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ENVIRONMENT

Subject:
Work Plan for Site Assessment and Liner Inspection
Warren State #1 Production Facility
OMNCD Remediation Case Numbers: 1RP-4732 and 1RP-4738
Lea County, New Mexico

Date:
July 31, 2017

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Our ref:
TX001562.0001

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Dear Mr. Griswold:

On behalf of Marathon Oil Company (Marathon), Arcadis U.S., Inc. (Arcadis) has prepared this work plan to assess current soil conditions and to inspect the secondary containment liner to confirm that it will contain liquids at the Warren State #1 Production Facility (the Site). The Site is located approximately 1.75-mile east-northeast of the intersection of S. Prairie View Road and Midway Road in eastern Lea County, New Mexico (**Figure 1**).

BACKGROUND

On June 6, 2017, the high-level switch on the produced water tank at the Site was manually bypassed which prevented the produced water from the Warren State #1 well (30-025-34034) to be pumped to a nearby injection well. Because of the manual bypass, the 500-barrel (bbl) produced water tanks at the Site were overfilled, and 200-bbls of produced water were released to secondary containment. The released fluids were recovered using a vacuum truck and were transported offsite for disposal.

Following the previous release to secondary containment, a second release occurred at the Site on June 9, 2017. Approximately 200-bbls of produced water were released and overflowed the secondary containment structure into a pasture. Approximately 1,000-bbls were recovered from the secondary containment structure via vacuum truck and disposed offsite. The incident is under investigation, and the exact cause has not yet been determined.

Marathon notified the NMOCD of each release incident via submittal of the Release Notification and Corrective Action Form C-141. NMOCD assigned remediation case numbers 1RP-4732 and 1RP-4738 to the two spills, respectively.

SCOPE OF WORK

Based on the Release Notification and Corrective Action Form C-141 for each spill event, the liner of the secondary containment and current condition of subsurface soils requires evaluation. The following site assessment will be performed in accordance with New Mexico Administrative Code 19.15.30 NMAC.

Task 1 – Site Assessment

Task 1a - Liner Inspection

Arcadis will inspect the liner integrity within the secondary containment structure to confirm it will continue to contain liquids. It is understood that the current liner system consists of a high-density polyethylene (HDPE) liner overlain with gravel. Soft dig methods (hand shovels) will be employed to expose the liner in targeted locations to determine if breakthrough or tearing of the liner has occurred. The inspection will focus on walkways or high foot traffic areas, adjacent to system or equipment footings, along seams, and in low spots. Photographic documentation of the exposed/inspected area will be collected. The exposed areas will be restored to original condition post inspection.

Task 1b - Soil Assessment – Hand Auger

A New Mexico One Call Locate Request will be placed at a minimum of 48 hours prior to commencing field activities to help identify any public utility alignment that may be in conflict with the proposed sampling. Upon completion of utility clearance, four soil borings will be advanced using a hand auger at the locations depicted on **Figure 2** (i.e. secondary containment structure and spill area) to assess current soil conditions. Soils will be screened for organic vapors using photo-ionization detector (PID), logged for lithology, and soil samples will be collected for analysis. The soil samples selected for chemical analysis will be collected and submitted for analysis in accordance with the soil sampling procedures discussed in the sections below.

It should be noted that the geology in southeast New Mexico does not always allow for hand auger borehole advancement with refusal commonly occurring within 18 inches of surface. The assessment activities described below will commence if refusal is met within the first 18 inches of surface.

Task 1c - Soil Assessment – Drilling Rig Option, if needed

If refusal is encountered in the hand auger borings, a private utility contractor will be subcontracted to aid in identification of any subsurface lines in and around the site using Ground Penetrating Radar (GPR) and radio detection. This subsurface line locate will be used in conjunction with the New Mexico One Call Locate Request. Sample locations may require field modification due to onsite utility locations and/or field conditions.

The field crew will attempt air-knifing to clear borehole locations from surface grade to a depth of four feet to further reduce the potential to hit buried utilities. Once cleared, the initial four soil borings will be

advanced into the subsurface as shown on **Figure 2**, in areas where visible signs of the release (i.e., stressed vegetation or surface staining) are observed. The total borehole depths are assumed not to exceed 30 feet below ground surface (ft bgs). Up to four secondary soil borings will be advanced in the areas where visible signs of the release (i.e., stressed vegetation or surface staining) are observed downgradient of the secondary containment. This area is anticipated to be located northeast of the tank battery based on a information provided by Marathon personnel. If visual observations of staining or stressed vegetation are not identified, the secondary borings will be placed approximately 25 feet laterally from any boring in which field screening readings are observed in the primary soil borings. Soil cores will be screened for organic vapors using a PID and logged for lithology and soil samples collected for analysis as appropriate. The soil samples selected for chemical analysis will be collected and submitted for analysis in accordance with the soil sampling procedures discussed in the sections below.

A review of the New Mexico Water Rights Reporting System online database indicates the depth to groundwater within a ½-mile radius of the Site is approximately 51 feet bgs. Additionally, with the exception of small seasonal playa type lakes and stock ponds in the general area, no significant surface water bodies are present within one mile of the Site. Shallow groundwater is not anticipated to be encountered while drilling; however, a temporary groundwater monitoring well may be installed and sampled per NMOCD regulations in the event groundwater is observed while drilling.

The coordinates of each soil boring location will be identified in the field using a hand-held global positioning system (GPS), and any surface staining will additionally be mapped using a GPS in support of report preparation. After completion of the field drilling activities, soil cuttings from each boring will be containerized in DOT-approved drums for later disposal at a Marathon-approved facility.

Soil Sampling Procedures

Three samples will be collected from each soil boring advanced in support of Task 1b or 1c for laboratory analysis as follows:

- One sample will be collected from the 0 to 2 ft depth interval,
- the second sample will be collected from the depth interval demonstrating the highest PID reading of organic vapors, and
- the third sample will be from the terminus of the soil boring, anticipated to be from the zone below the highest PID interval where field screening indicates concentrations would likely be below regulatory limits.

In the event field screening measurements are negligible, the second sample will be collected from the mid depth interval of the soil boring. A total of twenty-four soil samples will be collected with the secondary borehole location samples placed on hold pending analytical results from the primary borehole samples. Additionally, two quality assurance and quality control (QA/QC) soil samples will be collected from the soil borings as follows:

- One QA/QC sample will be collected from the deepest sample, and
- One QA/QC sample will be collected from the soil boring located farthest from the point of release.

An aliquot of soils selected for laboratory analysis will be field-screened for chloride by mixing the soil with distilled water and testing the rinsate using Hach chloride test strips to measure chloride concentrations in milligrams per liter (mg/L).

Soil Laboratory Analyses

The soil samples collected for laboratory analysis will be placed in clean, laboratory-supplied sample containers and submitted to Xenco Laboratories, Inc. in Midland, Texas (Xenco) under chain-of-custody protocol. The samples will be analyzed for the following using a standard two-week turnaround time:

- Benzene, toluene, ethylene, and xylenes (collectively referred to as BTEX) by EPA Method 8260B,
- Gasoline Range Organics, Oil Range Organics, and Diesel Range Organics (GRO, ORO, and DRO) by EPA Method 8015M,
- Chloride by EPA Method 300, and
- Percent moisture by Standard Method (SM) 2540B.

Task 2 – Reporting

Results of the site assessment will be compiled in a report with the final laboratory and field testing data and submitted to the NMOCD. The report will include site maps, sample locations, and photographs, as appropriate. Should additional assessment or remediation be warranted, Arcadis will prepare a follow up work plan.

SCHEDULE

Arcadis anticipates beginning field work once agency approval has been received. It is estimated that field work will take one day if hand auger sampling is successful and three days if an air rotary drilling rig is necessary. Analytical results are anticipated to be received within 10 business days of submittal to the analytical laboratory upon completion of the field work. A final report will be prepared for submittal to the NMOCD.

CLOSING

Marathon and Arcadis appreciate your assistance on this project. If you have any questions regarding this work plan, please do not hesitate to contact Ms. Wendy Gram with Marathon at (713) 296-2862.

Sincerely,

Arcadis U.S., Inc.

Colin Melson, P.G.
Senior Geologist

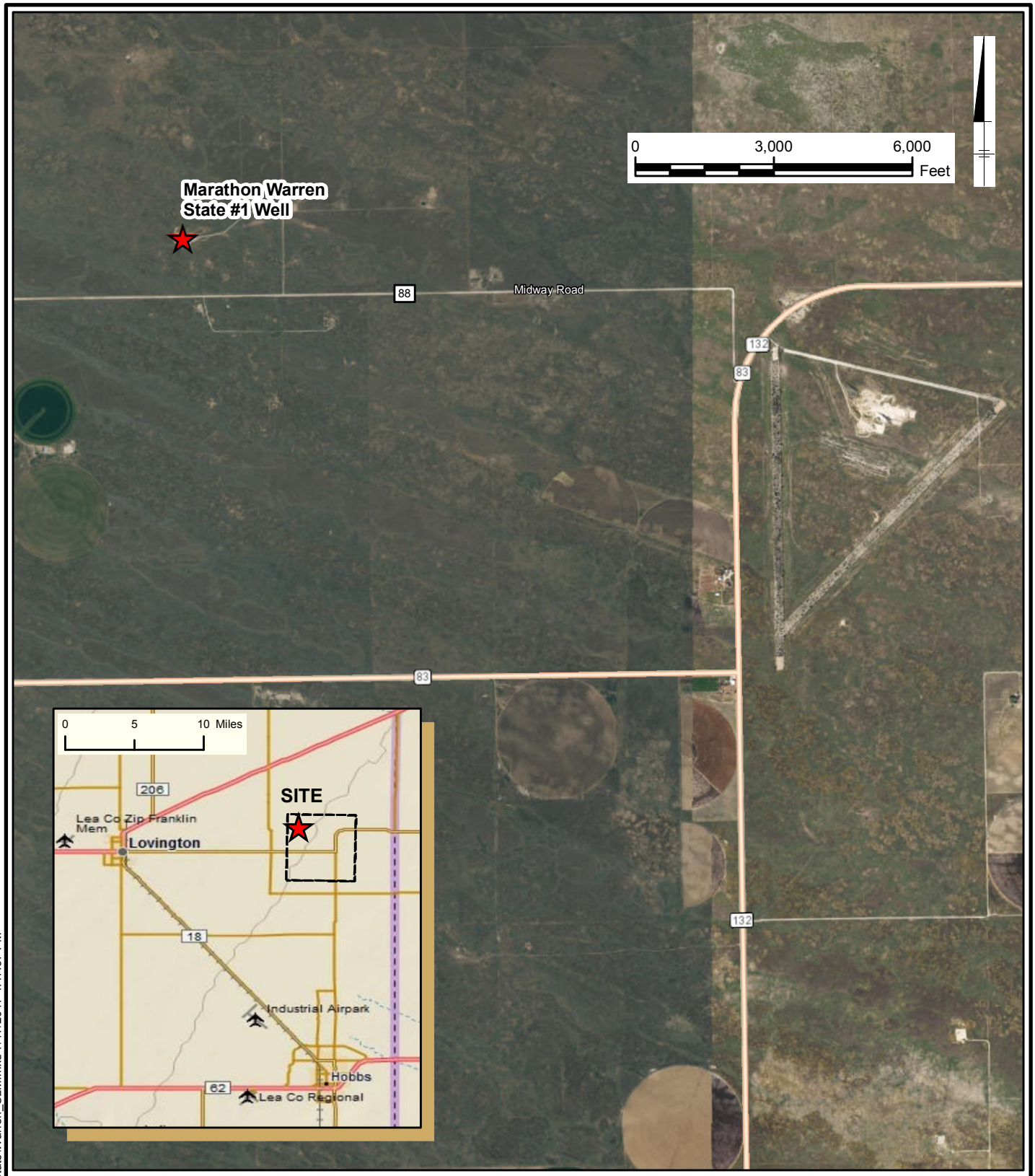
Copies:
Wendy Gram – Marathon Oil Company
Mr. Jim Griswold – NMOCD
Ryan Mueller – Arcadis

Enclosures:

Figures

1 Site Location Map

2 Proposed Soil Boring Map



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WARREN STATE #1 WELL PRODUCTION FACILITY

SITE LOCATION MAP

July 2017

Ground Condition Depicted 5/11/2016
Digital Data Courtesy of USDA, NAIP

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FIGURE 1

City: Houston Div/Group: Remediation West -Air Group Created By: W Berry Last Saved By: wberry ; Client (Project #)
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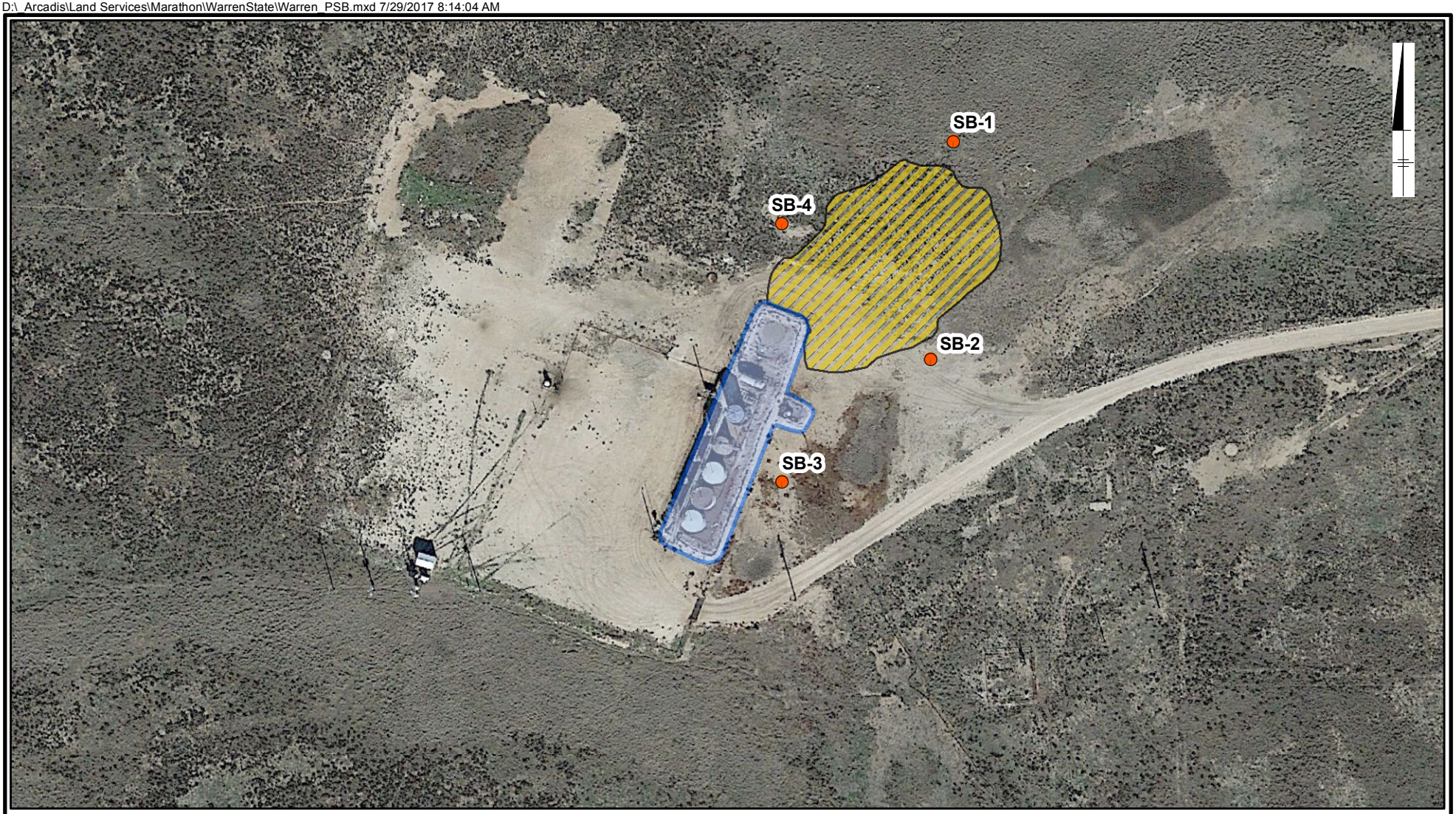

0 100 200 Feet

GRAPHIC SCALE

LEGEND:

- Proposed Soil Boring
- Secondary Containment Structure
- Spill Area

Ground Condition Depicted 11/22/2016
Digital Data Courtesy of Google Earth

NOTE:
"Secondary" soil borings locations will be selected based on field observations.

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PROPOSED SOIL BORINGS

July 2017

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FIGURE 2