TRIDENT ENVIRONMENTAL

P. O. Box 12177 • Odessa TX 79768

May 13, 2016

Submitted electronically via email

Mr. Jamie Keyes
New Mexico Oil Conservation Division
1625 N. French Drive
Hobbs, Mexico 88240

RECEIVED
By JKeyes at 8:35 am, May 16, 2016

APPROVED

Ensure BLM concurrence/approval.

RE: Corrective Action Plan
NMOCD Case No. 1R-3921
EOG Endurance FED 25 #2 Produced Water Release
T26S R33E Section 25 Unit Letter E
Lea County, New Mexico

Dear Ms. Jones:

Trident Environmental was retained by Energi Insurance Inc.(Energi), insurance agent for Steve Kent Trucking NM LLC (SKT), to prepare and submit this *Corrective Action Plan* (CAP) to the New Mexico Oil Conservation Division (OCD) and U.S. Bureau of Land Management (BLM) for the site referenced above.

Background

An accidental produced water release occurred at the Endurance FED 25 #2 salt water disposal (SWD) facility (API No. 30-025-41067) on a lease operated by EOG Resources Inc (EOG). The site is located approximately 21 miles southwest of Jal, New Mexico as depicted in Figure 1 (Site Location Map). The initial form C-141 (Appendix A) submitted to the OCD on October 15, 2015 by EOG incorrectly reported that the release occurred on October 4, 2015, when it actually occurred between the evening hours on October 11, 2015 and early morning hours of October 12, 2015. The release occurred sometime after a driver for Steve Kent Trucking Inc. unloaded his tank truck into the produced water load line at the facility. The cause of the release is not exactly known but is suspected to be the failure of the driver to close the load valve prior to leaving the location, however it was also due to the failure of the backflow prevention check valve between the load valve and produced water tank. According to the initial form C-141, the estimated volume of the spill was 100 barrels (bbl) with about 40 bbl recovered (60 bbl lost) by a vacuum truck during the early morning hours on October 12, 2015. The release originated from the load line and flowed approximately 150 ft west across the well pad and then north-northwesterly approximately 300 ft into undeveloped pasture land, as depicted in Figure 2.

Site Setting

- The topography is slightly undulating and regionally slopes to the southwest at about 50 ft/mile and locally slopes gently to the north-northwest;
- The surface soils consist of fine loamy sand belonging to the Pyote and Maljamar soil map unit.
- Groundwater in the area occurs within the Ogallala Aquifer under unconfined conditions.
- No fresh water wells are located within 1-mile of the Site according New Mexico Office of the State Engineer (OSE) database records;
- The nearest water well (C-2270/3577) is located approximately 1.7 miles west of the site (Section 22) with a surface elevation of 3252 ft AMSL according to USGS topography. OSE records report that depth to water at this well is 125 ft below ground surface (bgs) which correlates to a groundwater elevation of 3127 ft AMSL.
- With a surface elevation of 3340 ft at the release site and groundwater elevation of 3127 ft, depth to groundwater is greater than 200 feet bgs.
- Based on the criteria established by the OCD (*Guidelines for Remediation of Leaks, Spills and Releases, August 13, 1993*), and a score of zero, the NMOCD recommended remediation action levels (RRALs) for chlorides are 1,000 mg/kg (protective of groundwater).

A Point of Diversion summary of active and inactive water wells in Township 26S, Ranges 33E and 34E, with reported depths to groundwater listed is provided in Appendix A.

Investigation Summary

Soon after the release, Larson & Associates Inc. (LAI) was retained by EOG to conduct an initial investigation to delineate the soil impact at the site. On October 16, October 19 , November 2, and November 21, 2015, LAI used a direct push rig to collect soil samples at depth for vertical delineation of nine sample points located in pooled areas along the axis of the release path between the load line (DP-1) and its final resting point (DP-9) as depicted in Figure 2.

Total petroleum hydrocarbons (TPH) were well below the RRAL in all samples. Chloride was delineated vertically to 250 milligrams per kilogram (mg/kg) at all soil locations with the exception of samples DP-6 at 12 feet (451 mg/kg) and DP-8 at 16 feet (3,270 mg/kg).

On behalf of EOG, LAI submitted an *Investigation Report* to the OCD on November 21, 2015. The investigation report detailed the results summarized above and included a remediation plan that was conditionally-approved by OCD on November 23, 2015 (Appendix B).

On November 21, 2015, LAI performed additional investigation by retaining Scarborough Drilling, Inc. to use an air rotary rig and jam tube sampler to complete vertical delineation at DP-8. Soil samples were collected at 20 and 25 feet bgs, and submitted to Permian Basin Analytical Laboratory (Midland TX) for chloride analysis with results of 284 mg/kg and 642 mg/kg, respectively. Lab reports are included in Appendix B.

Corrective Action Plan

The CAP herein has been developed to address only the reported release (1R-3921), while it is not technically feasible to separately delineate the impacts from any potential releases which may have occurred before or after the reported October 12, 2015 release. The following corrective actions are described below:

1. The spill area below sample points DP-2 and DP-4 will not require excavation because delineation shows these areas to be well below the 1,000 mg/kg RRAL.
2. The spill area below sampling points DP-1, DP-3, DP-6, and DP-7 will be excavated to 8 ft, where they meet the 1,000 mg/kg RRAL criteria based on the LAI investigation, and then backfilled with soil less than 1,000 mg/kg.
3. The spill area below sampling points DP-5, DP-8, and DP-9 will be excavated to 8 ft, backfilled with soil less than the 1,000 mg/kg RRAL to 4 ft, lined with 20-ml plastic at 4 ft, and then backfilled with soil less than 1,000 mg/kg.
4. The final 1 ft of backfill will consist of top soil as the final surface layer, except for the drilling pad area which will be backfilled with caliche as it is an active SWD facility (interim layer prior to final site reclamation).
5. During excavation activities, delineation soil samples will be field tested for chloride (Appendix C) in a manner consistent with the standard titration method (SM 4500Cl-B) performed at accredited laboratories. When maximum depth has been reached bottom grab samples will be collected for chloride analysis by an accredited laboratory (Cardinal Lab in Hobbs NM and/or Permian Basin Environmental Lab in Midland TX) to confirm when RRAL criteria have been met.
6. A six-point composite sample will be collected from each individual soil stockpile and submitted for chloride analysis by the accredited laboratory to determine disposition (backfill or disposal) of the stockpiles.
7. Excavated soil stockpiles above the 1,000 mg/kg RRAL will be transported to a NMOCD-permitted landfarm or landfill facility for disposal.
8. The backfilled excavation will be reseeded with BLM #2 mix (Sand dropseed, Little Bluestem, Coreopsis, Plains Bristlegrass, and Sideoats grama) at the recommended application rate, to restore the native vegetation to pre-existing conditions.

The diagram below illustrates the above-described excavation, backfill, liner, and top soil depths.

Depth (ft)	DP-1	DP-3	DP-5	DP-6	DP-7	DP-8	DP-9
0 - 1	TOPSOIL (Chloride <250 mg/kg)						
1 - 4	Backfill <1000	Backfill <1000	Backfill <1000 LINER	Backfill <1000	Backfill <1000	Backfill <1000 LINER	Backfill <1000 LINER
4 - 8			Backfill <1000			Backfill <1000	Backfill <1000
8 - 10	973	44.9	2,040	257	12.5	4,960	500
10 - 12	454	131	239		11.5	2,440	4,330
12 - 14	2.4					10,700	598
14 - 16	5.1					3,270	125
20						284	
25						642	

Following the completion of the actions described above, Trident Environmental will submit a closure report and final C-141 to the OCD and BLM.

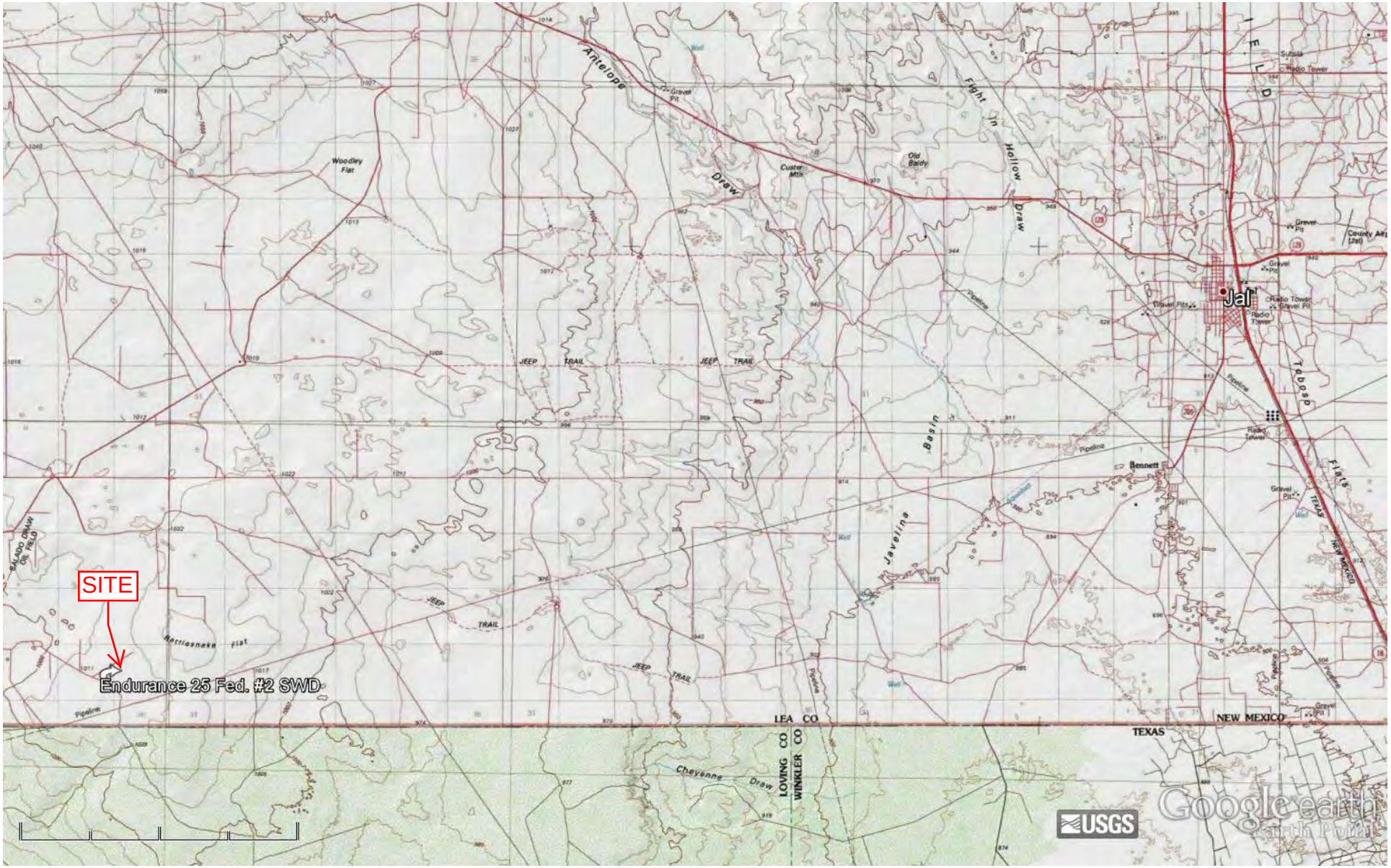
We look forward to your approval to move forward with this proposed *Corrective Action Plan*. We can be contacted at 432-638-8740 (gil@trident-environmental.com), or Dan Bergsten at 978-531-1822, ext. 870 (dbergsten@energi.com).

Sincerely,

Gilbert J. Van Deventer, PG, REM

cc: Shelly Tucker (BLM-Carlsbad NM)
Dan Bergsten (Energi - Carlsbad CA)
Zane Kurtz (EOG - Midland TX)

FIGURES



Google earth

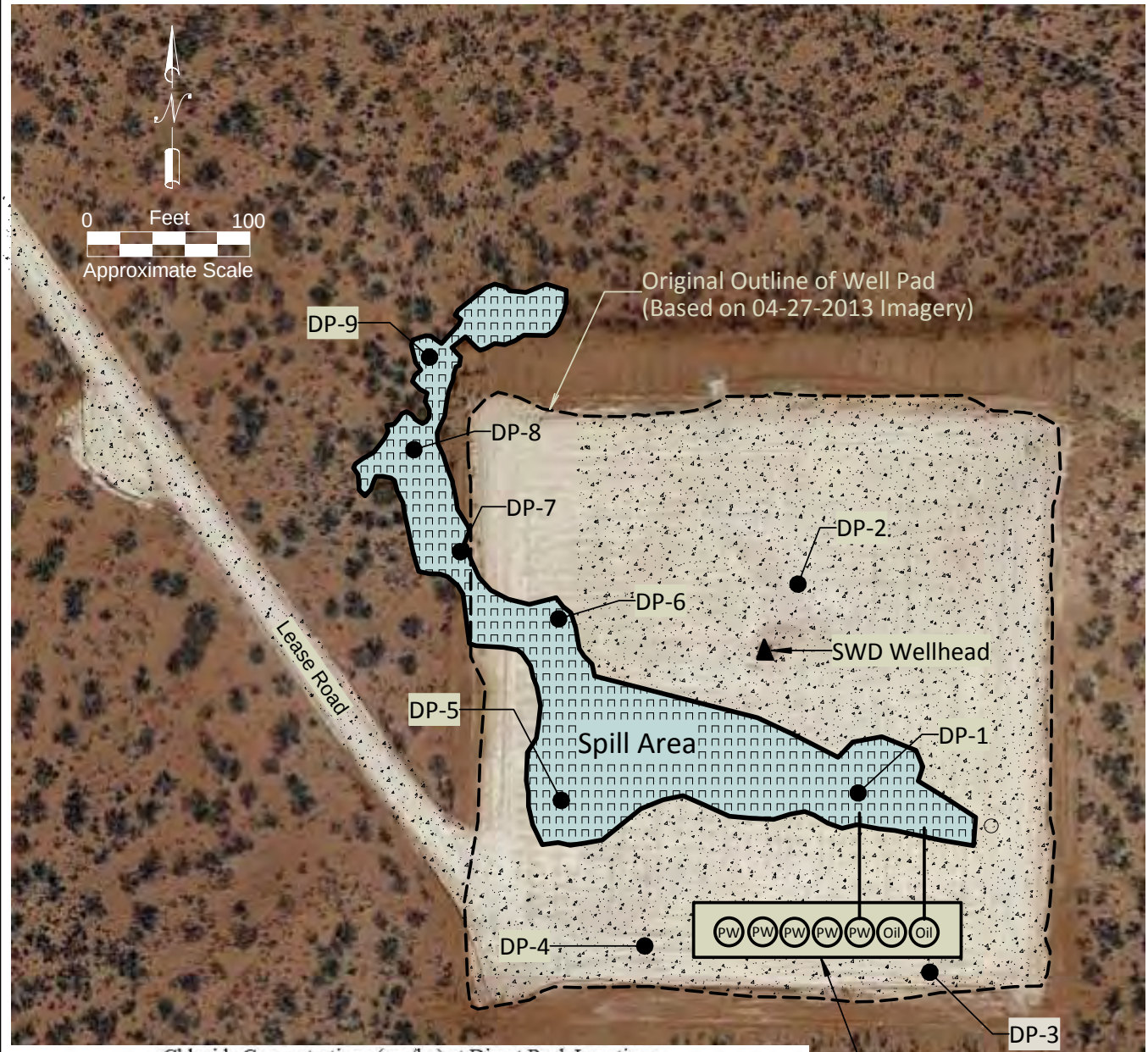
miles 10

km 20

TRIDENT ENVIRONMENTAL

EOG RESOURCES, INC.
Endurance 25 Federal #2 SWD
T26S - R33E - Section 25 - Unit E
Lea County, New Mexico

FIGURE 1
Location Map



Chloride Concentrations (mg/kg) at Direct Push Locations

Depth (ft)	DP-1	DP-2	DP-3	DP-4	DP-5	DP-6	DP-7	DP-8	DP-9
0 - 1	4,090	189	10,100	31.9	2,890	4,120	2,920	4,280	4,150
1 - 2			2,700	2.5	2,130	1,120	4,280	3,330	2,800
2 - 4	6,780	117	630	25.9	1,480	164	3,110	3,710	4,170
4 - 6	10,400	872	2,370	<1.11	6,530	172	4,310	8,240	5,850
6 - 8	10,300	108	1,720	<1.04	4,450	7230	1,920	5,350	3,000
8 - 10	973	90.4	44.9	33.2	2,040	257	12.5	4,960	500
10 - 12	454	7.9	131	44.2	239	---	11.5	2,440	4,330
12 - 14	2.4	---	---	---	---	---	---	10,700	598
14 - 16	5.1	---	---	---	---	---	---	3,270	125
20	---	---	---	---	---	---	---	284	---
25	---	---	---	---	---	---	---	642	---

TRIDENT ENVIRONMENTAL

EOG RESOURCES, INC.
Endurance 25 Federal #2 SWD
T26S - R33E - Section 25 - Unit E
Lea County, New Mexico

FIGURE 2

Site Map

APPENDIX A

Point of Diversion Summaries

for Township 26S, Ranges 33E and 34E

New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Well Drill Dates & Depths)

(acre ft per annum) (R=POD has been replaced and no longer serves this file, C=the file is closed) (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) (NAD83 UTM in meters) (in feet)

WR File Nbr	Sub basin	Use	Diversion	County	POD Number	Code Grant	Source	q 64	q 16	q 4	Sec	Tws	Rng	X	Y	Start Date	Finish Date	Depth Well	Depth Water
C 02270	CUB	PLS	3	LE	C 02270		Shallow	1	1	2	27	26S	33E	636063	3543722	08/28/1992	12/31/1910	150	125
C 02273	CUB	PDL	3	LE	C 02273				1	2	21	26S	33E	634549	3545134*		12/31/1930	160	120
C 02285	CUB	PLS	3	LE	C 02285 POD1		Shallow	1	4	4	03	26S	33E	636613	3548855		12/31/1982	220	220
C 02286	CUB	PLS	3	LE	C 02286			3	4	4	03	26S	33E	636470	3548714		12/31/1974	220	175
C 02287	CUB	STK	3	LE	C 02287			3	4	4	03	26S	33E	636427	3548708			220	
				LE	C 02287 POD2			4	4	4	03	26S	33E	636612	3548675*				
C 02288	CUB	PLS	3	LE	C 02288			4	4	4	03	26S	33E	636646	3548758		12/31/1982	220	180
C 02289	CUB	PLS	3	LE	C 02289			4	4	4	03	26S	33E	636612	3548675*		12/31/1949	200	160
C 02290	CUB	PLS	3	LE	C 02290			4	4	4	03	26S	33E	636538	3548770		12/31/1949	200	160
C 02293	CUB	PLS	3	LE	C 02293			2	2	1	14	26S	33E	637501	3546975		12/31/1949	200	135
C 02294	CUB	PLS	3	LE	C 02294			4	4	3	11	26S	33E	637465	3547003		12/31/1949	200	145
C 02295	CUB	PLS	3	LE	C 02295			2	2	4	12	26S	33E	639850	3547710*		12/31/1949	250	200
C 03494	C	PRO	0	LE	C 02285 POD1		Shallow	1	4	4	03	26S	33E	636613	3548855		12/31/1982	220	220
C 03495	C	PRO	0	LE	C 02286			3	4	4	03	26S	33E	636470	3548714		12/31/1974	220	175
C 03496	C	PRO	0	LE	C 02287			3	4	4	03	26S	33E	636427	3548708			220	
C 03497	C	PRO	0	LE	C 02288			4	4	4	03	26S	33E	636646	3548758		12/31/1982	220	180
C 03498	C	PRO	0	LE	C 02290			4	4	4	03	26S	33E	636538	3548770		12/31/1949	200	160
C 03499	C	PRO	0	LE	C 02293			2	2	1	14	26S	33E	637501	3546975		12/31/1949	200	135

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

(acre ft per annum) (R=POD has been replaced and no longer serves this file, C=the file is closed) (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) (NAD83 UTM in meters) (in feet)

WR File Nbr	Sub basin	Use	Diversion	County	POD Number	Code Grant	Source	q 6416	q 4	q	Sec	Tws	Rng	X	Y	Start Date	Finish Date	Depth Well	Depth Water
C 03500	C	PRO	0	LE	C 02294			4	4	3	11	26S	33E	637465	3547003		12/31/1949	200	145
C 03539	C	PRO	0	LE	C 02270		Shallow	1	1	2	27	26S	33E	636063	3543722	08/28/1992	12/31/1910	150	125
C 03540	C	PRO	0	LE	C 02270		Shallow	1	1	2	27	26S	33E	636063	3543722	08/28/1992	12/31/1910	150	125
C 03541	C	PRO	0	LE	C 02270		Shallow	1	1	2	27	26S	33E	636063	3543722	08/28/1992	12/31/1910	150	125
C 03577	CUB	EXP	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03592	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03593	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03594	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03596	C	STK	3	LE	C 03596 POD1		Shallow	3	3	4	22	26S	33E	636017	3543756	07/21/2010	07/21/2010	225	
C 03597	C	PRO	0	LE	C 03596 POD1		Shallow	3	3	4	22	26S	33E	636017	3543756	07/21/2010	07/21/2010	225	
C 03598	C	PRO	0	LE	C 03596 POD1		Shallow	3	3	4	22	26S	33E	636017	3543756	07/21/2010	07/21/2010	225	
C 03599	C	PRO	0	LE	C 03596 POD1		Shallow	3	3	4	22	26S	33E	636017	3543756	07/21/2010	07/21/2010	225	
C 03676	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03677	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110
C 03678	C	PRO	0	LE	C 03577 POD1		Shallow	3	3	3	22	26S	33E	636010	3543771	11/19/2012	11/20/2012	750	110

Record Count: 33

PLSS Search:

Township: 26S **Range:** 33E

Sorted by: File Number

New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Well Drill Dates & Depths)

(acre ft per annum) (R=POD has been replaced and no longer serves this file, C=the file is closed) (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) (NAD83 UTM in meters) (in feet)

WR File Nbr	Sub basin	Use	Diversion	County	POD Number	Code Grant	Source	q 6416	q 4	Sec	Tws	Rng	X	Y	Start Date	Finish Date	Depth Well	Depth Water
C 02291	CUB	PLS	3	LE	C 02291			1 1	2	06	26S	34E	640825	3550140*		12/31/1949	220	160
C 02292	CUB	PLS	3	LE	C 02292 POD1			4 1	2	06	26S	34E	640992	3549987		12/31/1949	200	140
C 03441	C	STK	3	LE	C 03441 POD1		Shallow	4 1	2	06	26S	34E	640971	3550039	05/03/2010	05/03/2010	250	
C 03442	C	STK	3	LE	C 03442 POD1		Shallow	4 1	2	06	26S	34E	641056	3550028	05/03/2010	05/03/2010	251	
C 03477	C	PRO	0	LE	C 03442 POD1		Shallow	4 1	2	06	26S	34E	641056	3550028	05/03/2010	05/03/2010	251	
C 03491	C	PRO	0	LE	C 03441 POD1		Shallow	4 1	2	06	26S	34E	640971	3550039	05/03/2010	05/03/2010	250	
C 03492	C	PRO	0	LE	C 03442 POD1		Shallow	4 1	2	06	26S	34E	641056	3550028	05/03/2010	05/03/2010	251	
C 03493	C	PRO	0	LE	C 02292 POD1			4 1	2	06	26S	34E	640992	3549987		12/31/1949	200	140

Record Count: 8

PLSS Search:

Township: 26S **Range:** 34E

Sorted by: File Number

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

APPENDIX B

Approved Form C-141 with Investigation Report (text only)

and DP-8 Vertical Delineation Lab Report

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: EOG Resources, Inc.	Contact: Zane Kurtz
Address: 5509 Champions Dr., Midland, TX 79705	Telephone No." 432-425-2023
Facility Name: Endurance 25 Fed #2 SWD	Facility Type: Salt Water Disposal

Surface Owner: U.S. (BLM)	Mineral Owner: U.S (BLM)	API No.30-025-41067

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
D	25	26S	33E	2310	North	990	West	Lea

Latitude 32.0153° **Longitude** -103.5315°

NATURE OF RELEASE

Type of Release: Produced Water	Volume of Release: 100 bbl	Volume Recovered: 40 bbl
Source of Release: Load Line Valve	Date and Hour of Occurrence: 10-04-2015/12:00 hrs	Date and Hour of Discovery: 10-05-2015/02:00hrs
Was Immediate Notice Given? ☐ Yes ☒ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	
If a Watercourse was Impacted, Describe Fully.*		

RECEIVED
By Kellie Jones at 9:58 am, Oct 16, 2015

Describe Cause of Problem and Remedial Action Taken. *Driver for Kent Trucking forgot to close valve at load line prior to pulling truck away causing produced water to spill on ground and migrate off location into pasture. Valve was closed and liquid picked up with vacuum truck.

Describe Area Affected and Cleanup Action Taken. *Spill occurred at load line and flowed south off location into pasture about 350 feet. Spill width is about 50 feet. Samples will be collected to delineate TPH and chloride in soil for remediation plan.

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:

Printed Name: Jamon Hohensee, EOG Resources, Inc.

Title: Environmental Rep.

E-mail Address: jamon_hohensee@eogresources.com

Date: 10-16-2015 Phone: 432-556-8074

OIL CONSERVATION DIVISION

Approved by Environmental Specialist:

Approval Date: 10/16/2015 Expiration Date: 12/16/2015

Conditions of Approval:
Site samples required. Delineate and remediate as per MNOCD guides. Geotag photographs of remediation required.

Attached ☐
1RP-3921

* Attach Additional Sheets If Necessary

nKJ1528936186
pKJ1528936421

REVIEWED
By Kellie Jones at 9:36 am, Nov 23, 2015

APPROVED CONDITIONAL
By Kellie Jones at 9:36 am, Nov 23, 2015

1. Ensure DP-8 is vertically delineated.
2. Provide documentation in regards to the depth to groundwater.
3. For samples DP1, DP5, DP7, DP8, and DP9, we believe going down to 8 feet in these areas will get the majority of the release.
4. Ensure BLM approval/concurrence.

Larson & Associates, Inc.
Environmental Consultants

Investigation Summary
Endurance 25 Fed. #2 SWD Produced Water Spill
November 12, 2015

Introduction

This investigation summary is prepared on behalf of EOG Resources, Inc. (EOG) for submittal to the New Mexico oil Conservation Division (OCD) and U.S. Bureau of Land Management (BLM) for a produced water spill at the EOG Endurance 25 Fed #2 SWD tank battery (Site). The Site is located in Unit E (NW/4, SE/4), Section 25, Township 26 South, Range 33 East, in Lea County, New Mexico. The approximate geodetic position is north 32° 00' 53.75" and west 103° 31' 53.07". The spill occurred on October 4, 2015, due a value being left open at the load line prior to pulling the transport truck away. The estimated volume of the spill was 100 barrels (bbl) with about 40 bbl recovered. The spill flowed north into a pasture and covered an area measuring about 54,450 square feet or 1.2 acres. The initial C-141 was submitted to OCD District 1 on October 15, 2015. The OCD assigned the spill remediation project number 1RP-3921. Figure 1 presents a topographic map. Figure 2 presents an aerial map.

Setting

The setting is as follows:

- The surface elevation is about 3,340 feet above mean sea level (MSL);
- The topography is slightly undulating and slopes to the southeast;
- Surface water run-off is the northwest in the general direction of the spill;
- The nearest surface water feature is an intermittent drainage located about 1,050 feet southwest of the Site;
- The soils are designated as "Berino-Cacique loamy fine sands association", consisting of loamy fine sand to about 05 feet bgs and sandy clay loam to about 5 feet bgs, derived from reworking the Blackwater Draw (Pleistocene) and Ogallala (Pliocene) formations, in descending order;
- Groundwater is greater than 200 feet bgs according to records from the New Mexico Office of the State Engineer (OSE);
- The nearest fresh water well is located about 1.7 miles west of the Site, in Unit C (SE/4, SW/4), Section 22, Township 26 south, Range 33 East, with depth to water reported at approximately 125 feet below ground surface (bgs);

Remediation Action Levels

Remediation action levels (RRAL) were calculated for benzene, BTEX and TPH based on the following criteria established by the OCD (*Guidelines for Remediation of Leaks, Spills and Releases, August 13,* 1993):

Criteria	*Result*	*Score*
Depth-to-Groundwater	>100 feet	0
Wellhead Protection Area	No	0
Distance to Surface Water Body	> 1000 Horizontal Feet	0

The following RRAL apply to the release for ranking score: 0

- Benzene 10 mg/Kg
- BTEX 50 mg/Kg
- TPH 5,000 mg/Kg

Initial Samples and Analysis

Initial samples were collected on October 16, 2015, October 29, 2015, and November 2, 2015, to delineate the spill. LAI personnel used a direct push (Terraprobe®) rig to collect soil samples at nine (9) locations (DP-1 through DP-9) between approximately 12 and 16 feet bgs. Permian Basin Environmental Lab (PBEL) in Midland, Texas, analyzed the upper sample (0 to 1 foot) for total petroleum hydrocarbons (TPH) by SW-846 method 8015 modified. All samples were analyzed for chloride by method 300. Table 1 presents the analytical data summary. Figure 3 presents the sample locations. Attachment A presents the laboratory report.

Referring to Table 1, TPH was below the RRAL in all samples. TPH was also below the Reporting Limit (RL) in all samples except DP-1 (27.2 mg/Kg). Chloride was delineated vertically to 250 milligrams per kilogram (mg/Kg) in all borings except DP-6 and DP-8. Chloride decreased below 250 mg/Kg between about 0 feet (DP-4) and 14 feet (DP-9). Chloride was 451 mg/Kg and 3,270 mg/Kg in the deepest samples from DP-6, 10 to 12 feet and DP-8, 14 to 16 feet, respectively.

Remediation Plan:

- Excavate soil to approximately 4 feet bgs from area shown on Figure 4 and install 20 mil thickness poly liner in bottom of excavation;
- Backfill excavations with clean topsoil and seed;
- Dispose contaminated soil at OCD approved landfill; and
- Prepare final report for submission to OCD and BLM.

K. Huckaba

Kimberly Huckaba
Staff Geologist

Table 1
Investigation Soil Sample Analytical Data Summary
EOG Resources, Inc., Endurance 25 Fed #2 SWD Spill
UL D Section 25, Township 26 South, Range 33 East
Lea County, New Mexico
1RP-3921

Sample	Depth (Feet)	Collection Date	C6 - C12 (mg/Kg)	>C12 - C28 (mg/Kg)	>C28 - C35 (mg/Kg)	TPH (mg/Kg)	Chloride (mg/Kg)
OCD RRAL:							
DP-1	0 - 2	10/16/2015	<26.0	**27.2**	<26.0	**27.2**	**4,090**
	2 - 4	10/16/2015	--	--	--	--	**6,780**
	4 - 6	10/16/2015	--	--	--	--	**10,400**
	6 - 8	10/16/2015	--	--	--	--	**10,300**
	8 -10	10/16/2015	--	--	--	--	**973**
	10 - 12	10/16/2015	--	--	--	--	**454**
	12 - 14	10/29/2015	--	--	--	--	2.40
	14 - 16	10/29/2015	--	--	--	--	5.10
DP-2	0 - 2	10/16/2015	<26.9	<26.9	<26.9	<26.9	**189**
	2 - 4	10/16/2015	--	--	--	--	**117**
	4 - 6	10/16/2015	--	--	--	--	**872**
	6 - 8	10/16/2015	--	--	--	--	108
	8 -10	10/16/2015	--	--	--	--	90.4
	10 - 12	10/16/2015	--	--	--	--	7.9
DP-3	0 - 1	10/19/2015	<28.4	<28.4	<28.4	<28.4	**10,100**
	1 - 2	10/19/2015	--	--	--	--	**2,700**
	2 - 4	10/19/2015	--	--	--	--	**630**
	4 - 6	10/16/2015	--	--	--	--	**2,370**
	6 - 8	10/16/2015	--	--	--	--	**1,720**
	8 -10	10/16/2015	--	--	--	--	44.9
	10 - 12	10/16/2015	--	--	--	--	131
DP-4	0 - 1	10/19/2015	<27.5	<27.5	<27.5	<27.5	31.9
	1 - 2	10/19/2015	--	--	--	--	2.5
	2 - 4	10/19/2015	--	--	--	--	25.9
	4 - 6	10/16/2015	--	--	--	--	<1.11
	6 - 8	10/16/2015	--	--	--	--	<1.04
	8 -10	10/16/2015	--	--	--	--	33.2
	10 - 12	10/16/2015	--	--	--	--	44.2
DP-5	0 - 1	10/19/2015	<25.8	<25.8	<25.8	<25.8	**2,890**
	1 - 2	10/19/2015	--	--	--	--	**2,130**
	2 - 4	10/19/2015	--	--	--	--	**1,480**
	4 - 6	10/16/2015	--	--	--	--	**6,530**
	6 - 8	10/16/2015	--	--	--	--	**4,450**
	8 -10	10/16/2015	--	--	--	--	**2,040**
	10 - 12	10/16/2015	--	--	--	--	239

Table 1
Investigation Soil Sample Analytical Data Summary
EOG Resources, Inc., Endurance 25 Fed #2 SWD Spill
UL D Section 25, Township 26 South, Range 33 East
Lea County, New Mexico
1RP-3921

DP-6	0 - 1	10/19/2015	<26.6	<26.6	<26.6	<26.6	**4,120**
	1 - 2	10/19/2015	--	--	--	--	**1,120**
	2 - 4	10/19/2015	--	--	--	--	164
	4 - 6	10/16/2015	--	--	--	--	172
	6 - 8	10/16/2015	--	--	--	--	**7230**
	8 -10	10/16/2015	--	--	--	--	257
	10 - 12	10/16/2015	--	--	--	--	**451**
DP-7	0 - 1	10/19/2015	<25.5	<25.5	<25.5	<25.5	**2,920**
	1 - 2	10/19/2015	--	--	--	--	**4,280**
	2 - 4	10/19/2015	--	--	--	--	**3,110**
	4 - 6	10/16/2015	--	--	--	--	**4,310**
	6 - 8	10/16/2015	--	--	--	--	**1,920**
	8 -10	10/16/2015	--	--	--	--	12.5
	10 - 12	10/16/2015	--	--	--	--	11.5
DP-8	0 - 1	10/19/2015	<26.0	<26.0	<26.0	<26.0	**4,280**
	1 - 2	10/19/2015	--	--	--	--	**3,330**
	2 - 4	10/19/2015	--	--	--	--	**3,710**
	4 - 6	10/16/2015	--	--	--	--	**8,240**
	6 - 8	10/16/2015	--	--	--	--	**5,350**
	8 -10	10/16/2015	--	--	--	--	**4,960**
	10 - 12	10/16/2015	--	--	--	--	**2,440**
	12 - 14	11/2/2015	--	--	--	--	**10,700**
	14 - 16	11/2/2015	--	--	--	--	**3,270**
DP-9	0 - 1	10/19/2015	<25.8	<25.8	<25.8	<25.8	**4,150**
	1 - 2	10/19/2015	--	--	--	--	**2,800**
	2 - 4	10/19/2015	--	--	--	--	**4,170**
	4 - 6	10/16/2015	--	--	--	--	**5,850**
	6 - 8	10/16/2015	--	--	--	--	**3,000**
	8 -10	10/16/2015	--	--	--	--	**500**
	10 - 12	10/16/2015	--	--	--	--	**4,330**
	12 - 14	11/2/2015	--	--	--	--	**598**
	14 - 16	11/2/2015	--	--	--	--	125

Notes: Laboratory analysis performed by Permian Basin Environmental Lab, Midland, Texas

TPH by EPA SW-846 method 8015 (GRO and DRO)

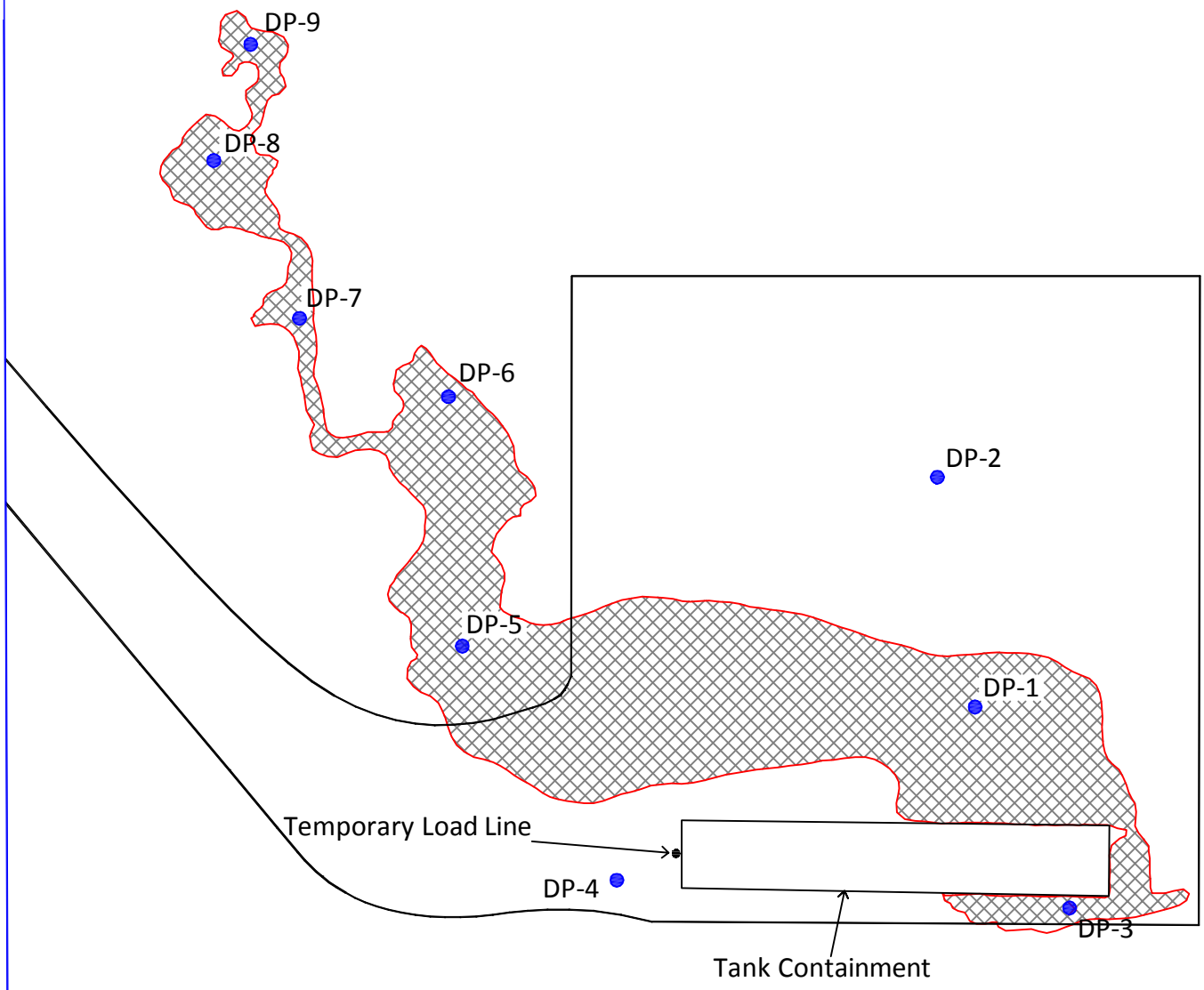
Chloride by method 300.0

Depth in feet below ground surface (bgs)

mg/Kg: milligrams per kilogram equivalent to parts per million (ppm)

RRAL: Recommended Remediation Action Level (RRAL) calculated from OCD guidance document (August 13, 1993)

--: Sample not analyzed



Legend

DP-1 -Direct Push Sampling Location, October 16, 29 and November 2, 2015

-Spill Area

-Excavate Area to Approximately 4 feet bgs, install 20 mil thickness poly liner, and backfill with clean topsoil

100 0 100

Graphic Scale in Feet

EOG Resources, Inc.
Endurance 25 Fed. #2 SWD
Unit E, Sec. 25, T-26-S, R-33-E
Lea County, New Mexico
32° 00' 53.75" N
103° 31' 53.07" W

Figure 4 - Proposed Remediation Area

Larson & Associates, Inc.

Mark Larson

From: Mark Larson
Sent: Friday, November 27, 2015 9:59 AM
To: Mark Larson; dan
Subject: Fwd: 1RP-3921 - Endurance 25 Fed #2 SWD Investigation Summary

Sent from my iPhone

Begin forwarded message:

From: "Jones, Kellie, EMNRD" <Kellie.Jones@state.nm.us>
Date: November 23, 2015 at 9:04:22 AM PST
To: Kimberly Huckaba <khuckaba@laenvironmental.com>
Cc: "stucker@blm.gov" <stucker@blm.gov>, "Oberding, Tomas, EMNRD" <Tomas.Oberding@state.nm.us>, Mark Larson <Mark@laenvironmental.com>, "Keyes, Jamie, EMNRD" <Jamie.Keyes@state.nm.us>
Subject: RE: 1RP-3921 - Endurance 25 Fed #2 SWD Investigation Summary

Kimberly,

Good morning. My comments are below in regards to the recent submittal.

1. Ensure DP-8 is vertically delineated.
2. Provide documentation in regards to the depth to groundwater.
3. For samples DP1, DP5, DP7, DP8, and DP9, we believe going down to 8 feet in these areas will get the majority of the release.
4. Ensure BLM approval/concurrence.

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

Have a great day!

Kellie Jones
Environmental Specialist, District 1
Oil Conservation Division, EMNRD
575-393-6161 ext. 111
575-370-3180 (emergency-cell)
E-Mail: kellie.jones@state.nm.us

From: Kimberly Huckaba [mailto:khuckaba@laenvironmental.com]
Sent: Wednesday, November 18, 2015 7:18 AM
To: Jones, Kellie, EMNRD
Cc: stucker@blm.gov; Oberding, Tomas, EMNRD; Mark Larson
Subject: 1RP-3921 - Endurance 25 Fed #2 SWD Investigation Summary

Dear Ms. Jones,

Please find the attached summary which is submitted to the Oil Conservation Division (OCD) on behalf of EOG Resources, Inc. (EOG), to document the investigation and remediation plan of a produced water spill at the Endurance 25 Fed #2 SWD located in Lea County, New Mexico. The remediation plan proposes to excavate soil to about 4 feet below ground surface (bgs), install a 20 mil thickness polyethylene liner, backfill with clean soil and seed to BLM requirements. A temporary load line is proposed near the west end of the tank battery to allow trucks access the facility during the remediation. Please do not hesitate to contact Mark Larson at (432) 556-8685 or me with any questions you may have.

Sincerely,

Kimberly Huckaba

Larson & Associates, Inc.
Staff Geologist
432.687.0901 (O)
432.557.9703 (C)

--

Mark Larson

From: Tucker, Shelly [stucker@blm.gov]
Sent: Monday, November 23, 2015 11:46 AM
To: Jones, Kellie, EMNRD
Cc: Kimberly Huckaba; Oberding, Tomas, EMNRD; Mark Larson; Keyes, Jamie, EMNRD
Subject: Re: 1RP-3921 - Endurance 25 Fed #2 SWD Investigation Summary

BLM concurs with NMOCD stipulations

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Shelly J Tucker
Environmental Protection Specialist
Bureau of Land Management

620 E. Greene St
Carlsbad, NM 88220

575.234.5905 - Direct
575.361.0084 - Cellular

stucker@blm.gov

On Mon, Nov 23, 2015 at 10:04 AM, Jones, Kellie, EMNRD <Kellie.Jones@state.nm.us> wrote:

Kimberly,

Good morning. My comments are below in regards to the recent submittal.

1. Ensure DP-8 is vertically delineated.
2. Provide documentation in regards to the depth to groundwater.
3. For samples DP1, DP5, DP7, DP8, and DP9, we believe going down to 8 feet in these areas will get the majority of the release.
4. Ensure BLM approval/concurrence.

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

Have a great day!

Kellie Jones

Environmental Specialist, District 1

Oil Conservation Division, EMNRD

575-393-6161 ext. 111

575-370-3180 (emergency-cell)

E-Mail: kellie.jones@state.nm.us

PERMIAN BASIN
ENVIRONMENTAL LAB, LP
10014 SCR 1213
Midland, TX 79706

PBELAB

Analytical Report

Prepared for:

Mark Larson

Larson & Associates, Inc.

P.O. Box 50685

Midland, TX 79710

Project: EOG Endurance 25

Project Number: 15-0160-01

Location: Lea County, New Mexico

Lab Order Number: 5K23001

NELAP/TCEQ # T104704156-13-3

Report Date: 11/24/15

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: EOG Endurance 25
Project Number: 15-0160-01
Project Manager: Mark Larson

Fax: (432) 687-0456

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DP-8 20'	5K23001-01	Soil	11/21/15 11:59	11-23-2015 08:57
DP-8 25'	5K23001-02	Soil	11/21/15 12:06	11-23-2015 08:57

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: EOG Endurance 25
Project Number: 15-0160-01
Project Manager: Mark Larson

Fax: (432) 687-0456

DP-8 20'

5K23001-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**284**	1.11	mg/kg dry	1	P5K2401	11/24/15	11/24/15	EPA 300.0	
% Moisture	**10.0**	0.1	%	1	P5K2402	11/24/15	11/24/15	% calculation	

Larson & Associates, Inc.	Project: EOG Endurance 25	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 15-0160-01	
Midland TX, 79710	Project Manager: Mark Larson	

DP-8 25'

5K23001-02 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**642**	1.05	mg/kg dry	1	P5K2401	11/24/15	11/24/15	EPA 300.0	
% Moisture	**5.0**	0.1	%	1	P5K2402	11/24/15	11/24/15	% calculation	

General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P5K2401 - * DEFAULT PREP *** **										
Blank (P5K2401-BLK1)				Prepared & Analyzed: 11/24/15						
Chloride	ND	1.00	mg/kg wet							
LCS (P5K2401-BS1)				Prepared & Analyzed: 11/24/15						
Chloride	210	1.00	mg/kg wet	200		105	80-120			
LCS Dup (P5K2401-BSD1)				Prepared & Analyzed: 11/24/15						
Chloride	207	1.00	mg/kg wet	200		103	80-120	1.66	20	
Duplicate (P5K2401-DUP1)		**Source: 5K20001-01**		Prepared & Analyzed: 11/24/15						
Chloride	5160	29.4	mg/kg dry		5180			0.341	20	
Duplicate (P5K2401-DUP2)		**Source: 5K20001-09**		Prepared & Analyzed: 11/24/15						
Chloride	ND	1.15	mg/kg dry		174				20	
Batch P5K2402 - % Solids										
Blank (P5K2402-BLK1)				Prepared & Analyzed: 11/24/15						
% Moisture	ND	0.1	%							
Duplicate (P5K2402-DUP1)		**Source: 5K20001-04**		Prepared & Analyzed: 11/24/15						
% Moisture	13.0	0.1	%		14.0			7.41	20	
Duplicate (P5K2402-DUP2)		**Source: 5K23002-04**		Prepared & Analyzed: 11/24/15						
% Moisture	7.0	0.1	%		11.0			44.4	20	

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: EOG Endurance 25
Project Number: 15-0160-01
Project Manager: Mark Larson

Fax: (432) 687-0456

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
LCS	Laboratory Control Spike
MS	Matrix Spike
Dup	Duplicate

Report Approved By: Brent Barron Date: 11/24/2015

Brent Barron, Laboratory Director/Technical Director

5QK23001

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

Data Reported to:

DATE: 11/21/2015 PAGE 1 OF 1

PO #: _____ LAB WORK ORDER #: _____

PROJECT LOCATION OR NAME: EOG Endurance 25

LAI PROJECT #: 15-0160-01 COLLECTOR: Michael Gar

TRRP report? ☐ Yes ☐ No

TIME ZONE: Time zone/State: MST/NM

S=SOIL P=PAINT
W=WATER SL=SLUDGE
A=AIR OT=OTHER

Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	PRESERVATION: HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	ANALYSES: BTEX ☐ MTBE ☐	TPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐	GASOLINE MOD 8015 ☐	DIESEL - MOD 8015 ☐	VOC 8260 ☐	SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐	8081 PESTICIDES ☐ 8151 HERBICIDES ☐	8082 PCBS ☐	TCLP - METALS (RCRA) ☐ TCLP VOC ☐	TCLP - PEST ☐ HERB ☐ Semi-VOC ☐	TOTAL METALS (RCRA) ☐ OTHER LIST ☐	LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐	RCI ☐ TOX ☐ FLASHPOINT ☐	TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐	pH ☐ HEXAVALENT CHROMIUM ☐	EXPLOSIVES ☐ PECHLORATE ☐	CHLORIDES ☐ ANIONS ☐ ALKALINITY ☐ (300.0)	FIELD NOTES
DP-8 20'	R1	11/21	11:59	S	1					X																	X	
DP-8 25'	R1	↓	12:06	S	1					X																	X	
DP-8 30'	#	↓	12:12	S	1					X																	X	
DP-8 35'	↓	↓	12:15	S	1					X																	X	
DP-8 40'	↓	↓	12:28	S	1					X																	X	
TOTAL																												

RELINQUISHED BY:(Signature) DATE/TIME 8:57/11/23/15 RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME 11-23-15 8:57 RECEIVED BY: (Signature)

TURN AROUND TIME
NORMAL ☐
1 DAY ☐
2 DAY ☐
OTHER ☐
_____

LABORATORY USE ONLY:
RECEIVING TEMP: 5.4 THERM #: _____
CUSTODY SEALS - ☐ BROKEN ☐ INTACT ☐ NOT USED
☐ CARRIER BILL # _____
☐ HAND DELIVERED

APPENDIX C

Field Chloride Titration Procedure

Procedure:

1. Make sure scale is reading in grams (g) with one-tenth of a gram precision.
2. Zero-out (tare) the weight on the scale containing a clean, dry 40-ml vial *without* lid attached.
3. Add approximately 10 grams of soil to the vial and record the weight, and re-zero (tare) the scale.
4. Using a 10 ml pipette add about 30 ml of distilled water to the vial and record the weight.
5. Place lid on vial and agitate for 20 seconds, then allow up to 20 minutes for the soil and water to separate.
6. Place a clean, dry paper cup on the scale and zero it out (tare).
7. Using a 10 ml pipette, remove and measure approximately 10 ml of the free liquid extract from the vial (record the volume) and place in the paper cup.
8. Swirl in 3 drops of Potassium Chromate to the solution in the paper cup.
9. Using the small pipette, add Silver Nitrate to the solution in the paper cup drop by drop while swirling until the solution turns brick red. Record the volume (ml) of Silver Nitrate used.
10. Perform calculations as follows:

Parameters Water (g) Soil (g)
Silver Nitrate (ml) Solution (ml)
Constant = Chloride mole Weight x $AgNO_3$ normal (35,450 x 0.282) = (9,997)

Calculation of chloride concentration in soil:

$$Csoil(mg/kg) = (Clmol - wt \times normal) \times \frac{Water(g)}{Soil(g)} \times \frac{AgNO_3(ml)}{Solution(ml)}$$

or

$$Csoil(mg/kg) = (9997) \times \frac{Water(g)}{Soil(g)} \times \frac{AgNO_3(ml)}{Solution(ml)}$$

Field Chloride Titration Results

Site: Endurance Fed 25 #2 SWD **Site:** T26S-R33E-Section 25-Unit E **Date:** _____

No.	Sample ID	Sample Depth (feet)	Distilled Water Wt. (grams)	/	Soil Weight (grams)	x	$AgNO_3$ Volume (ml)	/	Extract Volume (ml)	x	Corr. Fact.	=	Chloride Concentration (mg/kg)
1	Example	1	30.0	/	10.4	x	0.087	/	10.0	x	9997	=	251
2	Example	2	30.2	/	10.0	x	0.335	/	10.1	x	9997	=	1,001
3				/		x		/		x	9997	=	
4				/		x		/		x	9997	=	
5				/		x		/		x	9997	=	
6				/		x		/		x	9997	=	
7				/		x		/		x	9997	=	
8				/		x		/		x	9997	=	
9				/		x		/		x	9997	=	
10				/		x		/		x	9997	=	
11				/		x		/		x	9997	=	
12				/		x		/		x	9997	=	
13				/		x		/		x	9997	=	
14				/		x		/		x	9997	=	
15				/		x		/		x	9997	=	
16				/		x		/		x	9997	=	
17				/		x		/		x	9997	=	
18				/		x		/		x	9997	=	
19				/		x		/		x	9997	=	
20				/		x		/		x	9997	=	

Chloride Titration Procedure

1	Make sure scale is reading in grams (g) with one-tenth of a gram precision.
2	Zero-out (tare) the weight on the scale containing a clean, dry 40-ml vial *without* lid attached.
3	Add about 10 grams of soil to the vial and **record the weight**, and re-zero the scale (tare).
4	Using a 10 ml pipette add about 30 ml of distilled water to the vial and and **record the weight.**
5	Place lid on vial and agitate for 20 seconds, then allow up to 20 minutes for the soil and water to separate.
6	Place a clean, dry paper cup on the scale and zero it out (tare).
7	7. Using a 10 ml pipette, remove and measure approximately 10 ml of the free liquid extract from the vial (**record the volume**) and place in the paper cup.
8	Add 3 drops of Potassium Chromate to the solution and swirl it in the plastic cup.
9	Using a small (1 ml) pipette, add Silver Nitrate ($AgNO_3$) to the solution in the plastic cup drop by drop while swirling until the solution turns brick red. **Record the volume** (ml) of ($AgNO_3$) used.
10	Perform calculations as shown in table above