

State of Colorado
Oil and Gas Conservation Commission

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Received 02/02/15
REM 8898
Document 2313835

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.

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

☒ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☐ Other (describe): _____

OGCC Employee:
☐ Spill ☐ Complaint
☐ Inspection ☐ NOAV
Tracking No: _____

OGCC Operator Number: 66571

Name of Operator: OXY USA WTP LP

Address: 760 HORIZON DR #101

City: GRAND JUNCTION State: CO Zip: 81506

Contact Name and Telephone:

Justin Booth

No: (970) 263-3648

Fax: (970) 812-7738

API Number: 05-045-07210

County: Garfield

Facility Name: _____

Facility Number: 323998 Pad/439120 Spill

Well Name: Cascade Creek

Well Number: #605-2

Location: (QtrQtr, Sec, Twp, Rng, Meridian): NW1/4SE1/4, Sec 5, T6S, R97W, 6th PM Latitude: 39.548846 Longitude: -108.240388

TECHNICAL CONDITIONS

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

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.): Rangeland, O&G Operations

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Silas loam, 1 to 12 %slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Conn Creek ~320 south of the spill location, groundwater

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

Impacted Media (check):

☒ Soils

☐ Vegetation

☐ Groundwater

☒ Surface Water

Extent of Impact:

113 cubic yards

Not applicable

Not applicable

Not applicable

How Determined:

Laboratory analytical data, field observations

visual, limited to well pad

confining shale layer below release

Laboratory analytical data, field observations

REMEDIAL WORKPLAN

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

See attached narrative.

Describe how source is to be removed:

See attached narrative.

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.:

See attached narrative.



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

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REMEDIAL WORKPLAN (Cont.)

OGCC Employee: _____

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

See attached narrative.

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.

See attached narrative.

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:

See attached narrative.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

See attached narrative.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 9/22/2014 Date Site Investigation Completed: 10/31/2014 Date Remediation Plan Submitted: 12/15/2014
Remediation Start Date: 9/22/2014 Anticipated Completion Date: 12/1/2015 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: Blair Rollins

Signed: [Signature]

Title: Regulatory Contractor

Date: 12/31/14

OGCC Approved: _____ Title: EPS Northwest Date: 2/2/15



December 12, 2014

Justin Booth
OXY USA WTP LP
760 Horizon Drive, Suite 101
Grand Junction, Colorado 81506

**RE: Remediation Report
Conn Creek 605-2 Dump Line Spill,
Garfield County, Colorado
COGCC Spill #439120
Olsson Project Number 014-2804**

Dear Mr. Booth:

The Conn Creek 605-2 well pad location is a producing natural gas well operated by OXY USA WTP LP (OXY). This report summarized Olsson Associates, Inc. (Olsson) spill characterization activities, impacted soil removal oversight, and excavation clearance activities with respect to a dump-line release identified on September 19, 2014 on the east side of the separator unit. The spill involved the release of approximately 6 barrels of condensate and 54 barrels of produced water. This project is being conducted under the jurisdiction of the Colorado Oil and Gas Conservation Commission (COGCC).

SITE SETTING

The 605-2 well pad is located in the NW quarter of the SE quarter of Section 5, Township 6 South, Range 97 West in Garfield County, Colorado (Lat/Long 39.548846/-108.240388). Figure 1 presents a general Site Location Map. The site is located in an area of generally south-southwest draining topography in the headwaters of the nearby Conn Creek. Conn Creek is located approximately 320 feet south of the release location. A spring-fed pond is located approximately 220 feet east-southeast and a dry streambed is located approximately 160 feet east of the release location.

EXCAVATION ACTIVITIES

On September 19, 2014 an Oxy employee noticed a release of liquids pooling on the ground surface adjacent to the east of the separator. OXY exposed the dump line leak location with impacted soil being stockpiled adjacent to the excavation on September 22, 2014. Olsson arrived on that date, assessed the excavation using a photoionization detector (PID) equipped with a 10.6 volt lamp and field observations, and determined that the extent of contamination was not identified at any of the walls or bottom of the excavation. Approximately 30 cubic yards of excavated soil were stockpiled adjacent to the excavation. The initial excavation was

approximately 12 feet in diameter and 6 feet deep. Soil conditions uncovered during the initial excavation show approximately 6 feet of silty clay soil over weathered shale dipping to the east.

The excavation was subsequently deepened and enlarged with a trackhoe on September 23, 2014. Excavation activities were limited to the west by the separator. Soil screening during the excavation enlargement indicated that impacted soil outside of the immediate release area was limited to the weathered shale and adjacent overlying soil. The silty clay soil was excavated from the surface to approximately 1 foot from the weathered shale and stockpiled as clean overburden. The soil located directly above the weathered shale and weathered shale were excavated and stored as contaminated excavation spoils on pond liner material located in the south portion of the well pad. Approximately 147 cubic yards of soil were removed from the excavation (88 cubic yards of contaminated soil and 59 cubic yards of clean overburden). The excavation was left open to aerate.

Soil samples were collected for COGCC Table 910-1 constituents from the excavation's four walls and bottom within the shale layer to determine the extent of contamination. In addition, surface water samples were collected from the nearby pond and Conn Creek. Samples were placed into pre-cleaned sample containers, chilled, and shipped under chain-of-custody conditions for analyses by Environmental Science Corporation (ESC) of Mount Juliet, Tennessee. Analytical results from the excavation activities are summarized in the attached table and revealed:

- Total petroleum hydrocarbon concentrations exceeded Table 910-1 standards in the excavations west wall and bottom samples at 5,700 milligrams per kilogram (mg/kg) and 3,500 mg/kg respectively.
- Benzene, toluene, and xylene exceeded Table 910-1 standards in the west wall sample.
- Benzene exceeded Table 910-1 standards in the bottom sample.
- Arsenic exceeded Table 910-1 standards in all samples. Two of the samples (S. Wall 9FT and E. Wall 10FT) exceeded the background arsenic concentration of 30 mg/kg.

The excavation spoil material was allowed to aerate and was overturned on September 28, and October 1, 2014 to expedite petroleum remediation efforts. Excavation spoils and overburden sampling occurred on October 6, 2014. Composite samples of each material were collected and analyzed for Table 910-1 constituents. ESC laboratory results are summarized in the attached table and revealed no exceedance of Table 910-1 standards. Laboratory analyses revealed the following key items:

- Laboratory detections of gasoline-range organics (GRO) and diesel-range organics (DRO) were identified in the spoil pile composite sample at 26 and 31 mg/kg respectively.
- No petroleum constituents were detected in the overburden sample.

- Arsenic was detected at 10 mg/kg in the spoil sample and at 15 mg/kg in the overburden sample which exceeds Table 910-1 maximum contaminant levels (MCL), but is below the background concentration established for the site of 30 mg/kg.

A 6% mixture of Microblaze® Emergency Liquid Spill Control solution was introduced to the site on October 15, 2014. Two 3-inch diameter holes were hand augered near the south end of the separator. The borings were advanced to approximately 5 feet below grade to the top of the shale layer (refusal). Eight gallons of the Microblaze solution was allowed to infiltrate each boring to treat unexcavated materials below the south end of the separator. 87 gallons of the solution was splash-applied to the exposed shale layer in the bottom of the excavation in the vicinity of the release and allowed to flow along the same fractures and channels presumed to be taken by the spilled fluids. In general, the solution followed the shale's slight slope to the east and infiltrated the numerous cracks.

Follow up arsenic sampling was conducted on the south and east walls of the open excavation on October 16, 2014. Arsenic soil samples were collected from the soil overlying the shale bedrock approximately 5 feet below grade. The samples were chilled and sent to ESC under chain-of-custody for analysis. Laboratory analysis is summarized in the attached table and revealed:

- Arsenic concentrations of the south and east walls was identified at 10 and 12 mg/kg respectively.

An excavation bottom sample was collected on October 21, 2014 to determine the effectiveness of the aeration and Microblaze application. The sample was collected from the floor of the excavation beneath the spill location and analyzed for benzene, toluene, ethylbenzene, xylene, GRO, and DRO. The sample was chilled and sent to ESC for analysis. Laboratory analytical results are summarized on the attached table and revealed:

- Total petroleum hydrocarbons (GRO plus DRO) were identified at 12,300 mg/kg which exceeds the Table 910-1 MCL of 500 mg/kg.
- Xylene exceeded the Table 910-1 MCL of 175 mg/kg with 190 mg/kg.
- The laboratory detection limit for benzene (1.0 mg/kg) exceeds the Table 910-1 MCL of 0.17 mg/kg due to laboratory dilution.

The excavation was allowed to aerate an additional 10 days when another sample of the excavation bottom was collected on October 31, 2014 from beneath the release location. The sample was chilled and shipped to ESC for full Table 910-1 soil analyses. Laboratory analysis is summarized in the attached table and revealed:

- No exceedances of Table 910-1 constituents exceeded their respective MCLs except for arsenic (20 mg/kg) which was below the background concentration established for the site.

The north, east, and south walls and the bottom of the excavation was identified to be below Table 910-1 MCLs. OXY backfilled the excavation on December 4, 2014 using the remediated spoils and overburden.

Summary and Recommendations


A release of condensate and produced water occurred on September 19, 2014 at the 605-2 well pad owned and operated by OXY USA WTP LP. Site assessment and remediation activities identified hydrocarbon impacted soil leading to the removal of approximately 88 cubic yards of contaminated soil that were treated by aeration at the location. Soil removal, aeration, and MicroBlaze treatment of the excavation resulted in remediation to below COGCC Table 910-1 MCL in the north, east, and south walls and the bottom of the excavation. Nearby surface water and soil 15 feet upgradient of the release, to the west, have been characterized and identified to be unimpacted.


A small volume of remaining contamination remains below the separator unit (estimated to be less than 25 cubic yards of soil). Removal of the separator unit was not practical at the time of assessment and remediation activities. The remaining impacted materials have been treated with Microblaze and any residual contamination will be characterized and remediated at the end of the well pads useful production.

Surface water will be monitored for four consecutive quarters from the pond and downstream locations for Table 910-1 analytes. Should any analyte exceed Table 910-1 MCL, OXY will address the requirements for additional monitoring or remediation efforts.

Please call us if you have any questions.

Sincerely,
Olsson Associates, Inc.


Blair Rollins
Senior Scientist


Robert Stockton
Project Scientist

<div>605-2</div> <div>Soil Samples</div>	Sample Name	W POT 6FT	S WALL 9FT	E WALL 10FT	N WALL 8	W WALL 8	BOTTOM (W)	SPOILS	OVERBURDEN	605-2:AS S. WALL	605-2:AS E WALL	BOTTOM: 10-21-14	Bottom 6 ft
	Sample Date	9/23/2014	9/23/2014	9/23/2014	9/23/2014	9/23/2014	9/23/2014	10/6/2014	10/6/2014	10/16/2014	10/16/2014	10/21/2014	10/31/2014
	Location (depth)	West Pot Hole (6')	Excavation Clearance (9')	Excavation Clearance (10')	Excavation Clearance (8')	Excavation (8')	Excavation (8')	Spoil Piles (Composite)	Overburden (composite)	Excavation Clearance (5')	Excavation Clearance (5')	Excavation (8')	Excavation Clearance (9')
	Lab Report	L723450	L723450	L723450	L723450	L723450	L723450	L727234 L725852	L725852	L728623	L728623	L729178	L732111 L736281 L735603
	Lab Sample ID	L723450-01	L723450-02	L723450-03	L723450-04	L723450-05	L723450-06	L727234-01 L725852-02	L725852-01	L728623-01	L728623-02	L729178-01	L732111-01 L736281-01 L735603-01
Organics in Soil MCL(mg/Kg)													
TPH (GRO + DRO)	500	17.5	40.5	4.5	4.5	5700	3500	57	4.5			12300	<100.5
Total Petroleum Hydrocarbons - GRO		<0.50	<0.50	<0.50	<0.50	3900	2300	26	<0.50			2500	<0.5
Total Petroleum Hydrocarbons - DRO		17	<40	<4.0	<4.0	1800	1200	31	<4.0			9800	100
Benzene	0.17	<0.0050	<0.0050	<0.0050	<0.0050	3.2	1.6	<0.0050	<0.0050			<1.0	<0.005
Toluene	85	<0.025	<0.025	<0.025	<0.025	110	39	<0.025	<0.025			25	<0.025
Ethylbenzene	100	<0.0050	<0.0050	<0.0050	<0.0050	20	7.2	<0.0050	<0.0050			2.8	<0.005
Xylenes	175	<0.015	<0.015	<0.015	<0.015	290	120	<0.015	<0.015			190	<0.015
Organics in Soil (PAH's) (mg/Kg)													
Anthracene	1000	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				0.011
Acenaphthene	1000	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Benzo(A)anthracene	0.22	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				0.0091
Benzo(A)pyrene	0.022	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Benzo(B)fluoranthene	0.22	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Benzo(K)fluoranthene	2.2	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Chrysene	22	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				0.0084
Dibenzo(A,H)anthracene	0.022	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Fluoranthene	1000	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Flourene	1000	<0.060	<0.012	<0.0060	<0.0060			0.0068	<0.060				0.021
Indeno(1,2,3,C,D)pyrene	0.22	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				<0.0060
Napthalene	23	<0.20	<0.040	<0.020	<0.020			<0.020	<0.20				<0.020
Pyrene	1000	<0.060	<0.012	<0.0060	<0.0060			<0.0060	<0.060				0.01
Inorganics in Soil (mg/Kg)													
pH	6-9 su	6.0	6.0	6.0	6.1			8.4	8.6				8.0
Sodium adsorption ratio (SAR)	<12	1.5	1.9	2.0	1.8			2.1	0.6				11.0
EC	<4 mmhos/cm	0.053	0.048	0.072	0.046			0.43	0.17				0.81
Metals in Soils (mg/Kg)													
Mercury	23	0.04	0.03	0.03	0.03			0.024	<0.020				0.056
Arsenic (BG= 30 ¹)	0.39	15	71	54	28			10	15	10	12		20
Barium (LDNR True Total)	15,000	490	530	510	590			290	260				490
Cadmium	70	<0.50	<0.50	<0.50	<0.50			<0.50	0.8				<2.5
Chromium	120,000	41	49	46	32			29	28				37
Copper	3100	30	40	34	23			18	17				34
Lead	400	20	30	19	16			12	12				22
Nickel	1600	50	39	42	39			23	18				33
Selenium	390	<2.0	<10.0	<10.0	<2.0			<2.0	<2.0				<10.0
Silver	390	<5.0	<5.0	<5.0	<1.0			<1.0	<1.0				<5.0
Zinc	23,000	75	70	69	59			60	52				82

Notes:
Bold = Above Table 910 Standards
¹ - 610-21-41 sample; L524257, 7/1/2011

605-2 Water Samples	Sample Name	POND	DOWNSTREAM
	Sample Date	9/23/2014	9/23/2014
	Location (depth)	Pond	Downstream
	Lab Report	L723453	L723453
	Lab Sample ID	L723453-01	L723453-02
Organics in Water			
	MCL (mg/L)		
Total Petroleum Hydrocarbons - GRO	Detection	<0.10	<0.10
Total Petroleum Hydrocarbons - DRO		0.1	<0.10
Benzene	0.005	<0.0010	<0.0010
Toluene	1.0	<0.0050	<0.0050
Ethylbenzene	0.7	<0.0010	<0.0010
Xylenes	10	<0.0030	<0.0030
Inorganics in Water			
	(mg/L)		
TDS (<1.25 X BG: BG= 320) ²	400	280	380
Chlorides (<1.25 X BG: BG= 2.1) ²	2.63	3.3	11
Sulfates (<1.25 X BG: BG=56) ²	70	10	53
Metals in Water			
	(mg/L)		
Selenium	NA	<0.0010	0.001
Calcium	NA	24	69
Iron	NA	<0.10	<0.10
Magnesium	NA	14	28
Manganese	NA	0.022	<0.010
Potassium	NA	5.1	2.1
Sodium	NA	19	40

Notes:

Bold = Above Table 910 Standards

² - Drainage 605-2-N sample; L538963-1, 9/29/2011

NA - None Assigned