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Project 9675
spill 440852
Document 2526268

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:

Spill Complaint
 Inspection 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

OGCC Operator Number: 47120 Name of Operator: <u>Kerr-McGee Oil and Gas Onshore, LP</u> Address: <u>1099 18th Street, Suite 1800</u> City: <u>Denver</u> State: <u>CO</u> Zip: <u>80202</u>		Contact Name and Telephone Name: <u>Phillip Hamlin</u> No: <u>970-336-3500</u> Fax: <u>970-336-3656</u>	
API/Facility No: <u>328016</u> 440852 Facility Name: <u>HSR Corvi</u> Well Name: <u>HSR Corvi</u> Location (QtrQtr, Sec, Twp, Rng, Meridian): <u>NWNE S36 T4N R66W</u>		County: <u>Weld</u> Facility Number: <u>64N66W36NWNE</u> Well Number: <u>2-36</u> Latitude: <u>40.273019</u> Longitude: <u>-104.722636</u>	

TECHNICAL CONDITIONS

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

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

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Non-Crop Land

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Silty sand to silty clay

Potential receptors (water wells within 1/4 mi, surface waters, etc.): The nearest surface water is located approximately 1400' northwest of the site.
The nearest water well is located approximately 630' northwest of the release area.

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>25' (E-W) x 15' (N-S) x 19' bgs</u>	<u>Excavation, soil sampling, and laboratory analysis</u>
<input type="checkbox"/> Vegetation	_____	_____
<input checked="" type="checkbox"/> Groundwater	<u>See attached data</u>	<u>Groundwater sampling and laboratory analysis</u>
<input type="checkbox"/> Surface water	_____	_____

REMEDIATION WORKPLAN

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

On February 9, 2015, historical hydrocarbon impacts were discovered during the abandonment of the HSR Corvi 64N66W36NWNE production facility. The volume of released material is unknown. The facility was shut in, associated infrastructure removed, and excavation activities commenced. Groundwater was not encountered in the initial excavation. An Initial Form 19 was submitted to the COGCC on February 12, 2014, (Document # 400789156), and a Supplemental Form 19 was submitted to the COGCC on February 19, 2015, (Document # 400794046). The COGCC has issued Spill Tracking # 440852 for this release.

Describe how source is to be removed:

On February 9, 2015, excavation activities commenced and approximately 150 cubic yards of impacted material were excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Excavation activities were guided in the field using a photoionization detector (PID) to measure volatile organic compound (VOC) concentrations in soil. Soil samples were collected from the base and sidewalls of the excavation area at approximately 18 and 15 feet bgs, respectively. Soil samples were submitted to Origins Laboratory in Denver, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA Method 8260, TPH - diesel range organics and oil range organics (DRO and ORO) by USEPA Method 8015. Laboratory results indicated that benzene and TPH concentrations in soil samples N01@15, S01@15, W01@15, and B01@18 were above applicable COGCC Table 910-1 standards. Additional excavation activities were not conducted due to the presence of multiple active underground lines. Between March 5 and 10, 2015, six soil borings (S-BH01, W-BH02, N-BH03, N-BH04, W-BH05, and NW-BH06) were advanced to depths between 22 and 32 feet bgs to further delineate soil impacts. Soil impacted above COGCC Table 910-1 standards was encountered in borings W-BH02 and NW-BH06. Groundwater was encountered in the boreholes at approximately 19 feet bgs. Six groundwater samples (S-BH01, W-BH02, N-BH03, N-BH04, W-BH05, and NW-BH06) were collected and submitted for laboratory analysis of BTEX. Analytical results received on March 12, 2015, indicated that multiple constituents in samples BH02, BH03, BH04, BH05, and BH06 were above the applicable COGCC Table 910-1 groundwater standards. Soil and groundwater analytical results are summarized in Tables 1 and 2, respectively. Soil and soil boring sample locations are illustrated on Figure 1 and laboratory analytical reports are included as Attachment A.

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.:

Impacted soil was excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado. Remediation options to address remaining in-situ soil impacts above COGCC Table 910-1 standards, including in-situ and ex-situ methodologies, are currently being evaluated. Proposed groundwater monitoring and remediation measures are described on the following page.



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

REMEDIATION WORKPLAN (CONT.)

OGCC Employees: _____

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
As previously described, soil borings S-BH01, W-BH02, N-BH03, N-BH04, W-BH05, and NW-BH06 were converted to temporary monitoring wells BH01 - BH06 between March 5 and 10, 2015, to assess the extent of potential groundwater impacts. Additional temporary groundwater monitoring wells (BH07-BH11) were installed on August 17 and 25, 2015. Groundwater samples are collected on a quarterly basis and submitted to Origins Laboratory in Denver, Colorado for analysis of BTEX by USEPA Method 8260B. Temporary monitoring well locations and the March 2016 groundwater analytical results are illustrated on Figure 2, and the most recent quarterly groundwater contour map is presented on Figure 3. Groundwater analytical results are summarized in Table 2, and the groundwater laboratory analytical reports and well completion diagrams are included as Attachments A and B, respectively. Quarterly groundwater monitoring at the temporary monitoring locations will be conducted until BTEX concentrations remain below COGCC groundwater standards for four consecutive quarters.

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 excavation has been backfilled with clean soil and graded to match the adjacent topography. Kerr-McGee's tank battery has been decommissioned and will not be rebuilt. Reclamation activities at the site will be compliant with COGCC regulations.

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 N If yes, describe:
Laboratory data indicate that impacted soil was partially removed via excavation. Remediation options for remaining impacted soils are under evaluation. Temporary monitoring wells have been installed to further assess groundwater impacts, and groundwater points of compliance have been achieved in multiple directions. Additional monitoring wells may be installed as necessary. Soil and groundwater analytical results are summarized in Tables 1 and 2, respectively. The analytical laboratory reports are included as Attachment A.

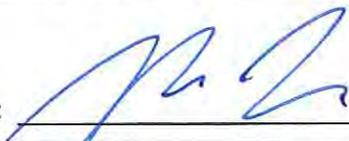
Final disposition of E&P waste (land treated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Impacted soil was transported to the Buffalo Ridge Landfill in Keensburg, Colorado for disposal.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began:	<u>2/9/2015</u>	Date Site Investigation Completed:	<u>TBD</u>	Remediation Plan Submitted:	_____
Remediation Start Date:	<u>2/9/2015</u>	Anticipated Completion Date:	<u>12/15/2017</u>	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:  Title: Senior HSE Representative Date: 5/10/2016

OGCC Approved: _____ Title: _____ Date: _____

Submit reports of site investigation and progress of remediation including results of sampling and analysis on an annual basis or more often until remediation is closed.