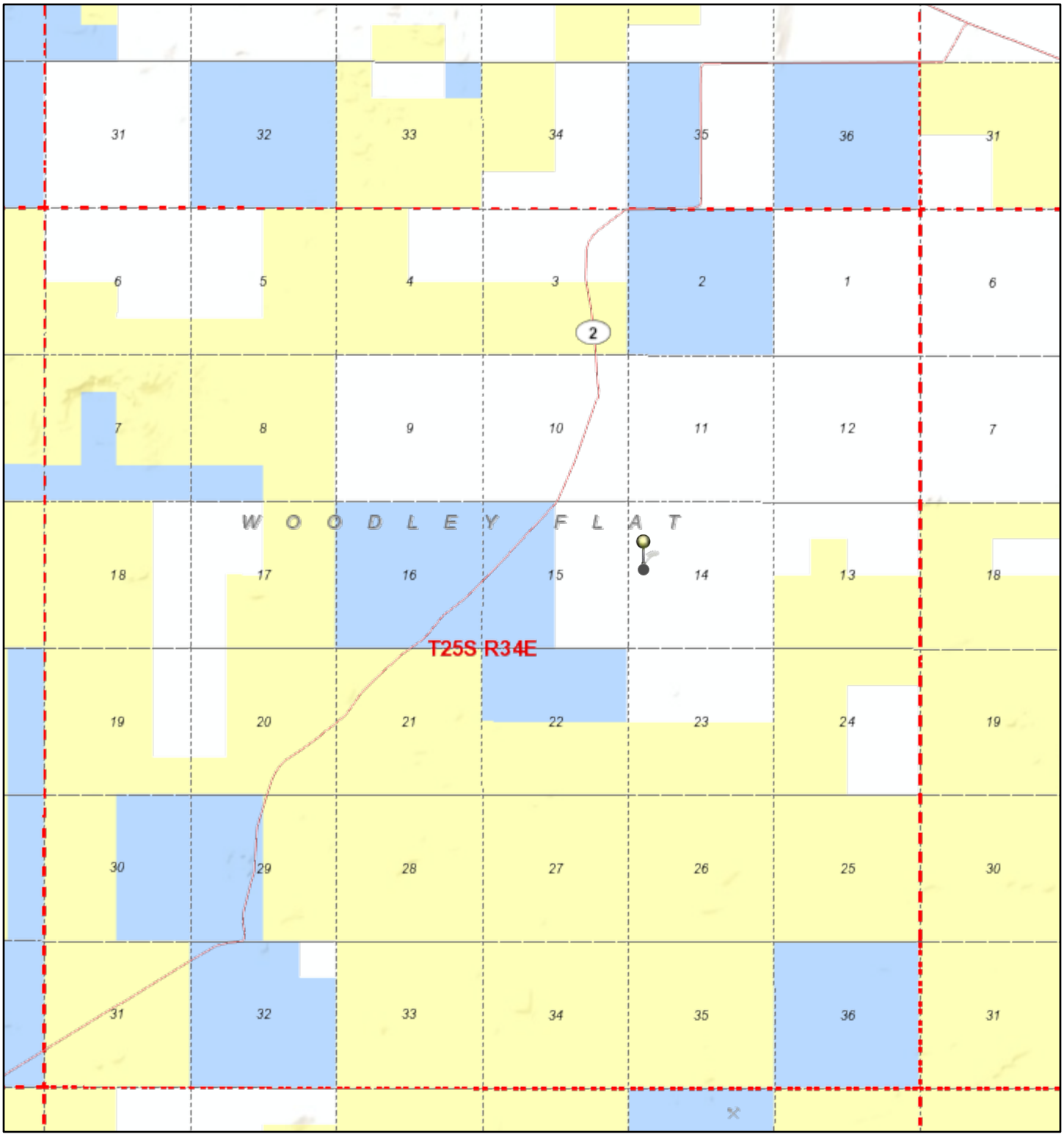
August 5, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Active Mines in New Mexico



8/5/2019 8:56:22 AM

1:72,224

0 0.5 1 2 mi

0 0.75 1.5 3 km

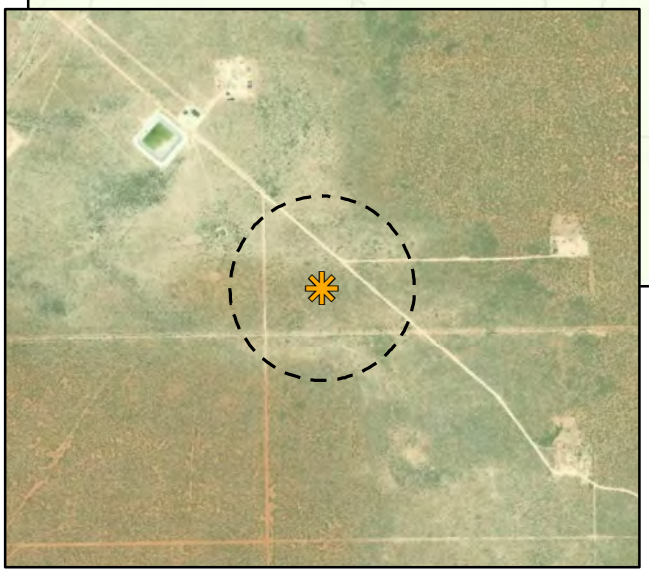
Registered Mines

Aggregate, Stone etc.

U.S. Bureau of Land Management - New Mexico State Office, Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS

EMNRD MMD GIS Coordinator

NM Energy, Minerals and Natural Resources Department (http://nm-emnrd.maps.arcgis.com/apps/webappviewer/index.html?id=1b5e577974664d689b47790897ca2795)



Notes: Aerial Image from ESRI Digital Globe 2017

LEGEND

SITE

1000FT BUFFER

KARST POTENTIAL

CRITICAL

HIGH

MEDIUM

LOW

Marathon Oil

Karst Potential
Ender Wiggins
14 Fed 1H

VERTEX

DRAWN:	NM
APPROVED:	KM
DATE:	AUG 06/19

FIGURE: **1**

VERSATILITY. EXPERTISE.

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- **OTHER AREAS OF FLOOD HAZARD**
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- **OTHER FEATURES**
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/5/2019 at 12:00:39 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lea County, New Mexico

August 5, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,790 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lea County, New Mexico
Survey Area Data: Version 15, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Sep 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PU	Pyote and maljamar fine sands	6.0	48.4%
WF	Wink fine sand	6.4	51.6%
Totals for Area of Interest		**12.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lea County, New Mexico

PU—Pyote and maljamar fine sands

Map Unit Setting

National map unit symbol: dmqq
Elevation: 3,000 to 3,900 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 60 to 62 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Maljamar and similar soils: 45 percent
Pyote and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Maljamar

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 24 inches: fine sand
Bt - 24 to 50 inches: sandy clay loam
Bkm - 50 to 60 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 60 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Loamy Sand (R042XC003NM)
Hydric soil rating: No

Description of Pyote

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 30 inches: fine sand
Bt - 30 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Loamy Sand (R042XC003NM)
Hydric soil rating: No

Minor Components

Kermit

Percent of map unit: 10 percent
Ecological site: Sandhills (R042XC022NM)
Hydric soil rating: No

WF—Wink fine sand

Map Unit Setting

National map unit symbol: dmrl
Elevation: 2,600 to 4,600 feet

Mean annual precipitation: 10 to 21 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 185 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Wink and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wink

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous sandy alluvium and/or calcareous sandy eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 12 inches: fine sand
Bk - 12 to 23 inches: sandy loam
BCk - 23 to 60 inches: variable

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XC005NM)
Hydric soil rating: No

Minor Components

Jal

Percent of map unit: 5 percent
Ecological site: Limy (R042XC030NM)
Hydric soil rating: No

Midessa

Percent of map unit: 4 percent
Ecological site: Loamy (R042XC007NM)
Hydric soil rating: No

Drake

Percent of map unit: 3 percent
Landform: Playa dunes
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: High Lime 16-21" PZ (R077CY026TX)
Hydric soil rating: No

Kermit

Percent of map unit: 3 percent
Ecological site: Sandhills (R042XC022NM)
Hydric soil rating: No

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ATTACHMENT 5

Table 3. Soil Characterization - Salinity and Petroleum Hydrocarbon Parameters
Client Name: Marathon Oil
Site Name: Ender Wiggins 14 WA Fed Com #001H
Project #: 19E-00614-010
Lab Report: 1908697-001

Table 3. Soil Analysis - August 11, 2019																			
Sample Description			Field Screening			Petroleum Hydrocarbons													Inorganic
						Volatile							Extractable						
Sample ID	Depth (ft)	Sample Date	Volatile Organic Compounds (PID)	Extractable Organic Compounds (PetroFla	Quantab Result (High/Low)	Benzene	Toluene	Ethylbenzene	Xylenes (o&m)	Xylenes (p)	Xylenes (Total)	BTEX (Total)	Gasoline Range Organics (GRO)	Diesel Range Organics (DRO)	Motor Oil Range Organics (MRO)	(GRO + DRO)	Total Petroleum Hydrocarbons (TPH)	Chloride
			(ppm)	(ppm)	(+/-)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Base 19-01	**1**	8/11/2019	3.40	136.00	522.00	ND	ND	ND			ND	ND	ND	71	78	71	149	390.0
Base 19-02	**1**	8/11/2019	1.90	117.00	522.00	ND	ND	ND			ND	ND	ND	76	150	76	226	440.0

Bold and Shaded indicates exceedance outside of applied action level.

VERTEX

ATTACHMENT 6

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

August 14, 2019

Dennis Williams

Marathon Oil Company
4111 Tidwell Road
Carlsbad, NM 88220
TEL: (575) 297-0956
FAX:

RE: Ender Wiggins 14 Federal Com 1H OrderNo.: 1908697

Dear Dennis Williams:

Hall Environmental Analysis Laboratory received 2 sample(s) on 8/13/2019 for the analyses presented in the following report.

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

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

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon Oil Company
Client Sample ID: Base 19-01 1.0'
Project: Ender Wiggins 14 Federal Com 1H
Collection Date: 8/11/2019 11:00:00 AM
Lab ID: 1908697-001
Matrix: MEOH (SOIL)
Received Date: 8/13/2019 9:35:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **CAS**	
Chloride	390	60		mg/Kg	20	8/13/2019 1:37:15 PM	46757
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	71	9.3		mg/Kg	1	8/13/2019 12:13:07 PM	46750
Motor Oil Range Organics (MRO)	78	47		mg/Kg	1	8/13/2019 12:13:07 PM	46750
Surr: DNOP	116	70-130		%Rec	1	8/13/2019 12:13:07 PM	46750
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	3.8		mg/Kg	1	8/13/2019 1:57:34 PM	G62098
Surr: BFB	95.3	77.4-118		%Rec	1	8/13/2019 1:57:34 PM	G62098
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.019		mg/Kg	1	8/13/2019 1:57:34 PM	B62098
Toluene	ND	0.038		mg/Kg	1	8/13/2019 1:57:34 PM	B62098
Ethylbenzene	ND	0.038		mg/Kg	1	8/13/2019 1:57:34 PM	B62098
Xylenes, Total	ND	0.076		mg/Kg	1	8/13/2019 1:57:34 PM	B62098
Surr: 4-Bromofluorobenzene	91.2	80-120		%Rec	1	8/13/2019 1:57:34 PM	B62098

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon Oil Company
Client Sample ID: Base 19-02 1.0'
Project: Ender Wiggins 14 Federal Com 1H
Collection Date: 8/11/2019 11:00:00 AM
Lab ID: 1908697-002
Matrix: MEOH (SOIL)
Received Date: 8/13/2019 9:35:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **CAS**	
Chloride	440	60		mg/Kg	20	8/13/2019 1:49:40 PM	46757
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	76	9.4		mg/Kg	1	8/13/2019 12:37:27 PM	46750
Motor Oil Range Organics (MRO)	150	47		mg/Kg	1	8/13/2019 12:37:27 PM	46750
Surr: DNOP	109	70-130		%Rec	1	8/13/2019 12:37:27 PM	46750
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	3.6		mg/Kg	1	8/13/2019 2:21:02 PM	G62098
Surr: BFB	96.0	77.4-118		%Rec	1	8/13/2019 2:21:02 PM	G62098
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.018		mg/Kg	1	8/13/2019 2:21:02 PM	B62098
Toluene	ND	0.036		mg/Kg	1	8/13/2019 2:21:02 PM	B62098
Ethylbenzene	ND	0.036		mg/Kg	1	8/13/2019 2:21:02 PM	B62098
Xylenes, Total	ND	0.072		mg/Kg	1	8/13/2019 2:21:02 PM	B62098
Surr: 4-Bromofluorobenzene	92.9	80-120		%Rec	1	8/13/2019 2:21:02 PM	B62098

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1908697**
14-Aug-19

Client: Marathon Oil Company
Project: Ender Wiggins 14 Federal Com 1H

Sample ID: **MB-46757**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBS**	Batch ID: **46757**	RunNo: **62096**
Prep Date: **8/13/2019**	Analysis Date: **8/13/2019**	SeqNo: **2108091** Units: **mg/Kg**

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

Sample ID: **LCS-46757**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSS**	Batch ID: **46757**	RunNo: **62096**
Prep Date: **8/13/2019**	Analysis Date: **8/13/2019**	SeqNo: **2108092** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	15	1.5	15.00	0	97.0	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1908697**

14-Aug-19

Client: Marathon Oil Company

Project: Ender Wiggins 14 Federal Com 1H

Sample ID: **LCS-46750**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **46750**	RunNo: **62090**
Prep Date: **8/13/2019**	Analysis Date: **8/13/2019**	SeqNo: **2107006** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	55	10	50.00	0	110	63.9	124			
Surr: DNOP	4.9		5.000		97.3	70	130			

Sample ID: **MB-46750**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **46750**	RunNo: **62090**
Prep Date: **8/13/2019**	Analysis Date: **8/13/2019**	SeqNo: **2107007** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	10		10.00		104	70	130			

Sample ID: **LCS-46728**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **46728**	RunNo: **62090**
Prep Date: **8/12/2019**	Analysis Date: **8/13/2019**	SeqNo: **2108302** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.3		5.000		85.1	70	130			

Sample ID: **MB-46728**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **46728**	RunNo: **62090**
Prep Date: **8/12/2019**	Analysis Date: **8/13/2019**	SeqNo: **2108305** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.7		10.00		97.2	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1908697**

14-Aug-19

Client: Marathon Oil Company

Project: Ender Wiggins 14 Federal Com 1H

Sample ID: **RB**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **G62098**	RunNo: **62098**
Prep Date:	Analysis Date: **8/13/2019**	SeqNo: **2107567** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	1000		1000		101	77.4	118			

Sample ID: **2.5UG GRO LCS**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **G62098**	RunNo: **62098**
Prep Date:	Analysis Date: **8/13/2019**	SeqNo: **2107568** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	96.6	80	120			
Surr: BFB	1100		1000		111	77.4	118			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1908697**

14-Aug-19

Client: Marathon Oil Company

Project: Ender Wiggins 14 Federal Com 1H

Sample ID: **RB**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBS**	Batch ID: **B62098**	RunNo: **62098**
Prep Date:	Analysis Date: **8/13/2019**	SeqNo: **2107583** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	1.0		1.000		99.8	80	120			

Sample ID: **100NG BTEX LCS**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSS**	Batch ID: **B62098**	RunNo: **62098**
Prep Date:	Analysis Date: **8/13/2019**	SeqNo: **2107584** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.0	0.025	1.000	0	100	80	120			
Toluene	1.1	0.050	1.000	0	106	80	120			
Ethylbenzene	1.1	0.050	1.000	0	108	80	120			
Xylenes, Total	3.2	0.10	3.000	0	108	80	120			
Surr: 4-Bromofluorobenzene	1.1		1.000		108	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **MARATHON OIL COMPA** Work Order Number: **1908697** RcptNo: **1**

Received By: **Erin Melendrez** **8/13/2019 9:35:00 AM**

Completed By: **Leah Baca** **8/13/2019 9:57:52 AM**

Reviewed By: ENM 8/13/19

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? Courier

Log In

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

# of preserved bottles checked for pH: (<2 or >12 unless noted)
Adjusted?
Checked by: LB 8/13/19

Special Handling (if applicable)

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

Person Notified: Date
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.3	Good	Not Present			

Chain-of-Custody Record

Same Day

Turn-Around Time: ~~24 Hour~~ Turn
☐ Standard ☑ ~~Rush~~

Client: Marathon Oil
Bill Vertex

Mailing Address: 4111 S. Tidwell dr.
Carlsbad, NM 88220

Phone #: 575-988-0561

email or Fax#: icastro@marathonoil.com

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

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☐ EDD (Type)

Project Name: Ender Wiggins 14 Federal Com 1H

Project #: 19E-00614

Project Manager: Dennis Williams
Permian@Vertex.ca

Sampler:

On Ice: ☑ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 7.8-0.5(CF)=(°C) 2.3°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 1908697	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
8-11-19	11:00A	Soil	Base19-01 1.0'	1 JAR		-001	X	X					X			
8-11-19	11:00A	Soil	Base19-02 1.0'	1 JAR		-002	X	X					X			

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
8-12-19	8:50A		Ym Reback		8-12-19	830am
8/12/19	830am	Ym Reback			8/12/19	0830
8/12/19	1900				8/13/19	0935

Remarks:

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