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Apache Corporation

**EAU Pilot Project
Remediation
Proposal**

EAU M-141
C-11-T18S-R27E
225' FNL & 2280' FWL
30-015-22834
Eddy County, New Mexico

August 10, 2016

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EAU Pilot Project

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225' FNL & 2280' FWL
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Prepared for:
Apache
Corporation
Eddy County, New Mexico

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- Hydrology Map
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- Soils Map
- Surface and Mineral Map
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- Vicinity Map

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1. INTRODUCTION

1.1 Site Information

The subject site is a ROW and pasture area located approximately 10 miles southeast of Artesia, New Mexico at GPS coordinates of 32°46'5.01"N, 104°15'3.87"W. The fiberglass line is owned and operated by Apache Corporation.

The OCD 2RP # is 3572. The release area fingers through an area of a total 52,922 square feet with a linear distance of 1,050 feet. There is a west side that is 918 ft. long by 1-4' wide, an east side that is 763 ft. long by 1 ft. wide, and area at point of release that encompasses an area of 4,846 square feet with area for fiberglass line repair adding 143 square feet. The elevation at the point of release is 3,719 ft. with a 5.55% grade leading to northernmost point of release at 3535.9 ft. The release primarily headed in a northern direction, down slope, and fingered out in several places as fluid moved around vegetation.

2. SUMMARY OF SITE INVESTIGATION ACTIVITIES

2.1 Initial Reporting and Incident Description

New Mexico Oil Conservation Division (NMOCD) was notified of the release by Bruce Baker (Apache Corporation) via e-mail to Mike Bratcher (NMOCD) and Shelly Tucker (BLM) February 25, 2016 at 10:47 am. A form C-141 was submitted on February 26, 2016 by Bruce Baker.

The release was reported to have had failure in a repair clamp on a buried four inch fiberglass line resulting in a 50 bbl release containing 40 bbls water and 10 bbls oil with 5 bbls of fluid recovered. The line was isolated and a vacuum truck was dispatched to pick up standing fluid. The entire release was in the pasture. The area was mapped and a one call placed to permanently repair the line.

2.2 Sampling Activities

Initial release site investigation activities were conducted on March 2, 2016 (0-2') and follow-up samples conducted on March 10, 2016 (SP-2 / 3-6'). Grab samples were collected utilizing a backhoe to a varied depth of down to 6-feet below ground surface. Laboratory results are presented below in Table 1, and the laboratory results is shown as Attachment 2 in Appendix A.

Table 1: Laboratory Sampling Results

Sample ID	BTEX	Chlorides	GRO	DRO
3/2/2016				
S-1				
0'	333	15600	7890	44500
1'	151	8600	823	1680
2'	26.2	6400	70.4	223
S-2				
0'	350	7200	7810	69100
1'	52.9	5730	276	870
2'	468	2320	2340	4200
3'	31.1	clay	289	947
4'	0.386	clay	<10	<10
5'	<0.300	clay	<10	<10
6'	<0.300	clay	<10	<10
S-3				
0'	599	6530	13200	66500
1'	202	8260	401	1240
2'	1.48	720	<10	47.2
S-4				
0'	115	14200	3100	61100
1'	6.13	416	153	1980
2'	<0.300	80	<10	47.2
S-5				
0'	98.4	2960	2620	48500
1'	9.33	3680	355	4210
2'	10.3	848	185	2590

3. ENVIRONMENTAL ASSESSMENT

3.1 Surface and Mineral Ownership

The release site falls inside BLM and state managed lands and on an existing ROW and pasture. Apache will work with the BLM and OCD to complete the in-situ remediation of the release site. (Figure 2 in Appendix C)

3.2 Hydrology

Water well depths were not located in the area. There is one intermittent storm water drainage area within a quarter mile to the north. There are no bodies of water, lakes, or streams near this release site. (Figure 5 in Appendix C)

The site ranking for this site is a 0 based on the following:

Depth to ground water	>100'
Wellhead Protection Area	>1000'
Distance to surface water body	>1000'

3.3 Karst

The area surrounding this release site has a high karst potential. A complete walk of the area showed there to be no known or visible signs of karst features in the area.

Mitigation measures will be to practice diligence with water movement through selected pilot area to collection tank. Records will be kept showing these volumes and differences.

3.4 Range

The range allotment is in the Turkey Track, 65075 and cattle are sometimes in the area. All open trenches or excavations will be fenced to prevent injury to cattle if left unattended. All equipment left overnight will be positioned to prevent injury to cattle.

3.5 Soils, Geology, and Vegetation

According to the soil survey data in the United States Department of Agriculture Natural Resources Conservation Service (NRCS), the soil description is RG – Reeves Gypsum land complex, 0-3 percent slopes. The natural drainage is well-drained. Water movement is very low. Shrink – swell potential is low. The soils in the area is loamy to gypsum soils. The soil has a sodic horizon within 30 inches of soil surface. According to United States Geological Survey, the underlying geology is in the Artesia Group (Pat). The Artesia is distinguishable from Moenkopi by its finer grain size, absence of conglomerate, predominance of brown, sandy siltstone. Contains: dolomite, sandstone, anhydrite, and siltstone. The vegetation in the area consist of mesquite, four-wing

saltbush, and grasses found in gypsum soils. All areas on the ROW will be seeded with the BLM 4 seed mix for gypsum soil types.

4. REMEDIATION PLAN

Apache has met with the BLM and OCD in order to review an in-situ remediation of the area. Apache has selected an area north of the point of release up to a surface steel pipeline as the initial in-situ remediation area. This area is a 6,023 square foot area.

4.1 Soil Remediation Plan

After many discussions with Apache, NMOCD and the Bureau of Land Management, our goal is not only to relieve the hydrocarbon and chloride contamination from the soil, but also to collect the effluent for off-site disposal. We will be able to achieve these goals by utilizing SuperAll for the hydrocarbons, BRINE-AID™ for the chlorides, and AWD collection system for the effluent removal. Effluent water will be utilized for the application of both remediation products.

1. Using a trench, we will excavate an area three and one-half feet deep and four inches wide throughout the contaminated area. We will then install ten separate collection lines running parallel on five-foot centers. All of the lines will be connected to a main header down grade. Coming out of the header will be a single four to six inch poly pipe to transport the effluent the rest of the way downhill to a holding tank. The treatment grid will be approximately 100 feet by 80 feet.
2. For the first application, we will use BRINE-AID™ at a dilution ratio of 20 parts effluent water to one part BRINE-AID™. This will be applied to the entire area. The application and subsequent flushes will require one 130-barrel and one 80-barrel vacuum truck. Field samples during treatment and lab samples during flushing will be completed for both water and soil.
3. One week after the first application, we will flush the entire site with just effluent water. Field samples during treatment and lab samples during flushing will be completed for both water and soil.
4. One week following the first flush, we will treat again with BRINE-AID™ using the same application process outlined in step 1. Field samples during treatment and lab samples during flushing will be completed for both water and soil.
5. One week following the second treatment, we will flush again as outlined in step 3. Field samples during treatment and lab samples during flushing will be completed for both water and soil.

6. One week following the second flush, we will apply SuperAll, using the quantity and dilution ratio recommended by them. The application will require two 130-barrel vacuum trucks. Field samples during treatment and lab samples during flushing will be completed for both water and soil.
7. One week following the application of SuperAll, we will flush with the balance of BRINE-AID™ and effluent water at a dilution ratio of approximately 30 to 1. Field samples during treatment and lab samples during flushing will be completed for both water and soil.

4.2 Seeding Plan

The ROW area will be seeded with the BLM seed mix #4 after the project has been completed. The seed bed will be prepared by raking area, broadcast seeding, and raking lightly to cover seed.

5. REMEDIATION WORK SCHEDULE

Initial section of the pilot project for in-situ remediation activities are expected to commence after receiving approval and funding of this proposed plan.

6. FOLLOW-UP SCHEDULE

A remediation report for this section will be completed and mailed within 30 days of remediation work being completed to BLM and OCD. This report will have the map of actual remediation area, photos of remediation, sampling details, and photos of the seeding of completed project area.



Appendix A

Attachments



Appendix B

Photos

Appendix C

Figures



Appendix D

Laboratory Results