M & M EXCAVATING, INC.
PO Box 1120
Carlsbad, New Mexico 88221
Phone (575) 236-6600

February 12, 2020

NMOCD District 2
Mr. Robert Hamlet
811 S. First Street
Artesia, New Mexico 88210

Dear Mr. Hamlet:

M&M Excavating, Inc. (MMX) has prepared this Remediation Closure Report for Devon Energy Production Company that describes the remediation of a release of liquids at the Cotton Draw Unit #084 SWD. The site is in Unit Letter I, Section 02, Township 25S, Range 31E, Latitude 32.1592751, Longitude -103.7438736, Eddy County, New Mexico, on Federal Land with State owned mineral rights. Figure 1 provides the vicinity and site location on an USGS 7.5-minute quadrangle map.

Site Information and Closure Criteria

The Cotton Draw Unit #084 SWD is located approximately thirty-three (33) miles southeast of Loving, New Mexico on Federal land at an elevation of approximately 3,464 feet above mean sea level (amsl).

Based upon well water data. (Appendix B), depth to groundwater in the area is estimated to be 400 feet below grade surface (bgs). There are ten known water wells within ½ mile of the location, according to the New Mexico Office of the State Engineer (NMOSE) and USGS. The nearest significant watercourse is a freshwater pond 3320 feet to the southeast.

The site has wells within 1000 feet and has therefore been remediated to the applicable NMOCD Closure Criteria for groundwater less than 50 feet bgs. The site has been restored to meet the standards of Table I of 19.15.29.12 NMAC.

Table 2 demonstrates the Closure Criteria applicable to this location. Pertinent well data is attached in Appendix B.

Release Information and Closure Criteria			
Name	Cotton Draw Unit #084 SWD		
API Number	30-015-29728		
Incident Number	2RP-4325		
Source of Release	Frac Tank		
Released Material	Produced Water	Released Volume	65 BBLS
Recovered Volume	10 BBLS	Net Release	55BBLS
NMOCD Closure Criteria	<50 feet to groundwater		

Release Information

On July 23, 2019, a release was discovered at the Cotton Draw Unit #084 SWD site due to a frac tank overfilling, which approximately 65 bbls of produced water released. Initial response

activities were conducted by the operator and included source elimination and site containment, which recovered approximately 10 bbls of produced water. The site has since begun plugging and abandonment activities, and most of the tanks and equipment have been removed. Figures 1 and 2 illustrate the vicinity and site location. Figure 3 illustrates the release location. The C-141 forms are included in Appendix A.

Release Characterization and Remediation Activities

As little was known about the impacted area, on October 9, 2019, Vertex personnel arrived on site and conducted an Electromagnetic (EM) Survey across the entire Cotton Draw Unit #084 SWD pad in order to "identify anomalously conductive soils and infer changes in the soil characteristics and composition.". The full EM report is included in Appendix D.

Using the EM survey to guide to sampling, MMX personnel travelled to location on October 10th and again on November 26th and December 3, 2019 to collect soil samples around potential areas of concern. Figure 3 shows the sample locations georeferenced over the EM survey.

A total of three (3) sample locations were established and three (3) samples (L1, L2 and TB), were collected for laboratory analysis for total chloride using EPA Method 300.0; benzene, toluene, ethylbenzene and total xylenes (BTEX) using EPA Method 8021B; and motor, diesel and gasoline range organics (MRO, DRO, and GRO) by EPA Method 8015D. Samples were placed into laboratory supplied glassware, labeled, and maintained on ice until delivery to Hall Laboratories in Albuquerque, New Mexico (Appendix C).

As summarized in Table 3, none of the results exceeded Closure Criteria for the location. Final Laboratory results are summarized in Table 3. Laboratory reports are included in Appendix C.

On behalf of Devon Energy, MMX requests closure for the release associated with 2RP-4325.

Submitted by:
M&M Excavating, Inc.

Parker Kimbley

Parker Kimbley

ATTACHMENTS:

Figures:

Figure 1: Vicinity and Well Head Protection Map
Figure 2: Surface Water Radius Map
Figure 3: Site and Sample Location Map

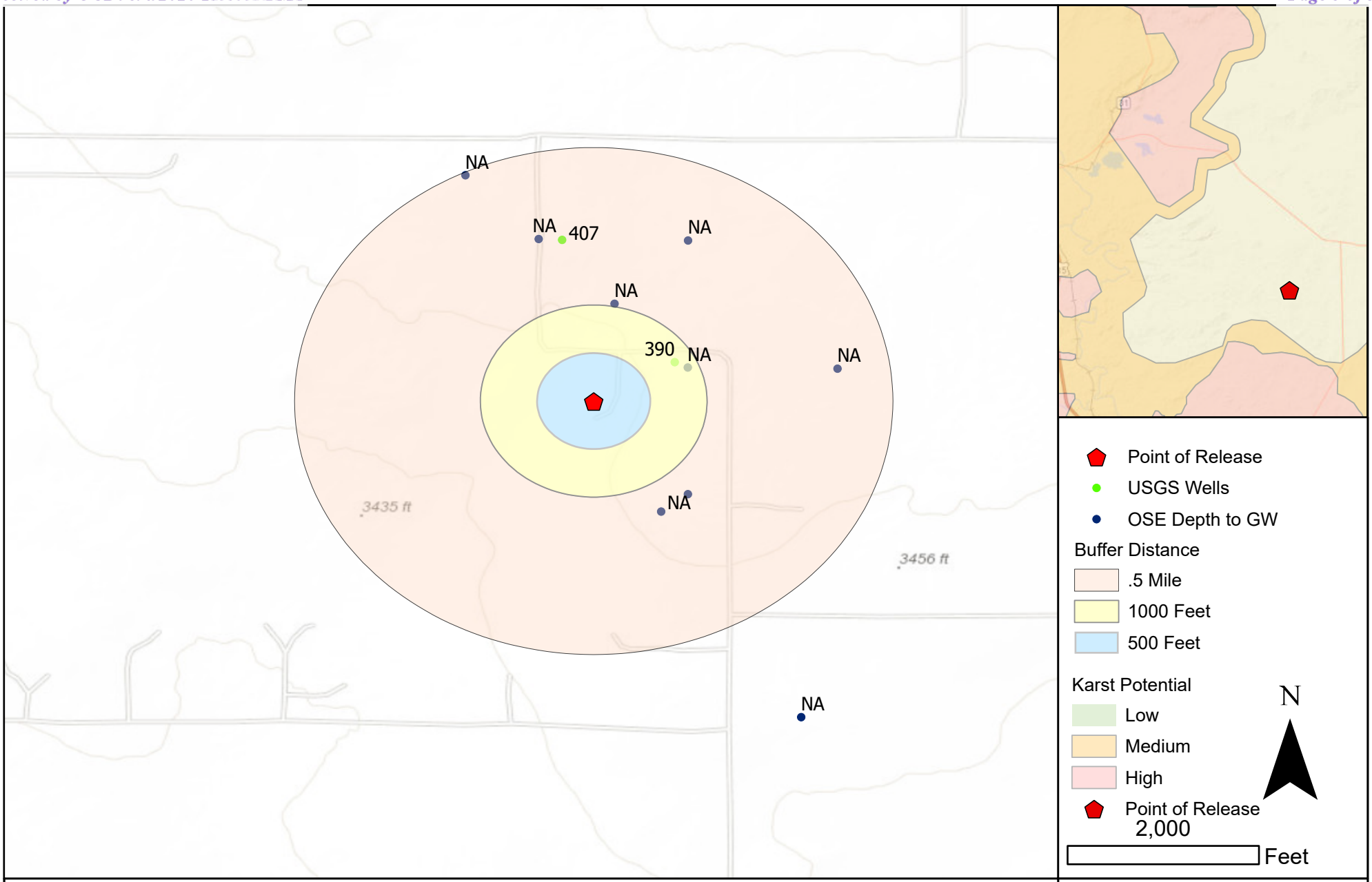
Tables:

Table 2: NMOCD Closure Criteria Justification
Table 3: Summary of Sample Results

Appendices:

Appendix A: C141 Forms
Appendix B: Water Well Data
Appendix C: Laboratory Analytical Reports
Appendix D: Vertex Electromagnetic Survey Results & Interpretation for Cotton Draw Unit #084 SWD

FIGURES



Regional Vicinity & Wellhead Protection Map
Cotton Draw Unit #084 SWD- Devon Energy
Sec 2 T25S R31E Eddy County, New Mexico

Figure 1

P:\Enterprise 2019 MSA on Call Services (5E27957)\GIS\ARCGIS\ENTERPRISE_MIT.aprx

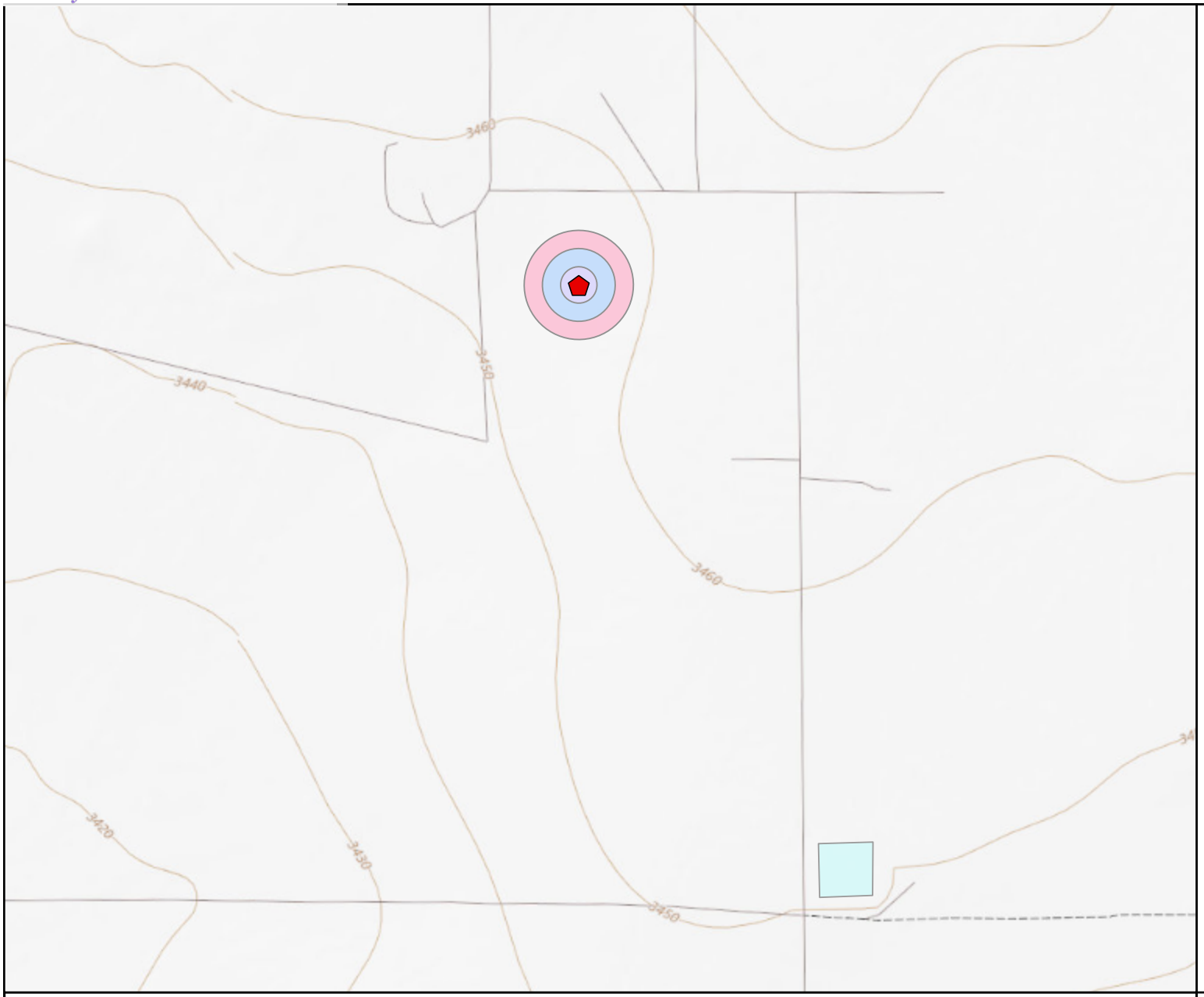
Date Saved: 2/4/2020

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

Drawn LC
Date 2/4/2020
Checked
Approved

M&M EXCAVATING, INC.

78 Robertson Rd
Carlsbad, NM 88220
(575) 230-6600



Point of Release
Springs Seeps
Streams Canals
Rivers
NM Wetlands
Lakes Playas
FEMA Flood Zones 2011

Buffer Distance
100 Feet
200 Feet
300 Feet
Release Area

N

0 425 850 1,700 Feet

Surface Water Protection Map
Cotton Draw Unit #084 SWD - Devon Energy
Sec 2 T25S R31E Eddy County, New Mexico

Figure 2

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

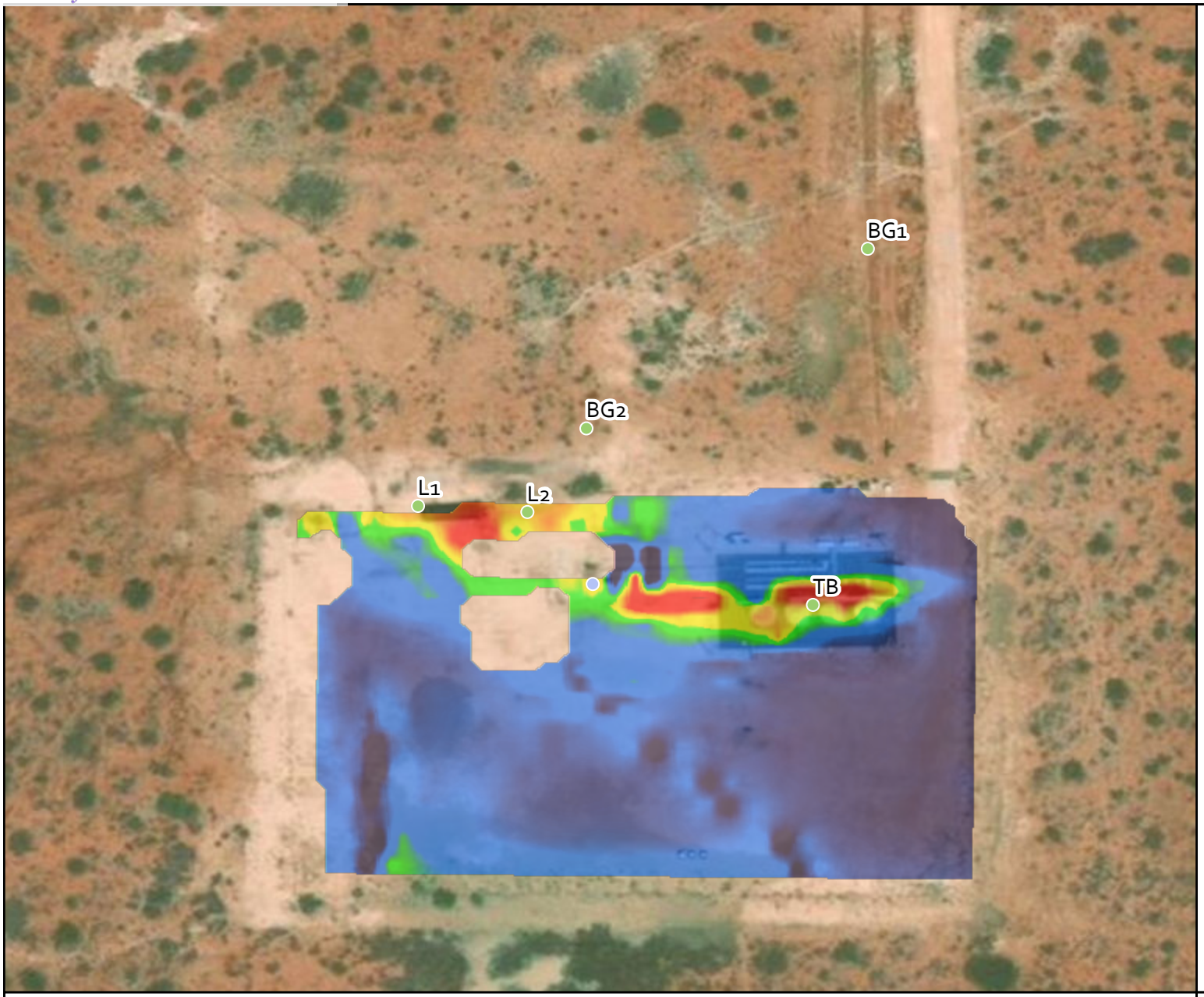
Date Saved: 7/18/2019

Drawn LC
Date 7/18/2019
Checked
Approved

M&M EXCAVATING, INC.

78 Roberson Rd
Carlsbad, NM 88220
(575) 236-6600

P:\5-MM Excavating (5128335)\GIS\ARCGIS\MMX_MIT.aprx



- Point of Release
- Sample Locations

N

140 Feet

Site & Sample Locations
Cotton Draw #84 SWD - Devon Energy

Figure 3

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

Date Saved: 11/20/2019

Drawn LC
Date 11/20/2019
Checked
Approved

M&M EXCAVATING, INC.

78 Roberson Rd
Carlsbad, NM 88220
(575) 236-6600

P:\5-MM Excavating (5128335)\GIS\ARCGIS\MMX_MIT.aprx

TABLES

Table 2: NMOCD Closure Criteria

Cotton Draw Unit #084 SWD

Devon Energy Production Company

Site Information (19.15.29.11.A(2, 3, and 4) NMAC)			Source/Notes
Depth to Groundwater (feet bgs)		400	USGS (Appendix B)
Hortizontal Distance From All Water Sources Within 1/2 Mile (ft)		--	10 OSE & USGS wells (see appendix B)
Hortizontal Distance to Nearest Significant Watercourse (ft)		3320	Freshwater pond to the southeast

Closure Criteria (19.15.29.12.B(4) and Table 1 NMAC)							
Depth to Groundwater			Closure Criteria (units in mg/kg)				
			Chloride *numerical limit or background, whichever is greater	TPH	GRO + DRO	BTEX	Benzene
Less than 50' BGS	X		600	100		50	10
51' to 100'			10000	2500	1000	50	10
Greater than 100'			20000	2500	1000	50	10
Surface Water	Yes	No	if yes, then				
Less than 300' from continuously flowing watercourse or other significant watercourse?		x	600	100		50	10
Less than 200' from lakebed, sinkhole or playa lake?		x					
Water Well or Water Source							
Less than 500 feet from spring or a private, domestic fresh water well used by less than 5 households for domestic or stock watering purposes?		x					
Less than 1000' from fresh water well or spring?	x						
Human and Other Areas							
Less than 300' from an occupied permanent residence, school, hospital, institution or church?		x					
Within incorporated municipal boundaries or within a defined municipal fresh water well field?		x					
Less than 100' from wetland?		x					
Within area overlying a subsurface mine		x					
Within an unstable area?		x					
Within a 100-year floodplain?		x					

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Table 3: Summary of Sample Results

Cotton Draw Unit #084 SWD

Devon Energy Production Company

2RP-4325

Sample ID	Sample Date	Depth (feet bgs)	BTEX	Benzene	GRO	DRO	MRO	Total TPH	Cl-
			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
NMOCD Closure Criteria			50	10				100	600
L1	11/26/2019	surface	<0.21	<0.023	<4.7	<9.0	<45	<58.7	350
		2	--	--	--	--	--	--	490
L2		surface	<0.217	<0.024	<4.8	<9.4	<47	<61.2	120
		2	--	--	--	--	--	--	88
TB	10/30/2019	surface	<0.215	<0.024	<4.8	<9.2	<46	<60.0	<60
		2	--	--	--	--	--	--	390
		6	--	--	--	--	--	--	78

M & M EXCAVATING, INC.

Appendix A: C141 Forms

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

State of New Mexico
Energy Minerals and Natural Resources

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

NM OIL CONSERVATION
ARTESIA DISTRICT
AUG 03 2017
RECEIVED

Form C-141
Revised August 8, 2011
Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

nAB1721952285 6137 OPERATOR ☒ Initial Report ☐ Final Report

Name of Company Devon Energy Production Company	**Contact** Matt Nettles, Production Foreman
Address 6488 Seven Rivers Hwy Artesia, NM 88210	**Telephone No.** 575-513-5767
Facility Name Cotton Draw Unit 84	**Facility Type** Salt Water Disposal

Surface Owner Federal	**Mineral Owner** State	**API No** 30-015-29728

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
I	2	25S	31E	2615'	FSL	1160'	FEL	Eddy

Latitude: 32.1592751 **Longitude:** -103.7438736

NATURE OF RELEASE

Type of Release Produced Water	**Volume of Release** 65bbls	**Volume Recovered** 10bbls
Source of Release Frac tank on location	**Date and Hour of Occurrence** July 23, 2017 @ 11:30	**Date and Hour of Discovery** July 23, 2017 @ 11:30
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	**If YES, To Whom?** Shelly Tucker, BLM Mike Bratcher/Crystal Weaver, OCD	
By Whom? Ray Carter, Asst. Production Foreman	**Date and Hour** Shelly Tucker, BLM July 23, 2017 @11:45 AM Mike Bratcher/Crystal Weaver, OCD July 23, 2017 @ 6:42 PM	
Was a Watercourse Reached? ☐ Yes ☒ No	**If YES, Volume Impacting the Watercourse** N/A	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*
The casing was blown down and didn't get shut off completely, causing the frac tank to run over on the location. The 2 inch ball valve was shut to prevent any further release.

Describe Area Affected and Cleanup Action Taken.*
Approximately 65bbls of produced water was released onto the Northwest corner of location. 0.5 bbls left the location and was release onto the adjacent pasture. A vacuum truck was dispatched and recovered approximately 10bbls of produced water. An environmental contractor will be contacted to assist with the delineation and remediation.

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

Signature: Sheila Fisher	OIL CONSERVATION DIVISION Signed By Mike Bratcher
Printed Name: Sheila Fisher	Approved by Environmental Specialist:
Title: **Field Admin Support**	Approval Date: 8/4/17 Expiration Date: N/A
E-mail Address: **Sheila.fisher@dvn.com**	Conditions of Approval: See attached ☐ Attached
Date: Phone: **575.748.1829**	

2RP-4325

8/4/17 AB

Operator/Responsible Party,

The OCD has received the form C-141 you provided on 8/3/2017 regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number 2RP-4335 has been assigned. **Please refer to this case number in all future correspondence.**

It is the Division's obligation under both the Oil & Gas Act and Water Quality Act to provide for the protection of public health and the environment. Our regulations (19.15.29.11 NMAC) state the following,

> *The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.* [emphasis added]

Release characterization is the first phase of corrective action unless the release is ongoing or is of limited volume and all impacts can be immediately addressed. Proper and cost-effective remediation typically cannot occur without adequate characterization of the impacts of any release. Furthermore, the Division has the ability to impose reasonable conditions upon the efforts it oversees. **As such, the Division is requiring a workplan for the characterization of impacts associated with this release be submitted to the OCD District 2 office in ARTESIA on or before 9/3/2017. If and when the release characterization workplan is approved, there will be an associated deadline for submittal of the resultant investigation report. Modest extensions of time to these deadlines may be granted, but only with acceptable justification.**

The goals of a characterization effort are: 1) determination of the lateral and vertical extents along with the magnitude of soil contamination. 2) determine if groundwater or surface waters have been impacted. 3) If groundwater or surface waters have been impacted, what are the extents and magnitude of that impact. 4) The characterization of any other adverse impacts that may have occurred (examples: impacts on vegetation, impacts on wildlife, air quality, loss of use of property, etc.). To meet these goals as quickly as possible, the following items must, at a minimum, be addressed in the release characterization workplan and subsequent reporting:

- Horizontal delineation of soil impacts in each of the four cardinal compass directions. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. This is not an exclusive list of potential contaminants. Analyzed parameters should be modified based on the nature of the released substance(s). Soil sampling must be both within the impacted area and beyond.

- Vertical delineation of soil impacts. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. As above, this is not an exclusive list of potential contaminants and can be modified. Vertical characterization samples should be taken at depth intervals no greater than five feet apart. Lithologic description of encountered soils must also be provided. At least ten vertical feet of soils with contaminant concentrations at or below these values must be demonstrated as existing above the water table.

- Nominal detection limits for field and laboratory analyses must be provided.

- Composite sampling is not generally allowed.

- Field screening and assessment techniques are acceptable (headspace, titration, EC [include algorithm for validation purposes], EM, etc.), but the sampling and assay procedures must be clearly defined. Copies of field notes are highly desirable. A statistically significant set of split samples must be submitted for confirmatory laboratory analysis, including the laterally farthest and vertically deepest sets of soil samples. Make sure there are at least two soil samples submitted

for laboratory analysis from each borehole or test pit (highest observed contamination and deepest depth investigated). Copies of the actual laboratory results must be provided including chain of custody documentation.

•Probable depth to shallowest protectable groundwater and lateral distance to nearest surface water. If there is an estimate of groundwater depth, the information used to arrive at that estimate must be provided. If there is a reasonable assumption that the depth to protectable water is 50 feet or less, the responsible party should anticipate the need for at least one groundwater monitoring well to be installed in the area of likely maximum contamination.

• If groundwater contamination is encountered, an additional investigation workplan may be required to determine the extents of that contamination. Groundwater and/or surface water samples, if any, must be analyzed by a competent laboratory for volatile organic hydrocarbons (typically Method 8260 full list), total dissolved solids, pH, major anions and cations including chloride and sulfate, dissolved iron, and dissolved manganese. The investigation workplan must provide the groundwater sampling method(s) and sample handling protocols. To the fullest extent possible, aqueous analyses must be undertaken using nominal method detection limits. As with the soil analyses, copies of the actual laboratory results must be provided including chain of custody documentation.

• Accurately scaled and well-drafted site maps must be provided providing the location of borings, test pits, monitoring wells, potentially impacted areas, and significant surface features including roads and site infrastructure that might limit either the release characterization or remedial efforts. Field sketches may be included in subsequent reporting, but should not be considered stand-alone documentation of the site's layout. Digital photographic documentation of the location and fieldwork is recommended, especially if unusual circumstances are encountered.

Nothing herein should be interpreted to preclude emergency response actions or to imply immediate remediation by removal cannot proceed as warranted. Nonetheless, characterization of impacts and confirmation of the effectiveness of remedial efforts must still be provided to the OCD before any release incident will be closed.

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

Bratcher, Mike, EMNRD

From:	Fisher, Sheila <Sheila.Fisher@dvn.com>
Sent:	Thursday, August 3, 2017 12:37 PM
To:	Bratcher, Mike, EMNRD; Weaver, Crystal, EMNRD; Shelly Tucker (stucker@blm.gov); Amber Groves (agroves@slo.state.nm.us)
Cc:	Nettles, Matt; Carter, Ray; Shoemaker, Mike; Fulks, Brett
Subject:	Cotton Draw Unit 84_65bbl pw_7.23.17
Attachments:	Cotton Draw Unit 84_65bbls pw_Inital C-141_7.23.17.doc; Cotton Draw Unit 84_65bbls pw_GIS Image_7.23.17.pdf

Good Afternoon,

Attached please find the Initial C-141 and GIS Image for the 65bbl produced water release at the Cotton Draw Unit 84 on 7.23.17.

If you have any questions please feel free to contact me.

Thank you,

Sheila Fisher
Field Admin Support
Production
B-Schedule

Devon Energy Corporation
PO Box 250
Artesia, NM 88211
575 748 1829 Direct

Cotton Draw Unit 84

65bbl pw_7.23.17

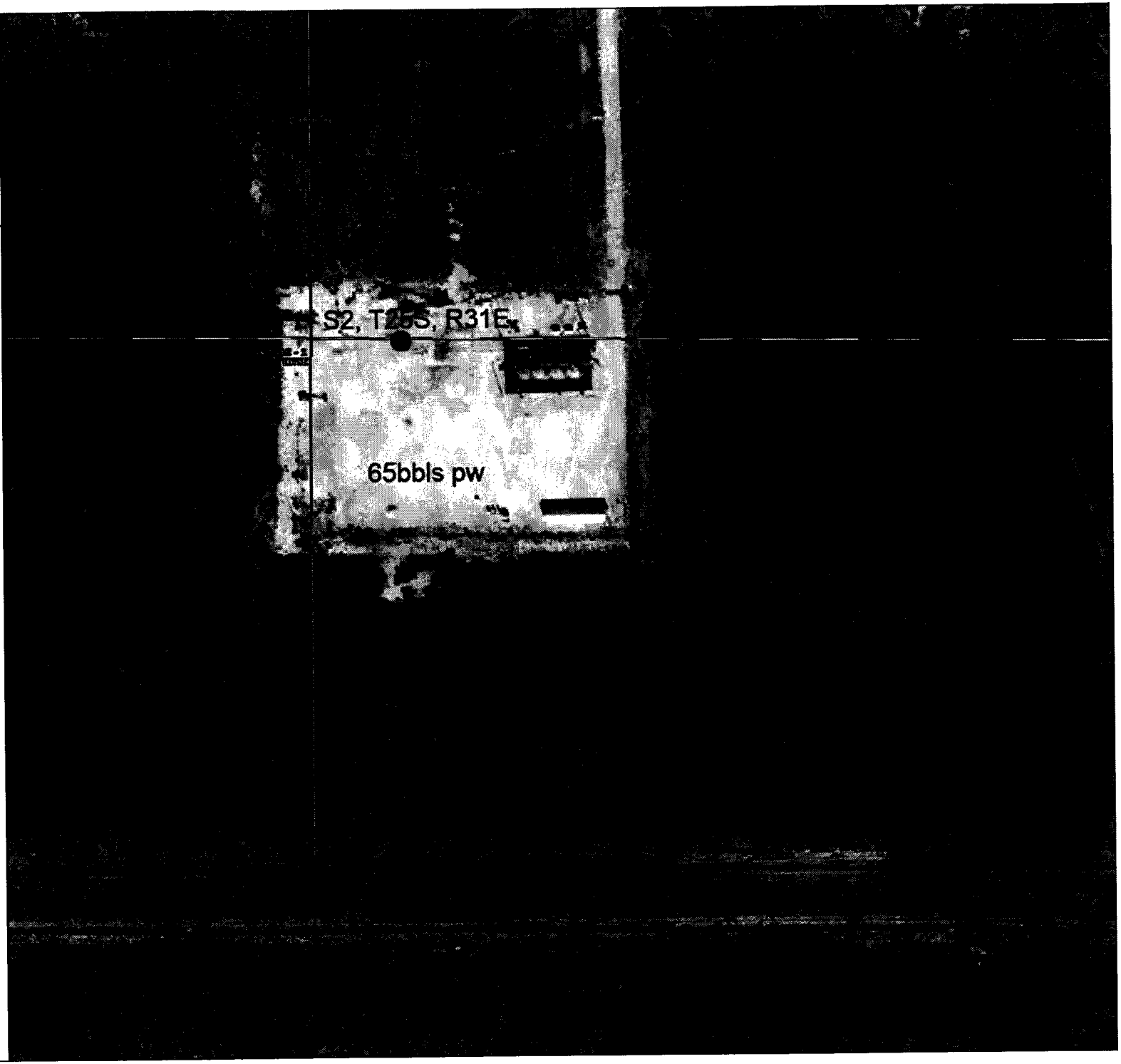
devon

This map is for illustrative purposes only and is neither a legally recorded map nor survey and is not intended to be used as one. Devon makes no warranty, representation, or guarantee of any kind regarding this map.

WGS_1984_Web_Mercator_Auxiliary_Sphere
Prepared by: Sheila Fisher
Map is current as of: 24-Jul-2017

N

Miles
0 0.01 0.02 0.04 1:1,779



Bratcher, Mike, EMNRD

From: Shoemaker, Mike <Mike.Shoemaker@dvn.com>
Sent: Sunday, July 23, 2017 6:42 PM
To: Bratcher, Mike, EMNRD; Weaver, Crystal, EMNRD
Cc: Fulks, Brett
Subject: Spill at the CDU 84 SWD

Mike and Crystal,
Just wanted to make you aware of a release from earlier today. The assistant foreman tried to leave a message around 11:50 am but was unsuccessful. Shelly Tucker with BLM was also notified at 11:45 a.m. We had a Frac tank that over ran at the CDU 84 SWD the spill was approximately 65 bbl of PW. The casing was blown down yesterday and didn't get shut off completely, causing the frac tank to run over on the location. About 1/2 bbl went outside fence, but stayed on the pad surface and no fluids were lost into the pasture. A vacuum truck was dispatched and approximately 10bbls of PW were recovered. A C-141 will be prepared and submitted.

Thanks,

Mike Shoemaker
EHS Representative

Devon Energy Corporation
6488 Seven Rivers Highway
Artesia, New Mexico 88210
575-746-5566 Office
575-513-5035 Mobile

devon

Appendix B: Water Well Data

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

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

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

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

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Twn	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 02569		CUB	ED	4	4	2	02	25S	31E	618699	3558891*	275	1016		
C 02573		CUB	ED	1	4	2	02	25S	31E	618499	3559091*	313			
C 02570		CUB	ED	4	2	4	02	25S	31E	618704	3558489*	390	895		
C 03830 POD1		CUB	ED	4	2	4	02	25S	31E	618632	3558432	395	450		
C 02571		CUB	ED	4	1	2	02	25S	31E	618292	3559294*	534	860		
C 02572		CUB	ED	4	2	2	02	25S	31E	618695	3559294*	569	852		
C 02568		CUB	ED	4	3	1	01	25S	31E	619103	3558892*	666	1025		
C 02574		CUB	ED	1	1	2	02	25S	31E	618092	3559494*	795			
C 02250		CUB	ED	3	1	4	21	25S	31E	614912	3553620*	6255	400	390	10

Average Depth to Water: **390 feet**
Minimum Depth: **390 feet**
Maximum Depth: **390 feet**

Record Count: 9

UTMNAD83 Radius Search (in meters):

Easting (X): 618446 **Northing (Y):** 3558782 **Radius:** 7000

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

National Water Information System: Web Interface

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

Groundwater levels for the Nation

Search Results -- 1 sites found

site_no list =

- 320932103443801

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

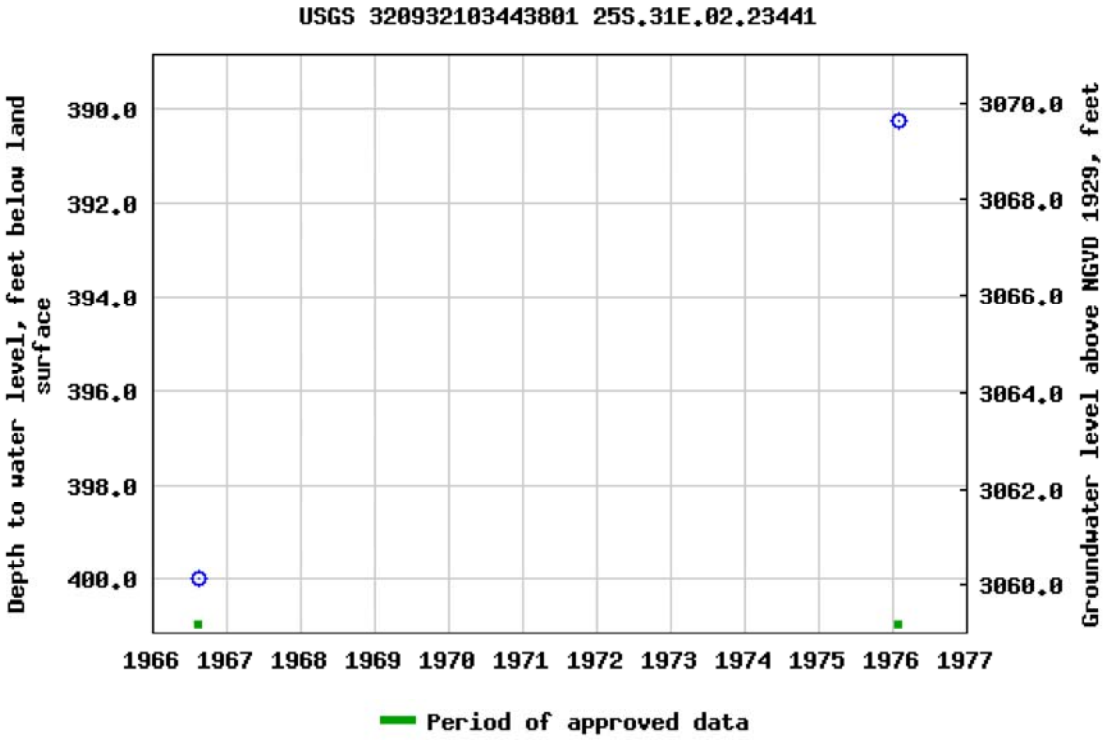
USGS 320932103443801 25S.31E.02.23441

Available data for this site Groundwater: Field measurements | GO

Eddy County, New Mexico
Hydrologic Unit Code 13070001
Latitude 32°09'37.4", Longitude 103°44'29.6" NAD83
Land-surface elevation 3,460.00 feet above NGVD29
The depth of the well is 1,016 feet below land surface.
This well is completed in the Rustler Formation (312RSLR) local aquifer.

Output formats

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



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

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Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
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Title: Groundwater for USA: Water Levels
URL: https://nwis.waterdata.usgs.gov/nwis/gwlevels?

Page Contact Information: USGS Water Data Support Team
Page Last Modified: 2019-07-18 14:51:17 EDT
1.07 1.03 nadww01

USGS Home
Contact USGS
Search USGS

National Water Information System: Web Interface

USGS Water Resources

Data Category: Groundwater | Geographic Area: United States | GO

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- Full News

Groundwater levels for the Nation

Search Results -- 1 sites found

site_no list =

- 320952103444401

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

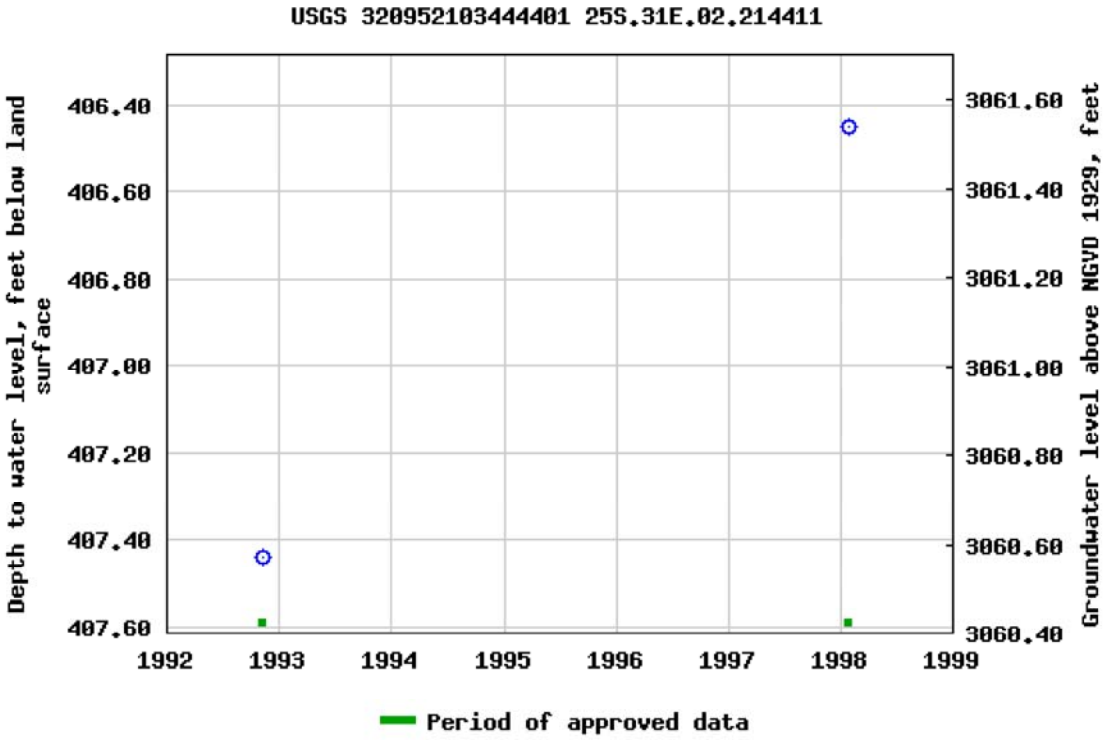
USGS 320952103444401 25S.31E.02.214411

Available data for this site Groundwater: Field measurements | GO

Eddy County, New Mexico
Hydrologic Unit Code 13070001
Latitude 32°09'50.0", Longitude 103°44'41.2" NAD83
Land-surface elevation 3,468.0 feet above NGVD29
This well is completed in the Azotea Tongue of Seven Rivers Formation (313AZOT) local aquifer.

Output formats

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



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

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

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

Page Contact Information: USGS Water Data Support Team
Page Last Modified: 2019-07-18 15:51:15 EDT
0.95 0.9 nadww01

Appendix C: Laboratory Analytical Reports

Appendix D: Vertex Electromagnetic Survey Results & Interpretation for Cotton Draw Unit #084 SWD

November 6, 2019 Vertex Project #: 19E-03788

Devon Energy Corporation
6488 7 Rivers Highway
Artesia, New Mexico 88210

Attention: Amanda Davis

Re: Electromagnetic Survey Results and Interpretation for Cottonwood Draw #084 SWD

Ms. Davis,

Devon Energy Corporation (Devon) retained Vertex Resource Services Inc. (Vertex) to conduct an electromagnetic (EM) survey at Cottonwood Draw #084 SWD (hereafter referred to as the "site"). The site is located approximately 34 miles southeast of Carlsbad, New Mexico. Vertex personnel conducted the EM survey on October 9, 2019. This letter reviews the results of the EM survey at the site and discusses the apparent conductivity anomalies that were observed.

Method

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)

Ground conductivity measurements were acquired using the Geonics EM31 Terrain Conductivity Meter. Data were collected continuously along transects spaced approximately 5 yards across the site. Data were 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, is approximately 16 feet. The conductivity values are not specific values from discrete depths; they are weighted averages of conductivity

between the surface and the depth of exploration of the EM field, and are termed 'apparent conductivities'. The apparent conductivity values obtained are in units of millisiemens per metre (mS/m).

Interpretation

The results of the EM31 survey are presented as an apparent conductivity contour map on Figure 1. Pertinent features and anomalies are identified and discussed in the table below. At the time of the survey, all infrastructure (as observed on the aerial image in Figure 1) had been removed from the site and there were pipe and debris piles in the northwest part of the site, as indicated on Figure 1.

Anomaly	Conductivity Range (mS/m)	Description
A	10 – 30	Low conductivity regions (blue contours) possibly representative of background conditions.
B	70 – 180	Elevated conductivity region (green to red contours) along the north fence line. May be attributable to increased TDS, increased clay content, and/or metal influence. Elevated conductivity extends beyond the northern limits of the plotted EM grid.
C	70 – 110	Elevated conductivity region (green to yellow contours) in the northwest corner of the site. May be attributable to increased TDS, increased clay content, and/or metal influence. Elevated conductivity extends beyond the northern limits of the plotted EM grid.
D1, D2	70 – 195	Elevated conductivity regions (green to red contours) east of the debris, in the northeast part of the site. Anomaly D2 is coincident with former infrastructure, as observed on the aerial image in Figure 1. May be attributable to increased TDS, increased clay content, and/or metal influence.
E-E' **F-F'**	Oscillating Values	Linear anomalies possibly attributable to subsurface metal influence.
G	Oscillating Values	Typical metal response located east of the debris.

If it is determined that the elevated conductivity anomalies are coincident with elevated chlorides, an electrical resistivity tomography (ERT) investigation is recommended to determine the vertical extent of the anomalies.

Any subsequent investigations should include areas of apparent background conductivity, as well as potentially impacted areas.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at 587.316.1793 or lpankratow@vertex.ca.

Sincerely,

PROFESSIONAL GEOPHYSICIST ALBERTA
LAURIE PANKRATOW
Nov 6, 2019

Laurie Pankratow, B.Sc., P.Geoph.
GEOPHYSICIST
APEGA PERMIT TO PRACTICE #10647

List of Figures

Limitations

This report has been prepared for the sole benefit of Devon Energy Corporation (Devon). This document may not be used by any other person or entity 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.

FIGURES

618364 618379 618395 618410 618425 618440 618456 618471 618486 618501 618517 618532 618547

3558806 3558791 3558776 3558760 3558745 3558730 3558715

N

C
B
G
D2
D1
Waste
Drums
Pipes
Debris
F
E
A
E'
F'

Legend

A Anomaly
Survey Track
Fence

10 30 50 70 90 110 130 150 170 190
Apparent Conductivity (mS/m)
(16 ft Depth of Exploration)

0 15 30 60 ft
SCALE 1:500
NAD 83 UTM Zone 13N

Notes: Aerial Image from ESRI, 2017

devon

Site Schematic with EM31 Apparent Conductivity Overlay Cottondraw #084 SWD

VERTEX

DRAWN:	LP	FIGURE: 1
APPROVED:	---	
DATE:	NOV 05/19	

VERSATILITY. EXPERTISE.

Document Path: \\vtx-fs01.corp.internal\shared\vps\04 - Geomatics\1-Projects_US PROJECTS\Devon Energy Corporation\19E-03788 (Cottonwood Draw #084 SWD)\Figure 1 Site Schematic with EM31 Overlay (19E-03788).mxd

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

State of New Mexico
Energy Minerals and Natural Resources

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

Form C-141
Revised August 8, 2011

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

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company Devon Energy Production Company	**Contact** Matt Nettles, Production Foreman
Address 6488 Seven Rivers Hwy Artesia, NM 88210	**Telephone No.** 575-513-5767
Facility Name Cotton Draw Unit 84	**Facility Type** Salt Water Disposal

Surface Owner Federal	**Mineral Owner** State	**API No** 30-015-29728

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
I	2	25S	31E	2615’	FSL	1160’	FEL	Eddy

Latitude: 32.1592751 **Longitude:** -103.7438736

NATURE OF RELEASE

Type of Release Produced Water	**Volume of Release** 65bbls	**Volume Recovered** 10bbls
Source of Release Frac tank on location	**Date and Hour of Occurrence** July 23, 2017 @ 11:30	**Date and Hour of Discovery** July 23, 2017 @ 11:30
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	**If YES, To Whom?** Shelly Tucker, BLM Mike Bratcher/Crystal Weaver, OCD	
By Whom? Ray Carter, Asst. Production Foreman	**Date and Hour** Shelly Tucker, BLM July 23, 2017 @11:45 AM Mike Bratcher/Crystal Weaver, OCD July 23, 2017 @ 6:42 PM	
Was a Watercourse Reached? ☐ Yes ☒ No	**If YES, Volume Impacting the Watercourse** N/A	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*
The casing was blown down and didn't get shut off completely, causing the frac tank to run over on the location. The 2 inch ball valve was shut to prevent any further release.

Describe Area Affected and Cleanup Action Taken.*
Approximately 65bbls of produced water was released onto the Northwest corner of location. 0.5 bbls left the location and was release onto the adjacent pasture. A vacuum truck was dispatched and recovered approximately 10bbls of produced water. An environmental contractor will be contacted to assist with the delineation and remediation.
This well has been plugged and abandoned, and all remediation activities were completed alongside the reclamation activities. Closure report attached.

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

Signature: *Sheila Fisher*	OIL CONSERVATION DIVISION	
Printed Name: Sheila Fisher	Approved by Environmental Specialist:	
Title: **Field Admin Support**	Approval Date:	Expiration Date:
E-mail Address: **Sheila.fisher@dvn.com**	Conditions of Approval:	Attached ☐
Date: 2/12/20 Phone: **575.748.1829**		

* Attach Additional Sheets If Necessary

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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	
District RP	2RP-4325
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?	>100 (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

State of New Mexico
Oil Conservation Division

Incident ID	
District RP	2RP-4325
Facility ID	
Application ID	

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.

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: Amanda Davis Title: EHS Professional

Signature: Amanda Davis Date:

email: Amanda.Davis@dvn.com Telephone: 575-748-0176

OCD Only

Received by: Jocelyn Harimon Date: 07/01/2022

State of New Mexico
Oil Conservation Division

Incident ID	
District RP	2RP-4325
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: Amanda Davis Title: EHS Professional

Signature: *Amanda Davis* Date:

email: Amanda.Davis@dvn.com Telephone: 575-748-0176

OCD Only

Received by: Date:

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

Signature: Jocelyn Harimon Date: 07/01/2022

State of New Mexico
Oil Conservation Division

Incident ID	
District RP	2RP-4325
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.***

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

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

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

☒ Description of remediation activities

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations. The responsible party acknowledges they must substantially restore, reclaim, and re-vegetate the impacted surface area to the conditions that existed prior to the release or their final land use in accordance with 19.15.29.13 NMAC including notification to the OCD when reclamation and re-vegetation are complete.

Printed Name: Amanda Davis Title: EHS Professional

Signature: *Amanda Davis* Date: _____

email: Amanda.Davis@dvn.com Telephone: 575-748-0176

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: Jocelyn Harimon Date: 07/01/2022

Printed Name: Jocelyn Harimon Title: Environmental Specialist

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

CONDITIONS

Operator:	OGRID:
DEVON ENERGY PRODUCTION COMPANY, LP 333 West Sheridan Ave. Oklahoma City, OK 73102	6137
	Action Number: 8098
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
jharimon	Please note that, when the well or facility is plugged or abandoned, the final remediation and reclamation shall take place in accordance with 19.15.29.12 and 19.15.29.13 NMAC once the site is no longer being used for oil and gas operations.	7/1/2022