



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.

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

Page 1 of 2

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 valve 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.



Kimberly Huckaba
Staff Geologist

Tables

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

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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

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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

P: Laboratory results pending

Bold and highlighted denotes concentration greater than OCD Recommended Remediation Action Level (RRAL)

Figures

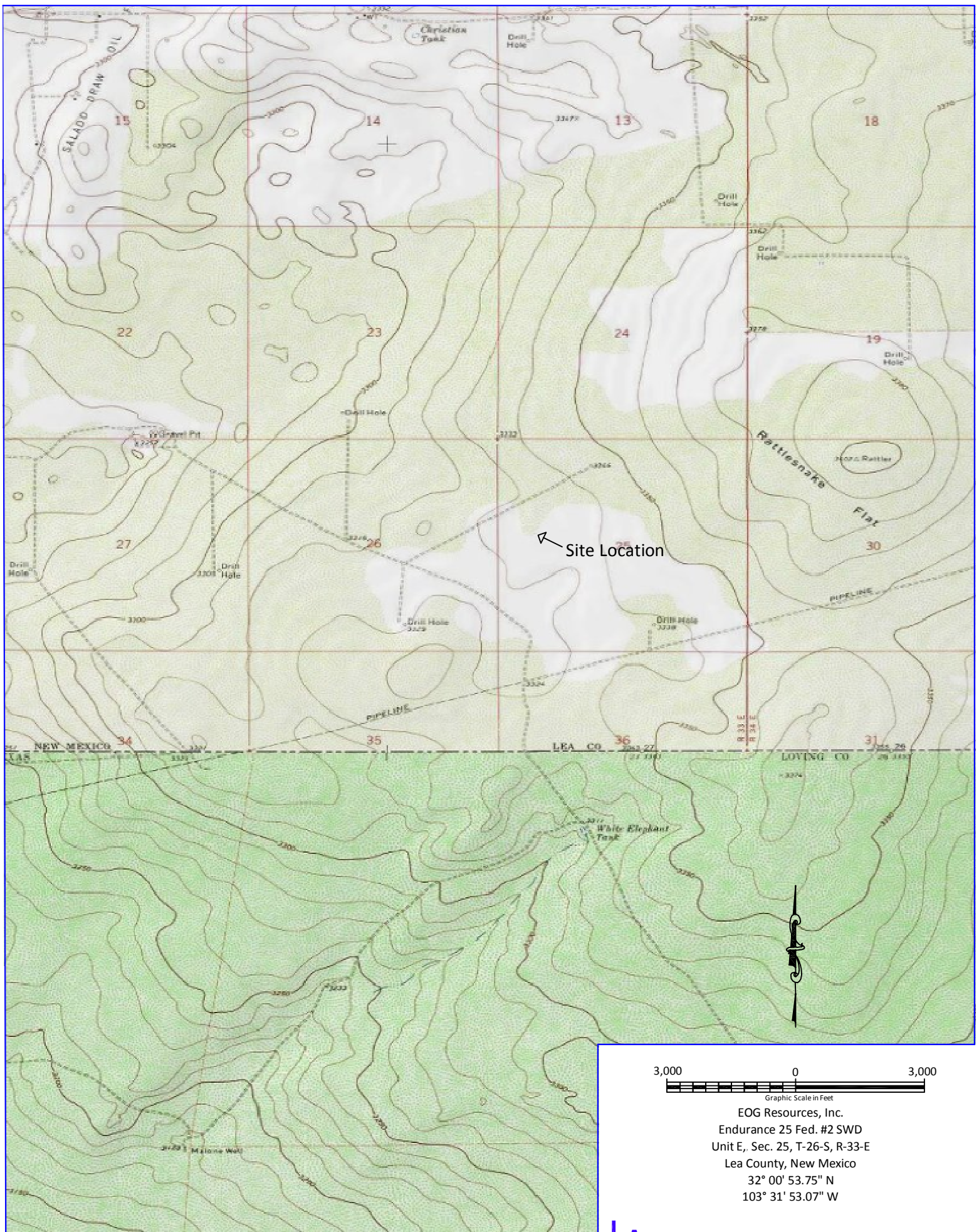


Figure 1 - Topographic Map

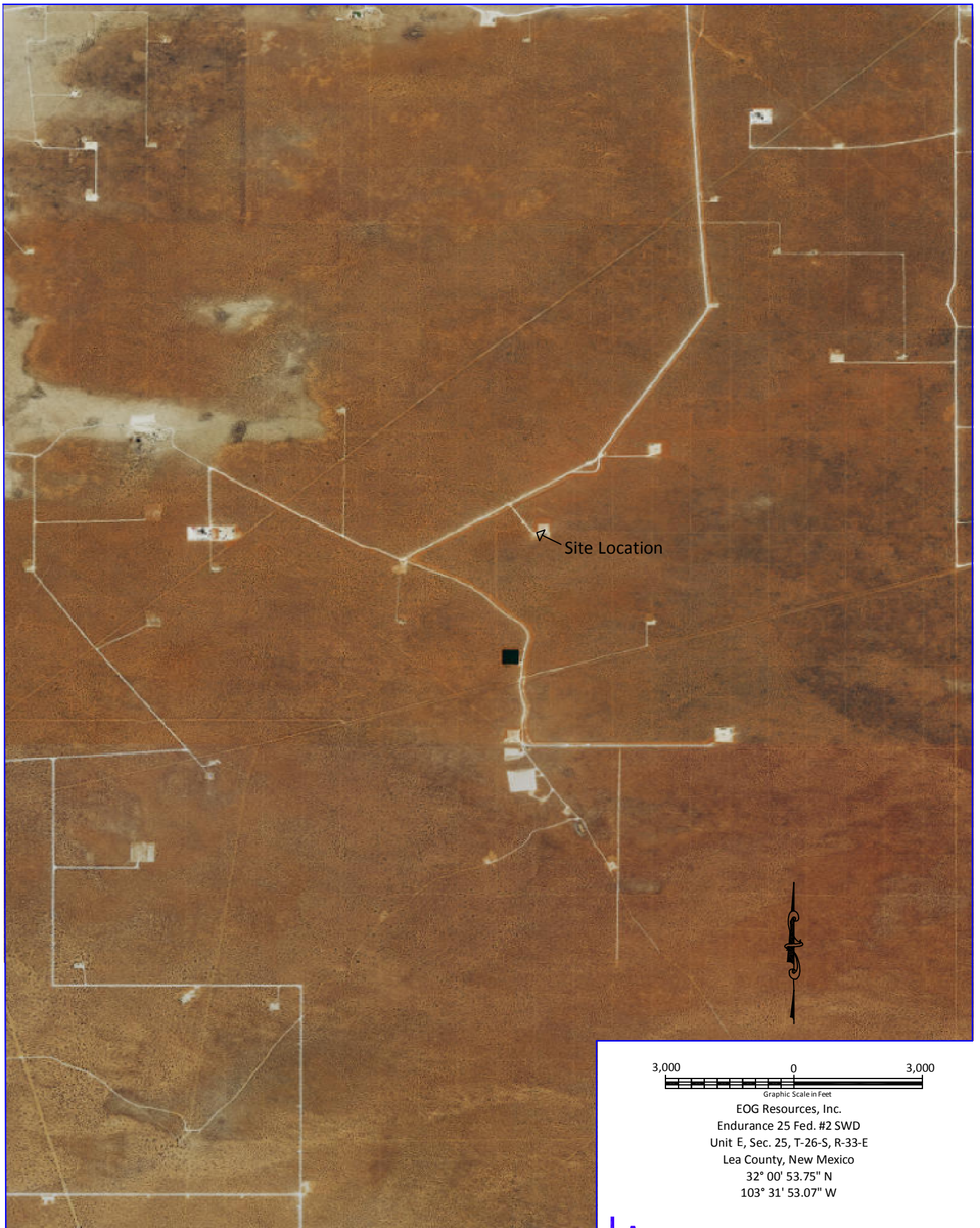
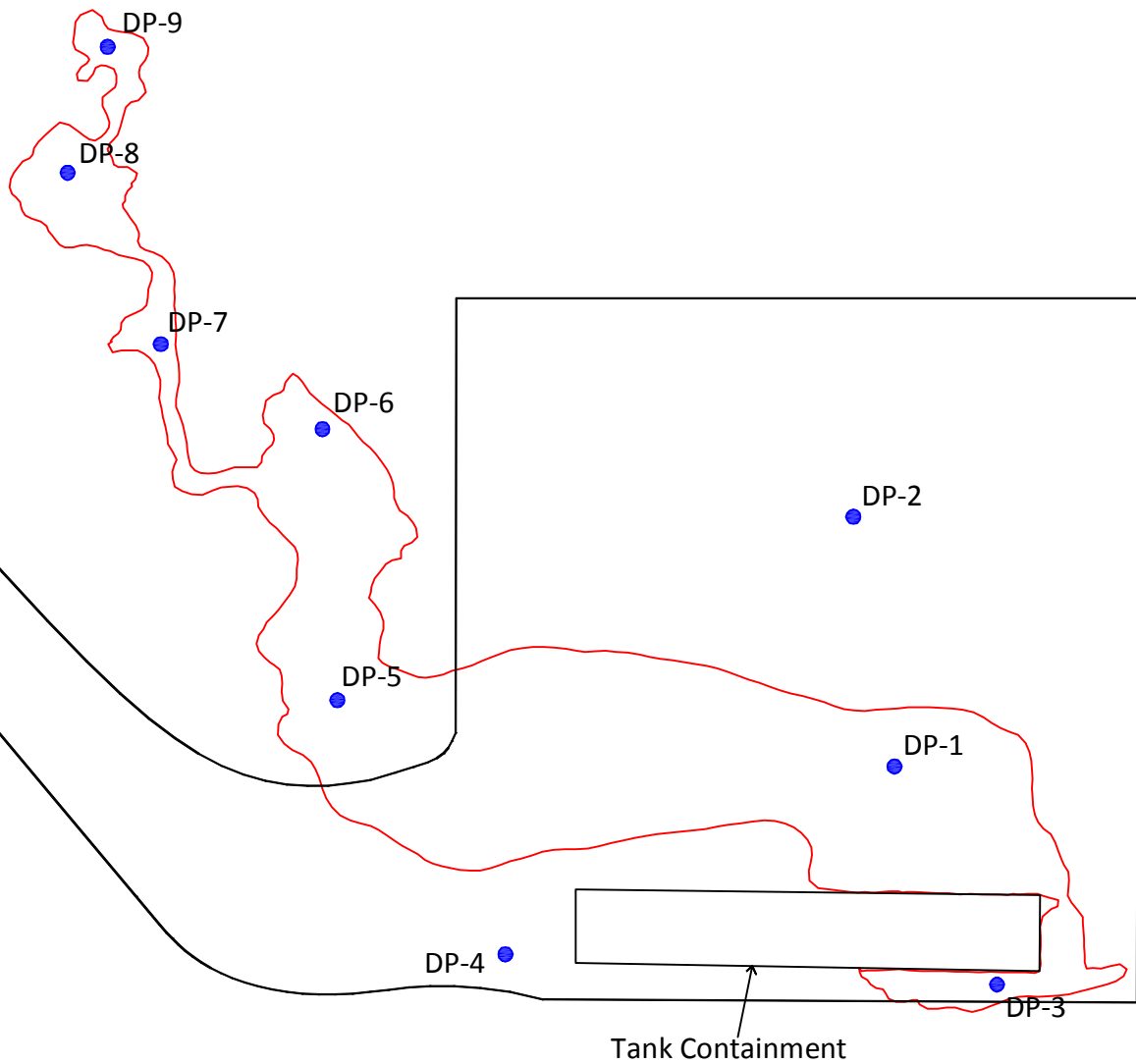
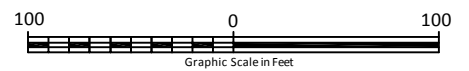


Figure 2 - Aerial Map



Legend

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



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 3 - Site Map

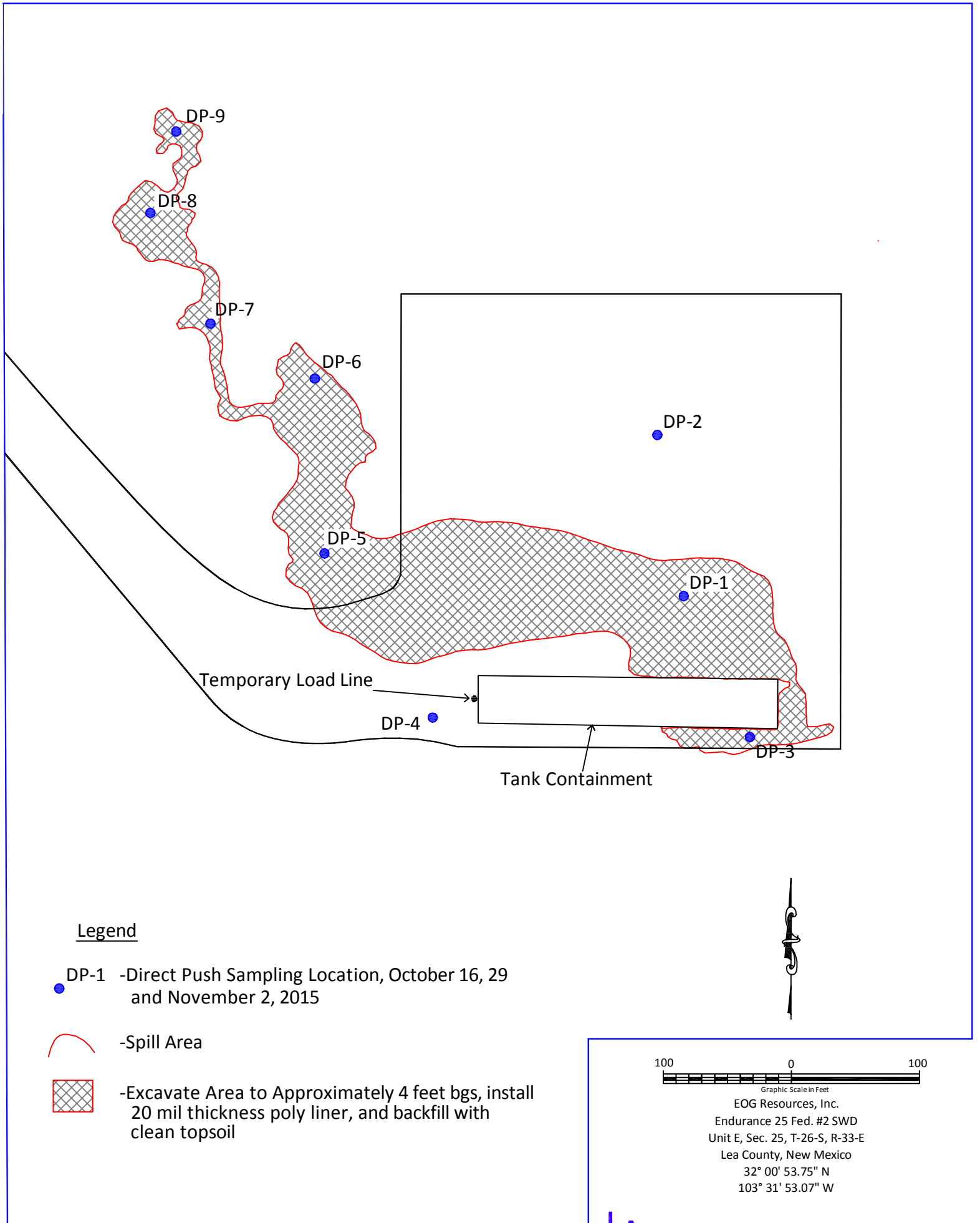


Figure 4 - Proposed Remediation Area

Attachment A

Photographs



Endurance 25 Fed #2 SWD Sign, October 14, 2015



Endurance 25 Fed #2 SWD, Viewing East, October 14, 2015



Endurance 25 Fed #2 SWD, Viewing West, October 14, 2015



Endurance 25 Fed #2 SWD, Viewing Northeast, October 14, 2015



Endurance 25 Fed #2 SWD, Viewing North, October 14, 2015



Endurance 25 Fed #2 SWD, Viewing Northeast, October 14, 2015