General Information

NMOCD District:	District 2	Incident #:	NRM2008663010
Landowner:	Federal		
Client:	Mack Energy Corporation	Site Location:	Partition Federal
Date:	August 21, 2020	Project #:	20E-01755-001
Client Contact:	Matt Buckles	Phone #:	(575) 748-1288
Vertex PM:	Natalie Gordon	Phone #:	(505) 506-0040

Objective

The objective of this environmental remediation work plan is to identify areas of exceedance for constituents of concern found during spill assessment and site characterization activities and propose appropriate remediation techniques to address the open release at Partition Federal (hereafter referred to as "Partition"). This incident occurred when a pipe fitting on the oil lact split open, releasing approximately 90 barrels (bbls) of crude oil onto the well pad. The release ran southwest off the well pad into the adjacent pasture. The location and boundaries of this release are identified on Figure 1 (Attachment 1). Areas of concern identified and delineated include nearby equipment and aboveground pipelines.

Initial site research and characterization has been completed and a closure criteria determination worksheet, and applicable research as it pertains to closure criteria selection, are included in Attachment 2. The release at Partition is not subject to the requirements of Paragraph (4) of Subsection C of 19.15.29.12 *New Mexico Administrative Code* (NMAC). As there is no recent groundwater data from within 0.5 miles of the release location, the depth to groundwater cannot be accurately determined 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

Minimum depth below any point within the horizontal boundary of the release to groundwater less than 10,000 mg/L TDS[1]	Constituent	Limit
< 50 feet	Chloride	600 mg/kg
	TPH[2] (GRO + DRO + MRO)	100 mg/kg
	BTEX[3]	50 mg/kg
	Benzene	10 mg/kg

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

In addition to the Closure Criteria established in Table 1, restoration and reclamation activities will be required for off-pad portions of the release to meet restoration requirements associated with releases off-lease. The New Mexico Oil Conservation Division (NM OCD) currently requires a minimum of four feet of non-waste containing, uncontaminated, earthen material with chloride concentrations of less than 600 mg/kg, and levels of other contaminants that meet the most protective concentrations contained in 19.15.29.12 NMAC as shown in Table 1.

Site Assessment/Characterization

The Partition release characterization was completed on August 3, 2020. A total of 21 sample points were established across the release area as shown on Figure 1 (Attachment 1) and soil samples were collected from these locations at various depths. Each soil sample was field screened, using an electrical conductivity (EC) meter to estimate the level of chlorides in the soil,

a photoionization detector to detect the presence of volatile organics and the PetroFLAG unit to estimate levels of petroleum hydrocarbons. The results were used to determine the horizontal and vertical extents of the release as shown on Figure 1 (Attachment 1). A selection of these characterization samples were submitted to a laboratory for full analysis to support the in-field findings. Data from the field screening and laboratory analyses have been compared to the above-noted closure criteria results to establish the appropriate level of remediation required. Complete characterization field screening and laboratory data results are presented in Table 2 (Attachment 3) and exceedances are identified in the table as bold with a grey background.

Proposed Remedial Activities

Vertex proposes areas identified with contaminant concentrations approaching, or above, the closure criteria identified in Table 1 be remediated through excavation and removal of contaminated soil with the use of mechanical equipment. Remediation should include excavation of the entire release footprint of approximately 7,180 square feet, to depths ranging between one and four feet below ground surface (bgs) as determined by initial characterization sampling.

A Vertex environmental technician will be onsite during excavation activities utilizing field screening methods to confirm removal of contaminated soil to below the applicable closure criteria as shown in Table 1. Approximately 605 cubic yards of contaminated soil are projected to be removed during excavation. Contaminated soils will be removed from site immediately or stored on a 30-mil liner prior to removal and disposal at an approved facility. Once excavation is complete, five-point composite confirmatory samples will be collected from the base and sidewalls of the excavation in accordance with the sample plan detailed in Attachment 4. The sampling plan is based on a non-parametric statistical sampling design, using the methods developed by Hahn and Meeker (1991), and was designed through the Visual Sample Plan (VSP) program. Sampling using VSP meets the Environmental Protection Agency's data quality assessment standards (DQAs) for composite sampling. This type of sampling approach is a variance from the alternative 200 square foot rule as described in Subparagraph (c) of Paragraph (1) of Subsection D of 19.15.29.12 NMAC. Please let this workplan serve as a formal variance request to the above-mentioned sampling method per the variance process outlined in Subsection A of 19.15.29.14 NMAC.

The need for a variance to the 200 square foot sampling method is based on an effort to decrease potential impacts to the off-lease portions of the spill. Using the VSP program to design a statistical sampling plan allows for a sampling approach that provides high statistical confidence in proving that no contaminants of concern above the closure and remediation requirements shown in Table 1 remain in the release area, while minimizing additional ground disturbing activities and potential damage to existing vegetation via foot and/or vehicle traffic. Statistically, the high level of confidence obtained by following the VSP sampling method in Attachment 4 is not significantly increased by collecting additional samples. For each additional sample collected over the VSP-recommended number, the incremental increase in confidence gets smaller but the risk of additional unnecessary impact to the remediation area and surrounding landscape increases due to the presence of technicians and equipment.

All confirmatory samples will be placed into laboratory-provided containers, preserved on ice and submitted to a National Environmental Laboratory Accreditation Program-approved laboratory for chemical analysis. Laboratory analyses will include 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.

A GeoExplorer 7000 Series Trimble global positioning system (GPS) unit, or equivalent, will be used to map the approximate center of each of the five-point composite samples.

Excavations will be backfilled with clean soil sourced locally and contoured to reconstruct existing grade and prevent ponding of water or erosion, and aid in the re-establishment of native vegetation in the off-pad portions of the remediation area.

Timeline for Completion

Remediation activities, as outlined in this workplan, are projected to be completed within 90 days of receiving NM OCD notice of approval of this workplan and alternate sampling plan.

If there are any questions regarding this report, please contact the undersigned at 505-506-0040.

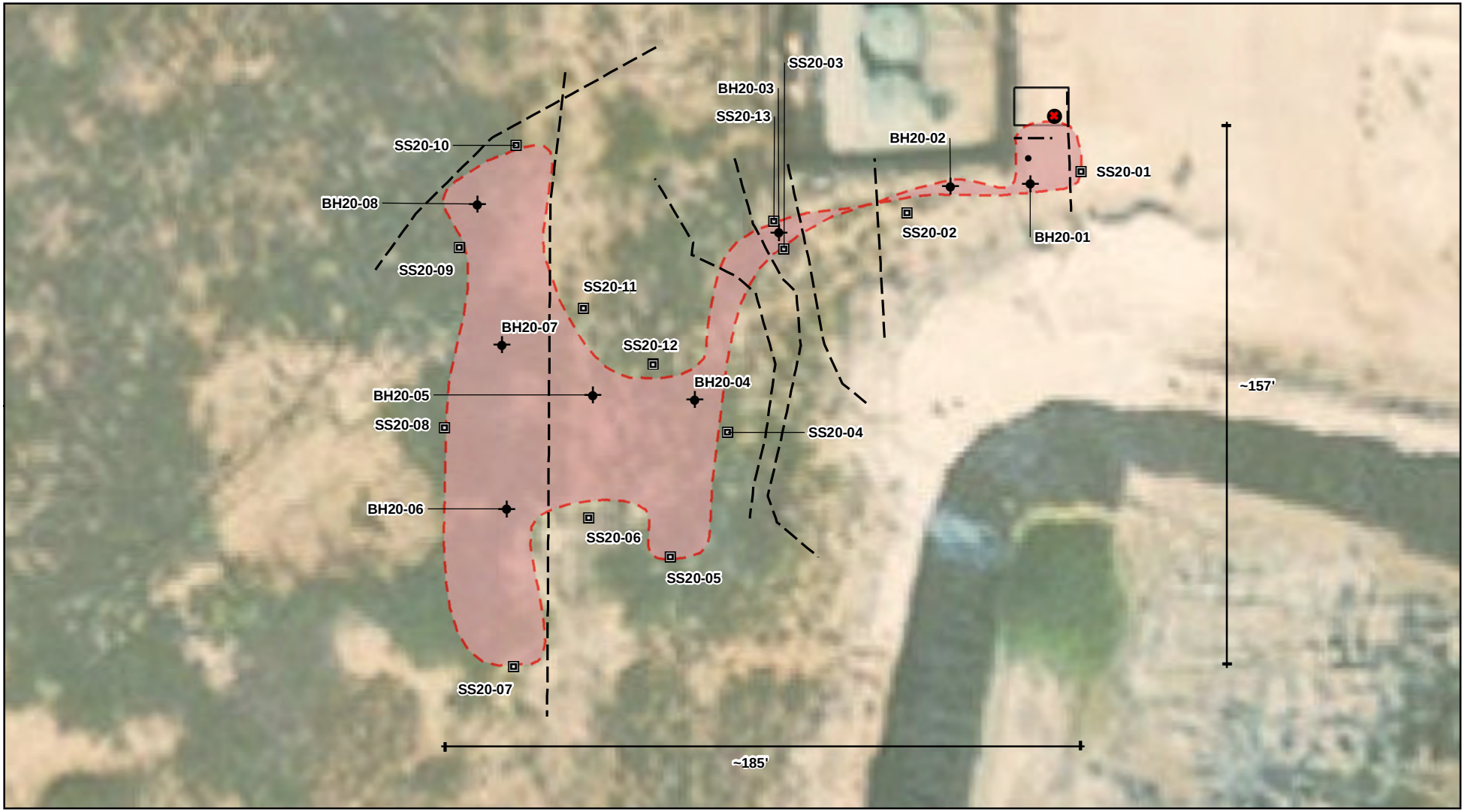
Sincerely,

Natalie Gordon
PROJECT MANAGER

Attachments

Attachment 1: Figure 1 – Release Area and Characterization Sampling Points
Attachment 2: Closure Criteria Determination Worksheet and Documentation
Attachment 3: Table 2 – Release Characterization Sampling – Field Screening and Laboratory Data
Attachment 4: Sampling to Compute a Nonparametric One-Sided Upper Tolerance Limit to Test that a Large Portion of a Room Surface Does Not Contain Contamination

ATTACHMENT 1



Borehole
Point of Release
Soil Sample
Telephone Pole
Aboveground Pipeline
Approximate Spill Extent (~ 7,180 sq. ft.)
Infrastructure

VERTEX

0 10 20 40 ft

Map Center:
Lat/Long: 32.823259, -103.823070

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

N

Initial Characterization Sampling and Site Schematic Partition Federal

FIGURE: 1

MACK Energy Corporation

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: Imagery from ESRI, 2016.

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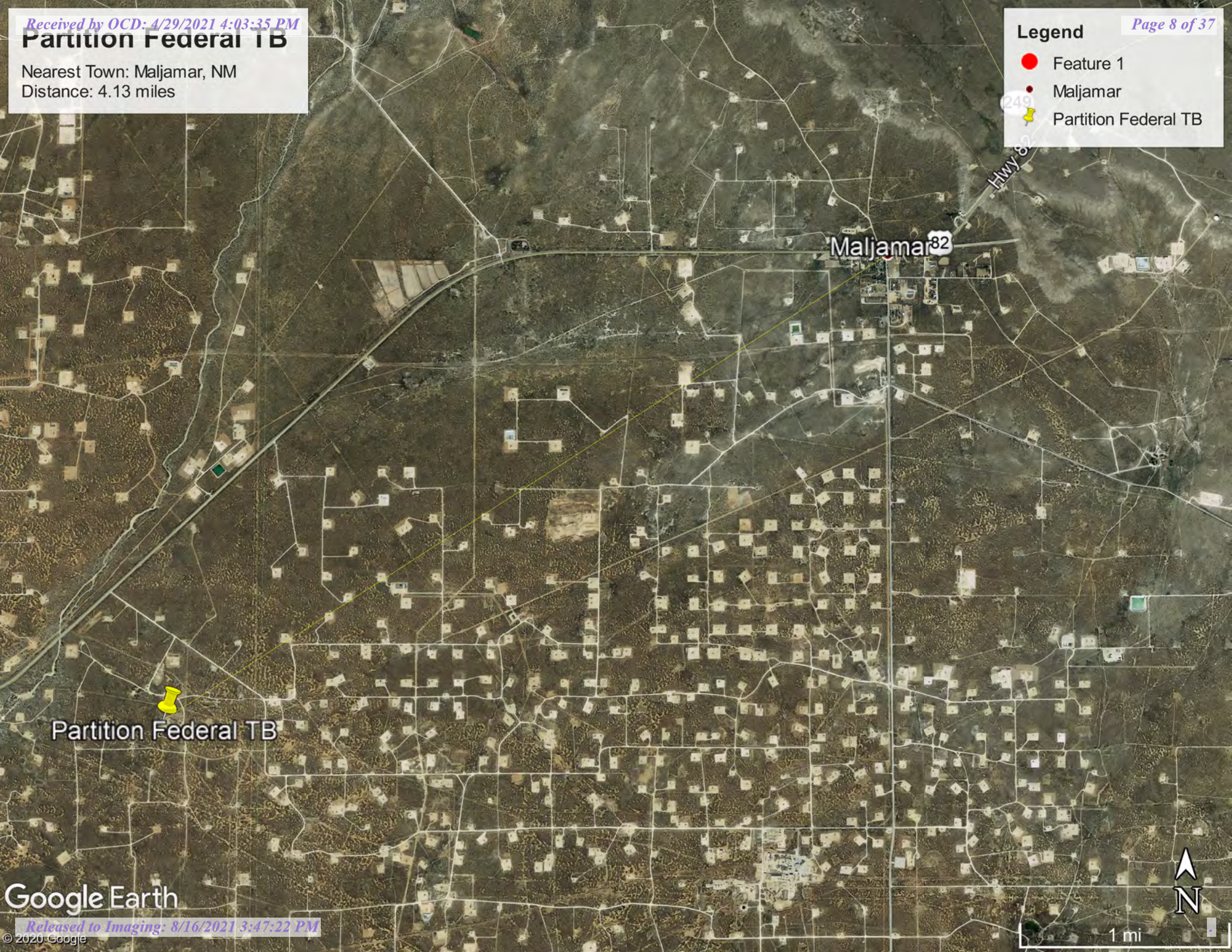
Document Path: G:\1-Projects_US PROJECTS\Mack Energy\20E-01755\001 - Partition Federal TB\Figure 1 Initial Characterization Partition Federal TB.mxd

ATTACHMENT 2

Closure Criteria Determination			
Site Name: Partition Federal TB			
Spill Coordinates: 32.823697, -103.822709		X:	Y:
Site Specific Conditions		Value	Unit
1	Depth to Groundwater	**0**	feet
2	Within 300 feet of any continuously flowing watercourse or any other significant watercourse	154,627	feet
3	Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)	7,392	feet
4	Within 300 feet from an occupied residence, school, hospital, institution or church	20,907	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**	20,907	feet
	ii) Within 1000 feet of any fresh water well or spring	20,907	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	7,392	feet
8	Within the area overlying a subsurface mine	No	(Y/N)
9	Within an unstable area (Karst Map)		Critical High Medium Low
10	Within a 100-year Floodplain	>100	year
NMAC 19.15.29.12 E (Table 1) Closure Criteria		<50'	<50' 51-100' >100'

Partition Federal TB

Nearest Town: Maljamar, NM
Distance: 4.13 miles



National Water Information System: Web Interface

USGS Water Resources

Data Category: Site Information | Geographic Area: United States | GO

Click to hideNews Bulletins

- Introducing The Next Generation of USGS Water Data for the Nation
- Full News

USGS 324649103504201 17S.31E.34

Available data for this site: SUMMARY OF ALL AVAILABLE DATA | GO

Well Site

DESCRIPTION:

Latitude 32°46'49", Longitude 103°50'42" NAD27
Eddy County, New Mexico , Hydrologic Unit 13060011
Well depth: 271 feet

AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Field/Lab water-quality samples	1948-12-06	1948-12-06	1
Revisions	Unavailable (site:0) (timeseries:0)		

OPERATION:

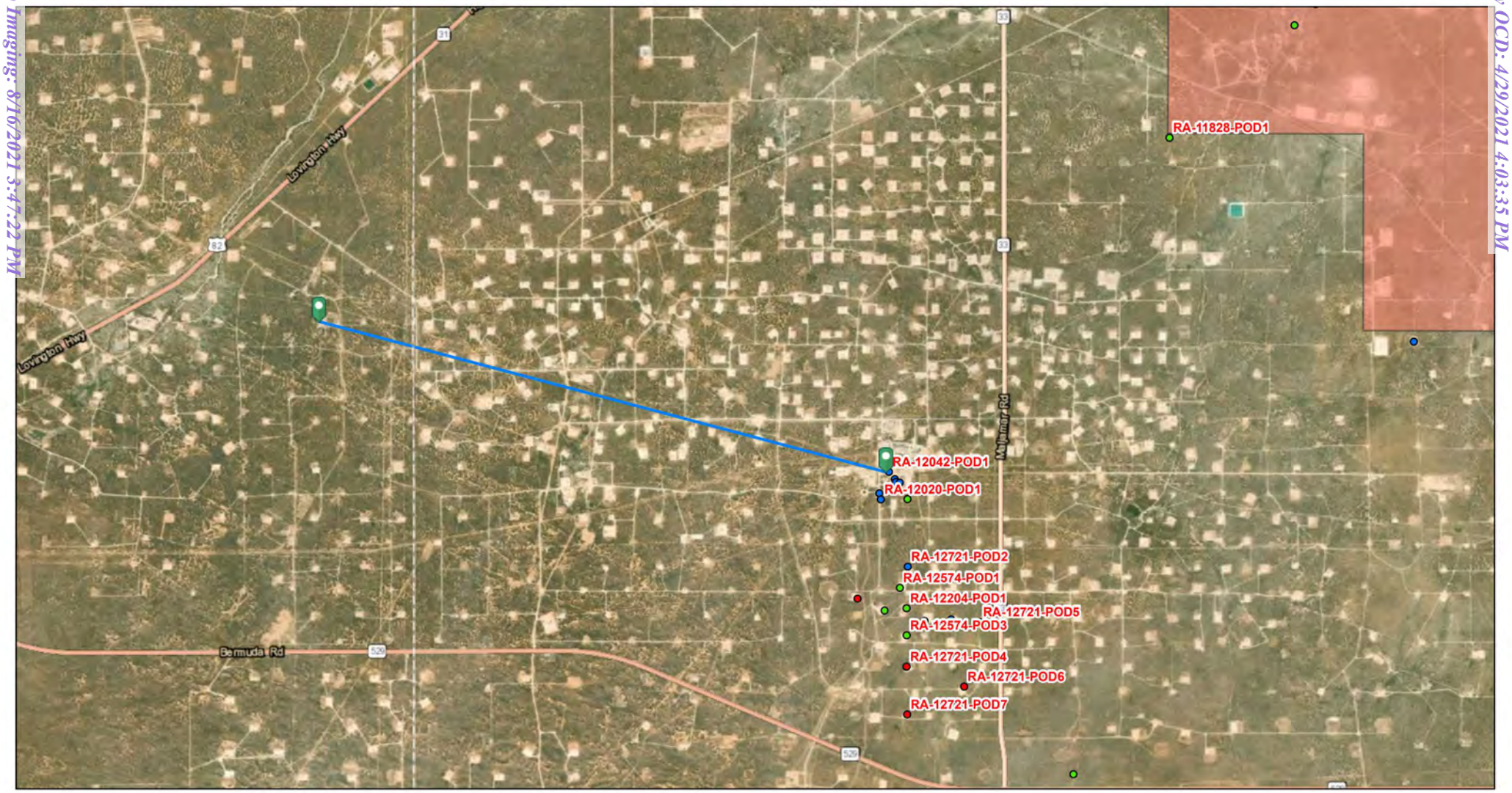
Record for this site is maintained by the USGS New Mexico Water Science Center
Email questions about this site to New Mexico Water Science Center Water-Data Inquiries

---

URL: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=324649103504201

Page Contact Information: New Mexico Water Data Support Team
Page Last Modified: 2020-08-04 10:50:57 EDT
0.4 0.4 caww02

Partition Federal TB



8/4/2020, 8:58:47 AM

1:36,112

0 0.38 0.75 1.5 mi

0 0.5 1 2 km

Water Right Regulations
- Critical Management Area - Guidelines
- OSE District Boundary

GIS WATERS PODs
- Active
- Pending
- Plugged

Conveyances
- Acequia
- Acequia Tunnel
- Canal
- Channel
- Closed Drain
- Community Ditch
- Connector
- Culvert
- Ditch
- Diversion Weir
- Drain
- Feeder
- Interior Drain
- Lateral
- Pipe
- Wasteway
- Other
- Unknown

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user

New Mexico Office of the State Engineer
Point of Diversion Summary

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

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
	RA 12042 POD1	2	2	1	28	17S	32E	614891	3631181

Driller License: 1261 **Driller Company:** DARRELL CRASS DRILLING CO., INC

Driller Name: CRASS, DARRELL (LD)

Drill Start Date: 11/13/2013 **Drill Finish Date:** 11/22/2013 **Plug Date:**

Log File Date: 12/12/2013 **PCW Rcv Date:** **Source:**

Pump Type: **Pipe Discharge Size:** **Estimated Yield:**

Casing Size: 10.00 **Depth Well:** 400 feet **Depth Water:**

Water Bearing Stratifications:	Top	Bottom	Description
	10	30	Sandstone/Gravel/Conglomerate

New Mexico Office of the State Engineer
Point of Diversion Summary

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

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
	RA 12521 POD1	3	3	4	21	17S	32E	615127	3631271

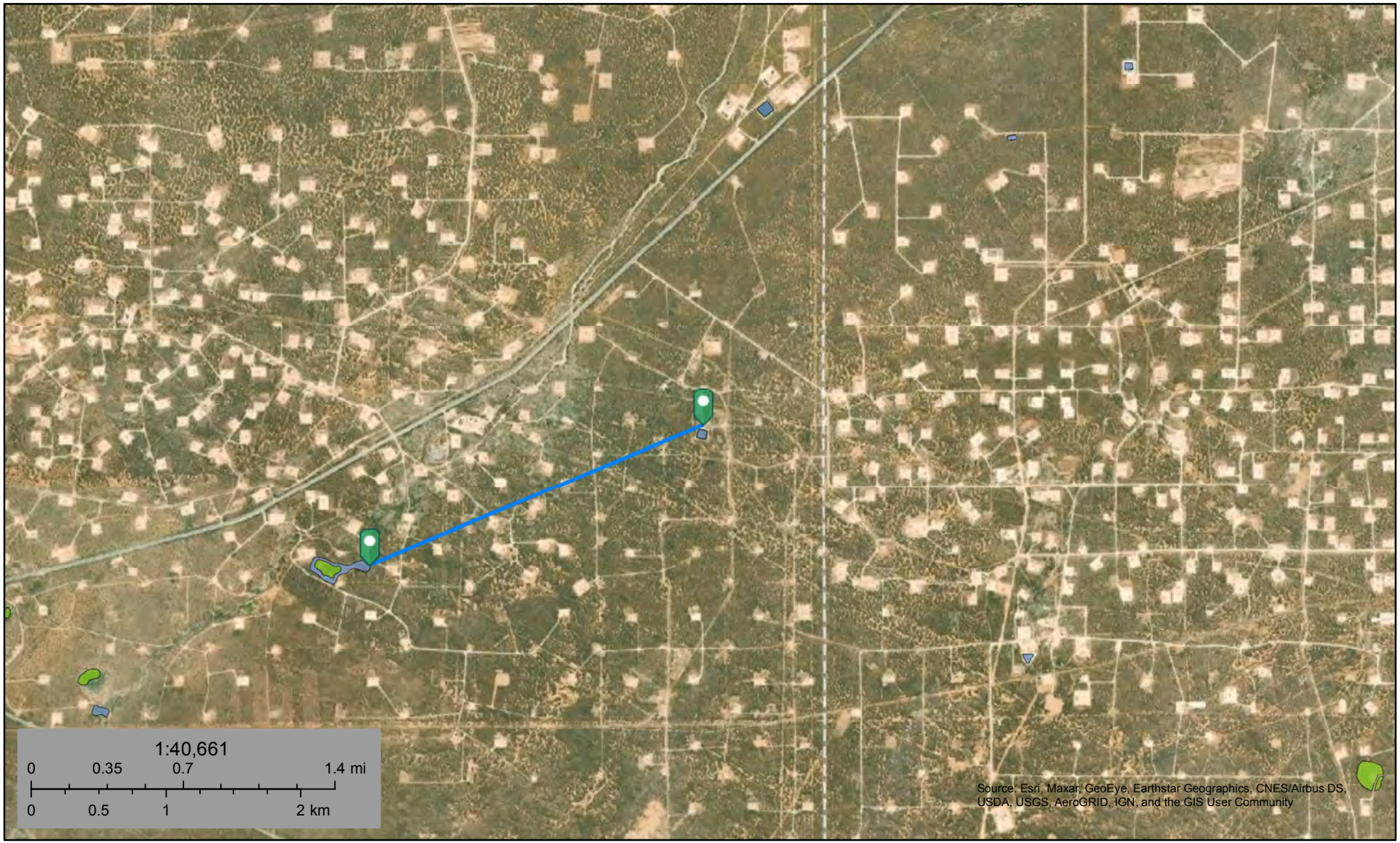
Driller License:	1456	**Driller Company:**	WHITE DRILLING COMPANY		
Driller Name:	WHITE, JOHN W				
Drill Start Date:	07/21/2017	**Drill Finish Date:**	07/26/2017	**Plug Date:**	
Log File Date:	08/22/2017	**PCW Rcv Date:**		**Source:**	Shallow
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:	2.00	**Depth Well:**	105 feet	**Depth Water:**	92 feet

Water Bearing Stratifications:	Top	Bottom	Description
	85	101	Sandstone/Gravel/Conglomerate
	101	105	Sandstone/Gravel/Conglomerate

Casing Perforations:	Top	Bottom
	75	105

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands 1.4 miles away



August 4, 2020

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.

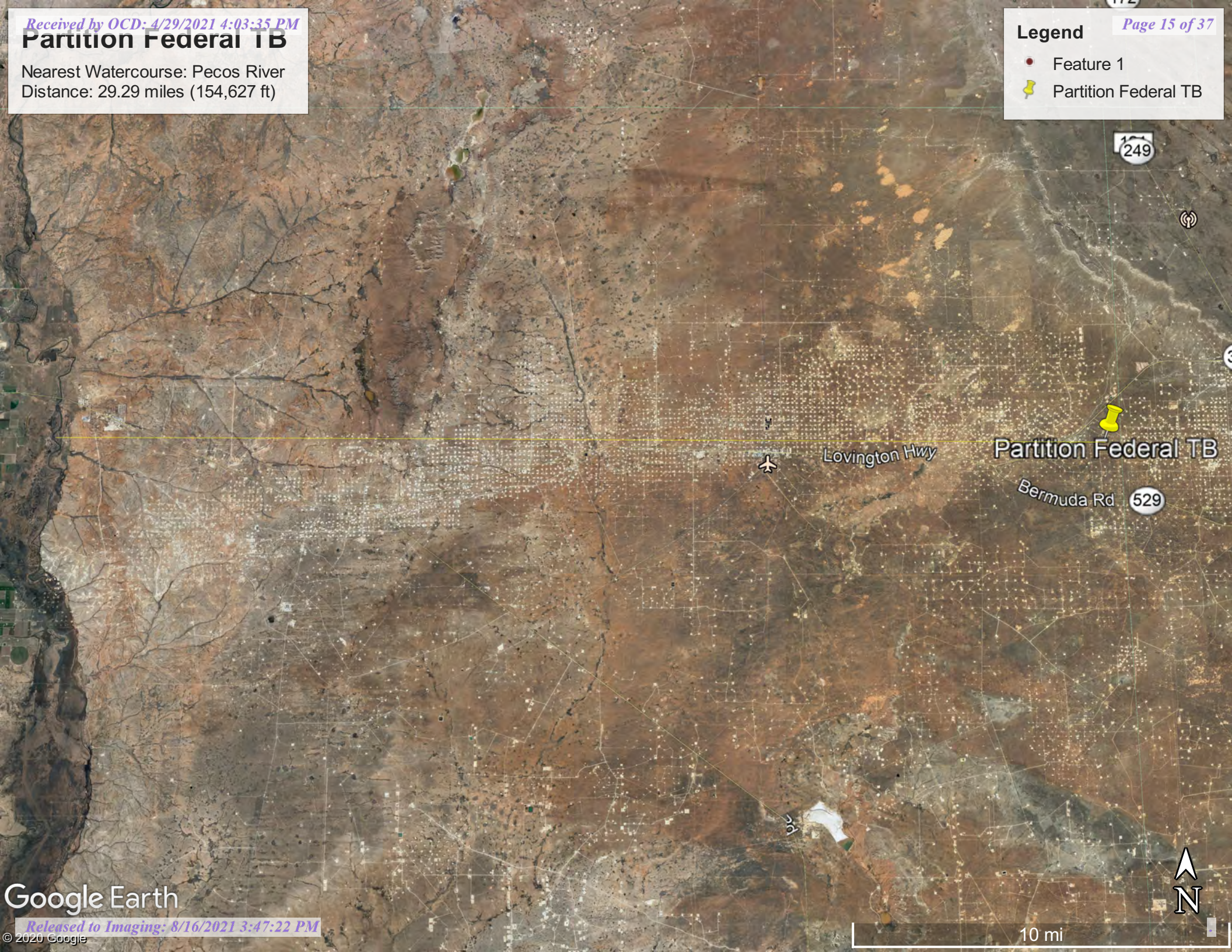
National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Partition Federal TB

Nearest Watercourse: Pecos River
Distance: 29.29 miles (154,627 ft)

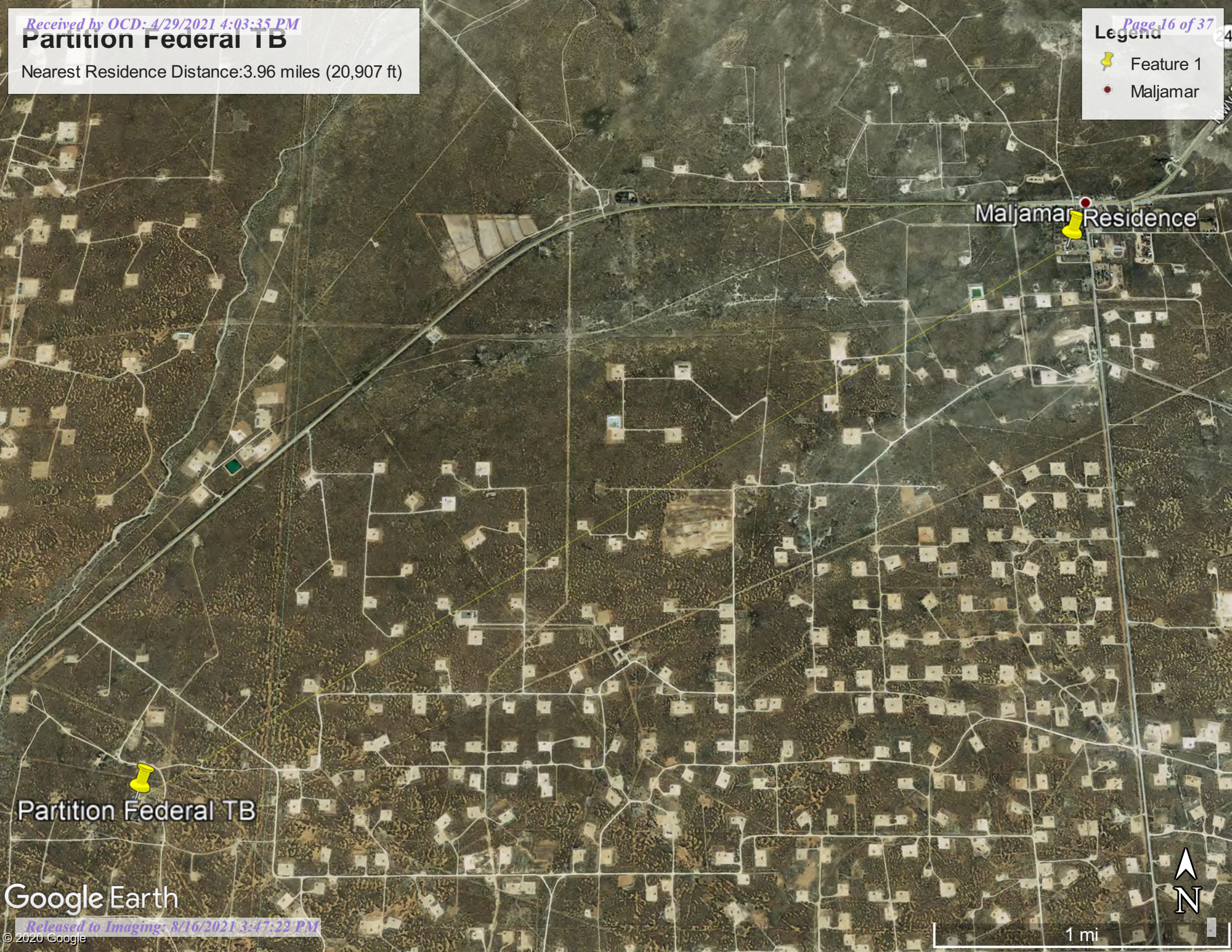
Legend

- Feature 1
- Partition Federal TB



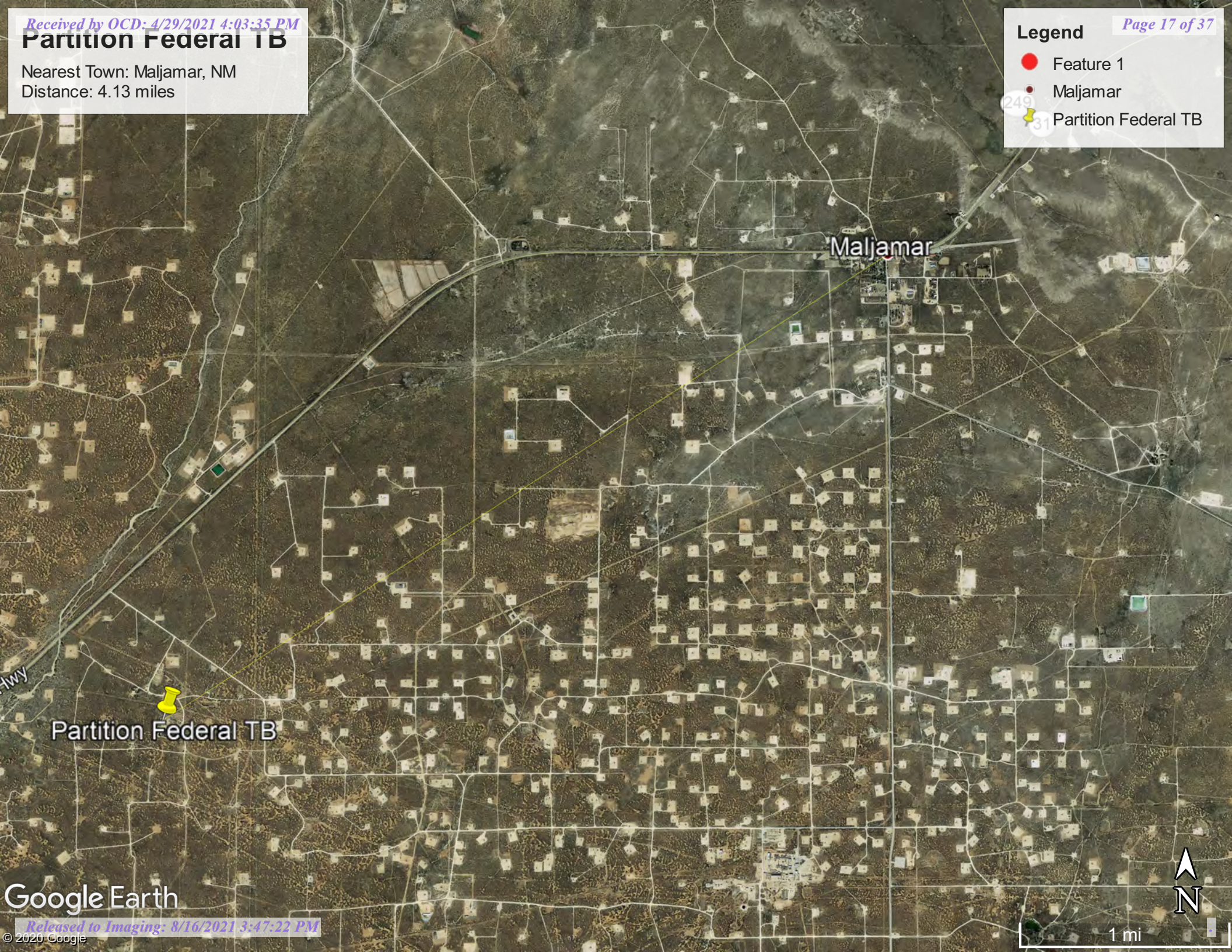
Partition Federal TB

Nearest Residence Distance:3.96 miles (20,907 ft)



Partition Federal TB

Nearest Town: Maljamar, NM
Distance: 4.13 miles



Soil Map—Eddy Area, New Mexico

Map Scale: 1:1,260 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

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: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

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

Date(s) aerial images were photographed: Sep 18, 2016—Nov 20, 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
KM	Kermit-Berino fine sands, 0 to 3 percent slopes	6.0	100.0%
Totals for Area of Interest		**6.0**	**100.0%**

Eddy Area, New Mexico

KM—Kermit-Berino fine sands, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1w4q
Elevation: 3,100 to 4,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 190 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Kermit and similar soils: 50 percent
Berino and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kermit

Setting

Landform: Alluvial fans, plains
Landform position (three-dimensional): Rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 7 inches: fine sand
H2 - 7 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 3.1 inches)

Interpretive groups

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

Description of Berino

Setting

Landform: Fan piedmonts, plains
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 17 inches: fine sand
H2 - 17 to 50 inches: fine sandy loam
H3 - 50 to 58 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Minor Components

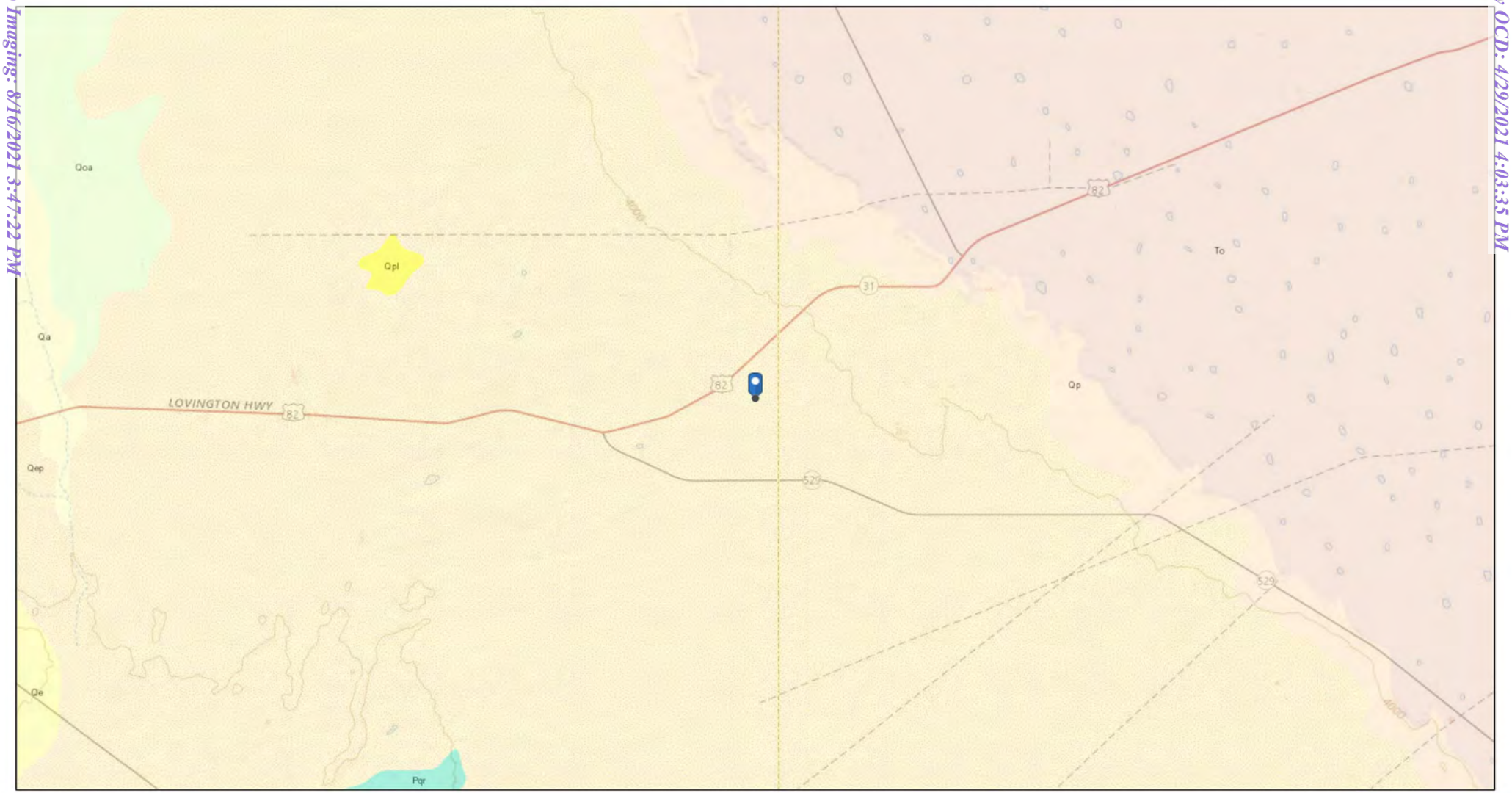
Active dune land

Percent of map unit: 15 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Partition Federal TB



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0 1.5 3 6 mi

0 2.25 4.5 9 km

Faults

- Fault, Exposed
- Fault, Intermittent
- Fault, Concealed
- Shere Zone

Dikes

- <all other values>
- Dike
- Dike intruding fault
- Volcanic Vents

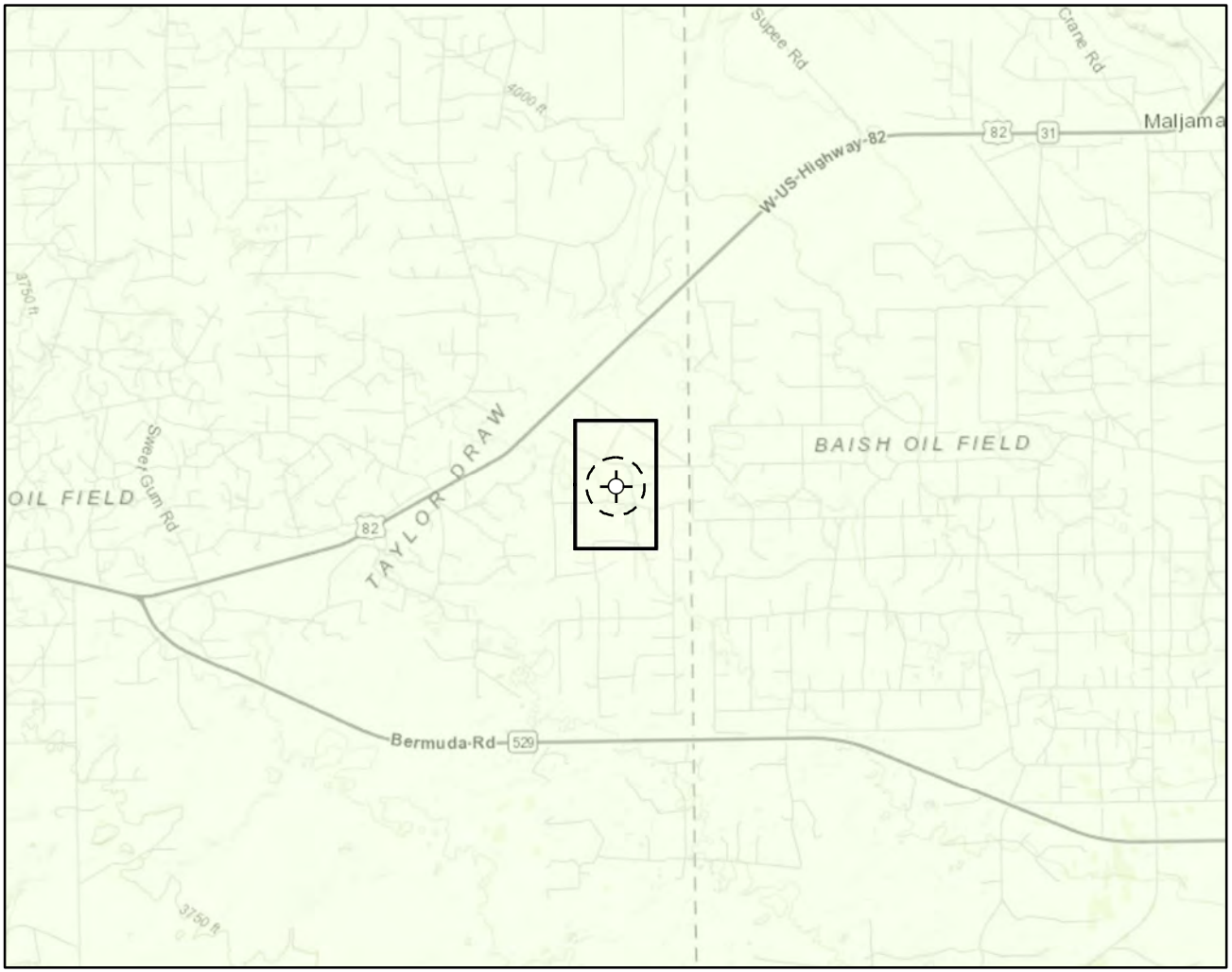
STATEMAP (1993 to Present) [Publications]

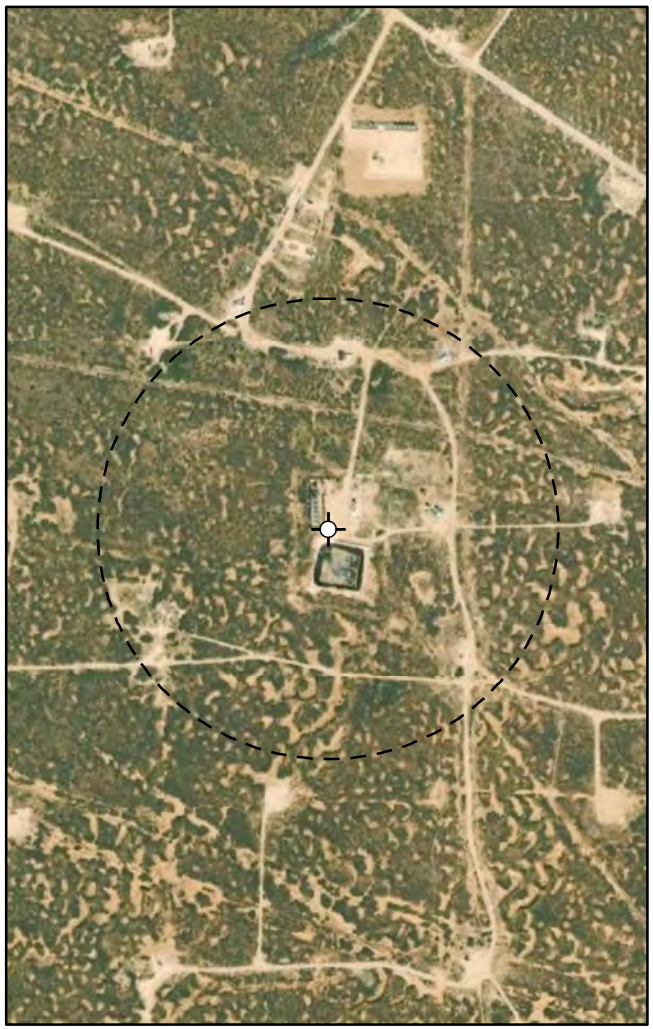
- Mapping in Complete
- Mapping in Progress

NMBGMR, USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset;

Web AppBuilder for ArcGIS

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line





Karst Potential

- Critical
- High
- Medium
- Low

- Site Location
- Site Buffer (1,000 ft.)

Overview Map

0 0.25 0.5 1 mi

Detail Map

0 150 300 600 ft.

VERTEX

Map Center:
Lat/Long: 32.823599, -103.822754

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

N

Karst Potential
Partition Federal TB

FIGURE:
X

MACK Energy Corporation

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: Inset Map, ESRI 2016; Overview Map: ESRI World Topographic

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Document Path: G:\1-Projects_US PROJECTS\Mack Energy\20E-017555\001 - Partition Federal TB\Fig X Karst Potential Partition Federal TB.mxd

ATTACHMENT 3

Client Name: Mack Energy
Site Name: Partition Federal TB
NM OCD Tracking Number: NRM2008663010
Project #: 20E-01755-001
Lab Report: 2008126; 2008129; 2008257

Table 2. Characterization Sampling Field Screen and Laboratory Results - Depth to Groundwater <50 feet bgs

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 (Electroconductivity)	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)	(ppm)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
BH20-01	0	August 3, 2020	odor	-	<0	<0.0120	<1.080	<24.0	6,300	6,300	**6,300**	**12,600**	84
	1	August 3, 2020	-	**629**	<0	-	-	-	-	-	-	-	-
	3	August 3, 2020	-	30	<0	<0.023	<0.210	<4.7	<9.5	<47	<14.2	<61.2	<60
BH20-02	0	August 3, 2020	odor	-	18	-	-	-	-	-	-	-	-
	1	August 3, 2020	odor	**EE**	<0	-	-	-	-	-	-	-	-
	2	August 3, 2020	-	24	<0	-	-	-	-	-	-	-	-
BH20-03	0	August 3, 2020	odor	-	50	<0.120	1.350	46	5,700	4,000	**5,746**	**9,746**	140
	2	August 3, 2020	-	**EE**	<0	<0.120	3.220	150	4,600	1,800	**4,750**	**6,550**	<60
	4	August 3, 2020	-	22	<0	<0.024	<0.217	<4.8	<9.6	<48	<14.4	<62.4	<60
BH20-04	0	August 3, 2020	odor	-	<0	-	-	-	-	-	-	-	-
	0.5	August 3, 2020	-	**1,111**	<0	-	-	-	-	-	-	-	-
	2	August 3, 2020	-	**EE**	<0	-	-	-	-	-	-	-	-
	4	August 3, 2020	-	71	<0	-	-	-	-	-	-	-	-
BH20-05	0	August 3, 2020	odor		<0	-	-	-	-	-	-	-	-
	1	August 3, 2020	odor	**EE**	20	-	-	-	-	-	-	-	-
	2	August 3, 2020	-	-	148	-	-	-	-	-	-	-	-
	3	August 3, 2020	-	32	330	-	-	-	-	-	-	-	-
BH20-06	0	August 3, 2020	odor	-	<0	-	-	-	-	-	-	-	-
	0.5	August 3, 2020	-	**233**	<0	-	-	-	-	-	-	-	-
	1	August 3, 2020	-	33	<0	-	-	-	-	-	-	-	-
BH20-07	0	August 3, 2020	odor	-	<0	<0.120	<1.080	<24.0	3,200	2,200	**3,200**	**5,400**	<60
	1	August 3, 2020	-	-	<0	<0.024	<0.216	<4.8	83	66	83	**149**	<60
	2	August 3, 2020	-	42	<0	-	-	-	-	-	-	-	-
	3	August 3, 2020	-	16	<0	-	-	-	-	-	-	-	-
BH20-08	0	August 3, 2020	odor	-	<0	-	-	-	-	-	-	-	-
	2	August 3, 2020	odor	**EE**	<0	-	-	-	-	-	-	-	-
	3	August 3, 2020	-	**EE**	<0	<0.047	<0.427	<9.5	210	540	210	**750**	<60
SS20-01	0-0.5	August 3, 2020	-	87	<0	<0.025	<0.221	<4.9	17	<47	17	17	<60
SS20-02	0-0.5	August 3, 2020	-	23	<0	<0.024	<0.216	<4.8	15	<48	15	15	<60
SS20-03	0-0.5	August 3, 2020	-	84	<0	<0.024	<0.220	<4.9	10	<49	10	10	<60
SS20-04	0-0.5	August 3, 2020	-	34	<0	<0.024	<0.217	<4.8	<9.4	<47	<14.2	<61.2	<59
SS20-05	0-0.5	August 3, 2020	-	26	<0	<0.024	<0.216	<4.8	<10.0	<50	<14.8	<64.8	<60
SS20-06	0-0.5	August 3, 2020	-	44	<0	<0.025	<0.222	<4.9	<10.0	<50	<14.9	<64.9	<60
SS20-07	0-0.5	August 3, 2020	-	12	<0	<0.024	<0.213	<4.7	<10.0	<50	<14.7	<64.7	<60
SS20-08	0-0.5	August 3, 2020	-	34	<0	<0.024	<0.213	<4.7	<9.4	<47	<14.1	<61.1	180
SS20-09	0-0.5	August 3, 2020	-	-	<0	-	-	-	-	-	-	-	-
SS20-10	0-0.5	August 3, 2020	-	59	<0	<0.025	<0.225	<5.0	<9.4	<47	<14.4	<61.4	<60
SS20-11	0-0.5	August 3, 2020	-	-	<0	-	-	-	-	-	-	-	-
SS20-12	0-0.5	August 3, 2020	-	74	<0	<0.025	<0.225	<5.0	<9.4	<47	<14.4	<61.4	<60
SS20-13	0-0.5	August 3, 2020	-	16	<0	<0.024	<0.217	<4.8	<10.0	<50	<14.8	<64.8	<60

"-" - not applicable/analyzed
Bold and shaded indicates exceedance outside of NM OCD Closure Criteria

ATTACHMENT 4

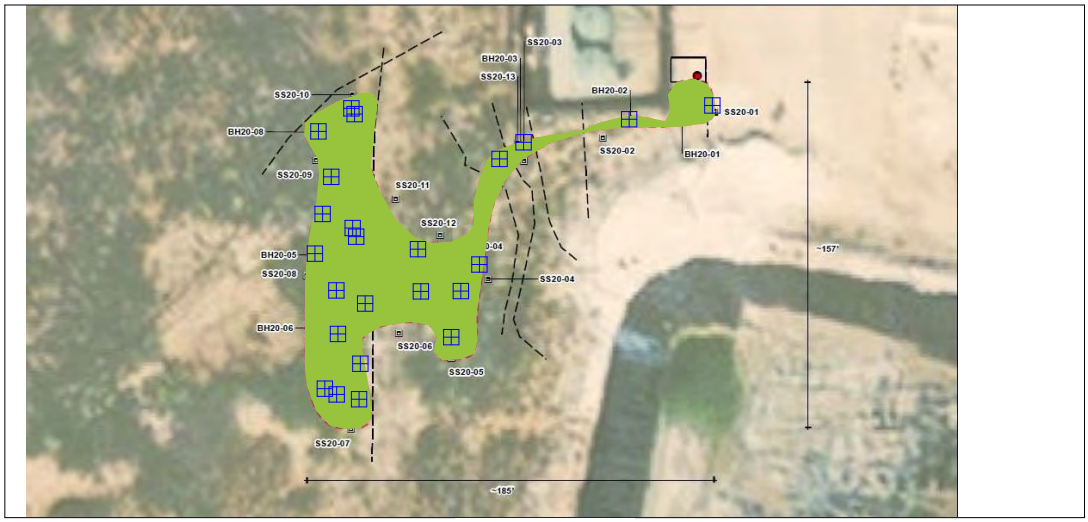
Sampling to Compute a Nonparametric (Distribution-Free) One-Sided Upper Tolerance Limit to Test that a Large Portion of Room Surfaces Does Not Contain Contamination

Summary

This report summarizes the sampling design developed by VSP based on inputs provided by the VSP user. The following table summarizes the sampling design developed by VSP. A figure that shows the sample placement on the map and a table that lists the sample locations are also provided below.

SUMMARY OF SAMPLING DESIGN	
Primary Objective of Design	Use a nonparametric (distribution-free) one-sided upper tolerance limit (UTL) to test if the true P^{th} percentile of a population exceeds the action level
Required fraction of the population to be less than the action level	0.9 (P=90)
Required percent confidence on the decision made using the UTL	92%
Method used to compute the number of samples, *n*	Hahn and Meeker (1991, page 169) (See equations below)
Sample placement method	Random point sampling in grids
Calculated total number of samples	24
Number of samples on map [a]	24
Number of selected sample areas that are not rooms	1
Total sampling surface area [b]	7253.04 ft^2
Total cost of sampling [c]	$3,880.00

[a] This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas (rooms).
[b] This is the total surface area of all selected rooms and other selected sample areas on the map of the site.
[c] Including measurement analyses and fixed overhead costs. See the Cost of Sampling section for an explanation of the costs presented here.



Floor Plan Map

Area: Area 1						
X Coord	**Y Coord**	**Label**	**Value**	**Type**	**Historical**	**Sample Area**
-395.6345	-241.0326			Random in Grid		

-385.1186	-243.3793			Random in Grid			
-401.2117	-238.4361			Random in Grid			
-384.4843	-226.6732			Random in Grid			
-395.0238	-212.6156			Random in Grid			
-341.6694	-214.0741			Random in Grid			
-395.7849	-192.1013			Random in Grid			
-382.2142	-198.2564			Random in Grid			
-355.9255	-192.6360			Random in Grid			
-337.1245	-192.4205			Random in Grid			
-405.8850	-174.7934			Random in Grid			
-386.3554	-166.7473			Random in Grid			
-357.2693	-172.6373			Random in Grid			
-328.3676	-179.9094			Random in Grid			
-402.1767	-156.0708			Random in Grid			
-388.1061	-162.7511			Random in Grid			
-398.1904	-138.6383			Random in Grid			
-318.9554	-130.1752			Random in Grid			
-404.1361	-117.1911			Random in Grid			
-387.0845	-109.1551			Random in Grid			
-307.5805	-122.3610			Random in Grid			
-257.9580	-111.4679			Random in Grid			
-388.7262	-106.4213			Random in Grid			
-218.7856	-104.9802			Random in Grid			

Primary Sampling Objective
The primary objective of this sampling effort is to make a decision whether an unacceptably large portion (fraction) of a specified surface area (target population) is contaminated above a specified action level (AL) or is otherwise defective. It is presumed that suitable actions have been identified to be implemented for either way the decision may go.

Population Parameter of Interest
The population parameter of interest is the true P^{th} percentile of the population of contaminant concentrations, where $0 < P < 100$, in this case, the 90^{th} percentile ($P = 90$). The true P^{th} percentile is the value above which (100 - P)% of the population lies and below which P% of the population lies. The objective is to reject the null hypothesis if the true P^{th} percentile exceeds the specified action level (AL). But, the true P^{th} percentile will never be known with 100% confidence because all possible measurements from the population cannot be obtained. Hence the decision whether to reject the null hypothesis is made using the computed upper tolerance limit (UTL) for the P^{th} percentile, that is, by computing the upper 100(1-α)% confidence limit on the P^{th} percentile (see Decision Rule below). For the current design α is 0.08, which means that the decision will be made using the computed UTL for the 92% confidence limit on the 90^{th} percentile.

Hypothesis Being Tested
The null hypothesis (baseline assumption) is as follows:

H_o: The true P^{th} percentile $\leq$ AL
or equivalently,
H_o: Less than P% of the population < AL

The H_o is rejected if UTL < AL, in which case the alternative hypothesis (H_a) is accepted as being true, where:

H_a: More than P% of the population < AL

Sampling Design Options
VSP offers many options to determine the locations at which measurements are made or samples are collected and subsequently measured. For this design, random point sampling in grids was chosen. This option offers a good balance between providing information about the spatial structure of the potential contamination while ensuring all portions of the site are represented (though, not as thoroughly as systematic grid sampling). Knowledge of the spatial structure is useful for geostatistical analysis. This option also has the benefit of placing the exact number of samples required by the design.

Decision Rule and Number of Samples, *n*
The null hypothesis is rejected and the alternative hypothesis is accepted if the nonparametric (distribution-free) UTL for the P^{th} percentile is less than the specified action level (AL). The nonparametric UTL is simply the maximum of the *n* measurements obtained from the population of interest, where *n* is computed using the following equation

$$n = \frac{\ln(\alpha)}{\ln(P/100)}$$

(from Hahn and Meeker 1991, page 169). These authors discuss the statistical meaning, use, and computation of nonparametric tolerance limits and the number of samples required (pages 91, 92,169, and 326).

The following table displays the values of the input parameters used for this design:

Parameter	Value
Input	
P	90
α	0.08 (8%)
Confidence (1-α)	92%
Output	
n	24

Statistical Assumptions
1. Representative measurements have been obtained from a defined target population using simple random sampling or a systematic grid pattern that has a randomly selected starting location.
2. The *n* measurements are statistically independent, i.e., there is no spatial correlation (no spatial patterns) of contaminant levels throughout the target population.
3. The maximum of the *n* measurements is not an invalid value, i.e., it is not a mistake or an unacceptably uncertain value due to faulty sample handling, transport, treatment, storage, or measurement.

Sensitivity Analysis
The sensitivity of the calculation of number of samples was explored by varying the required percent of the population to be less than the action level. and confidence level (1-α) (%). The following table shows the results of this analysis.

Number of Samples					
	CL=96	**CL=94**	**CL=92**	**CL=90**	**CL=88**
P=85	20	18	16	15	14
P=90	31	27	24	22	21
P=95	63	55	50	45	42

P = Required Percent of the Population to be Less Than the Action Level.
CL = Confidence Level (1-α) (%)

Cost of Sampling
The total cost of the completed sampling program depends on several cost inputs, some of which are fixed, and others that are based on the number of samples collected and measured. Based on the numbers of samples determined above, the estimated total cost of sampling and analysis at this site is $3,880.00, which averages out to a per sample cost of $161.67. The following table summarizes the inputs and resulting cost estimates.

COST INFORMATION			
Cost Details	**Per Analysis**	**Per Sample**	**24 Samples**
Field collection costs		$20.00	$480.00
Analytical costs (Analyte 1)	$100.00	$100.00	$2,400.00
Sum of Field & Analytical costs		**$120.00**	**$2,880.00**
Fixed planning and validation costs			$1,000.00
Total cost			**$3,880.00**

Recommended Data Analysis Activities
Post data collection activities generally follow those outlined in EPA's Guidance for Data Quality Assessment (EPA, 2000). The data analysts should become familiar with the context of the problem and goals for data collection and assessment. The *n* data should be verified and validated before being used to test the null hypothesis. The VSP user should enter the validated and verified *n* data values into the VSP dialog box and click on appropriate tabs to obtain the following statistical summaries of the data. If there is strong evidence that the *n* data are normally distributed, the VSP user may want to use VSP to determine the number of samples, *n*, required to compute the normal distribution UTL and then use that UTL (rather than the nonparametric UTL) to test the null hypothesis.

Summary statistics: *n*, minimum and maximum of the *n* measurements, range of the *n* data, mean, median, standard deviation, variance, skewness, percentiles, and the interquartile range

Statistical Tests of Normality Assumption: Shapiro-Wilk test (if $n \leq 50$) (Gilbert 1987), Lilliefors test (if $n > 50$) (EPA 2000).

Graphical Displays of the Data: Histogram, box-and-whisker plots and quantile-quantile (probability) plots (EPA 2000).

References

EPA. 2000. *Guidance for Data Quality Assessment, Practical Methods for Data Analysis*, EPA QA/G-9, EPA/600/R-96/084, July 2000, Office of Environmental Information, U.S. Environmental Protection Agency.

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*, Wiley & Sons, New York, NY.

Hahn, G.J. and W.Q. Meeker. 1991. *Statistical Intervals*. Wiley & Sons, Inc, New York, NY.

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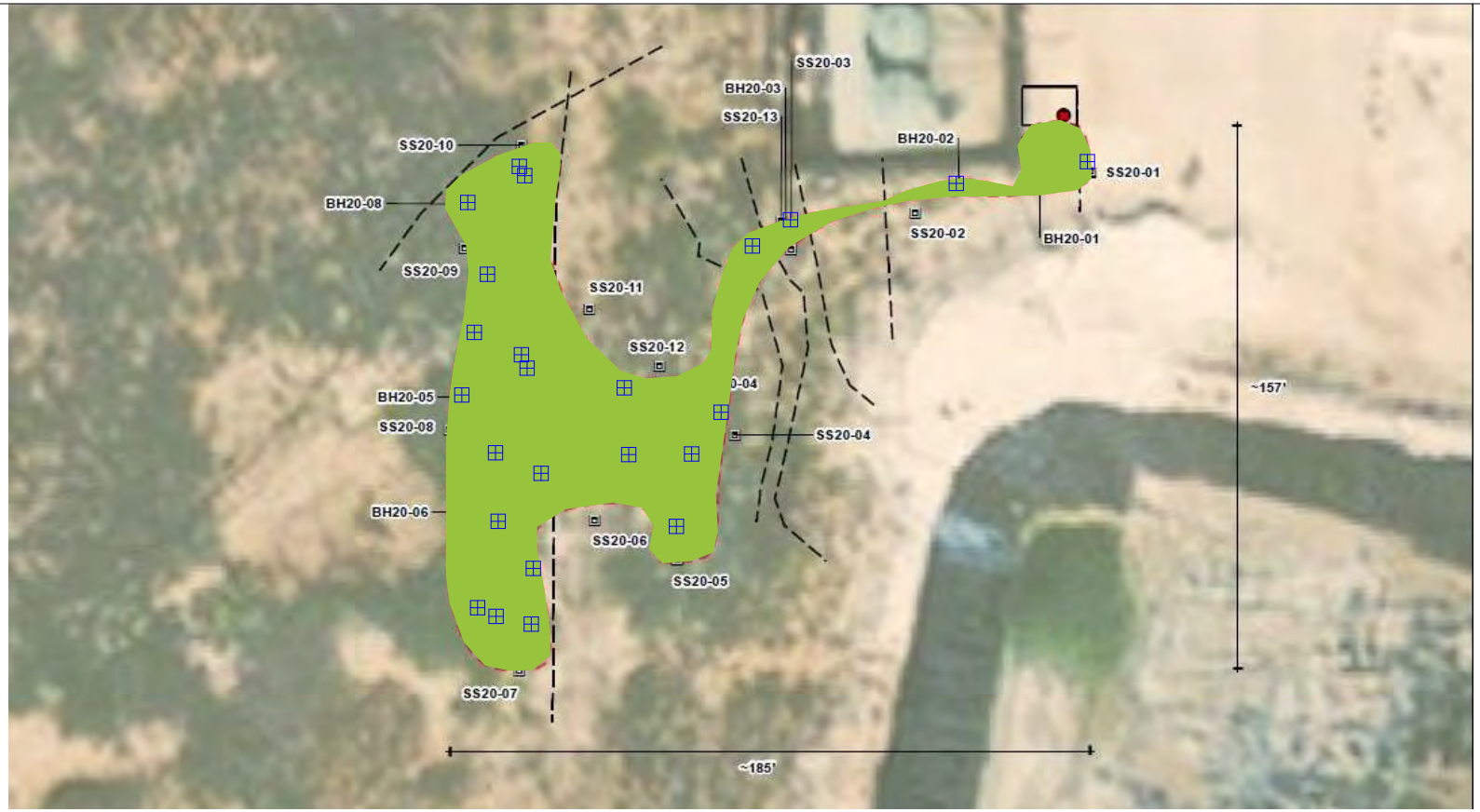
SS20-03
BH20-03
SS20-13
BH20-02
SS20-01
SS20-10
BH20-08
SS20-02
BH20-01
SS20-09
SS20-11
SS20-12
BH20-05
SS20-08
SS20-04
~157'
BH20-06
SS20-06
SS20-05
SS20-07
~185'

Incident ID	NRM2008663010
District RP	2
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?	<50 (ft bgs)
Did this release impact groundwater or surface water?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a wetland?	☐ Yes ☒ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☒ Yes ☐ No

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

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

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

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

Form C-141
Page 4

State of New Mexico
Oil Conservation Division

Incident ID	NRM2014054256
District RP	2
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: _____Matt Buckles_____ Title: _____Environmental_____

Signature:_____*Matt Buckles*_____ Date: ____12/9/2020_____

email: ___mattbuckles@mec.com_____ Telephone: _____575-748-1288_____

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	NRM2008663010
District RP	2
Facility ID	
Application ID	

Remediation Plan

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

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

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

☐ Contamination must be in areas immediately under or around production equipment where remediation could cause a major facility deconstruction.

☐ Extents of contamination must be fully delineated.

☐ Contamination does not cause an imminent risk to human health, the environment, or groundwater.

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

Printed Name: _____Matt Buckles_____ Title: _____Environmental_____

Signature: _____*Matt Buckles*_____ Date: _____*12/9/2020*_____

email: ___mattbuckles@mec.com_____ Telephone: _____575-748-1288_____

OCD Only

Received by: _____ Date: _____

☐ Approved ☐ Approved with Attached Conditions of Approval ☐ Denied ☐ Deferral Approved

Signature: _____ Date: _____

Form C-141
Page 5

State of New Mexico
Oil Conservation Division

Incident ID	NRM2008663010
District RP	2
Facility ID	
Application ID	

Remediation Plan

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

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

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

Printed Name: Matt Buckles Title: Environmental

Signature: *Matt Buckles* Date: *12/9/2020*

email: mattbuckles@mec.com Telephone: 575-748-1288

OCD Only

Received by: Robert Hamlet Date: 8/16/2021

☐ Approved ☒ Approved with Attached Conditions of Approval ☐ Denied ☐ Deferral Approved

Signature: Robert Hamlet Date: 8/16/2021

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Operator:	OGRID:
MACK ENERGY CORP P.O. Box 960 Artesia, NM 882110960	13837
	Action Number: 26389
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
rhamlet	The Workplan/Remediation Plan is approved with the following conditions: Sidewall/floor samples need to comply with the strictest closure criteria limits 600 mg/kg for Chlorides and 100 mg/kg TPH.	8/16/2021