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**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee:

<input type="checkbox"/> Spill	<input type="checkbox"/> Complaint
<input type="checkbox"/> Inspection	<input type="checkbox"/> NOAV

Tracking No: \_\_\_\_\_

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

- Spill or Release     Plug & Abandon     Central Facility Closure     Site/Facility Closure     Other (describe): \_\_\_\_\_

**GENERAL INFORMATION**

<b>OGCC Operator Number:</b> 47120	<b>Contact Name and Telephone</b>
<b>Name of Operator:</b> Kerr-McGee Oil and Gas Onshore LP	<b>Name:</b> Phillip Hamlin
<b>Address:</b> P.O. Box 173779	<b>No:</b> 970-336-3500
<b>City:</b> Denver <b>State:</b> CO <b>Zip:</b> 80217-3779	<b>Fax:</b> 970-336-3656
<b>API/Facility No:</b> 05-123-16540 / 248738	<b>County:</b> Weld
<b>Facility Name:</b> Clack 1-2A, Olson 2-2	<b>Facility Number:</b> _____
<b>Well Name:</b> Clack 1-2A	<b>Well Number:</b> _____
<b>Location (Qtr/qr, Sec, Twp, Rng, Meridian):</b> NWNE Sec 2-T3N-R67W	<b>Latitude:</b> 40.259088 <b>Longitude:</b> -104.855164

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Condensate and Produced Water

Site Conditions: Is location within a sensitive area (according to Rule 901e)?  Y     N    If yes, attach evaluation. Groundwater < 20 ft.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Rangeland

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: See attached boring logs.

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Surface water and wetlands located approximately 290' southwest, buildings located approximately 1,900' east, water well located approximately 160' east, and groundwater present at approximately 3.5-6' below ground surface (bgs).

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>Approximately 65' E-W x 30' N-S x 4' bgs</u>	<u>Subsurface site assessment</u>
<input type="checkbox"/> Vegetation	_____	_____
<input checked="" type="checkbox"/> Groundwater	<u>See attached data</u>	<u>Collected groundwater samples for laboratory analysis</u>
<input type="checkbox"/> Surface water	_____	_____

**REMEDIATION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):

A drain valve on the back of the oil tank at the Clack 1-2A, Olson 2-2 facility froze and ruptured. Approximately 16 barrels (bbls) of condensate and 15 bbls of produced water were released within the tank battery containment berm, which was lined with a geosynthetic Claymax<sup>®</sup> liner. The remaining condensate and produced water were removed from the leaking tank. A vacuum truck was used to recover approximately 10 bbls of condensate from within the tank battery containment berm. A topographic Site Location Map depicting the general location of the release is provided as Figure 1.

Describe how source is to be removed:

Petroleum hydrocarbon impacted soil was removed from within the lined containment to the depth of the geosynthetic Claymax<sup>®</sup> liner on the south side of the containment to accommodate the installation of a product recovery system. A product recovery system constructed with 1-inch PVC pipe was installed horizontally above the geosynthetic Claymax<sup>®</sup> liner. Approximately 10 gallons of product were removed from the recovery system. Based on diminishing product recovery, efforts were discontinued. The impacted soil was left in place beneath the aboveground storage tanks.

On August 4 and 6, 2015, a subsurface site assessment was completed at the site to determine if soil and shallow groundwater outside the secondary containment had been impacted. Eight assessment soil borings (SB01 through SB08) were advanced around the tank battery to 6 feet bgs using a hand auger to clear utilities and to total depth with a truck-mounted GeoProbe<sup>®</sup> rig. The soil samples were continuously sampled and screened using a photo-ionization detector (PID). Soil samples were submitted for laboratory analysis of total petroleum hydrocarbons (TPH) by United States Environmental Protection Agency (USEPA) Method 8015C and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260C. Laboratory analytical results indicated that TPH and BTEX concentrations were less than Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels. Depth to groundwater could not be accurately determined during assessment activities. Post-assessment measurements indicated that the depth to groundwater ranged from approximately 3.5 feet to 6 feet bgs. Therefore, analytical results for soil samples collected below the water table are not included in this report. Soil descriptions and PID headspace readings are recorded on the attached field boring logs.

Additionally, two directional soil borings (UTSB01 West and UTSB02 East) were advanced under the two aboveground storage tanks within the containment. The soil borings were advanced at a 45 degree angle using a hand auger to reach a target depth of approximately 3 feet beneath the storage tanks. A single soil sample was collected from the final depth of each soil boring. The laboratory analytical results indicated that benzene concentrations in both soil samples (UTSB01 West@3' and UTSB02 East@3') exceeded the COGCC Table 910-1 allowable level for benzene. In addition, soil sample UTSB02 East@3' also exceeded the COGCC Table 910-1 allowable level for TPH. The general site layout and assessment pothole locations are depicted on the Assessment Site Map provided as Figure 2. The assessment soil sample analytical results are summarized in Table 1 and the laboratory analytical reports are attached.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

The residual impacted soil remaining in place above the Claymax<sup>®</sup> liner will be reassessed when the tank battery is decommissioned.

State of Colorado Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado (303) 894-2100 Fax 894-2109



Tracking Number: Name of Operator: OGCC Operator No: Received Date: Well Name & No.: Facility Name & No.:

REMEDIATION WORKPLAN (CONT.)

OGCC Employee:

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.): On August 4 and 6, 2015, assessment soil borings SB01 through SB08 were completed as monitoring wells MW01 through MW08, respectively. In August 2015, groundwater samples were collected from monitoring wells MW01 through MW08 and submitted for laboratory analysis of BTEX by USEPA Method 8260C. Laboratory analytical results indicated that benzene concentrations in monitoring wells MW01 and MW04 exceeded the Colorado Groundwater Quality Standards (CGWQS). The groundwater monitoring well locations are depicted on the Site Map provided as Figure 3.

On August 5, 2015, groundwater monitoring wells MW01 through MW07 were surveyed to obtain relative groundwater elevation data. The groundwater elevation data indicated the groundwater flow direction at the site is to the west. A Groundwater Elevation Contour Map is provided as Figure 4. The relative groundwater elevation data is provided in Table 2.

Based on the laboratory analytical results, monitoring wells MW02, MW03, MW05, MW06, MW07, and MW08 have been designated as point of compliance (POC) wells. POC has been established at the site. Groundwater monitoring will continue on a quarterly basis.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required. The production facility remains at the site.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing. Is further site investigation required? [ ] Y [X] N If yes, describe: POC has been established. The surveyed groundwater flow direction is to the west. Groundwater monitoring will continue on a quarterly basis.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.): The residual impacted soil remaining in place above the Claymax® liner will be reassessed when the tank battery is decommissioned.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 2/13/2013 Date Site Investigation Completed: Active Remediation Plan Submitted: Remediation Start Date: 2/13/2013 Anticipated Completion Date: TBD Actual Completion Date:

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Phillip Hamlin

Signed: [Signature] Title: Senior HSE Representative Date: 10/13/15

OGCC Approved: Title: Date: