February 13, 2020 Vertex Project #: 19E-00575-017

Spill Closure Report: Fighting Okra 18 CTB 3
Unit D, Section 18, Township 26 South, Range 34 East
County: Lea
Tracking Number: TBD

Prepared For: Devon Energy Production Company
6488 Seven Rivers Highway
Artesia, New Mexico 88210

New Mexico Oil Conservation Division – District 1 – Hobbs
1625 North French Drive
Hobbs, New Mexico 88240

Devon Energy Production Company (Devon) retained Vertex Resource Services Inc. (Vertex) to conduct a spill assessment and remediation for a produced water release that occurred at Fighting Okra 18 Central Tank Battery (CTB) 3 (hereafter referred to as "Fighting Okra"). Devon provided notification of the spill via email to New Mexico Oil Conservation Division (NM OCD) District 1 and the Bureau of Land Management (BLM) on August 6, 2019, and followed up with submission of an initial C-141 Release Notification (Attachment 1) on August 8, 2019. The NM OCD tracking number for this incident is not yet assigned.

This letter provides a description of the spill assessment and remediation activities, and demonstrates that closure criteria established in 19.15.29.12 *New Mexico Administrative Code* (NMAC; New Mexico Oil Conservation Division, 2018) have been met and all applicable regulations are being followed. This document is intended to serve as a final report to obtain approval from NM OCD for closure of this release, with the understanding that any restoration of the site required as a result of this incident will be deferred until such time as oil and gas activities are terminated and the site is reclaimed per 19.15.29.13 NMAC.

Incident Description

On August 5, 2019, a release occurred at Devon's Fighting Okra site due to a hole on a dump valve of one of the three-phase separators. This incident resulted in the release of approximately 216 barrels (bbls) of produced water and three bbls of oil onto the wellpad underneath the production equipment. Upon discovery of the release, repairs were made and a hydrovac truck was dispatched to the site to recover free liquids. Approximately 15 bbls of produced water were recovered from the spill area and removed for disposal off-site. No oil or produced water was released into undisturbed areas or waterways.

Site Characterization

The release at Fighting Okra occurred on federally owned land, N 32.25695, W 103.305932, approximately 11 miles north-northwest of Jal, New Mexico. The legal description for the site is Unit D, Section 18, Township 26 South, Range 34 East, 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 in Attachment 2.

Fighting Okra is typical of oil and gas exploration and production sites in the western portion of the Permian Basin, and is currently used for oil and gas production, and storage. The following sections specifically describe the release area on the southern portion of the constructed wellpad where the heater treater is located.

The climate is semiarid, with average annual precipitation ranging between 10 and 12 inches. Litter, and to a lesser extent bare ground, are a significant proportion of ground cover; grasses comprise the remainder, with the dominant vegetation primarily being black grama, dropseeds, and bluestems with scattered shinnery oak and sand sage (United States Department of Agriculture, Natural Resources Conservation Service, 2019). Limited to no vegetation is allowed to grow on the compacted wellpad.

The Geological Map of New Mexico (New Mexico Bureau of Geology and Mineral Resources, 2019) indicates the surface geology at Fighting Okra is comprised primarily of Qp – Piedmont alluvial deposits from the Holocene to lower Pleistocene. The United States Department of Agriculture (USDA) *Web Soil Survey* characterizes the soil at the site as Pyote and Maljamar fine sands, which consists of fine sand and a thicker layer of sandy clay loam over a cemented material (United States Department of Agriculture, Natural Resources Conservation Service, 2019). The soil is well-drained with very low runoff and low available moisture levels in the profile. There is low potential for karst geology to be present near Fighting Okra (United States Department of the Interior, Bureau of Land Management, 2019).

There is no surface water located on-site. The nearest significant watercourse, as defined in Subsection P of 19.15.17.7 NMAC, is an intermittent stream located approximately 3.5 miles west-southwest of the release location (United States Department of the Interior, United States Geological Survey [USGS], 2019a). There are no continuously flowing watercourses or significant watercourses, lakebeds, sinkholes, playa lakes, or other critical water or community features as outlined in Paragraph (4) of Subsection C of 19.15.29.12 NMAC.

The nearest active well to the site is a livestock well located approximately 3,000 feet north of Fighting Okra (Google Earth Pro, 2019). Depth to groundwater at that well is 200 feet below ground surface (bgs; New Mexico Office of the State Engineer, New Mexico Water Rights Reporting System, 2019). There are three USGS wells in the vicinity of Fighting Okra, with the nearest well approximately 2,000 feet due east of the release location. That well shows a depth to groundwater of 173 feet bgs (United States Department of the Interior, United States Geological Survey, 2019b). Documentation pertaining to site characterization and depth to groundwater determination is included in Attachment 3.

Closure Criteria Determination

Using site characterization information, a closure criteria determination worksheet (Attachment 3) was completed to determine if the release was subject to any of the special case scenarios outlined in Paragraph (4) of Subsection C of 19.15.29.12 NMAC.

Based on data included in the closure criteria determination worksheet, the release at Fighting Okra is not subject to the requirements of Paragraph (4) of Subsection C of 19.15.29.12 NMAC and the closure criteria for the site are determined to be associated with the following constituent concentration limits.

Table 1. Closure Criteria for Soils Impacted by a Release		
Depth to Groundwater	**Constituent**	**Limit**
>100 feet	Chloride	20,000 mg/kg
	TPH[1] (GRO + DRO + MRO)	2,500 mg/kg
	GRO + DRO	1,000 mg/kg
	BTEX[2]	50 mg/kg
	Benzene	10 mg/kg

[1]Total petroleum hydrocarbons (TPH) = gasoline range organics (GRO) + diesel range organics (DRO) + motor oil range organics (MRO)
[2]Benzene, toluene, ethyl benzene and xylenes (BTEX)

Remedial Actions

An initial spill inspection, completed on August 7, 2019, identified and mapped the boundaries of the spill. The visible release footprint was approximately 231 feet by 106 feet; the total affected area was determined to be approximately 13,671 square feet. The Daily Field Report (DFR) associated with this initial site visit is included in Attachment 4. An electromagnetic (EM) survey was completed on August 22, 2019, using a Geonics EM31 Terrain Conductivity Meter to acquire ground conductivity measurements. The fixed-frequency EM method was used to map variations in ground conductivity to identify anomalously conductive soils and infer changes in the soil characteristics and composition.

This method uses portable instrumentation consisting of a transmitter coil and a receiver coil. A primary magnetic field from the transmitter coil induces subsurface eddy currents, which in turn generate a secondary magnetic field that is intercepted by the receiver coil. The ratio of the primary and secondary magnetic fields is related to ground conductivity.

Ground conductivity is influenced by the following:

- Concentration of total dissolved solids (TDS) within the groundwater
- Type of substrate
- Soil grain size (fine-grained clay is more electrically conductive than coarse-grained material such as sand or gravel)
- Soil temperature (conductivity decreases as soil temperature approaches freezing)

Data was collected continuously along transects spaced approximately 5 yards apart across the release area and data was logged using a Juniper Systems Archer2 Data Logger with an integrated global positioning system (GPS). The effective depth of investigation for the EM31, as operated during this investigation, was approximately 16 feet. The conductivity values are not specific values from discrete depths but are weighted averages of conductivity between the surface and the depth of exploration of the EM field, and are termed ‘apparent conductivity’. The apparent conductivity values obtained are in units of millisiemens per metre (mS/m).

The EM survey report from August 22, 2019, showed high apparent conductivity levels in the vicinity of the release underneath the production equipment, as expected. The EM survey data showed that the release did not spread northward across the pad, nor did the data indicate that the contamination migrated off-site. The EM survey results site

schematic is included in Attachment 5. The information from the EM survey report was used to develop an excavation plan for remediation of the contaminated portion of the pad.

Between August 23 and August 29, 2019, a Vertex representative was on-site to guide excavation using the EM survey results and field screen data to determine the extent of soil removal. At the completion of excavation activities on August 29, 2019, Vertex conducted confirmatory sampling. Vertex collected one background sample and 17 composite confirmatory soil samples, each representative of no more than 200 square feet per the alternate sampling method outlined in Subparagraph (c) of Paragraph (1) of Subsection D 19.15.29.12 NMAC, which does not require prior NM OCD approval. The composite samples were placed into laboratory-provided containers, preserved on ice, and submitted to a National Environmental Laboratory Accreditation Program (NELAP)-approved laboratory for chemical analysis. The DFRs associated with Vertex remediation activities are included as Attachment 4.

Laboratory analyses included Method 300.0 for chlorides, Method 8021B for volatile organics, including benzene and BTEX, and EPA Method 8015 for TPH, including MRO, DRO and GRO. Confirmatory sample analytical data are summarized in Table 2 (Attachment 6). Laboratory data reports and chain of custody forms are included in Attachment 7.

A GeoExplorer 7000 Series Trimble GPS unit was used to map the approximate center of each of the five-point composite samples. The confirmatory sample locations are presented on Figure 1 (Attachment 2).

Closure Request

Vertex does not recommend any additional remediation action to address the release at Fighting Okra. Laboratory analyses of the confirmatory samples showed constituent of concern concentration levels below NM OCD Closure Criteria for areas where depth to groundwater is greater than 100 feet bgs as shown in Table 1. There are no anticipated risks to human, ecological or hydrological receptors associated with the release site.

The spill area was excavated and sampled, and has been backfilled with clean material to the extent necessary. As the release occurred on an active wellpad, Vertex requests that restoration and reclamation of the spill area be deferred until such time as the wellpad is removed and the site is reclaimed per 19.15.29.13 NMAC.

Vertex requests that this incident be closed as all closure requirements set forth in Subsection E of 19.15.29.12 NMAC have been met. Devon certifies that all information in this report and the attachments is correct, and that they have complied with all applicable closure requirements and conditions specified in Division rules and directives to meet NM OCD requirements to obtain closure on the August 5, 2019, release at Fighting Okra 18 CTB 3.

Should you have any questions or concerns, please do not hesitate to contact me at 505.506.0040 or ngordon@vertex.ca.

Sincerely,

Natalie Gordon
PROJECT MANAGER

Attachments

References

Google Earth Pro. (2019). *Measured Distance from the Subject Site to Nearest Water Source.* Retrieved from http://earth.google.com.

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

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

New Mexico Oil Conservation Division. (2018). *Natural Resources and Wildlife Oil and Gas Releases*. Santa Fe, New Mexico.

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

United States Department of Agriculture, Natural Resources Conservation Service, (2019). *Web Soil Survey*. Retrieved from https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

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

United States Department of the Interior, United States Geological Survey. (2019b). *Groundwater for New Mexico: Water Levels*. Retrieved from https://nwis.waterdata.usgs.gov/nm/nwis/gwlevels? .

United States Department of the Interior, United States Geological Survey. (2019a). *The National Map: National Hydrography Dataset*. Retrieved from http://nationalmap.gov/index.

Limitations

This report has been prepared for the sole benefit of Devon Energy Production Company (Devon). 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. (Vertex) and Devon. 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

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	NVV2003741819
District RP	
Facility ID	
Application ID	

Release Notification

Responsible Party

Responsible Party	OGRID
Contact Name	Contact Telephone
Contact email	Incident # *(assigned by OCD)*
Contact mailing address	

Location of Release Source

Latitude _____ Longitude _____
(NAD 83 in decimal degrees to 5 decimal places)

Site Name	Site Type
Date Release Discovered	API# *(if applicable)*

Unit Letter	Section	Township	Range	County

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)	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		

State of New Mexico
Oil Conservation Division

Incident ID	NVV2003741819
District RP	
Facility ID	
Application ID	

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: _____ Title: _____

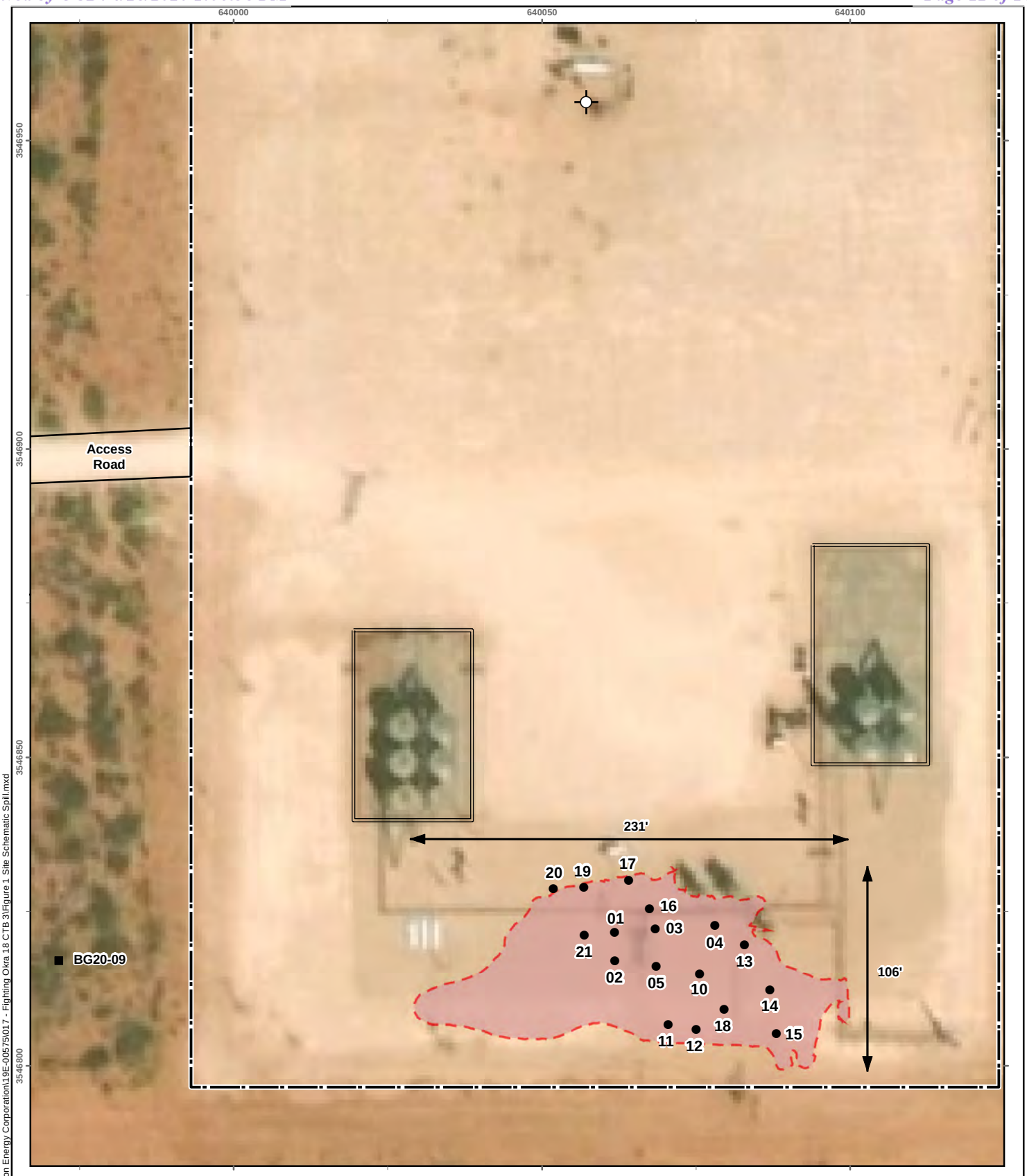
Signature: Kendra DeHoyos Date: _____

email: _____ Telephone: _____

OCD Only

Received by: _____ Date: _____

ATTACHMENT 2



Base Sample - Prefixed with "BS19"
Background Sample
Wellhead
Access Road
Well Pad
Containment
Spill Area (~13,671 sq.ft.)

VERTEX

0 12.5 25 50 ft.

NAD 1983 UTM Zone 13N
Date: Feb 13/20

N

Site Schematic and Confirmatory Sample Locations
Fighting Okra 18 CTB 3
Map Center: Lat/Long: 32.049426, -103.516608

FIGURE: 1

devon

Geospatial data presented in this figure may be derived from external sources and Vertex does not assume any liability for inaccuracies. This figure is intended for reference use only and is not certified for legal, survey, or engineering purposes.

Note: Background image from ESRI 2017.

VERSATILITY. EXPERTISE.

Document Path: G:\1-Projects_US PROJECTS\Devon Energy Corporation\19E-00575\017 - Fighting Okra 18 CTB 3\Figure 1 Site Schematic Spill.mxd

ATTACHMENT 3

Closure Criteria Determination Research			
Site Name: Fighting Okra 18 CTB 3			
Spill Coordinates:		X: 640066.57	Y: 3546813.67
Site Specific Conditions		Value	Unit
1	Depth to Groundwater	**200**	feet
2	Within 300 feet of any continuously flowing watercourse or any other significant watercourse	12,403	feet
3	Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)	40,963	feet
4	Within 300 feet from an occupied residence, school, hospital, institution or church	8,015	feet
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**	57,382	feet
	ii) Within 1000 feet of any fresh water well or spring	2,932	feet
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)
7	Within 300 feet of a wetland	1809	feet
8	Within the area overlying a subsurface mine	No	(Y/N)
9	Within an unstable area (Karst Map)	Low	Critical High Medium Low
10	Within a 100-year Floodplain	Undetermined Zone D Shaded	year
NMAC 19.15.29.12 E (Table 1) Closure Criteria		>100'	<50' 51-100' >100'

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	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 02295	CUB	LE	2	2	4	12	26S	33E	639850	3547710*	922	250	200	50
C 02293	CUB	LE	2	2	1	14	26S	33E	637501	3546975	2571	200	135	65
C 02294	CUB	LE	4	4	3	11	26S	33E	637465	3547003	2608	200	145	55
C 02292 POD1	CUB	LE	4	1	2	06	26S	34E	640992	3549987	3305	200	140	60
C 03441 POD1	C	LE	4	1	2	06	26S	34E	640971	3550039	3350	250		
C 03442 POD1	C	LE	4	1	2	06	26S	34E	641056	3550028	3363	251		
C 02291	CUB	LE	1	1	2	06	26S	34E	640825	3550140*	3411	220	160	60
C 02289	CUB	LE	4	4	4	03	26S	33E	636612	3548675*	3924	200	160	40
C 02288	CUB	LE	4	4	4	03	26S	33E	636646	3548758	3934	220	180	40
C 02285 POD1	CUB	LE	1	4	4	03	26S	33E	636613	3548855	4011	220	220	0
C 02290	CUB	LE	4	4	4	03	26S	33E	636538	3548770	4035	200	160	40
C 02286	CUB	LE	3	4	4	03	26S	33E	636470	3548714	4068	220	175	45
C 02287	C	LE	3	4	4	03	26S	33E	636427	3548708	4102	220		

Average Depth to Water: **167 feet**

Minimum Depth: **135 feet**

Maximum Depth: **220 feet**

Record Count: 13

UTMNAD83 Radius Search (in meters):

Easting (X): 640066.57 **Northing (Y):** 3546813.67 **Radius:** 5000

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

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

U.S. Fish and Wildlife Service
National Wetlands Inventory

Fighting Orka Watercourse 12,403 ft

August 13, 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 To

Legend | Basemap | Query

1:36,112

Legend

All Layers On/Off

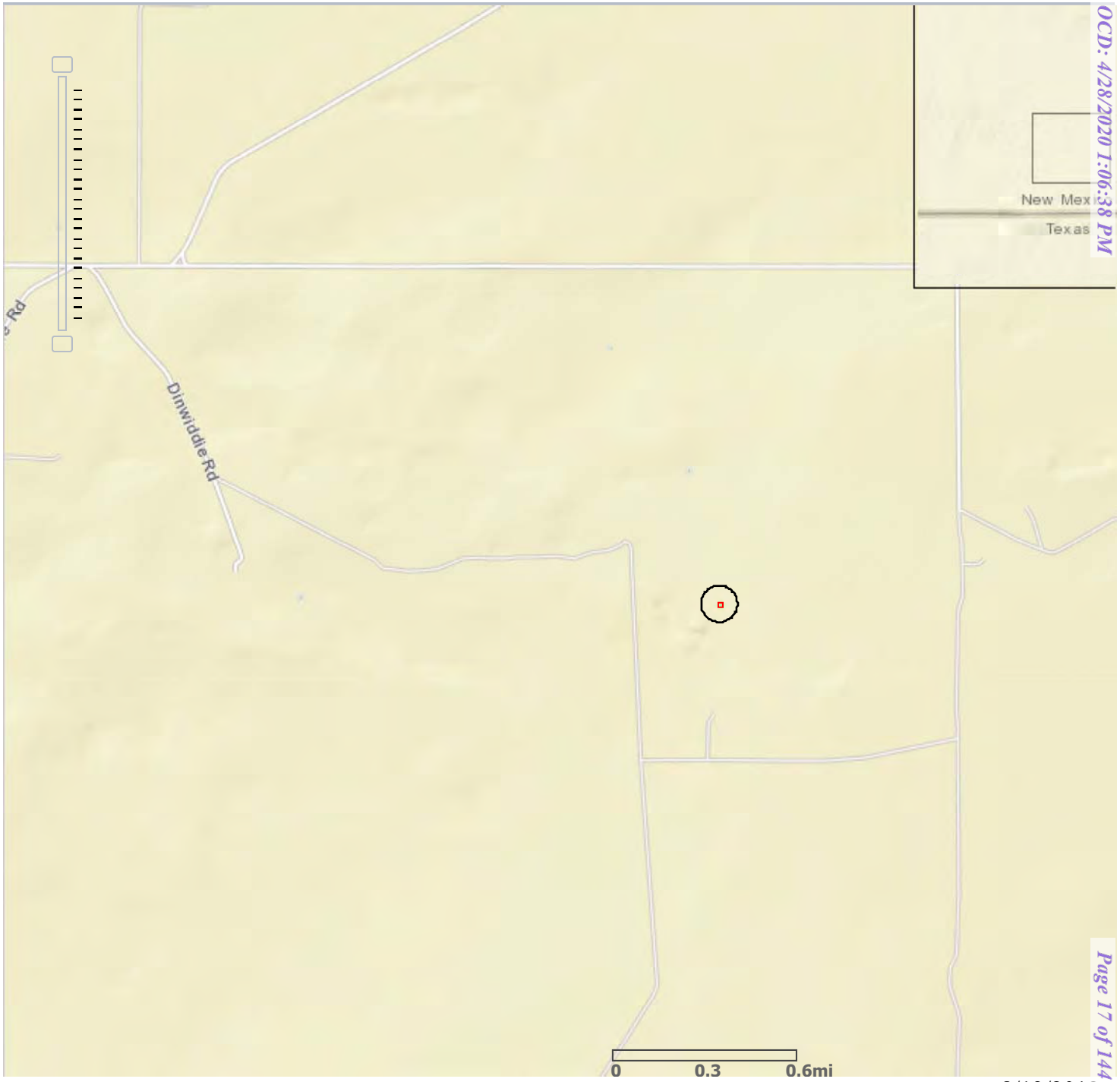
All Layer Transparency

- 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

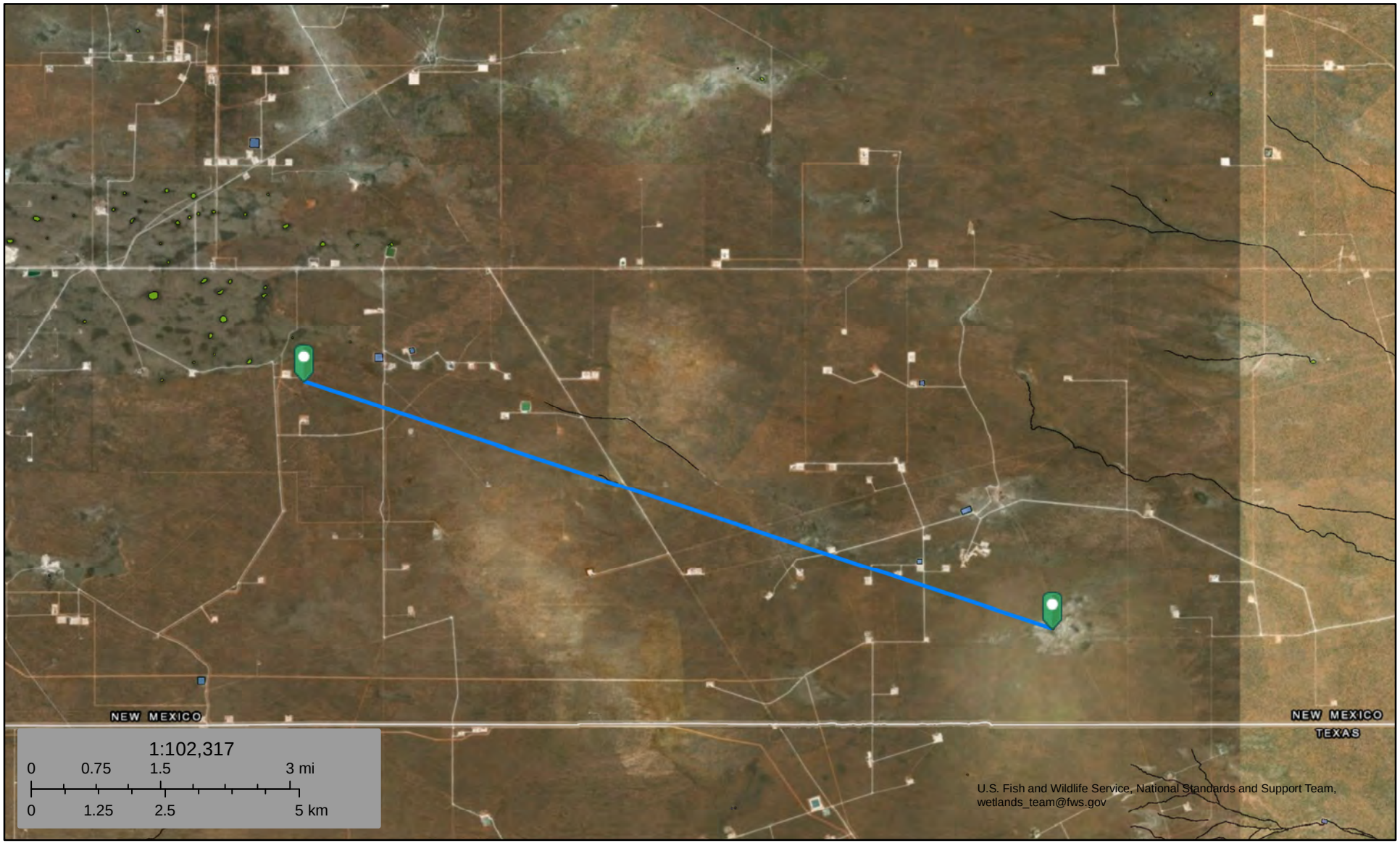


Received by OCD: 4/28/2020 1:06:38 PM

Page 17 of 144

U.S. Fish and Wildlife Service
National Wetlands Inventory

Fighting Okra Pond 40,963 ft.

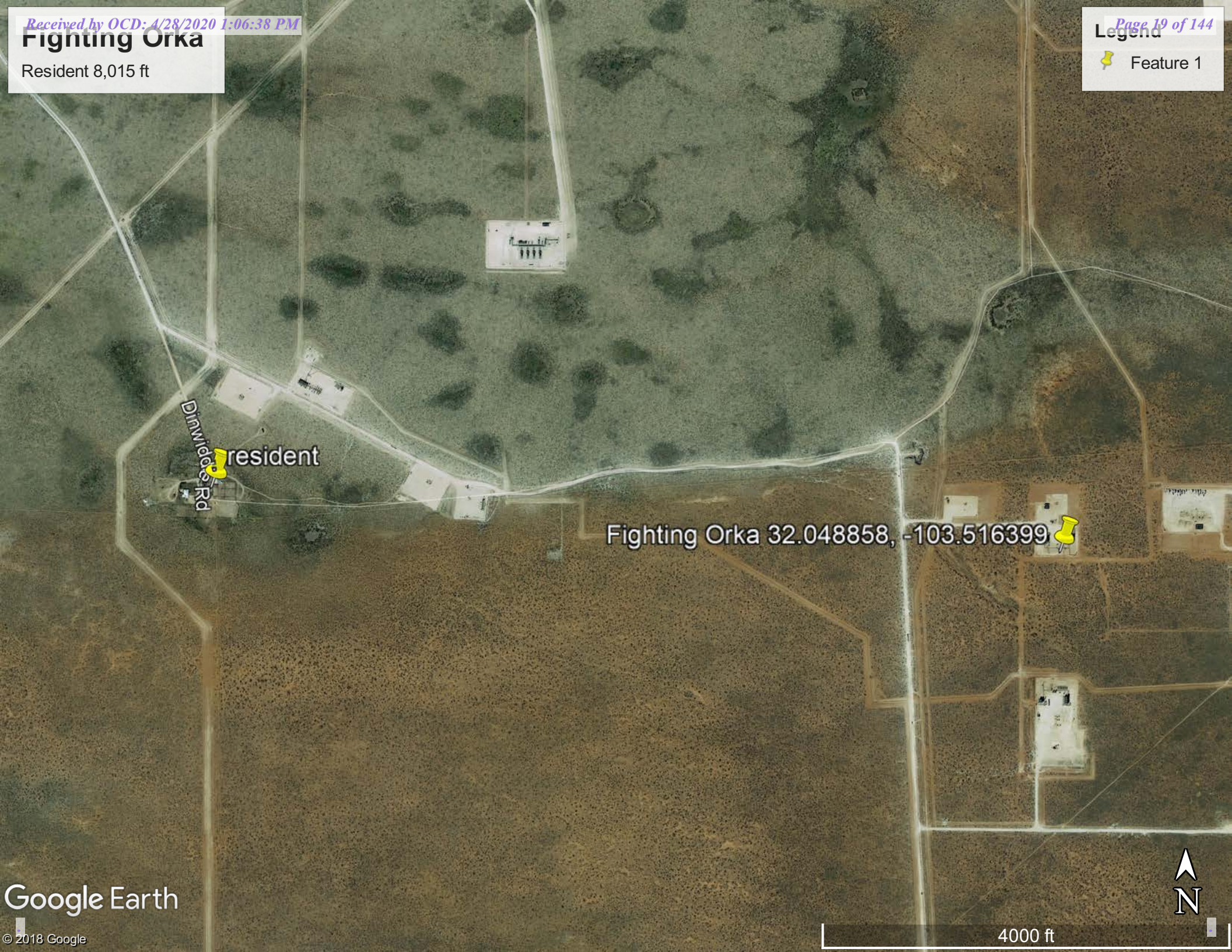


August 8, 2019

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.


Fighting Orka
Resident 8,015 ft
Legend
Feature 1
Dinwiddie Rd
resident
Fighting Orka 32.048858, -103.516399
Google Earth
© 2018 Google
N
4000 ft

Fighting Okra

Livestock Well Distance: 2932 ft.

Legend

Feature 1

Livestock Well 32.056969, -103.518562

Fighting Okra

Google Earth

© 2018 Google

N

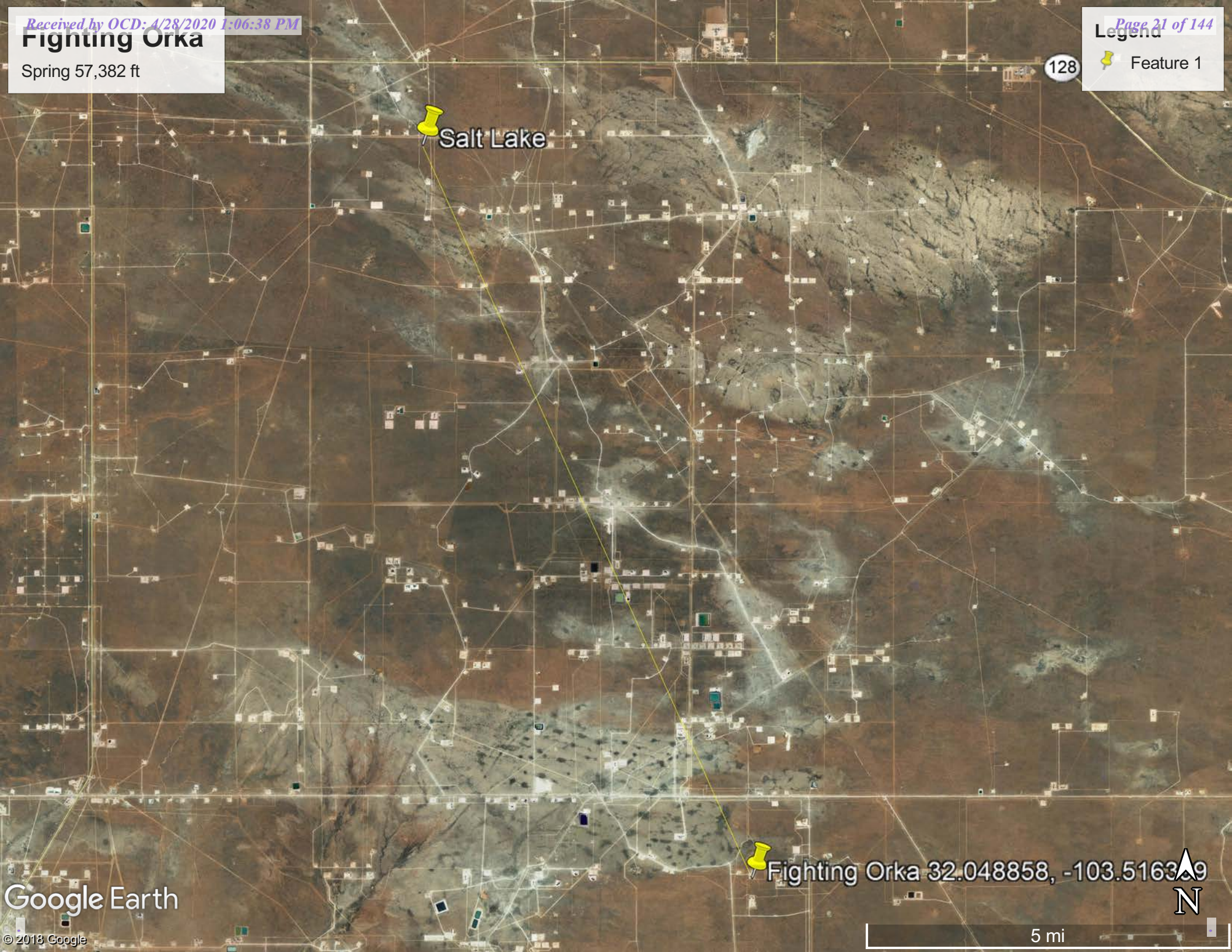
500 m

Fighting Orka

Spring 57,382 ft

Legend

Feature 1



New Mexico Office of the State Engineer

Wells with Well Log Information

(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	Source	q 6416	q 4	Sec	Twn	Rng	X	Y	Distance	Start Date	Finish Date	Log File Date	Depth Well	Depth Water	Driller	License Number
C 03441 POD1	C	LE	Shallow	4 1	2	06	26S	34E	640971	3550039	3350	05/03/2010	05/03/2010	05/17/2010	250		EADES, ALAN	1044
C 03442 POD1	C	LE	Shallow	4 1	2	06	26S	34E	641056	3550028	3363	05/03/2010	05/03/2010	05/17/2010	251		EADES, ALAN	1044

Record Count: 2

UTMNAD83 Radius Search (in meters):

Easting (X): 640066.57 **Northing (Y):** 3546813.67 **Radius:** 5000

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

U.S. Fish and Wildlife Service
National Wetlands Inventory

Fighting Okra Wetland 1,809 ft.

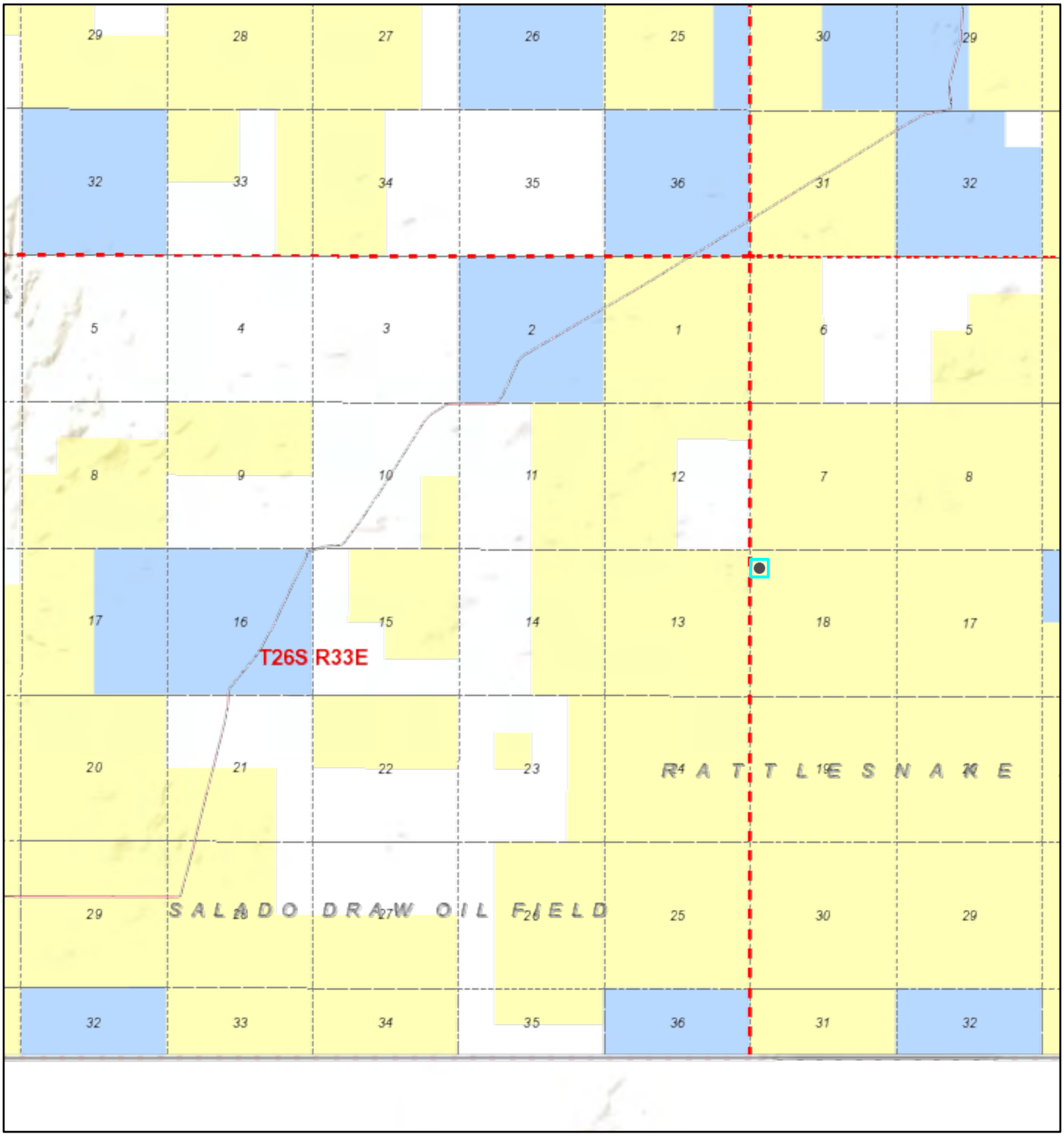
August 8, 2019

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



8/8/2019, 1:14:21 PM

1:72,224

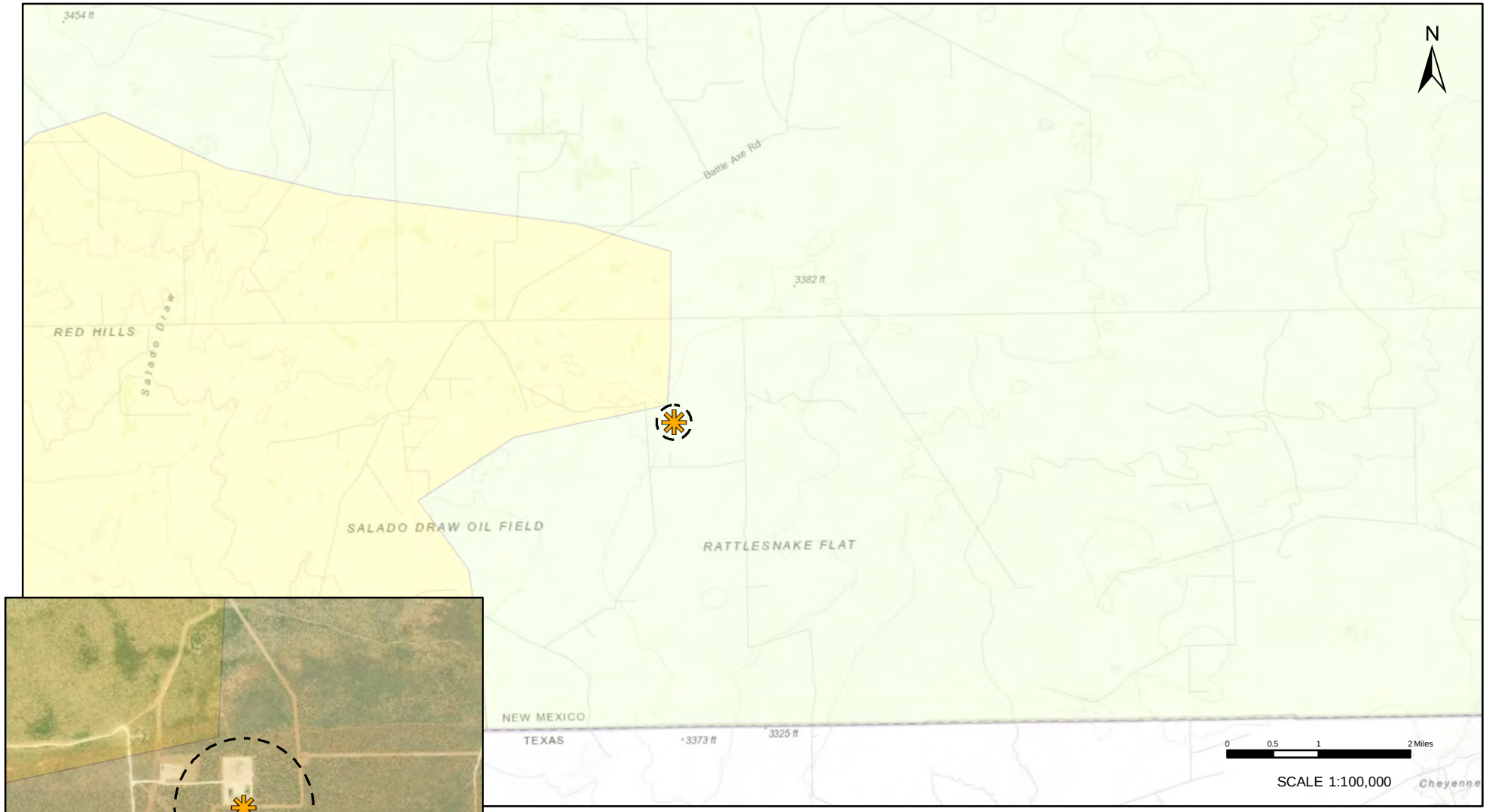
0 0.5 1 2 mi

0 0.75 1.5 3 km

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)



LEGEND

SITE

1000FT BUFFER

KARST POTENTIAL

CRITICAL

HIGH

MEDIUM

LOW

Notes: Aerial Image from ESRI Digital Globe 2017

devon

Karst Potential
Fighting Okra
18 19 Fed 3H

VERTEX

DRAWN:	NM
APPROVED:	SH
DATE:	AUG 11/19

FIGURE: 1

VERSATILITY. EXPERTISE.

National Flood Hazard Layer FIRMette

FEMA

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 8/7/2019 at 8:05:48 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

September 26, 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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: 1:1,410 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

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	9.8	100.0%
Totals for Area of Interest		**9.8**	**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

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

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 02295	CUB	PLS	3	INTREPID POTASH NEW MEXICO LLC	LE	C 02295					2 2 4	12	26S	33E	639850	3547710*	922

Record Count: 1

UTMNAD83 Radius Search (in meters):

Easting (X): 640066.57 **Northing (Y):** 3546813.67 **Radius:** 1610

Sorted by: Distance

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

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

ATTACHMENT 4

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/7/2019
Site Location Name:		Report Run Date:	8/7/2019 10:54 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	8/7/2019 8:00 AM
Arrived at Site	8/7/2019 10:32 AM
Departed Site	8/7/2019 11:35 AM
Returned to Office	8/7/2019 2:08 PM

Summary of Daily Operations

10:32 Inspect and map 3 phase separator spill.

Next Steps & Recommendations

1 Verify spill extent with surface sampling.

Daily Site Visit Report

Site Photos

Viewing Direction: South	**Viewing Direction**: Southeast
	
Separator and spill from north.	Separator and spill from NW.
Viewing Direction: West	**Viewing Direction**: West
	
Separator and spill from West.	Further at West teaching part of spill

Daily Site Visit Report

Viewing Direction: Southwest

Separator and spill from SW.

Viewing Direction: South

Separator and spill from South. Taken from Southern lease fence.

Viewing Direction: South

Separator and spill from outside of southern lease fence.

Viewing Direction: Northwest

Separator and spill from southeastern reach of spill; outside lease fence.

Daily Site Visit Report

Viewing Direction: West	**Viewing Direction**: West
	
Extent of spill outside lease fence.	Southern edge of spill taken from the east.
Viewing Direction: East	**Viewing Direction**: West
	
Eastern extent of spill.	Separator and spill from east.

Daily Site Visit Report

Viewing Direction: West	**Viewing Direction**: Northeast
	
Separator and spill from East.	NE extent of spill
Viewing Direction: Southwest	**Viewing Direction**: Southwest
	
Separator and spill from East footbridge.	Taken from NE footbridge.

Daily Site Visit Report

Viewing Direction: South

N extent of spill.

Viewing Direction: West

Spill taken from W footbridge.

Viewing Direction: Southwest

Spill taken from West footbridge.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Sharlene Harvester

Signature: 

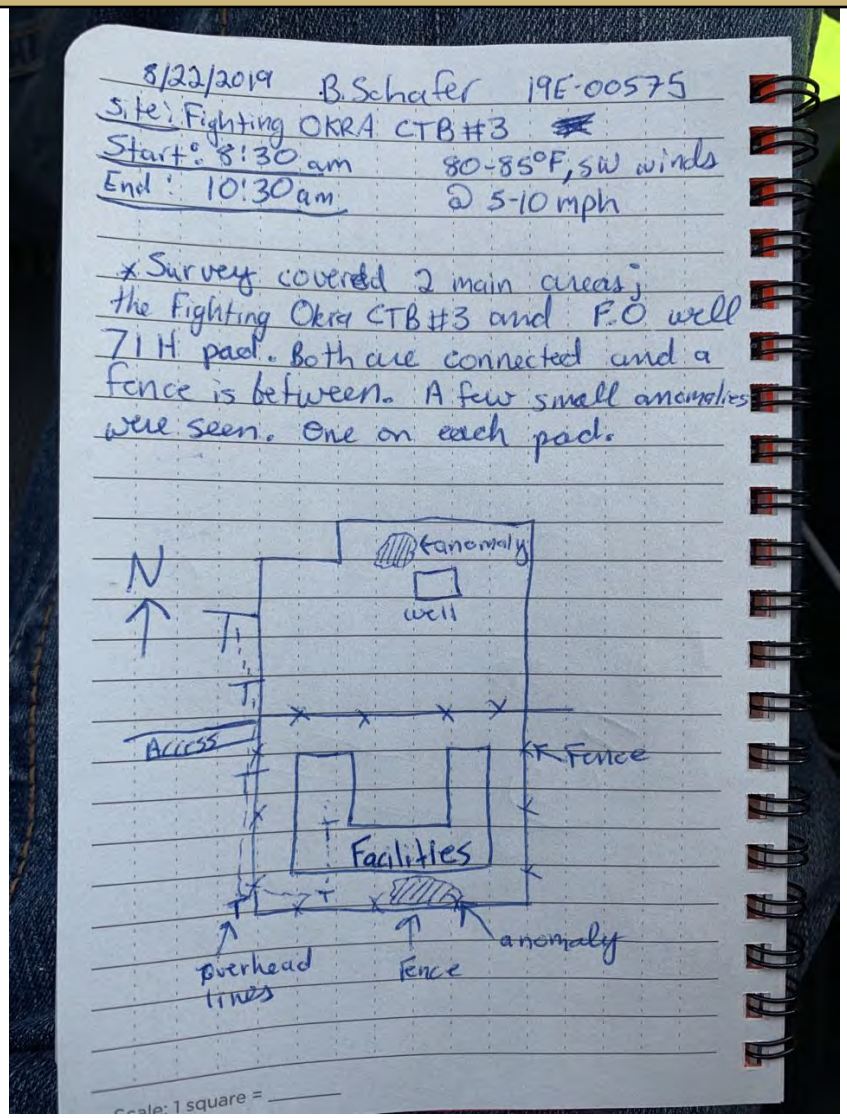
Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/22/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/23/2019 1:15 AM
Project Owner:	Amanda T. Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	NEW SPILL
Client Contact Phone #:	(575) 748-0176		

Summary of Times	
Left Office	8/22/2019 6:00 AM
Arrived at Site	8/22/2019 8:00 AM
Departed Site	8/22/2019 11:00 AM
Returned to Office	8/22/2019 1:00 PM

Daily Site Visit Report

Site Sketch



Daily Site Visit Report

Summary of Daily Operations

8:20 EM Survey

Next Steps & Recommendations

1 Await EM results

Daily Site Visit Report

Site Photos

Viewing Direction: Southeast	**Viewing Direction**: East
	
Overview of site	View East from Entrance
Viewing Direction: South	**Viewing Direction**: East
	
View south from entrance	View East across South end of pad/Spill area

Daily Site Visit Report

Viewing Direction: Northeast

View across pad from SW end

Viewing Direction: Northwest

View across spill area

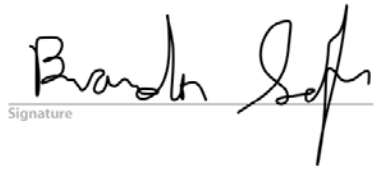
Viewing Direction: Southwest

View from NE end of pad 71H

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Brandon Schafer

Signature: 

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/23/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/24/2019 10:44 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	8/23/2019 6:45 AM
Arrived at Site	8/23/2019 8:45 AM
Departed Site	
Returned to Office	

Summary of Daily Operations

8:53 Fill out arrival and safety forms
Tailgate safety meeting
Begin excavation
Field screen
Fill out DFR
Take pictures
Return to office

Next Steps & Recommendations

1

Sampling

Daily Site Visit Report

VERTEX

TP19-01

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
0.5 ft.		107 ppm	High (300-6000ppm)	925 ppm		✓	,	Yes
1 ft.		62 ppm	Low (30-600 ppm)	150 ppm		✓	,	Yes

TP19-02

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.		47 ppm	Low (30-600 ppm)	78 ppm		✓	,	Yes
6 ft.		715 ppm	High (300-6000ppm)	512 ppm		✓	,	Yes

TP19-03

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.		236 ppm	Low (30-600 ppm)	619 ppm		✓	,	Yes
2 ft.		0 ppm	Low (30-600 ppm)	58 ppm		✓	,	Yes

Daily Site Visit Report

VERTEX

TP19-04

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
0.5 ft.		56 ppm	Low (30-600 ppm)	512 ppm		✓	,	Yes
1 ft.		20 ppm	Low (30-600 ppm)	110 ppm		✓	,	Yes

TP19-05

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.		91 ppm	Low (30-600 ppm)	512 ppm		✓	,	Yes

TP19-06

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
0.5 ft.		871 ppm	Low (30-600 ppm)	196 ppm		✓	,	Yes

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: TP19-01

Depth: 0.5 ft.

Sample Point ID: TP19-02

Depth: 6 ft.

Sample Point ID: TP19-03

Depth: 1 ft.

Sample Point ID: TP19-04

Depth: 0.5 ft.

Daily Site Visit Report

Sample Point ID: TP19-05	**Sample Point ID**: TP19-06
	
Depth: 1 ft.	**Depth:** 0.5 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature:

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/24/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	9/25/2019 8:05 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	8/24/2019 6:45 AM
Arrived at Site	8/24/2019 8:15 AM
Departed Site	8/24/2019 5:00 PM
Returned to Office	8/24/2019 6:15 PM

Summary of Daily Operations

8:43 Fill out safety forms
Tailgate safety meeting
Continue excavation and sampling
Take pictures
Fill out DFR
Return to office

Next Steps & Recommendations

1

Sampling

Daily Site Visit Report

VERTEX

Background19-09

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		20 ppm	Low (30-600 ppm)	163 ppm		✓	32.04891254, -103.51740115	Yes

TP19-06

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
0.5 ft.		29 ppm	Low (30-600 ppm)	68 ppm		✓	32.04883610, -103.51677455	Yes

TP19-10

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.		69 ppm	Low (30-600 ppm)	163 ppm		✓	32.04884046, -103.51629808	Yes

TP19-11

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
0.5 ft.		41 ppm	Low (30-600 ppm)	317 ppm		✓	32.04883688, -103.51636076	Yes

Daily Site Visit Report

Site Photos

Viewing Direction: South

Loading contaminated soil into truck

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: Background19-09

Depth: 2 ft.

Sample Point ID: TP19-06

Depth: 0.5 ft.

Sample Point ID: TP19-10

Depth: 1 ft.

Sample Point ID: TP19-11

Depth: 0.5 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature: 

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/26/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/31/2019 8:35 PM
Project Owner:	Amanda T. Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	NEW SPILL
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	8/26/2019 8:05 AM
Arrived at Site	8/26/2019 10:32 AM
Departed Site	8/26/2019 5:03 PM
Returned to Office	8/26/2019 8:48 PM

Summary of Daily Operations

16:10 Excavation and field screening

20:36 Excavation and field screening

Next Steps & Recommendations

1 Continue excavation

Sampling

ES-Base19-13

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.	0.2 ppm	287 ppm	Low (30-600 ppm)	600 ppm		✓	032.04896, -103.51622	Yes

Daily Site Visit Report

VERTEX

ES-Base19-14

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.	0.1 ppm	214 ppm	Low (30-600 ppm)	600 ppm		✓	032.04888, -103.51619	Yes

ES-Base19-15

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.	0.3 ppm	366 ppm	Low (30-600 ppm)	600 ppm		✓	032.04880, -103.51620	Yes

ES-Base19-16

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.	0.1 ppm	1000 ppm	Low (30-600 ppm)	600 ppm		✓	032.04901, -103.51635	Yes

ES-Base19-17

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.	0.4 ppm	172 ppm	Low (30-600 ppm)	600 ppm		✓	032.04904, -103.51645	Yes

Daily Site Visit Report

Site Photos

Viewing Direction: North

Open excavation

Viewing Direction: Northeast

Open excavation

Viewing Direction: Northeast

Open excavation

Viewing Direction: North

Open excavation

Daily Site Visit Report

Viewing Direction: North

Open excavation

Viewing Direction: North

Open excavation

Viewing Direction: Northeast

Open excavation

Daily Site Visit Report

Depth Sample Photos

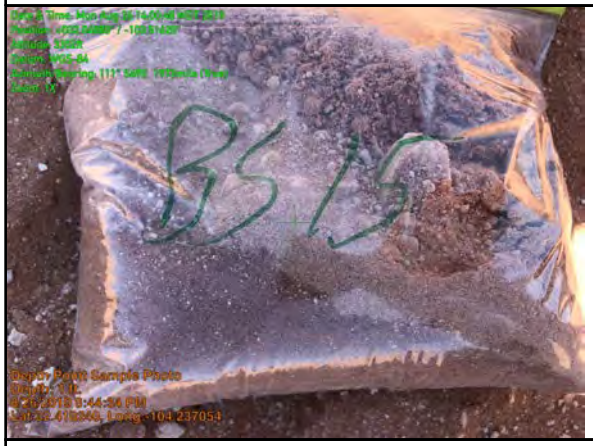
Sample Point ID: ES-Base19-13

Depth: 1 ft.

Sample Point ID: ES-Base19-14

Depth: 2 ft.

Sample Point ID: ES-Base19-15



Depth: 1 ft.

Sample Point ID: ES-Base19-16

Depth: 1 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-17

Depth: 1 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Dennis Williams

Signature: 

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/27/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/31/2019 8:25 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	8/27/2019 7:00 AM
Arrived at Site	8/27/2019 8:45 AM
Departed Site	8/27/2019 4:59 PM
Returned to Office	8/27/2019 6:06 PM

Summary of Daily Operations

16:46 Fill out arrival and safety forms
Tailgate safety meeting
Excavate spill area
Field screen
Fill out DFR
Return to office

Next Steps & Recommendations

1

Sampling

Daily Site Visit Report

ES-Base19-13

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		0 ppm	Low (30-600 ppm)	110 ppm		✓	32.04896, -103.51622	Yes

ES-Base19-14

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		22 ppm	Low (30-600 ppm)	137 ppm		✓	32.04888, -103.51619	Yes

ES-Base19-15

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		5 ppm	Low (30-600 ppm)	98 ppm		✓	32.04880, -103.51620	Yes

ES-Base19-16

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		2 ppm	Low (30-600 ppm)	109 ppm		✓	32.04901, -103.51635	Yes

Daily Site Visit Report

ES-Base19-17

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		53 ppm	Low (30-600 ppm)	255 ppm		✓	32.04904, -103.51645	Yes

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: ES-Base19-13

Depth: 2 ft.

Sample Point ID: ES-Base19-14

Depth: 2 ft.

Sample Point ID: ES-Base19-15

Depth: 2 ft.

Sample Point ID: ES-Base19-16

Depth: 2 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-17

Depth: 2 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature: 

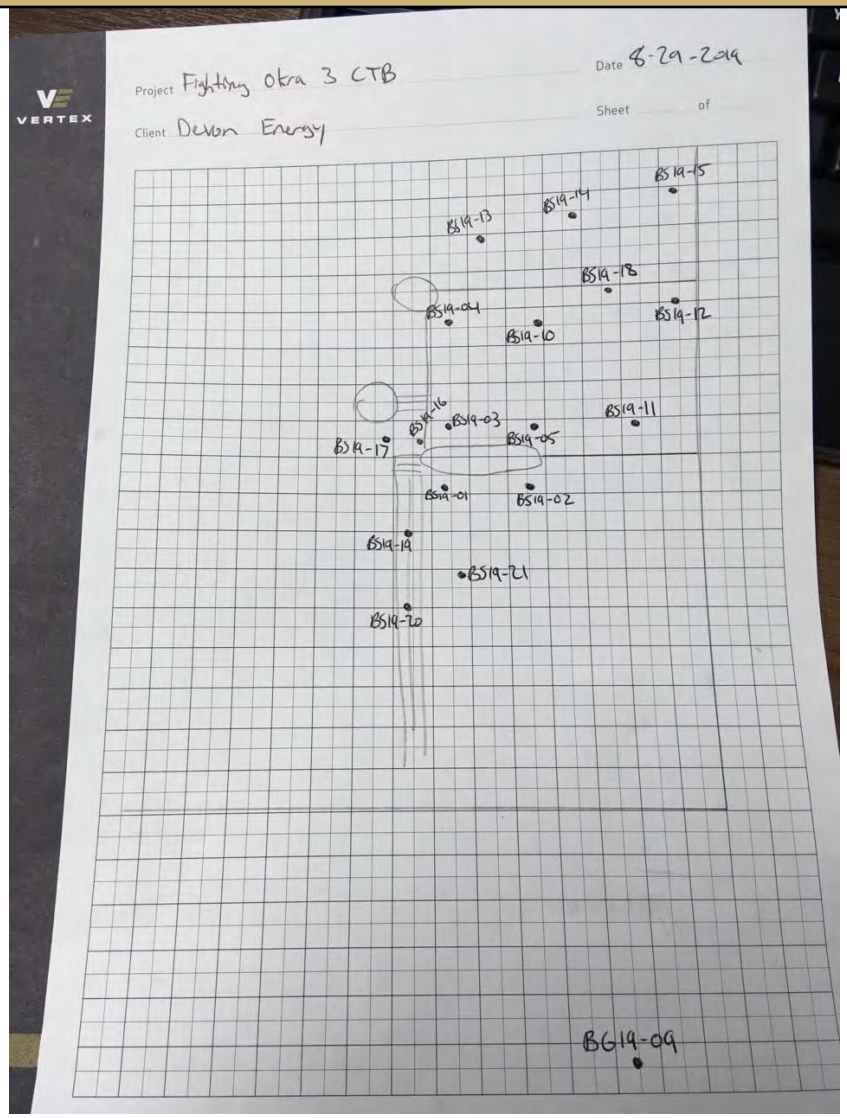
Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/28/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/31/2019 7:59 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times	
Left Office	8/28/2019 7:00 AM
Arrived at Site	8/28/2019 8:30 AM
Departed Site	8/28/2019 6:00 PM
Returned to Office	8/28/2019 7:15 PM

Daily Site Visit Report

Site Sketch



Daily Site Visit Report

Summary of Daily Operations

13:48 Fill out safety forms
Tailgate safety meeting
Excavate and field screen
Return to office

Next Steps & Recommendations

1

Sampling

ES-Base19-18

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		76 ppm	Low (30-600 ppm)	120 ppm		✓	32.04882440, -103.51628414	Yes

ES-Base19-19

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.		168 ppm	Low (30-600 ppm)	486 ppm		✓	32.04900488, -103.51652778	Yes
2 ft.		9 ppm	Low (30-600 ppm)	132 ppm		✓	,	Yes

Daily Site Visit Report

ES-Base19-20

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.		2 ppm	Low (30-600 ppm)	98 ppm		✓	32.04900159, -103.51657700	Yes

ES-Base19-21

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		15 ppm	Low (30-600 ppm)	61 ppm		✓	32.0488396, -103.51652406	Yes

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: ES-Base19-18

Depth: 2 ft.

Sample Point ID: ES-Base19-19

Depth: 1 ft.

Sample Point ID: ES-Base19-20

Depth: 1 ft.

Sample Point ID: ES-Base19-21

Depth: 2 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature: 

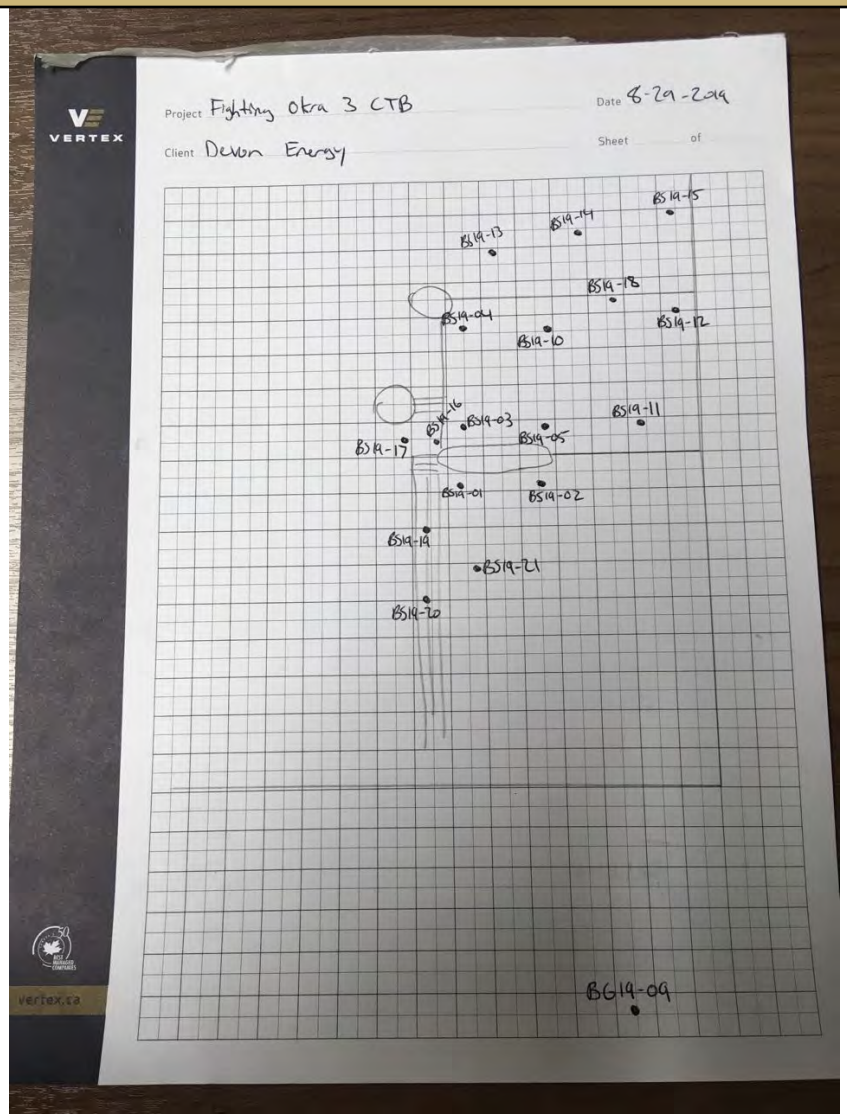
Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	8/29/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	8/31/2019 7:23 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	3 phase separator spill
Client Contact Phone #:	(575) 748-0176		

Summary of Times	
Left Office	8/29/2019 7:00 AM
Arrived at Site	8/29/2019 8:30 AM
Departed Site	8/29/2019 4:00 PM
Returned to Office	8/29/2019 6:00 PM

Daily Site Visit Report

Site Sketch



Daily Site Visit Report

Summary of Daily Operations

18:08 Fill out arrival and safety forms
Tailgate safety meeting
Finish excavation
Take samples
Return to office

Next Steps & Recommendations

1

Sampling

Background19-09

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04891254, -103.51740115	Yes

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?
2 ft.		2 ppm	Low (30-600 ppm)	74 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04893737, -103.51648369	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?
2 ft.		26 ppm	Low (30-600 ppm)	165 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04889609, -103.51647284	Yes

Daily Site Visit Report

ES-Base19-03

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		11 ppm	Low (30-600 ppm)	98 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04895351, -103.51639129	Yes

ES-Base19-04

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		34 ppm	Low (30-600 ppm)	132 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04884034, -103.51630095	Yes

ES-Base19-05

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04888425, -103.51639082	Yes

ES-Base19-10

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04884046, -103.51629808	Yes

Daily Site Visit Report

ES-Base19-11

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04883688, -103.51636076	Yes

ES-Base19-12

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04879335, -103.51632992	Yes

ES-Base19-13

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04896, -103.51622	Yes

ES-Base19-14

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04888, -103.51619	Yes

Daily Site Visit Report

ES-Base19-15

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04880, -103.51620	Yes

ES-Base19-16

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		9 ppm	Low (30-600 ppm)	120 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04901, -103.51635	Yes

ES-Base19-17

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04904, -103.51645	Yes

ES-Base19-18

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04882440, -103.51628414	Yes

Daily Site Visit Report

ES-Base19-19

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04900488, -103.51652478	Yes

ES-Base19-20

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.					BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04900159, -103.51657700	Yes

ES-Base19-21

Depth ft	VOC PID	Petro Flag TPH ppm	Quantab Range ppm	Quantab Reading ppm	Lab Analysis	Picture	Trimble Location	Marked On Site Sketch?
2 ft.		25 ppm	Low (30-600 ppm)	32 ppm	BTEX (EPA SW-846 Method 8021B/8260B), Chloride (EPA 300.0), TPH (EPA SW-846 Method 8015M)	✓	32.04893963, -103.51652406	Yes

Daily Site Visit Report

Depth Sample Photos

Sample Point ID: ES-Base19-01

Depth: 2 ft.

Sample Point ID: ES-Base19-02

Depth: 2 ft.

Sample Point ID: ES-Base19-03

Depth: 2 ft.

Sample Point ID: ES-Base19-04

Depth: 2 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-05	**Sample Point ID**: Background19-09
	
Depth: 2 ft.	**Depth:** 2 ft.
Sample Point ID: ES-Base19-10	**Sample Point ID**: ES-Base19-11
	
Depth: 2 ft.	**Depth:** 2 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-12

Depth: 2 ft.

Sample Point ID: ES-Base19-13

Depth: 2 ft.

Sample Point ID: ES-Base19-14

Depth: 2 ft.

Sample Point ID: ES-Base19-15

Depth: 2 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-16

Depth: 2 ft.

Sample Point ID: ES-Base19-17

Depth: 2 ft.

Sample Point ID: ES-Base19-18

Depth: 2 ft.

Sample Point ID: ES-Base19-19

Depth: 2 ft.

Daily Site Visit Report

Sample Point ID: ES-Base19-20	**Sample Point ID**: ES-Base19-21
	
Depth: 2 ft.	**Depth:** 2 ft.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jason Crabtree

Signature: 

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	9/13/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	9/14/2019 1:18 AM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	Flowline Leak
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	9/13/2019 7:15 AM
Arrived at Site	9/13/2019 9:00 AM
Departed Site	9/13/2019 4:21 PM
Returned to Office	9/13/2019 5:49 PM

Summary of Daily Operations

10:18 Arrive on site.
Complete safety paperwork.
Haul out remaining contaminant.
Backfill excavated area.
Document and complete DFR.
Return to office.

Next Steps & Recommendations

1 Continue backfilling

Daily Site Visit Report

Site Photos

Viewing Direction: East

Backfilled western most portion of excavation

Viewing Direction: East

Backfilled western most portion of excavation

Viewing Direction: North

Backfill between separator and heater treater

Viewing Direction: Northeast

Backfill between separator and heater treater

Daily Site Visit Report

Viewing Direction: South

Northern most excavated area backfilled

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Austin Harris

Signature: 

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	9/14/2019
Site Location Name:	Fighting Okra 18 CTB #3	Report Run Date:	9/15/2019 3:38 PM
Project Owner:	Amanda Davis	File (Project) #:	19E-00575
Project Manager:	Dennis Williams	API #:	30-025-44172
Client Contact Name:	Amanda Davis	Reference	Flowline Leak
Client Contact Phone #:	(575) 748-0176		

Summary of Times

Left Office	9/14/2019 7:30 AM
Arrived at Site	9/14/2019 8:57 AM
Departed Site	
Returned to Office	

Summary of Daily Operations

15:50 Arrive on site.
Complete safety paperwork.
Finish backfill operation.
Document and complete DFR.
Return to office.

Next Steps & Recommendations

1 Closure report

2 Send to client

Daily Site Visit Report

Site Photos

Viewing Direction: South

Far East side excavation backfilled

Viewing Direction: Northwest

Far East side excavation backfilled

Viewing Direction: West

Far East side excavation backfilled

Viewing Direction: North

Backfilled excavation between separator and heater treater

Daily Site Visit Report

Viewing Direction: Southwest	**Viewing Direction**: West
	
Backfilled excavation between separator and heater treater	Backfilled area north of flow lines
Viewing Direction: East	**Viewing Direction**: West
	
Backfilled area north of flow lines	Backfilled area southwest of separator

Daily Site Visit Report

Viewing Direction: East	**Viewing Direction**: East
	
Backfilled area southwest of separator	Backfilled area west of separator

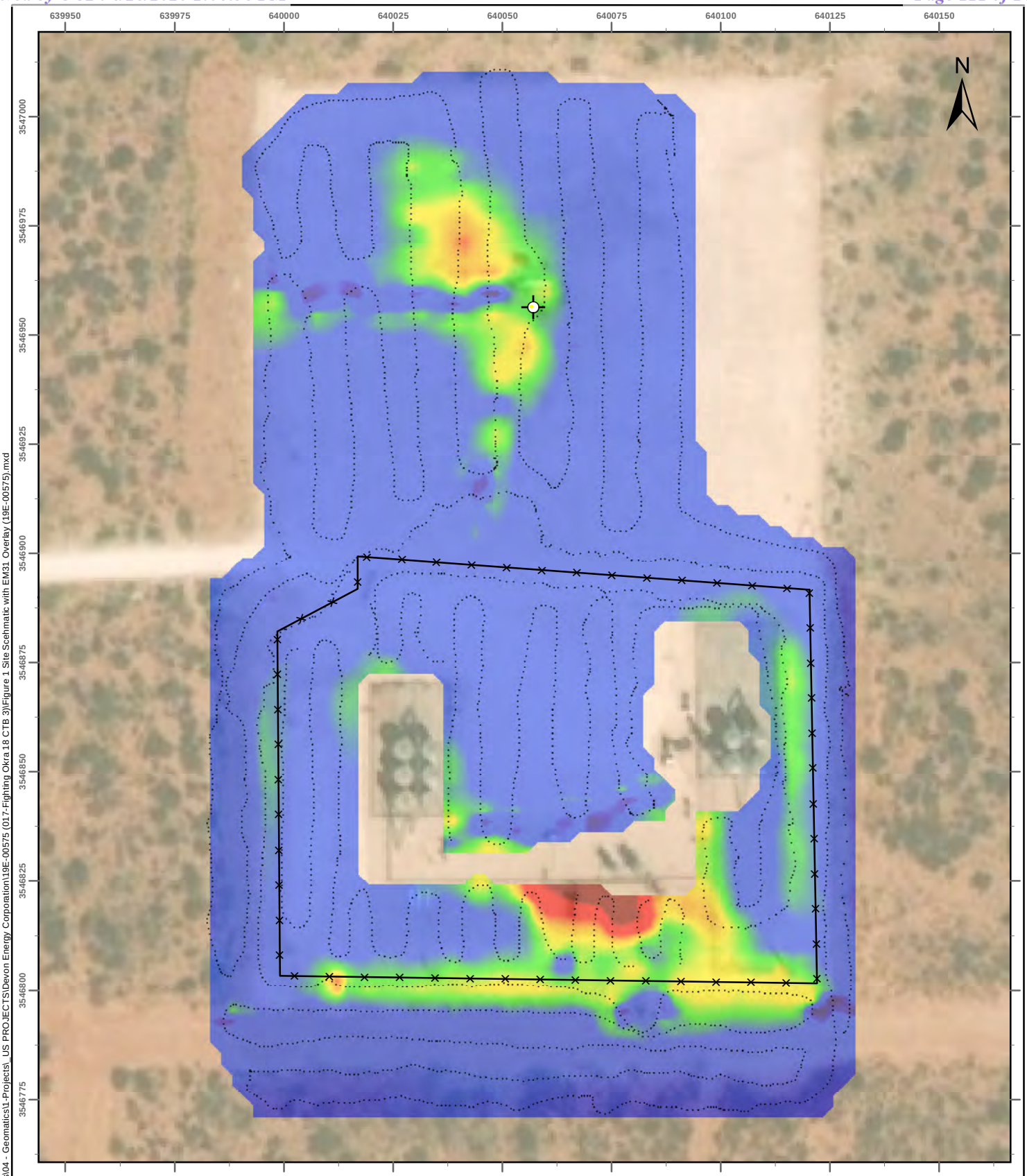
Daily Site Visit Report

Daily Site Visit Signature

Inspector: Austin Harris

Signature:

ATTACHMENT 5



LEGEND

- Well Centre
- Fence
- Survey Track

<0 10 20 30 40 50 60 70 80 90 100 110 120 130

Apparent Conductivity (mS/m)
(16 ft Depth of Exploration)

0 25 50 100 Ft

SCALE 1:1,200
UTM Zone 13N

Notes: Aerial Image from ESRI Digital Globe 2017

devon

Site Schematic with EM31 Apparent Conductivity Overlay
Fighting Okra 18 CTB 3

VERTEX

DRAWN:	LP
APPROVED:	DH
DATE:	AUG 26/19

FIGURE: 1

VERSATILITY. EXPERTISE.

Document Path: \\vtx-s-fs01.corp.internal\shared\vps\04 - Geomatics\1-Projects_US PROJECTS\Devon Energy Corporation\19E-00575 (017-Fighting Okra 18 CTB 3)\Figure 1 Site Scehmatic with EM31 Overlay (19E-00575).mxd

ATTACHMENT 6

Client Name: Devon Energy Production Company
Site Name: Fighting Okra 18 CTB 3
Project #: 19E-00575-017
Lab Report: 1909005

Table 2. Confirmatory Soil Samples - Depth to Groundwater >100 feet

Sample Description			Field Screening			Petroleum Hydrocarbons							Inorganic
						Volatile		Extractable					
Sample ID	Depth (ft)	Sample Date	Volatile Organic Compounds (PID)	Extractable Organic Compounds (Petro Flag)	Inorganics (Quantab - High/Low)	Benzene	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)
BG 19-09	2	August 29, 2019	-	-	-	<0.024	<0.217	<4.8	<9.3	<46	<14.1	<60.1	<60
BS 19-01	2	August 29, 2019	-	-	-	<0.024	<0.220	<4.9	<9.9	<50	<14.8	<64.8	310
BS 19-02	2	August 29, 2019	-	2	74	<0.023	<0.207	<4.6	<9.8	<49	<14.4	<63.4	220
BS 19-03	2	August 29, 2019	-	26	164	<0.025	<0.224	<5.0	9.7	<46	9.7	9.7	<60
BS 19-04	2	August 29, 2019	-	11	98	<0.024	<0.220	<4.9	<9.8	<49	<14.7	<63.7	<60
BS 19-05	2	August 29, 2019	-	64	132	<0.023	<0.211	<4.7	<9.8	<49	<14.5	<63.5	<60
BS 19-10	2	August 29, 2019	-	-	-	<0.024	<0.219	<4.9	<9.4	<47	<14.3	<61.3	230
BS 19-11	2	August 29, 2019	-	-	-	<0.024	<0.220	<4.9	<9.7	<48	<14.6	<62.6	170
BS 19-12	2	August 29, 2019	-	-	-	<0.024	<0.216	<4.8	<9.8	<49	<14.6	<63.6	<60
BS 19-13	2	August 29, 2019	-	-	-	<0.025	<0.221	<4.9	<9.6	<48	<14.5	<62.5	<59
BS 19-14	2	August 29, 2019	-	-	-	<0.024	<0.217	<4.8	<9.6	<48	<14.4	<62.4	<60
BS 19-15	2	August 29, 2019	-	-	-	<0.024	<0.213	<4.7	<9.8	<49	<14.5	63.5	<60
BS 19-16	2	August 29, 2019	-	9	120	<0.025	<0.222	<4.9	<9.3	<47	<14.2	<61.2	170
BS 19-17	2	August 29, 2019	-	-	-	<0.024	<0.220	<4.9	<9.4	<47	<14.3	<61.3	140
BS 19-18	2	August 29, 2019	-	-	-	<0.024	<0.219	<4.9	<9.5	<47	<14.4	<61.4	200
BS 19-19	2	August 29, 2019	-	-	-	<0.025	<0.222	<4.9	<9.9	<49	<14.8	<63.8	240
BS 19-20	2	August 29, 2019	-	-	-	<0.025	<0.221	<4.9	<9.4	<47	<14.3	<61.3	270
BS 19-21	2	August 29, 2019	-	25	32	<0.024	<0.217	<4.8	<9.9	<50	<14.7	<64.7	230

"-" - Not assessed/analyzed
Bold and shaded indicates exceedance outside of applied action level

ATTACHMENT 7

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

September 10, 2019

Dennis Williams

Vertex Resource Group Ltd.
213 S. Mesa St
Carlsbad, NM 88220
TEL:
FAX

RE: Fighting Okra 3 CTB OrderNo.: 1909005

Dear Dennis Williams:

Hall Environmental Analysis Laboratory received 18 sample(s) on 8/31/2019 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

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd.
Client Sample ID: BS19-01 2'
Project: Fighting Okra 3 CTB
Collection Date: 8/29/2019 12:00:00 PM
Lab ID: 1909005-001 **Matrix:** SOIL
Received Date: 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	9/6/2019 8:50:58 AM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/6/2019 8:50:58 AM
Surr: DNOP	105	70-130		%Rec	1	9/6/2019 8:50:58 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 12:55:25 PM
Surr: BFB	101	77.4-118		%Rec	1	9/6/2019 12:55:25 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 12:55:25 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 12:55:25 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 12:55:25 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 12:55:25 PM
Surr: 4-Bromofluorobenzene	86.4	80-120		%Rec	1	9/6/2019 12:55:25 PM
EPA METHOD 300.0: ANIONS						Analyst: **CJS**
Chloride	310	59		mg/Kg	20	9/8/2019 3:04:18 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-02 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:05:00 PM
Lab ID: 1909005-002 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/6/2019 10:05:06 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 10:05:06 AM
Surr: DNOP	104	70-130		%Rec	1	9/6/2019 10:05:06 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	9/6/2019 2:04:15 PM
Surr: BFB	101	77.4-118		%Rec	1	9/6/2019 2:04:15 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.023		mg/Kg	1	9/6/2019 2:04:15 PM
Toluene	ND	0.046		mg/Kg	1	9/6/2019 2:04:15 PM
Ethylbenzene	ND	0.046		mg/Kg	1	9/6/2019 2:04:15 PM
Xylenes, Total	ND	0.092		mg/Kg	1	9/6/2019 2:04:15 PM
Surr: 4-Bromofluorobenzene	88.4	80-120		%Rec	1	9/6/2019 2:04:15 PM
EPA METHOD 300.0: ANIONS						Analyst: **CJS**
Chloride	220	60		mg/Kg	20	9/8/2019 3:41:30 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd.
Client Sample ID: BS19-03 2'
Project: Fighting Okra 3 CTB
Collection Date: 8/29/2019 12:10:00 PM
Lab ID: 1909005-003 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	9.7	9.1		mg/Kg	1	9/6/2019 10:29:39 AM
Motor Oil Range Organics (MRO)	ND	46		mg/Kg	1	9/6/2019 10:29:39 AM
Surr: DNOP	109	70-130		%Rec	1	9/6/2019 10:29:39 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	9/6/2019 3:13:08 PM
Surr: BFB	98.8	77.4-118		%Rec	1	9/6/2019 3:13:08 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.025		mg/Kg	1	9/6/2019 3:13:08 PM
Toluene	ND	0.050		mg/Kg	1	9/6/2019 3:13:08 PM
Ethylbenzene	ND	0.050		mg/Kg	1	9/6/2019 3:13:08 PM
Xylenes, Total	ND	0.099		mg/Kg	1	9/6/2019 3:13:08 PM
Surr: 4-Bromofluorobenzene	85.4	80-120		%Rec	1	9/6/2019 3:13:08 PM
EPA METHOD 300.0: ANIONS						Analyst: **CJS**
Chloride	ND	60		mg/Kg	20	9/8/2019 3:53:55 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-04 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:15:00 PM
Lab ID: 1909005-004 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/6/2019 10:54:07 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 10:54:07 AM
Surr: DNOP	106	70-130		%Rec	1	9/6/2019 10:54:07 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 3:36:04 PM
Surr: BFB	98.2	77.4-118		%Rec	1	9/6/2019 3:36:04 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 3:36:04 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 3:36:04 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 3:36:04 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 3:36:04 PM
Surr: 4-Bromofluorobenzene	83.9	80-120		%Rec	1	9/6/2019 3:36:04 PM
EPA METHOD 300.0: ANIONS						Analyst: **CJS**
Chloride	ND	60		mg/Kg	20	9/8/2019 4:06:20 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-05 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:20:00 PM
Lab ID: 1909005-005 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/6/2019 11:18:44 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 11:18:44 AM
Surr: DNOP	108	70-130		%Rec	1	9/6/2019 11:18:44 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	9/6/2019 3:59:11 PM
Surr: BFB	100	77.4-118		%Rec	1	9/6/2019 3:59:11 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.023		mg/Kg	1	9/6/2019 3:59:11 PM
Toluene	ND	0.047		mg/Kg	1	9/6/2019 3:59:11 PM
Ethylbenzene	ND	0.047		mg/Kg	1	9/6/2019 3:59:11 PM
Xylenes, Total	ND	0.094		mg/Kg	1	9/6/2019 3:59:11 PM
Surr: 4-Bromofluorobenzene	85.7	80-120		%Rec	1	9/6/2019 3:59:11 PM
EPA METHOD 300.0: ANIONS						Analyst: **CJS**
Chloride	ND	60		mg/Kg	20	9/8/2019 4:18:45 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BG19-09 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:25:00 PM
Lab ID: 1909005-006 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**
Diesel Range Organics (DRO)	ND	9.3		mg/Kg	1	9/6/2019 11:43:12 AM
Motor Oil Range Organics (MRO)	ND	46		mg/Kg	1	9/6/2019 11:43:12 AM
Surr: DNOP	107	70-130		%Rec	1	9/6/2019 11:43:12 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/6/2019 4:22:11 PM
Surr: BFB	95.4	77.4-118		%Rec	1	9/6/2019 4:22:11 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 4:22:11 PM
Toluene	ND	0.048		mg/Kg	1	9/6/2019 4:22:11 PM
Ethylbenzene	ND	0.048		mg/Kg	1	9/6/2019 4:22:11 PM
Xylenes, Total	ND	0.097		mg/Kg	1	9/6/2019 4:22:11 PM
Surr: 4-Bromofluorobenzene	82.2	80-120		%Rec	1	9/6/2019 4:22:11 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	ND	60		mg/Kg	20	9/9/2019 9:51:12 AM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-10 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:30:00 PM
Lab ID: 1909005-007 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	9/6/2019 8:30:38 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/6/2019 8:30:38 AM
Surr: DNOP	98.8	70-130		%Rec	1	9/6/2019 8:30:38 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 7:02:44 PM
Surr: BFB	101	77.4-118		%Rec	1	9/6/2019 7:02:44 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 7:02:44 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 7:02:44 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 7:02:44 PM
Xylenes, Total	ND	0.097		mg/Kg	1	9/6/2019 7:02:44 PM
Surr: 4-Bromofluorobenzene	89.0	80-120		%Rec	1	9/6/2019 7:02:44 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	230	60		mg/Kg	20	9/9/2019 10:40:50 AM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-11 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:35:00 PM
Lab ID: 1909005-008 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	9/6/2019 8:54:36 AM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	9/6/2019 8:54:36 AM
Surr: DNOP	103	70-130		%Rec	1	9/6/2019 8:54:36 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 7:25:36 PM
Surr: BFB	101	77.4-118		%Rec	1	9/6/2019 7:25:36 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 7:25:36 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 7:25:36 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 7:25:36 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 7:25:36 PM
Surr: 4-Bromofluorobenzene	88.3	80-120		%Rec	1	9/6/2019 7:25:36 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	170	60		mg/Kg	20	9/9/2019 10:53:15 AM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd.
Client Sample ID: BS19-12 2'
Project: Fighting Okra 3 CTB
Collection Date: 8/29/2019 12:40:00 PM
Lab ID: 1909005-009 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/6/2019 9:18:22 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 9:18:22 AM
Surr: DNOP	104	70-130		%Rec	1	9/6/2019 9:18:22 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/6/2019 7:48:24 PM
Surr: BFB	98.0	77.4-118		%Rec	1	9/6/2019 7:48:24 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 7:48:24 PM
Toluene	ND	0.048		mg/Kg	1	9/6/2019 7:48:24 PM
Ethylbenzene	ND	0.048		mg/Kg	1	9/6/2019 7:48:24 PM
Xylenes, Total	ND	0.096		mg/Kg	1	9/6/2019 7:48:24 PM
Surr: 4-Bromofluorobenzene	85.0	80-120		%Rec	1	9/6/2019 7:48:24 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	ND	60		mg/Kg	20	9/9/2019 11:05:39 AM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-13 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:45:00 PM
Lab ID: 1909005-010 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	9/6/2019 9:42:17 AM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	9/6/2019 9:42:17 AM
Surr: DNOP	105	70-130		%Rec	1	9/6/2019 9:42:17 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 8:11:12 PM
Surr: BFB	96.7	77.4-118		%Rec	1	9/6/2019 8:11:12 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.025		mg/Kg	1	9/6/2019 8:11:12 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 8:11:12 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 8:11:12 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 8:11:12 PM
Surr: 4-Bromofluorobenzene	84.7	80-120		%Rec	1	9/6/2019 8:11:12 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	ND	59		mg/Kg	20	9/9/2019 3:51:03 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-14 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:50:00 PM
Lab ID: 1909005-011 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	9/6/2019 10:06:16 AM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	9/6/2019 10:06:16 AM
Surr: DNOP	101	70-130		%Rec	1	9/6/2019 10:06:16 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/6/2019 8:34:01 PM
Surr: BFB	98.2	77.4-118		%Rec	1	9/6/2019 8:34:01 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 8:34:01 PM
Toluene	ND	0.048		mg/Kg	1	9/6/2019 8:34:01 PM
Ethylbenzene	ND	0.048		mg/Kg	1	9/6/2019 8:34:01 PM
Xylenes, Total	ND	0.097		mg/Kg	1	9/6/2019 8:34:01 PM
Surr: 4-Bromofluorobenzene	85.7	80-120		%Rec	1	9/6/2019 8:34:01 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	ND	60		mg/Kg	20	9/9/2019 11:55:17 AM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-15 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 12:55:00 PM
Lab ID: 1909005-012 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/6/2019 10:30:16 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 10:30:16 AM
Surr: DNOP	98.6	70-130		%Rec	1	9/6/2019 10:30:16 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	9/6/2019 8:56:52 PM
Surr: BFB	100	77.4-118		%Rec	1	9/6/2019 8:56:52 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 8:56:52 PM
Toluene	ND	0.047		mg/Kg	1	9/6/2019 8:56:52 PM
Ethylbenzene	ND	0.047		mg/Kg	1	9/6/2019 8:56:52 PM
Xylenes, Total	ND	0.095		mg/Kg	1	9/6/2019 8:56:52 PM
Surr: 4-Bromofluorobenzene	87.7	80-120		%Rec	1	9/6/2019 8:56:52 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	ND	60		mg/Kg	20	9/9/2019 12:07:41 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-16 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:00:00 PM
Lab ID: 1909005-013 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.3		mg/Kg	1	9/6/2019 10:54:22 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/6/2019 10:54:22 AM
Surr: DNOP	97.8	70-130		%Rec	1	9/6/2019 10:54:22 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 9:19:40 PM
Surr: BFB	98.5	77.4-118		%Rec	1	9/6/2019 9:19:40 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.025		mg/Kg	1	9/6/2019 9:19:40 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 9:19:40 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 9:19:40 PM
Xylenes, Total	ND	0.099		mg/Kg	1	9/6/2019 9:19:40 PM
Surr: 4-Bromofluorobenzene	85.0	80-120		%Rec	1	9/6/2019 9:19:40 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	170	60		mg/Kg	20	9/9/2019 12:20:05 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-17 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:05:00 PM
Lab ID: 1909005-014 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	9/6/2019 11:18:27 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/6/2019 11:18:27 AM
Surr: DNOP	98.9	70-130		%Rec	1	9/6/2019 11:18:27 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 9:42:25 PM
Surr: BFB	96.6	77.4-118		%Rec	1	9/6/2019 9:42:25 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 9:42:25 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 9:42:25 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 9:42:25 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 9:42:25 PM
Surr: 4-Bromofluorobenzene	83.8	80-120		%Rec	1	9/6/2019 9:42:25 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	140	60		mg/Kg	20	9/9/2019 12:32:30 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-18 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:10:00 PM
Lab ID: 1909005-015 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.5		mg/Kg	1	9/6/2019 11:42:31 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/6/2019 11:42:31 AM
Surr: DNOP	98.8	70-130		%Rec	1	9/6/2019 11:42:31 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 10:05:21 PM
Surr: BFB	97.8	77.4-118		%Rec	1	9/6/2019 10:05:21 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/6/2019 10:05:21 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 10:05:21 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 10:05:21 PM
Xylenes, Total	ND	0.097		mg/Kg	1	9/6/2019 10:05:21 PM
Surr: 4-Bromofluorobenzene	83.7	80-120		%Rec	1	9/6/2019 10:05:21 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	200	60		mg/Kg	20	9/9/2019 12:44:54 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-19 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:15:00 PM
Lab ID: 1909005-016 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	9/6/2019 12:06:37 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/6/2019 12:06:37 PM
Surr: DNOP	99.7	70-130		%Rec	1	9/6/2019 12:06:37 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 10:28:21 PM
Surr: BFB	109	77.4-118		%Rec	1	9/6/2019 10:28:21 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.025		mg/Kg	1	9/6/2019 10:28:21 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 10:28:21 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 10:28:21 PM
Xylenes, Total	ND	0.099		mg/Kg	1	9/6/2019 10:28:21 PM
Surr: 4-Bromofluorobenzene	93.1	80-120		%Rec	1	9/6/2019 10:28:21 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	240	60		mg/Kg	20	9/9/2019 12:57:18 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-20 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:20:00 PM
Lab ID: 1909005-017 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	9/6/2019 12:30:40 PM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/6/2019 12:30:40 PM
Surr: DNOP	98.8	70-130		%Rec	1	9/6/2019 12:30:40 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/6/2019 11:37:45 PM
Surr: BFB	97.8	77.4-118		%Rec	1	9/6/2019 11:37:45 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.025		mg/Kg	1	9/6/2019 11:37:45 PM
Toluene	ND	0.049		mg/Kg	1	9/6/2019 11:37:45 PM
Ethylbenzene	ND	0.049		mg/Kg	1	9/6/2019 11:37:45 PM
Xylenes, Total	ND	0.098		mg/Kg	1	9/6/2019 11:37:45 PM
Surr: 4-Bromofluorobenzene	85.0	80-120		%Rec	1	9/6/2019 11:37:45 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	270	60		mg/Kg	20	9/9/2019 1:09:43 PM

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		

Analytical Report
Lab Order **1909005**
Date Reported: **9/10/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Vertex Resource Group Ltd. **Client Sample ID:** BS19-21 2'
Project: Fighting Okra 3 CTB **Collection Date:** 8/29/2019 1:25:00 PM
Lab ID: 1909005-018 **Matrix:** SOIL **Received Date:** 8/31/2019 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	9/6/2019 12:54:50 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/6/2019 12:54:50 PM
Surr: DNOP	99.3	70-130		%Rec	1	9/6/2019 12:54:50 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/7/2019 12:00:55 AM
Surr: BFB	99.9	77.4-118		%Rec	1	9/7/2019 12:00:55 AM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	ND	0.024		mg/Kg	1	9/7/2019 12:00:55 AM
Toluene	ND	0.048		mg/Kg	1	9/7/2019 12:00:55 AM
Ethylbenzene	ND	0.048		mg/Kg	1	9/7/2019 12:00:55 AM
Xylenes, Total	ND	0.097		mg/Kg	1	9/7/2019 12:00:55 AM
Surr: 4-Bromofluorobenzene	86.2	80-120		%Rec	1	9/7/2019 12:00:55 AM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Chloride	230	60		mg/Kg	20	9/9/2019 1:22:08 PM

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#: **1909005**
10-Sep-19

Client: Vertex Resource Group Ltd.
Project: Fighting Okra 3 CTB

Sample ID: **MB-47337** SampType: **mblk** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBS** Batch ID: **47337** RunNo: **62749**
Prep Date: **9/6/2019** Analysis Date: **9/8/2019** SeqNo: **2137240** Units: **mg/Kg**

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

Sample ID: **LCS-47337** SampType: **lcs** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSS** Batch ID: **47337** RunNo: **62749**
Prep Date: **9/6/2019** Analysis Date: **9/8/2019** SeqNo: **2137241** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	15	1.5	15.00	0	96.7	90	110			

Sample ID: **MB-47343** SampType: **MBLK** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBS** Batch ID: **47343** RunNo: **62754**
Prep Date: **9/9/2019** Analysis Date: **9/9/2019** SeqNo: **2138648** Units: **mg/Kg**

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

Sample ID: **LCS-47343** SampType: **LCS** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSS** Batch ID: **47343** RunNo: **62754**
Prep Date: **9/9/2019** Analysis Date: **9/9/2019** SeqNo: **2138649** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	15	1.5	15.00	0	97.7	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#: **1909005**
10-Sep-19

Client: Vertex Resource Group Ltd.
Project: Fighting Okra 3 CTB

Sample ID: **LCS-47292** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS** Batch ID: **47292** RunNo: **62700**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2135340** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	48	10	50.00	0	96.7	63.9	124			
Surr: DNOP	4.3		5.000		86.5	70	130			

Sample ID: **MB-47292** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS** Batch ID: **47292** RunNo: **62700**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2135341** 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		101	70	130			

Sample ID: **LCS-47342** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS** Batch ID: **47342** RunNo: **62753**
Prep Date: **9/9/2019** Analysis Date: **9/9/2019** SeqNo: **2137494** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.0		5.000		80.3	70	130			

Sample ID: **MB-47342** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS** Batch ID: **47342** RunNo: **62753**
Prep Date: **9/9/2019** Analysis Date: **9/9/2019** SeqNo: **2137495** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.1		10.00		91.1	70	130			

Sample ID: **1909005-001AMS** SampType: **MS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **BS19-01 2'** Batch ID: **47292** RunNo: **62753**
Prep Date: **9/5/2019** Analysis Date: **9/9/2019** SeqNo: **2137764** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	50	9.9	49.50	0	101	57	142			
Surr: DNOP	4.2		4.950		84.5	70	130			

Sample ID: **1909005-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **BS19-01 2'** Batch ID: **47292** RunNo: **62753**
Prep Date: **9/5/2019** Analysis Date: **9/9/2019** SeqNo: **2138206** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	9.5	47.53	0	94.6	57	142	10.8	20	

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#: **1909005**
10-Sep-19

Client: Vertex Resource Group Ltd.
Project: Fighting Okra 3 CTB

Sample ID: **1909005-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **BS19-01 2'** Batch ID: **47292** RunNo: **62753**
Prep Date: **9/5/2019** Analysis Date: **9/9/2019** SeqNo: **2138206** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.2		4.753		88.7	70	130	0	0	

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#: **1909005**

10-Sep-19

Client: Vertex Resource Group Ltd.

Project: Fighting Okra 3 CTB

Sample ID: **RB** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS** Batch ID: **G62710** RunNo: **62710**
Prep Date: Analysis Date: **9/6/2019** SeqNo: **2136663** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1100		1000		106	77.4	118			

Sample ID: **2.5UG GRO LCS** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS** Batch ID: **G62710** RunNo: **62710**
Prep Date: Analysis Date: **9/6/2019** SeqNo: **2136664** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1300		1000		126	77.4	118			S

Sample ID: **MB-47291** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS** Batch ID: **47291** RunNo: **62710**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136671** 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	980		1000		97.6	77.4	118			

Sample ID: **LCS-47291** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS** Batch ID: **47291** RunNo: **62710**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136672** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	5.0	25.00	0	93.8	80	120			
Surr: BFB	1200		1000		120	77.4	118			S

Sample ID: **1909005-001AMS** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **BS19-01 2'** Batch ID: **47291** RunNo: **62710**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136674** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	4.7	23.39	0	108	69.1	142			
Surr: BFB	1100		935.5		121	77.4	118			S

Sample ID: **1909005-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **BS19-01 2'** Batch ID: **47291** RunNo: **62710**
Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136675** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	4.9	24.56	0	98.6	69.1	142	4.37	20	
Surr: BFB	1200		982.3		121	77.4	118	0	0	S

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#: **1909005**

10-Sep-19

Client: Vertex Resource Group Ltd.

Project: Fighting Okra 3 CTB

Sample ID: **MB-47291** SampType: **MBLK** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **PBS** Batch ID: **47291** RunNo: **62710**

Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136705** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	0.85		1.000		85.2	80	120			

Sample ID: **LCS-47291** SampType: **LCS** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **LCSS** Batch ID: **47291** RunNo: **62710**

Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136706** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.025	1.000	0	94.7	80	120			
Toluene	0.98	0.050	1.000	0	98.0	80	120			
Ethylbenzene	0.99	0.050	1.000	0	98.9	80	120			
Xylenes, Total	2.9	0.10	3.000	0	95.4	80	120			
Surr: 4-Bromofluorobenzene	0.94		1.000		94.0	80	120			

Sample ID: **1909005-002AMS** SampType: **MS** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **BS19-02 2'** Batch ID: **47291** RunNo: **62710**

Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136709** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.0	0.024	0.9560	0.003758	109	76	123			
Toluene	1.1	0.048	0.9560	0	115	80.3	127			
Ethylbenzene	1.1	0.048	0.9560	0	118	80.2	131			
Xylenes, Total	3.3	0.096	2.868	0	114	78	133			
Surr: 4-Bromofluorobenzene	0.90		0.9560		94.2	80	120			

Sample ID: **1909005-002AMSD** SampType: **MSD** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **BS19-02 2'** Batch ID: **47291** RunNo: **62710**

Prep Date: **9/5/2019** Analysis Date: **9/6/2019** SeqNo: **2136710** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.99	0.025	0.9901	0.003758	99.1	76	123	6.17	20	
Toluene	1.0	0.050	0.9901	0	102	80.3	127	8.04	20	
Ethylbenzene	1.0	0.050	0.9901	0	105	80.2	131	8.13	20	
Xylenes, Total	3.1	0.099	2.970	0	103	78	133	7.03	20	
Surr: 4-Bromofluorobenzene	0.95		0.9901		95.8	80	120	0	0	

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: **VERTEX CARLSBAD** Work Order Number: **1909005** RcptNo: 1

Received By: **Andy Freeman** **8/31/2019 8:05:00 AM**

Completed By: **Erin Melendrez** **9/3/2019 7:53:53 AM**

Reviewed By: 9/3/19

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: DAD 9/3/19

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	3.4	Good	Yes			

Chain-of-Custody Record

Client: Vertex Resource Services

Mailing Address: 213 S. Mesa St
Carlsbad, NM 88220

Phone #: 575-361-1137

email or Fax#: Permian@Vertex.ca

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

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other

☐ EDD (Type)

Turn-Around Time: 5day
☐ Standard ☐ Rush

Project Name: Fighting Okra 3 CTB

Project #: 19E-00575

Project Manager: Dennis Williams Permian@Vertex.ca; Amanda Davis Amanda.Davis@DVN.com

Sampler: Jason Crabtree

On Ice: ☒ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 3.2 +0.2 = 3.4 (°C)

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

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 1909005	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)
8-29-19	12:00	S	BS19-01 2'	1 Jar	ice	-001	X	X					X			
	12:05		BS19-02 2'			-002	X	X					X			
	12:10		BS19-03 2'			-003	X	X					X			
	12:15		BS19-04 2'			-004	X	X					X			
	12:20		BS19-05 2'			-005	X	X					X			
			[redacted]													
	12:25		BG19-09 2'			-006	X	X					X			
	12:30		BS19-10 2'			-007	X	X					X			
	12:35		BS19-11 2'			-008	X	X					X			
	12:40		BS19-12 2'			-009	X	X					X			
	12:45		BS19-13 2'			-010	X	X					X			
↓	12:50	↓	BS19-14 2'	↓	↓	-011	X	X					X			

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
8/30/19	1500				8/30/19	1500
8/30/19	1900				8/31/19	0805

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.

Received by OCD: 4/28/2020 1:06:38 PM

Chain-of-Custody Record

Client: Vertex Resource Services

Mailing Address: 213 S. Mesa St
Carlsbad, NM 88220

Phone #: 575-361-1137

email or Fax#: Permian@Vertex.ca

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

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other

☐ EDD (Type)

Turn-Around Time: 5day
☐ Standard ☐ Rush

Project Name: Fighting Okra 3 CTB

Project #: 19E-00575

Project Manager: Dennis Williams Permian@Vertex.ca; Amanda Davis Amanda.Davis@DVN.com

Sampler: Jason Crabtree

On Ice: ☐ Yes ☐ No

# of Coolers:

Cooler Temp(including CF): (°C)

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

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 1909005	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)
8-29-19	12:55	S	BS19-15 2'	1 Jar	ice	-012	X	X					X			
	13:00		BS19-16 2'			-013	X	X					X			
	13:05		BS19-17 2'			-014	X	X					X			
	13:10		BS19-18 2'			-015	X	X					X			
	13:15		BS19-19 2'			-016	X	X					X			
	13:20		BS19-20 2'			-017	X	X					X			
	13:25		BS19-21 2'			-018	X	X					X			

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
8/30/19	1500				8/30/19	1500
8/30/19	1600				8/31/19	0805

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.

Received by OCD: 4/28/2020 7:06:38 PM

State of New Mexico
Oil Conservation Division

Incident ID	NVV2003741819
District RP	
Facility ID	
Application ID	

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?	200 (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
- ☒ NA 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.

Form C-141
Page 4

State of New Mexico
Oil Conservation Division

Incident ID	NVV2003741819
District RP	
Facility ID	
Application ID	

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: Wes Mathews . Title: EnvironmentalRepresentative

Signature: Wesley Mathews Date: 2/13/2020

email: Wesley.mathews@dvn.com . Telephone: 575-746-5549 .

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	NVV2003741819
District RP	
Facility ID	
Application ID	

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.***

[X] A scaled site and sampling diagram as described in 19.15.29.11 NMAC

[X] 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)

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

[X] 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: Wes Mathews Title: Environmental Representative

Signature: Wesley Mathews Date: 2/13/2020

email: wesley.mathews@dvn.com . Telephone: 575-746-5549 .

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: _____