

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax:(303)894-2109



FOR OGCC USE ONLY
Document 2315381
Received 9/1/2015

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 Operator Number: 66571

Name of Operator: OXY USA WTP LP

Address: 760 Horizon Drive, Suite 101

City: Grand Junction State: CO Zip: 81506

Contact Name and Telephone:

Blair K. Rollins

No: (970) 263-3637

Fax: (970) 263-3694

API Number: 05-045-10345

County: Garfield

Facility Name: CC 705-22-43 well pad

Facility Number: 335186 (REM #7820)

Well Name: N/A

Well Number: N/A

Location: (QtrQtr, Sec, Twp, Rng, Meridian): SENW, Sec 5, T7S, R97W, 6th PM Latitude: 39.47766 Longitude: -108.24353

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.

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: Happle-Rock outcrop association, 25-65% slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Nearest water well is ~970' southwest, nearest surface water is ~1,238' to the west, depth to the shallowest groundwater is ~100'

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

Impacted Media (check):

- ☐ Soils
☐ Vegetation
☐ Groundwater
☐ Surface Water

Extent of Impact:

Please refer to document number 2147354 and 1733935

How Determined:

REMEDIAL ACTION WORKPLAN

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

Please reference document numbers 1733935 and 2147354 for initial action taken and proposed remediation by Soil Vapor Extraction (SVE) system installation.

Describe how source is to be removed:

Please reference document numbers 1733935 and 2147354 for remediation workplan and source removal by SVE installation. The source was removed by installation of an SVE extraction system to include SVE wells throughout the subsurface plume area to remove hydrocarbon impacts within the soil. Please see attached report prepared by Olsson Associates.

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.:

After installation, the SVE system was operated for approximately 11 months during favorable weather and site conditions. Please see attached report prepared by Olsson Associates.



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

OGCC Employee: _____

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
Oxy collected quarterly surface water and water well samples throughout the life of the project, see attached water analytical results table. To date, no impacts have been identified at the cross-gradient or downgradient Conn Creek sample locations, or the domestic water well location. Please see attached report prepared by Olsson Associates.

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.
Following approval of this Remediation Project closure document, Oxy will plug and abandon the SVE wells using bentonite. Oxy will disconnect and remove the SVE trailer. Oxy will backfill any holes or depressions to the active working surface of the pad location and continue use the well pad until closure and final reclamation of the well pad is completed.

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:

Following approved document number 1733935, Oxy drilled two soil borings within the delineated area of original impact to assess remediation activities. Please see attached report prepared by Olsson Associates.

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

Please see attached report prepared by Olsson Associates. Oxy completed SVE remediation of the impacted soil and is requesting closure and no further action for Remediation Project number 7820.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: <u>6/12/2013</u>	Date Site Investigation Completed: <u>10/15/2013</u>	Date Remediation Plan Submitted: <u>10/15/2013</u>
Remediation Start Date: <u>7/29/2014</u>	Anticipated Completion Date: <u>7/31/2015</u>	Actual Completion Date: <u>7/31/2015</u>

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

Print Name: Blair K. Rollins

Signed:

Title: HES Specialist

Date: 7/31/2015

OGCC Approved: _____ Title: EPS Northwest Date: 9/1/15

Based on review of information presented, it appears that no further action is necessary at this time, and COGCC approves the closure request. However, should future conditions at the site indicate contaminant concentrations in soils exceeding COGCC standards or if ground water is found to be significantly impacted, then further investigation and/or remediation activities may be required at the site.



Blair Rollins
HES Specialist
OXY USA, Inc.
760 Horizon Drive, Suite 101
Grand Junction, CO 81506

July 27, 2015

**RE: Remediation Progress Report
Oxy CC 705-22-43
Garfield County, Colorado
REM# 7820**

Dear Mr. Rollins,

Following is a summary of events regarding the January 2013 release of produced water and condensate at OXY USA, Incorporated's Cascade Creek (CC) 705-22-43 wellpad (the site) site characterization, monitoring, and remediation efforts.

SITE SETTING

The site is an active oil and gas production well site located in the southeast quarter of the northwest quarter of Section 5, Township 7 South, Range 97 West, Sixth Principle Meridian in Garfield County, Colorado (39.47766 north latitude and -108.24353 west longitude). Conn Creek, at its closest point, is approximately 0.23 miles west of the site. A commercial water well permitted to Oxy is located approximately 0.5 miles south-southwest (down gradient) of the site. The site's location is shown in **Figure 1**.

BACKGROUND

On January 11, 2013, it was discovered by Oxy that a valve failed due to freezing conditions on one of the two production tanks on the site resulting in the release of approximately 180 barrels (bbls) of produced water and condensate into the unlined soil secondary containment area. The Colorado Oil and Gas Conservation Commission (COGCC) was verbally notified of the release on January 12, 2013. Approximately one bbl breached the containment area and flowed to the north along the site access road for approximately 50 feet. The remaining released fluid was adsorbed by the soil within the secondary containment. On January 11, 2013 the impacted soil outside the secondary containment was excavated and temporarily stockpiled within the secondary containment area for future disposal.

CHARACTERIZATION AND MONITORING ACTIVITIES

An investigation using hydro-excavation to pothole select locations at the site were conducted on January 15, 2013 showed no indications of petroleum impacted soils between 6 feet to 12 feet below ground surface (ft-bgs) at three locations (PH1, PH2, and PH3).

Five soil borings (BH1, BH2, BH3, BH4, and BH9) were advanced on February 8, 2013.

Seven soil boring (BH5-BH12) were advanced on July 16-18, 2013 which revealed petroleum-impacted soil limited to the area south and west of the above ground storage tanks in the vicinity

of the surface spill at boring locations BH1, BH2, BH3, BH5, BH6 and BH7. The highest TPH concentration was observed in a soil sample collected from boring BH8 at 15 to 20 ft-bgs at 4,860 milligrams per kilogram (mg/kg).

Groundwater was not observed in any of the site borings. Surface and well water have been monitored at three nearby locations: Conn Creek immediately west of the site (aka 797-06-07 approximately 1,100 feet west-southwest of the site), Cascade Creek Field Office located approximately 2,300 feet south-southwest of the site, and at the Oxy Cascade Creek Guard shack located approximately 3,900 feet south-southwest of the site. All locations are down gradient from the site. Benzene, toluene, ethylbenzene, and xylene (BTEX) constituents have not been detected in any sample collected at the locations since the release. Analytical results from the time of release discovery to the first quarter of 2015 are included in **Table 3**.

Soil vapor extraction (SVE) pilot testing was conducted on February 27, 2014 on BH5, BH8, BH10, BH11, and BH12 with test results showing adequate soil vapor communication and total petroleum hydrocarbon soil vapor analyses of up to 786,000 parts per billion by volume.

Three additional soil vapor extraction wells (BH13, BH14, and BH15) were installed on June 12, 2014 in the west portion of the planned remediation area.

REMEDIATION ACTIVITIES

SVE piping was plumbed from BH5, BH8, BH13, BH14, and BH15 to an SVE trailer at the Site in July 2014. The SVE system consists of five vacuum lines coupled to a 4" manifold, 117-gallon knockout tank, Roots URAI 59 positive displacement rotary blower powered by a 10 horsepower electric motor, and all electrical systems needed to heat, cool, operate, and monitor SVE functions. A rented diesel generator was used to power the SVE system. The SVE system began operation on July 28, 2014 and ran for 5,915 hours through June 11, 2015. Periodic shut downs of the system occurred primarily for two weeks in October 2014 for support generator malfunctions and for two weeks in January 2015 for support generator replacement.

The SVE system was programmed to run continuously with exhaust flows ranging from 480-500 cubic feet per minute from system startup to February 2015. Vacuum was applied at 50-inches of mercury ("Hg) to BH5, BH8, BH14, and BH15 and BH13 had a maximum vacuum capacity of 22-"Hg likely due to being in a fractured shale formation.

Seven SVE effluent monitoring events were performed to monitor for BTEX and TPH. Benzene concentrations were initially monitored at 3,290 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and were reduced to 8.5 $\mu\text{g}/\text{m}^3$ in May 2015. TPH concentrations were initially measured at 209 mg/m^3 , had a high measurement of 356 mg/m^3 in August 2014, and were reduced to 2.4 mg/m^3 in May 2015. Laboratory analyses of SVE effluent and select soil-vapor sample results are summarized in **Table 2**.

The SVE system was shut down on June 11, 2015 in anticipation of performing soil confirmation sampling in accordance with the supplemental form 27 (Soil Vapor Extraction Remediation Work Plan and System Design: COGCC document #1733935) dated August 7, 2014.

CONFIRMATION SAMPLING

On July 2, 2015 two soil borings were advanced near the BH2 and BH8 locations to a depth of 25 ft-bgs to capture soil conditions identified to be the most contaminated during site characterization activities. Soil sample SB-1 was advanced approximately four feet northwest of

the BH2 location and SB-2 was advanced approximately two feet west of the BH8 location. Soil borings were screened for odor, soil staining, and for VOCs using a PID to read head-space samples. Soil vapor readings of 150-160 parts per million were recorded at the 20-25 ft-bgs interval. Soil samples were submitted for laboratory analysis of COGCC Table 910-1 standards. Soil samples from the 20-25 ft-bgs interval were collected in laboratory-provided containers, placed on ice and shipped overnight with a chain of custody form to Environmental Science Corporation in Mount Juliet, Tennessee. Copies of the analytical reports are included in Attachment A. Soil sample locations are included on **Figure 2** and analytical results of investigation and confirmation activities are summarized in **Table 1**.

The analytical results from the soil boring confirmation samples are summarized in Table 1 and highlighted here:

- Arsenic concentrations in both soil borings exceed the Table 910-1 standard of 0.39 mg/kg (SB-1 @ 10.2 mg/kg and Sb-2 @ 8.4 mg/kg) at a depth of 20-25 ft-bgs within native materials.

No other Table 910-1 analytes exceeded their respective MCLs in confirmation soil samples.

SUMMARY AND CONCLUSIONS

Confirmation sampling was conducted on July 2, 2015. Based on water monitoring surrounding the site contamination has not impacted groundwater, SVE effluent monitoring shows negligible BTEX and TPH concentrations remain in soil gas, and confirmation soil samples show that the impacted source material has been remediated below Table 910-1 standards.

No action should be required for elevated arsenic concentrations because OXY has collected BG samples with concentrations higher than those seen in SB-1 and SB-2 from the 797-06-07 location directly west of the site: surface arsenic concentrations of 24 mg/kg were identified at that location on 4/17/2012. See **Figure 1** for background arsenic in soil sample locations.

Based on laboratory results from water, SVE effluent, and soil confirmation sampling results and observed field conditions, OXY requests that REM# 7820 be closed.

Thank you for allowing Olsson Associates the opportunity to complete this work for OXY. Please call me if you have any questions.

Sincerely,

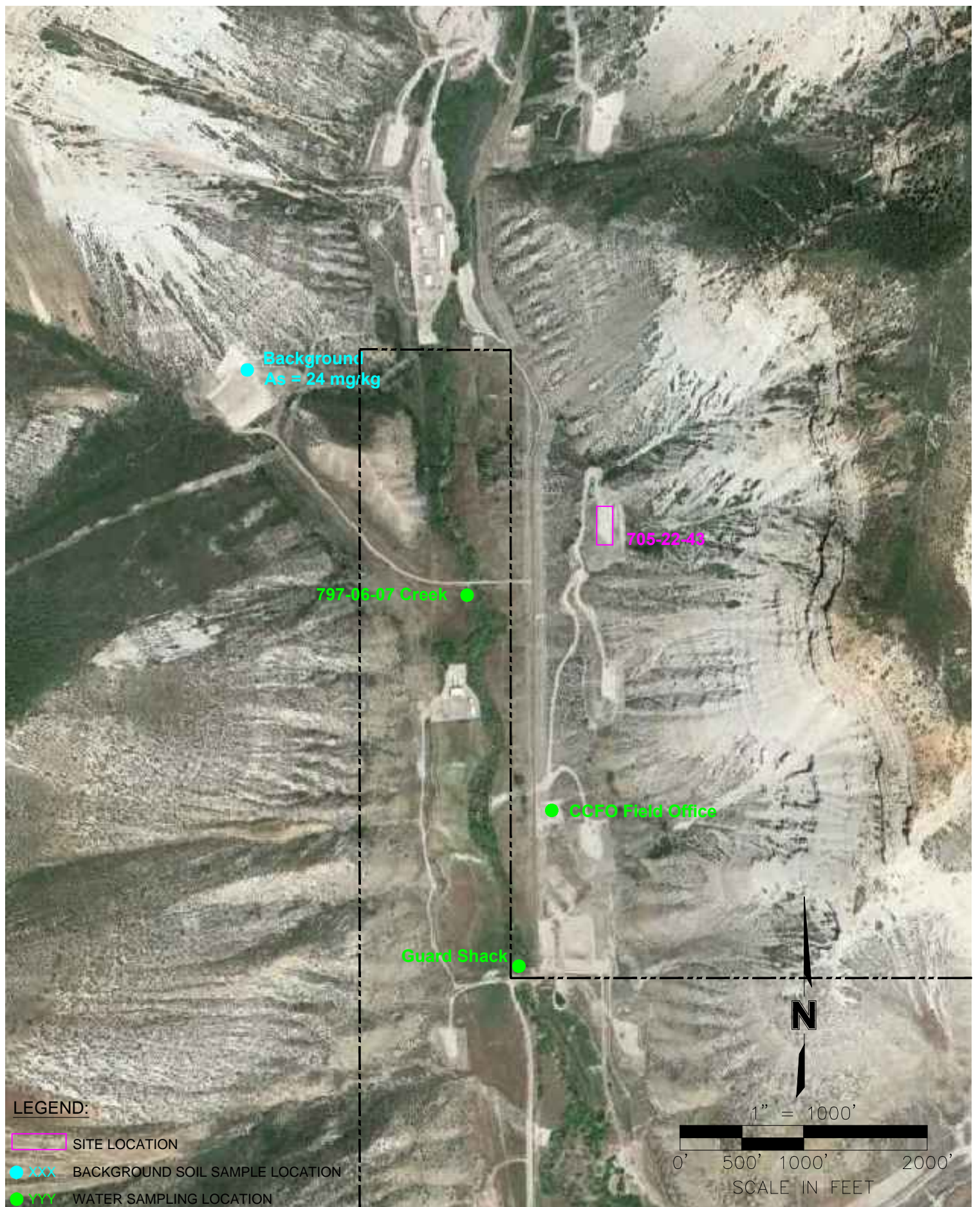
Olsson Associates



Robert A. Stockton
Project Scientist

Attachments:	Table 1	Soil Sample Summary
	Table 2	SVE Monitoring Summary
	Table 3	Water Monitoring Summary
	Figure 1	Location Map
	Figure 2	Soil Sample Location Map

Olsson Associates, Inc.
Grand Junction, Colorado



PROJECT NO: 013-0242
 DRAWN BY: RAS
 DATE: 07/27/2015

SITE MAP - REM# 7820
 705-22-43
 GARFIELD COUNTY, COLORADO

OLSSON
 ASSOCIATES

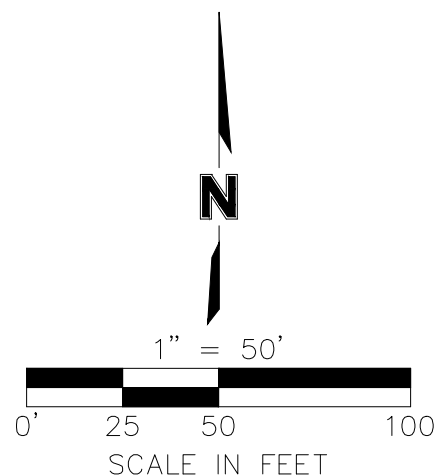
760 Horizon Drive, Suite 102
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 TEL 970.263.7800
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FIGURE
 1



LEGEND:

- SVE REMEDIATION PIPING
- SOIL BORINGS COMPLETED AND PLUMBED AS REMEDIATION WELLS
- SOIL BORINGS COMPLETED AS POTENTIAL REMEDIATION WELLS
- HYDRO-EXCAVATION BORING LOCATIONS
- 2/13-7/13 SOIL BORING LOCATIONS



PROJECT NO: 013-0242
 DRAWN BY: RAS
 DATE: 07/27/2015

SITE MAP - REM# 7820
 705-22-43
 GARFIELD COUNTY, COLORADO

OLSSON
 ASSOCIATES

760 Horizon Drive, Suite 102
 Grand Junction, CO 81506
 TEL 970.263.7800
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FIGURE

1[®]

Table 1
OXY USA WTP LP
CC 705-22-43
Soil Sample Summary

SAMPLE SUMMARY																										
Location Description		OXY USA WTP CC 705-22-43																								
LABORATORY DATA SUMMARY																										
Sample ID	BH 1	BH 1	BH 2	BH 2	BH 3	BH 3	BH 4	BH5	BH5	BH6	BH6	BH7	BH7	BH8	BH8	BH 9	BH 9	BH10	BH10	BH11	BH11	BH12	BH12	SB-1	SB-2	
Depth	25-30'	32-35'	25-30'	37-38'	15-20'	20-22'	10-14'	10-15'	45-50'	10-15'	45-50'	10-15'	45-50'	15-20'	45-50'	15-20'	30-34'	20-25'	45-50'	40-45'	45-50'	30-35'	40-45'	20-25'	20-25'	
Date	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	2/8/13	7/16/13	7/16/13	7/16/13	7/16/13	7/16/13	7/16/13	7/2/15	7/2/15	
COGCC MCL (mg/kg)																										
Organics																										
Total TPH	500	640	137	3500	1140	790	393	128	860	690	1120	<500	800	163	4860	<406.8	16.59	38.9	9.3	131.8	34.1	8.2	201	18.6	152.2	<160.5
TPH-GRO		480	97	3000	1000	610	300	62	700	440	860	300	670	3	4500	6.8	0.59	7.9	5.2	1.8	1.1	2.2	150	2.6	2.23	<0.5
TPH-DRO		160	40	500	140	180	93	66	160	250	260	<200	130	160	360	<400	16	31	4.1	130	33	6	51	16	150	160
Benzene	0.17	0.28	<0.0050	5.2	0.83	<0.50	<0.20	<0.50	<0.50	<0.050	<0.50	<0.050	<0.50	0.011	2.4	0.046	0.0067	0.067	0.011	<0.0050	<0.0050	0.053	<0.0050	0.04	0.053	<0.0050
Toluene	85	17	0.05	82	4.6	7.7	4	1.8	4.1	<0.25	3.4	<0.25	<2.5	<0.025	44	0.35	0.049	1.1	0.33	<0.025	<0.025	0.11	<0.025	0.044	0.825	<0.025
Ethylbenzene	100	4.7	0.11	14	4.4	1.7	0.95	0.38	1.2	0.27	0.79	<0.050	<0.50	<0.005	4.1	0.052	<0.0050	0.12	0.099	<0.0050	<0.0050	<0.0050	0.016	0.037	0.0622	<0.0050
Total Xylene	175	44	0.46	230	57	31	16	6.5	20	1.4	24	0.2	23	0.028	170	0.56	0.046	1.9	1.8	<0.015	0.026	<0.015	0.33	0.31	1.4	<0.015
Polynuclear Aromatic Hydrocarbons																										
Anthracene	1,000	<0.0060	<0.0060	0.0073	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	0.0086	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.012	<0.0060	
Acenaphthene	1,000	0.0081	<0.0060	0.027	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	0.014	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.012	<0.0060	
Benzo(a)anthracene	0.22	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.012	<0.0060	
Benzo(a)pyrene	0.022	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.003	<0.0060	
Benzo(b)fluoranthene	0.22	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	
Benzo(k)fluoranthene	2.2	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	
Chrysene	22	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.012	<0.0060	
Dibenzo(a,h)anthracene	0.022	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.003	<0.0060	
Fluoranthene	1,000	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.012	<0.0060	
Fluorene	1,000	0.016	<0.0060	0.054	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	0.021	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	0.0062	<0.0060	<0.012	<0.0060
Indeno(1,2,3-cd)pyrene	0.22	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.030	<0.0060	
Napthalene	23	0.4	0.074	1.5	0.2	0.48	0.12	0.017	0.19	0.32	0.2	0.19	0.21	0.037	0.64	<0.20	<0.0060	<0.0060	0.26	<0.020	<0.020	<0.020	0.14	<0.020	0.079	0.0802
Phenanthrene	NA	0.014	0.0071	0.032	<0.060	<0.060	0.0062	0.0096	0.024	0.046	0.025	0.066	0.011	0.024	0.014	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.040	0.00722	
Pyrene	1,000	<0.0060	<0.0060	<0.0060	<0.060	<0.060	<0.0060	<0.0060	0.0079	0.053	0.0068	0.055	<0.0060	0.012	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.040	<0.0060	
Metals																										
Chromium, Hexavalent	23	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Chromium, Trivalent	120,000	12	12	14	10	9.5	12	11	9.2	8.2	7.6	11	17	10	14	8.4	15	16	11	13	21	18	9.8	10	4.4	7.4
Arsenic	0.39	6.6	1.3	8.8	<0.38	5.5	5.8	6.4	6.6	7.1	5.8	24	8	6.6	11	7.7	9.4	10	8	14	13	12	3.6	89	10.2	8.4
Barium	15,000	350	200	260	280	350	240	240	200	150	150	1500	260	780	220	320	300	320	250	580	320	420	190	260	232	270
Cadmium	70	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.26	<0.25	<0.25	0.5	0.39	0.5	<0.25	0.26	<0.25	<0.25	<0.25	0.32	<0.25	<0.25	0.37	<1.2	0.573	ND
Chromium	NA	12	12	14	10	9.5	12	11	9.2	8.2	7.6	11	17	10	14	8.4	15	16	11	13	21	18	9.8	10	4.45	7.4
Copper	3,100	14	20	16	12	9.2	15	14	15	22	11	33	18	16	12	13	16	16	10	30	26	17	9.6	22	13.4	14
Lead	400	12	15	9.4	6	6.7	13	6.2	7.6	9	5.8	13	8.8	6.7	8	5.4	9.5	8.2	6.8	12	13	9.6	5.6	18	9.22	9.2
Nickel	1,600	12	16	12	8.7	11	12	13	14	13	11	19	17	14	13	11	11	9.9	21	18	15	12	29	13.8	14	
Mercury	1,600	0.024	<0.020	<0.020	<0.020	0.031	<0.020	<0.020	<0.020	<0.020	<0.020	0.033	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.051	<0.020	<0.020	<0.020	0.11	ND	ND
Selenium	390	3.7	4	2.2	3.7	2.4	3.8	2.4	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	1.4	<1.0	2.2	1.7	<1.0	1.9	1.3	1.1	<1.0	5.7	ND	ND
Silver	390	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.5	<2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	ND	ND
Zinc	23,000	64	76	57	58	55	70	61	52	46	40	59	64	59	47	42	54	53	40	66	59	56	48	68	52.9	46
General Chemistry																										
pH	6-9	8.4	9.1	8.4	9.1	8.8	9.1	8.8	8	8.7	8.1	8.5	8.7	8.8	8.2	8.6	8.5	8.4	8.4	8.1	8.3	8.1	8.8	8.3	8.48	8.58
Sodium Adsorption Ratio	<12	5.8	7.9	3	9.1	1.8	6	1.4	4.2	6.7	2.6	5.8	5.6	6	1.5	5.2	2.6	4.4	9.2	6.3	3	4.6	5.6	4.4	1.9	1.7
Specific Conductivity	<4 mmhos/cm	0.99	0.69	0.61	0.57	0.24	0.47	0.26	0.4	0.83	2.3	0.75	0.48	0.63	0.49	0.76	0.85	1.3	2	2.8	0.71	1.5	0.44	1.1	0.53	0.81

mg/kg - milligrams per kilogram

Table 2
OXY USA WTP LP
CC 705-22-43
SVE Monitoring Summary

Date	Exhaust Flow (cfm)	Sample Results					SVE Hours	Total Pounds Benzene Removed	Total Pounds TPH Removed
		Benzene ug/m ³	Toluene ug/m ³	Ethylbenzene ug/m ³	Xylene ug/m ³	TPH (mg/m ³)			
7/28/2014	500						22227		
7/31/2014	480	3290	6900	169	3710	209	22292	0.10	0.1
8/6/2014	500	1600	5300	330	4800	356	22392	0.68	90.98
8/13/2014	480	1000	4100	480	2700	232	22569	1.00	164.74
8/20/2014	480	1100	5700	430	5200	279	22735	1.33	247.94
10/3/2014	480	300	1000	310	1000	58.9	23144	1.55	291.21
1/13/2015	460	260	870	350	4800	92.2	25469	2.59	660.23
5/19/2015	420	8.5	41	3.4	300	2.4	28142	2.63	670.31

italics - indicates analyte was not detected by the laboratory and the detection limit was used for the calculation

BH8 Comparative Soil Vapor Results

Date	ppbV				
	Benzene	Toluene	Ethylbenzene	Xylene	TPH
2/27/2014 (pilot test)	8870	4770	<800	3520	2251000
1/30/2015 (progress sample)	3.3	33	3.9	45	17000

BTEX / TPH Removal - Calculated from Analytical Data

Table 3
OXY USA WTP LP
CC 705-22-43
Water Monitoring Summary

Location / Date Sampled	Organics					Inorganics			Field Parameters				
	TPH	Benzene, mg/L (MCL=0.005 mg/L)	Toluene, mg/L (MCL=1.0 mg/L)	Ethylbenzene, mg/L (MCL=0.7 mg/L)	Xylenes, mg/L (MCL=10.0 mg/L)	TDS, mg/L (MCL=<1.25xBG)	Chlorides, mg/L (MCL=<1.25xBG)	Sulfates, mg/L (MCL=<1.25xBG)	TDS, mS/cm	pH	Specific Conductance	Dissolved Oxygen, mg/L	Temperature, °C
Conn Creek - Guard Shack													
1/11/2013	<0.2	<0.001	<0.005	<0.001	<0.003	810	85	170	900	8.28	1.16		6.6
1/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	750	84	170		8.48	1.12		5.2
1/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	760	84	180	900	8.69	1.14		5.4
1/14/2013	<0.2	<0.001	<0.005	<0.001	<0.003	770	83	170	900	9.23	1.14		3.4
1/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	770	83	170	900	8.49	1.16		5.0
1/16/2013	<0.2	<0.001	<0.005	<0.001	<0.003	820	85	180	900	8.62	1.16		5.0
1/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	83	170	619	7.88	1.24	10.0	6.2
1/18/2013									1000	8.62	1.15		5.5
1/21/2013									900	8.39	1.16		4.5
1/23/2013	<0.2	<0.001	<0.005	<0.001	<0.003	760	83	180	900	8.69	1.15	18.1	9.0
1/25/2013									900	8.50	1.13	18.3	7.0
1/28/2013									800	8.41	1.14	13.6	6.7
1/30/2013	<0.2	<0.001	<0.005	<0.001	<0.003	800	82	170	1000	8.73	1.18	19.3	4.0
2/1/2013									900	8.42	1.17	19.0	5.3
2/4/2013									900	8.31	1.15	18.6	7.2
2/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	78	170	900	8.49	1.07	14.1	8.4
2/8/2013									800	8.53	1.16	10.1	5.1
2/11/2013									900	8.49	1.14	19.0	5.9
2/13/2013	0.11	<0.001	<0.005	<0.001	<0.003	750	83	170	1000	8.65	1.11	14.0	8.6
2/15/2013									900	8.52	0.14	18.6	6.3
2/18/2013									900	8.49	1.12	18.0	7.2
2/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	770	84	180	900	7.21	1.14	16.4	8.7
2/22/2013									800	7.74	1.17	16.9	6.0
2/25/2013									800	8.08	1.15		8.3
2/27/2013	<0.2	<0.001	<0.005	<0.001	<0.003	780	84	180	1000	8.54	1.14		8.2
3/1/2013									1000	8.64	1.16	14.4	7.7
3/4/2013									800	8.38	1.11	14.4	9.9
3/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	1000	83	180	900	8.65	1.13	18.1	11.4
3/13/2013									800	8.20	1.09	16.3	12.5
3/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	760	82	170	900	8.31	1.13	6.6	10.6
3/27/2013									800	8.31	1.09	9.5	12.0
4/3/2013	<0.2	<0.001	<0.005	<0.001	<0.003	500	84	180	900	7.95	1.09	8.0	14.8
4/10/2013									800	8.35	1.10	3.4	11.1
4/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	84	170	900	8.45	1.14	9.2	9.7
4/24/2013									800	8.31	1.15	8.5	13.8
5/1/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	80	170	900	7.69	1.19	8.4	12.8

Table 3
OXY USA WTP LP
CC 705-22-43
Water Monitoring Summary

Location / Date Sampled	Organics					Inorganics			Field Parameters				
	TPH	Benzene, mg/L (MCL=0.005 mg/L)	Toluene, mg/L (MCL=1.0 mg/L)	Ethylbenzene, mg/L (MCL=0.7 mg/L)	Xylenes, mg/L (MCL=10.0 mg/L)	TDS, mg/L (MCL=<1.25xBG)	Chlorides, mg/L (MCL=<1.25xBG)	Sulfates, mg/L (MCL=<1.25xBG)	TDS, mS/cm	pH	Specific Conductance	Dissolved Oxygen, mg/L	Temperature, °C
5/8/2013									900	8.23	1.15	6.6	11.4
5/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	81	180	900	8.32	1.13	5.2	16.7
5/22/2013									800	8.41	1.14	5.1	16.5
5/30/2013	<0.2	<0.001	<0.005	<0.001	<0.003	770	80	170	800	8.49	1.15	5.6	11.7
6/5/2013									900	8.25	1.13	5.7	12.3
6/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	770	80	170	700	8.25	0.34	5.2	15.9
7/19/2013	<0.2	<0.001	<0.005	<0.001	<0.003	780	82	180	800	8.22	1.14	4.0	18.8
9/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	74	160	800	9.02	1.13	5.1	14.4
10/18/2013									800	8.35	0.16		11.2
11/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	75	160	700	7.79		3.6	11.2
12/10/2013									900	8.10	1.14	4.0	8.6
1/8/2014	<0.2	<0.001	<0.005	<0.001	<0.003	720	73	160	800	7.30	1.14	7.1	7.3
5/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003	NA	69	160	806	8.22	1.25	6.9	12.1
8/28/2014	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	73	160	773	8.25	1.19	8.1	11.9
10/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	74	160	813	8.35	1.25	6.2	11.0
12/3/2014	<0.2	<0.001	<0.005	<0.001	<0.003	800	93	160	799	8.22	1.23	8.5	8.2
1/21/2015	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	85	160	839	8.30	1.29	10.2	6.4
Water Well - CCFO Field Office													
1/11/2013	<0.2	<0.001	<0.005	<0.001	<0.003	640	7	180					
1/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	680	7	180		8.93	0.94		9.4
1/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	670	7	180		8.11	1.50		10.7
1/14/2013	<0.2	<0.001	<0.005	<0.001	<0.003	660	7	190	800	8.33	0.95		13.0
1/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	600	7	180	800	7.87	0.89		9.2
1/16/2013	<0.2	<0.001	<0.005	<0.001	<0.003	660	8	190	800	8.49	1.04		9.0
1/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	7	180	572	7.66	1.06	13.4	10.1
1/18/2013									800	8.50	1.01		11.2
1/21/2013									800	8.28	0.92		11.6
1/23/2013	0.089	<0.001	<0.005	<0.001	<0.003	640	7	180	900	8.39	0.95	9.5	13.3
1/25/2013									800	7.21	0.97	17.7	10.7
1/28/2013									800	8.31	0.96	16.6	12.7
1/30/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	7	170	800	8.55	0.96	18.5	10.0
2/1/2013									800	8.49	0.97		10.1
2/4/2013									700	9.66	0.86	11.9	11.1
2/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	10	180	800	8.55	0.96	18.4	13.1
2/8/2013									800	8.68	0.96	17.2	16.5
2/11/2013									800	8.52	0.95	17.1	16.4
2/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	7	180	800	8.53	0.95	13.0	15.0

Table 3
OXY USA WTP LP
CC 705-22-43
Water Monitoring Summary

Location / Date Sampled	Organics					Inorganics			Field Parameters				
	TPH	Benzene, mg/L (MCL=0.005 mg/L)	Toluene, mg/L (MCL=1.0 mg/L)	Ethylbenzene, mg/L (MCL=0.7 mg/L)	Xylenes, mg/L (MCL=10.0 mg/L)	TDS, mg/L (MCL=<1.25xBG)	Chlorides, mg/L (MCL=<1.25xBG)	Sulfates, mg/L (MCL=<1.25xBG)	TDS, mS/cm	pH	Specific Conductance	Dissolved Oxygen, mg/L	Temperature, °C
2/15/2013									700	8.29	0.95	17.8	15.0
2/18/2013									800	8.48	0.99	13.1	15.2
2/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	660	7	180	800	7.10	0.97	16.7	12.0
2/22/2013									800	7.36	0.96	17.7	13.5
2/25/2013									800	7.91	0.98		14.5
2/27/2013	<0.2	<0.001	<0.005	<0.001	<0.003	670	78	140	900	8.46	1.00		13.9
3/1/2013									800	8.52	0.97	14.1	14.1
3/4/2013									800	8.34	0.95	13.5	13.8
3/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	7	180	800	8.44	0.99	16.2	13.6
3/13/2013									700	8.27	0.95	15.4	15.0
3/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	670	8	180	700	8.28	0.96	1.9	14.3
3/27/2013									700	8.28	0.94	2.1	16.7
4/3/2013	<0.2	<0.001	<0.005	<0.001	<0.003	500	7	170	700	8.19	0.96	1.8	16.2
4/10/2013									800	8.13	0.95	2.2	17.0
4/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	680	8	190	900	8.29	0.81	2.4	12.9
4/24/2013									800	8.39	1.01	1.5	15.7
5/1/2013	<0.2	<0.001	<0.005	<0.001	<0.003	640	55	150	900	8.11	1.02	1.5	16.2
5/8/2013									800	7.91	0.98	1.9	16.8
5/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	120	150	800	8.43	1.15	1.6	16.7
5/22/2013									800	8.36	0.96	1.1	20.1
5/23/2013	<0.2	<0.001	<0.005	<0.001	<0.003	640	8	180	900	8.04	0.96	1.2	17.8
6/5/2013									800	8.17	0.95	1.6	17.6
6/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	660	8	180	800	8.13	0.97	1.1	20.8
7/19/2013	<0.2	<0.001	<0.005	<0.001	<0.003	630	27	160	800	8.21	0.95	0.8	23.7
9/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	7	180	800	8.43	0.95	0.6	22.7
10/18/2013									800	8.23	0.55		16.4
11/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	650	8	180	800	8.13	0.80	1.3	19.5
12/10/2013									800	8.24	0.99	1.5	12.9
1/8/2014	<0.2	<0.001	<0.005	<0.001	<0.003	640	7	170	700	7.85	0.38	2.2	17.5
5/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003		7	180	810	7.81	2.77	1.4	20.6
8/28/2014	<0.2	<0.001	<0.005	<0.001	<0.003		8	180	676	7.94	1.04	0.6	22.2
12/3/2014	<0.2	<0.001	<0.005	<0.001	<0.003	696	93	160	695	7.89	1.07	0.7	18.4
1/21/2015	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	64	170	430	8.35	0.66	1.3	11.3
Surface Water - 797-06-07 Creek													
1/11/2013	<0.2	<0.001	<0.005	<0.001	<0.003	750	86	150	900	8.33	1.09		7.5
1/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	83	150					
1/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	690	86	150	900	8.05	1.10		6.4

Table 3
OXY USA WTP LP
CC 705-22-43
Water Monitoring Summary

Location / Date Sampled	Organics					Inorganics			Field Parameters				
	TPH	Benzene, mg/L (MCL=0.005 mg/L)	Toluene, mg/L (MCL=1.0 mg/L)	Ethylbenzene, mg/L (MCL=0.7 mg/L)	Xylenes, mg/L (MCL=10.0 mg/L)	TDS, mg/L (MCL=<1.25xBG)	Chlorides, mg/L (MCL=<1.25xBG)	Sulfates, mg/L (MCL=<1.25xBG)	TDS, mS/cm	pH	Specific Conductance	Dissolved Oxygen, mg/L	Temperature, °C
1/14/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	82	150	900	8.14	1.07		8.4
1/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	82	150	900	8.32	1.07		5.1
1/16/2013	<0.2	<0.001	<0.005	<0.001	<0.003	700	84	150	900	8.27	1.13		6.6
1/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	82	150	600	8.09	1.20	13.4	8.7
1/18/2013									900	8.23	1.10		8.6
1/21/2013									900	8.51	1.06		8.6
1/23/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	81	160	900	8.35	1.08	13.4	9.1
1/25/2013									900	8.55	1.05	12.3	9.3
1/28/2013									800	8.50	1.06	18.3	9.0
1/30/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	79	150	900	8.45	1.09	16.1	8.5
2/1/2013									900	8.40	1.08	18.6	8.4
2/4/2013									900	8.39	1.08	13.6	8.6
2/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	41	160	800	8.38	1.08	19.0	8.8
2/8/2013									800	8.41	1.08	18.5	8.5
2/11/2013									900	8.45	1.08	17.7	8.7
2/13/2013	0.13	<0.001	<0.005	<0.001	<0.003	710	80	150	900	8.75	1.07	17.8	8.8
2/15/2013									800	8.60	1.05	17.8	8.7
2/18/2013									900	8.63	1.08	16.4	8.9
2/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	81	180	800	6.67	1.09	14.0	8.8
2/22/2013									800	7.54	1.08	18.3	8.6
2/25/2013									900	8.22	1.11		8.3
2/27/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	82	150	900	9.01	1.12		7.3
3/1/2013									900	8.66	1.07	12.0	9.1
3/4/2013									900	8.75	1.08	17.1	8.6
3/6/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	80	150	800	8.91	1.09	18.5	8.9
3/13/2013									700	8.33	1.07	17.0	8.9
3/20/2013	<0.2	<0.001	<0.005	<0.001	<0.003	710	78	150	900	5.85	1.08	8.9	9.9
3/27/2013									800	8.27	1.08	7.2	8.9
4/3/2013	<0.2	<0.001	<0.005	<0.001	<0.003	600	79	150	900	8.03	1.12	4.1	9.9
4/10/2013									900	8.10	1.12	3.9	8.6
4/17/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	78	150	900	8.06	0.30	4.5	8.6
4/24/2013									800	7.92	1.19	4.8	10.5
5/1/2013	<0.2	<0.001	<0.005	<0.001	<0.003	700	77	140	800	7.95	1.11	4.3	9.4
5/8/2013									900	8.04	1.12	3.6	9.0
5/15/2013	<0.2	<0.001	<0.005	<0.001	<0.003	700	76	150	700	8.12	1.12	3.5	13.1
5/22/2013									700	8.37	1.13	3.5	9.9
5/23/2013	<0.2	<0.001	<0.005	<0.001	<0.003	730	78	150	900	7.82	1.14	3.7	9.6

Table 3
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CC 705-22-43
Water Monitoring Summary

Location / Date Sampled	Organics					Inorganics			Field Parameters				
	TPH	Benzene, mg/L (MCL=0.005 mg/L)	Toluene, mg/L (MCL=1.0 mg/L)	Ethylbenzene, mg/L (MCL=0.7 mg/L)	Xylenes, mg/L (MCL=10.0 mg/L)	TDS, mg/L (MCL=<1.25xBG)	Chlorides, mg/L (MCL=<1.25xBG)	Sulfates, mg/L (MCL=<1.25xBG)	TDS, mS/cm	pH	Specific Conductance	Dissolved Oxygen, mg/L	Temperature, °C
6/5/2013									800	8.01	1.17	3.5	10.1
6/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	740	76	150	600	8.13	1.15	3.2	10.3
7/19/2013	<0.2	<0.001	<0.005	<0.001	<0.003	720	74	160	800	8.68	1.11	2.9	12.1
9/12/2013	<0.2	<0.001	<0.005	<0.001	<0.003	690	73	150	900	8.29	1.13	3.0	12.3
10/18/2013									800	7.92	0.34	3.3	12.4
11/13/2013	<0.2	<0.001	<0.005	<0.001	<0.003	710	71	140	800	8.15		6.5	14.7
12/10/2013									800	8.55	1.20	8.3	3.7
1/8/2014	<0.2	<0.001	<0.005	<0.001	<0.003	710	70	140	800	7.43	0.83	3.8	9.2
5/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003	NA	69	140	442	7.74	0.68	5.0	11.9
8/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003	840	70	150	819	7.85	1.25	4.4	11.3
10/21/2014	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	74	160	813	7.70	1.25	3.4	10.3
11/24/2014	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	48	150	552	7.62	0.85	2.2	9.5
12/1/2014	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	85	150	760	7.61	1.17	2.1	9.4
12/8/2014	<0.2	<0.001	<0.005	<0.001	<0.003	786	80	140	786	7.68	1.21	3.4	9.5
12/15/2014	<0.2	<0.001	<0.005	<0.001	<0.003	786	83	150	786	7.60	1.21	2.6	8.9
12/22/2014	<0.2	<0.001	<0.005	<0.001	<0.003	793	97	140	793	7.59	1.22	2.2	8.8
1/21/2015	<0.2	<0.001	<0.005	<0.001	<0.003	N/A	94	140	445	7.58	0.69	3.5	7.1