FORM 27 Rev 6/99

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

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

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
City: Grand Junction State: CO Zip: 81506

Contact Name and Telephone:
Sean T. Norris
No: (970) 263-3628
Fax: (970) 263-3694

API Number: _____ County: Garfield
Facility Name: Cascade Creek -66S97W Facility Number: (Location ID 335456)
Well Name: Cascade Creek Well Number: 620-43-32
Location: (QtrQtr, Sec, Twp, Rng, Meridian): NESE, Sec 20, T6S, R97W, 6th PM Latitude: 39.505609 Longitude: -108.236685

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Condensate impacted soil

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 very channery sandy loam, 3 to 12 percent slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Nearest water well is approximately 1.53 miles to the northwest, the nearest surface water is approximately 250 feet southeast.

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

Impacted Media (check):	Extent of Impact:	How Determined:
☐ Soils	N/A	Laboratory analytical data
☐ Vegetation	N/A	Visual observation
☐ Groundwater	N/A	Laboratory analytical data and BMP's
☐ Surface Water	N/A	Visual observation

REMEDIATION WORKPLAN

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

Reference the Form 27 Site Investigation and Remediation Workplan submitted to the COGCC on February 3, 2011 (Document #2213209, REM #5660) for the 620-43-32 condensate and produced water spill.

Describe how source is to be removed:

Following the Form 27 (Document #2213209), Oxy excavated the accessible materials within the 620-43-32 spill area to include approximately 1,300 cubic yards of clean overburden and 4,000 cubic yards of impacted soil.

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.:

Please refer to the attached 620-43-32 Condensate Spill Remediation Report prepared by Walsh Environmental Scientists and Engineers, LLC dated March 30, 2011. Excavated soil was transported to the 620-21 well pad within a temporary storage location following a COGCC approved Sundry notice (Document #2213210) submitted on February 3, 2011. During the excavation, samples were collected verify impacted soils were removed to the extent of contamination. These confirmation samples identified organic compound exceedances within the excavation. The locations where exceedances were encountered were re-excavated and resampled to confirm adequate removal. Following the completion of the excavation on the 620-43-32, confirmation samples were collected from the excavation bottom which demonstrated contamination from the spill was removed.

Submit Page 2 with Page 1

REM # 5660

FORM 27 Rev 6/99

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Oil and Gas Conservation Commission
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REMEDIATION WORKPLAN (Cont.)

Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: Location ID # 335456
Facility Name & No: Cascade Creek 620-43-32

OGCC Employee:

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

No groundwater was impacted during the excavation of the 620-43-32 contaminated area. Also, no groundwater was impacted during the transportation, staging, and temporary storage of the spoil pile on the 620-21 as the containment was bermed and lined.

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.

Oxy backfilled and compacted the 620-43-32 excavation in layers to the pad grade with native material. The production facilities were reinstalled, tested, and then the wells were brought back on to production.

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:**

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Oxy submitted a Form 4 sundry notice (Document #2213210) on February 3, 2011 to temporarily store excavated E&P waste on the 620-21 well pad. The temporarily stored soils were characterized in April 2011 which identified episodic exceedances of TPH, yet the average of these samples was 457 mg/kg which is below COGCC Table 910-1 regulatory limit. Oxy allowed for volatilization of the soil pile throughout the summer to reduce TPH concentrations. Additional samples were collected in August 2011, which identified no exceedances in Table 910-1, except for SAR, pH, and arsenic. Please see attached figures and tables outlining soil pile sampling locations and analytical results. Oxy averaged the laboratory results from the August sampling, which identified TPH concentrations below Table 910-1. To address the SAR and pH exceedances, Oxy will grade the soils into the cut slope on the 620-21 well pad. During facility closure, these soils will be capped with at least three feet of native material to provide adequate agronomic zone. To address the arsenic exceedance, Oxy collected background samples from an undisturbed location on an adjacent well pad which identified concentrations of naturally occuring arsenic above the COGCC 910-1 concentration levels. Oxy has included a Form 4 sundry notice requesting a different standard be applied for arsenic in the soil pile based on the concentration of naturally occurring arsenic being above both Table 910-1 and the soil pile concentration.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 12/8/2010 Date Site Investigation Completed: 3/18/2011 Date Remediation Plan Submitted: 2/3/2011
Remediation Start Date: 2/8/2011 Anticipated Completion Date: ~~11/10/11~~ 3/31/2011 Actual Completion Date: 11/8/2011

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

Print Name: Sean T. Norris Signed: _____
Title: Senior Regulatory Advisor Date: 11/8/2011

OGCC Approved: _____ Title: FOR Chris Canfield Date: 02/14/2012
EPS NW Region

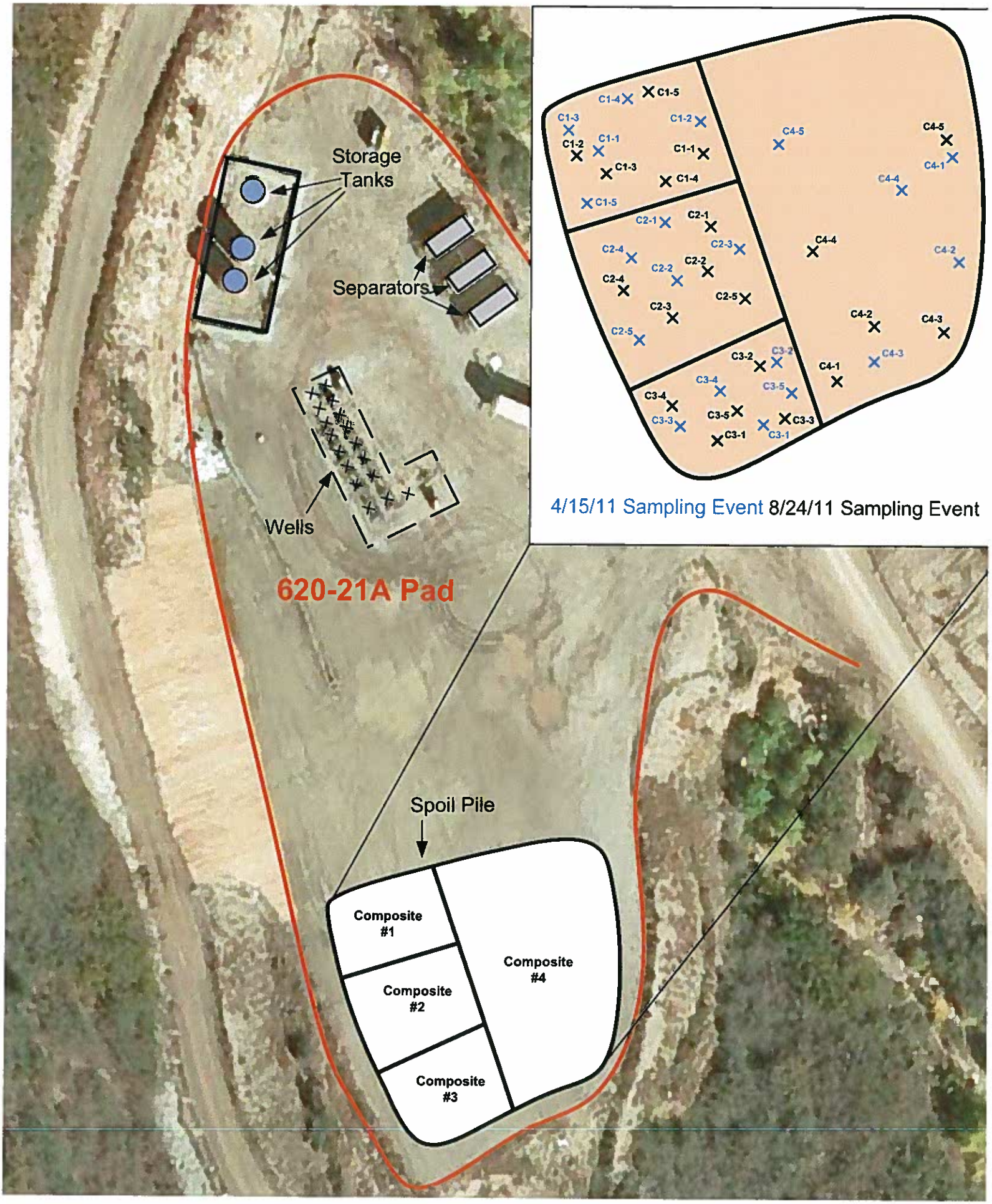
-32

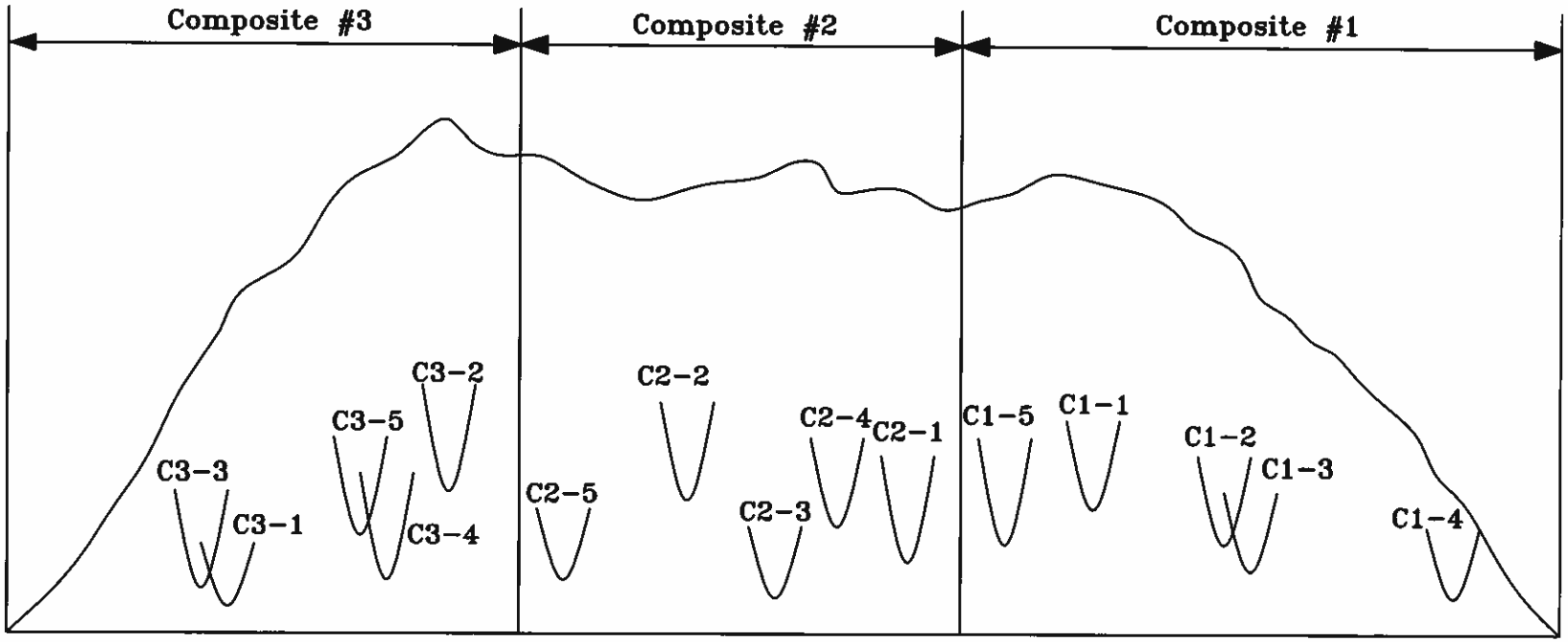

OXY USA WTP LP
760 Horizon Drive, Suite 101
Grand Junction, CO 81506
620-21 Background Sample Locations
Updated: September 19, 2011
Garfield County, Colorado
0 0.025 0.05 0.1 0.15 0.2 0.25 Miles
620-21 Temporary Storage Location
620-43-32 Spoil Pile Source Location
B-1
B-2
B-3
B-4
B-5
620-1

Table 1 - Background Samples

	Lab Report #	T44342	T44342	T44342	T44342	T44342
	Date Sampled	12/15/2009	12/15/2009	12/15/2009	12/15/2009	12/15/2009
	Sample Name	B-1 (Background)	B-2 (Background)	B-3 (Background)	B-4 (Background)	B-5 (Background)
Organics in Soil	MCL (mg/Kg)					
TPH (GRO and DRO)	**500**					
Benzene	**0.17**					
Toluene	**85**					
Ethylbenzene	**100**					
Xylenes	**175**					
Organics in Soil (PAH's)						
Acenaphthene	**1000**					
Anthracene	**1000**					
Benzo(A)anthracene	**0.22**					
Benzo(B)fluoranthene	**0.22**					
Benzo(K)fluoranthene	**2.2**					
Benzo(A)pyrene	**0.022**					
Chrysene	**22**					
Dibenzo(A,H)anthracene	**0.022**					
Fluoranthene	**1000**					
Flourene	**1000**					
Indeno(1,2,3,C,D)pyrene	**0.22**					
Naphthalene	**23**					
Pyrene	**1000**					
Inorganics in Soil						
EC	**<4 mmhos/cm or 2X background**	0.48	0.297	0.319	0.425	2.95
SAR	**<12**	0.463	0.925	2.45	3.52	7.61
pH	**6-9**	8.29	8.66	8.82	8.72	8.34
Metals in Soils						
Arsenic	**0.39**	**23.9**	**15.7**	**8.9**	**6.3**	**16.7**
Barium	**15,000**					
Boron (Hot Water Soluble)	**2 (mg/L)**					
Cadmium	**70**					
Chromium III	**120,000**					
Chromium VI	**23**					
Copper	**3100**					
Lead	**400**					
Mercury	**23**					
Nickel	**1600**					
Selenium	**390**					
Silver	**390**					
Zinc	**23,000**					

620-21A Pad Spoil Pile Overview





Explanation

* Depths of composite samples for 4/15/2011 sampling event

0 10 Feet

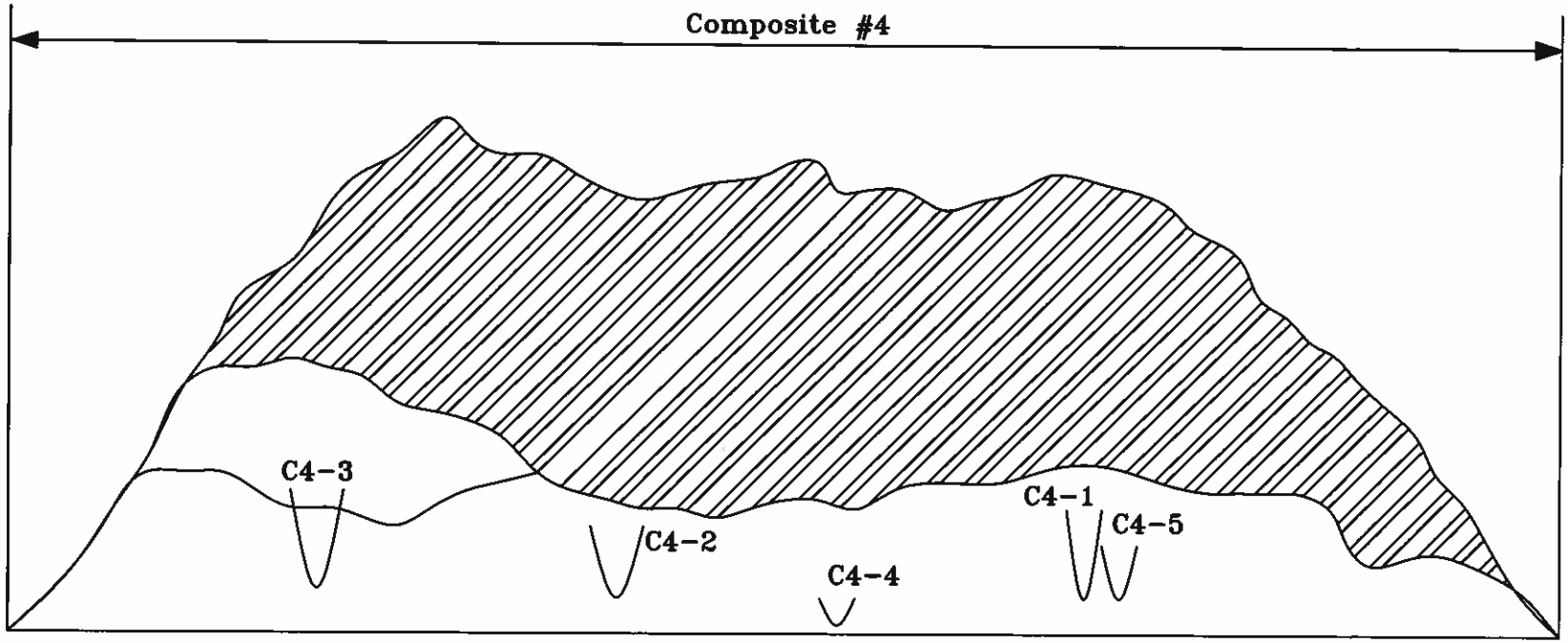
Approximate Scale

Walsh

Environmental Scientists and Engineers, LLC

620-21A Spoil Pile
West Facing Cross-Section
Oxy WTP LP Cascade Creek

900546.0007.010	Date 4/11	Figure 1



Explanation

▨ – Area containing Composites #1,2 & 3

* Depths of composite samples for 4/15/2011 sampling event

0 10 Feet

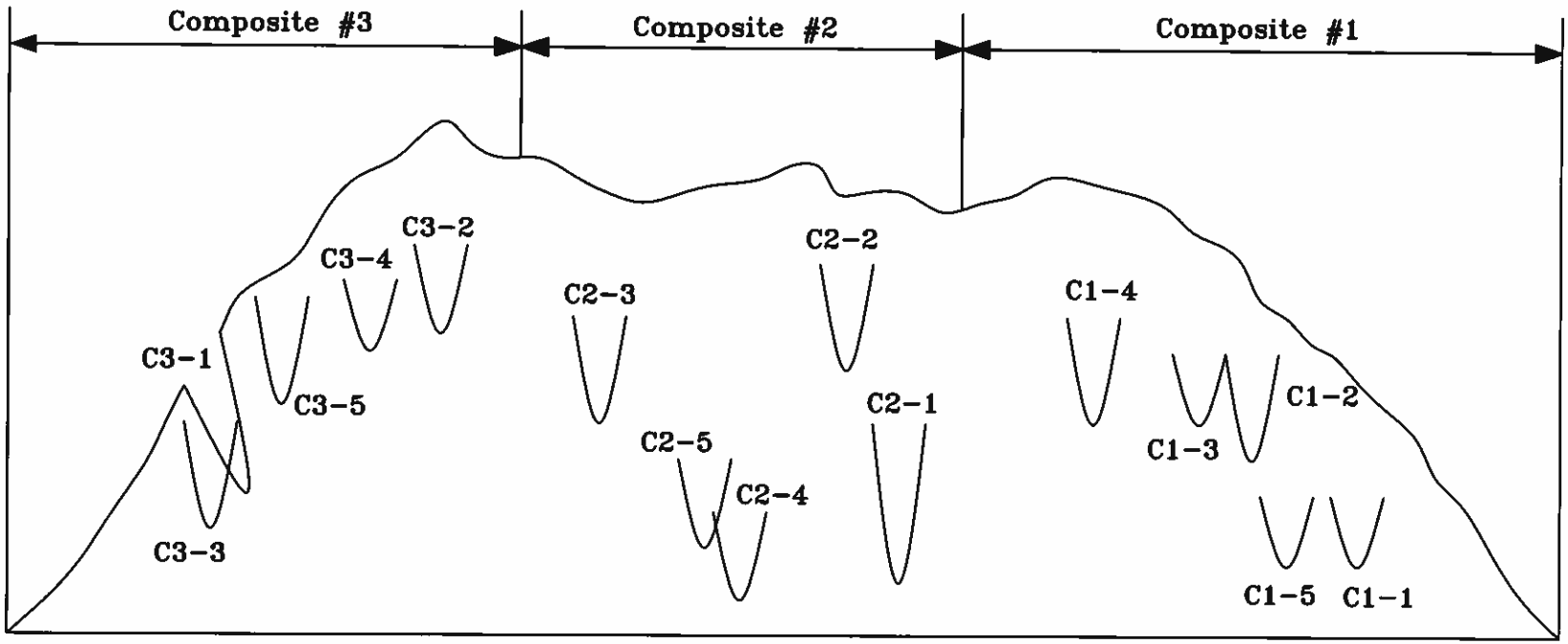
Approximate Scale

Walsh

Environmental Scientists and Engineers, LLC

620-21A Spoil Pile
West Facing Cross-Section
Oxy WTP LP Cascade Creek

900546.0007.010	Date 4/11	Figure 2



Explanation

* Depths of composite samples for 8/24/2011 sampling event

0 10 Feet

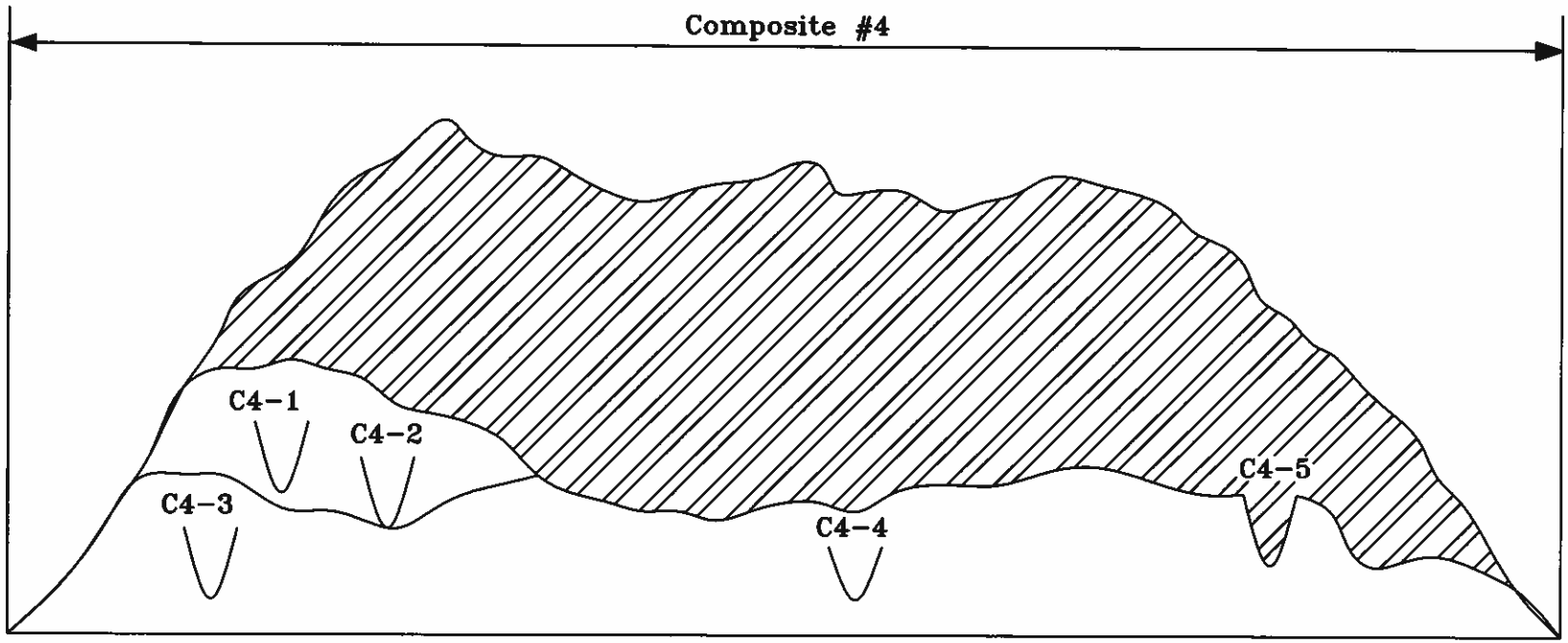
Approximate Scale

Walsh

Environmental Scientists and Engineers, LLC

620-21A Spoil Pile
West Facing Cross-Section
Oxy WTP LP Cascade Creek

900546.0007.010	Date 9/11	Figure 1



Explanation

▨ – Area containing Composites #1,2 & 3

* Depths of composite samples for 8/24/2011 sampling event

0 10 Feet

Approximate Scale

Walsh

Environmental Scientists and Engineers, LLC

620-21A Spoil Pile
West Facing Cross-Section
Oxy WTP LP Cascade Creek

900546.0007.010	Date 9/11	Figure 2

Table 2 - 620-43-32 Spill Spoil Pile (Located on the 620-21)

	Lab Report #	L511463	L511463	L511463	L511463		L533297	L533297	L533297	L533297		
	Date Sampled	04/15/2011	04/15/2011	04/15/2011	04/15/2011		08/31/2011	08/31/2011	08/31/2011	08/31/2011		
	Sample Name	21A-C1 4-6FT	21A-C2 4-6FT	21A-C3 3.5 - 6FT	21A-C4 1.5 5FT	AVERAGE for 4/15/2011 Samples	620-21A SPOIL COMP 1 4-5ft	620-21A SPOIL COMP 2 3-5ft	620-21ASPOIL-COMP 3 4-6FT	620-21ASPOIL-COMP 4 3-5FT	Average for 8/31/2011 Samples	Average of All samples (4/15/2011 and 8/31/2011)
Organics in Soil	MCL (mg/Kg)											
TPH (GRO and DRO)	500	580	235	720.00	294	457	462	92	418	44	254	356
Benzene	0.17	0.042	0.035	BDL	BDL	0.04	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	85	2.2	1.40	1.90	0.37	1.47	0.92	BDL	0.80	BDL	0.86	0.83
Ethylbenzene	100	BDL	0.140	0.24	0.077	0.15	0.0	0.140	0.15	BDL	0.11	0.13
Xylenes	175	23.0	22.0	21.00	8.3	19	18.0	BDL	8.80	BDL	13	11
Organics in Soil (PAH's)												
Acenaphthene	1000											
Anthracene	1000											
Benzo(A)anthracene	0.22											
Benzo(B)fluoranthene	0.22											
Benzo(K)fluoranthene	2.2											
Benzo(A)pyrene	0.022											
Chrysene	22											
Dibenzo(A,H)anthracene	0.022											
Fluoranthene	1000											
Flourene	1000											
Indeno(1,2,3,C,D)pyrene	0.22											
Naphthalene	23											
Pyrene	1000											
Inorganics in Soil												
EC	<4 mmhos/cm or 2X background											
SAR	<12	18.00	17.0	12.0	17	16.00	17.00	16.0	14.0	14	15.25	14.81
pH	6-9	9.1	8.9	8.8	9	8.95	8.6	8.7	8.9	8.6	8.70	8.73
Metals in Soils												
Arsenic	0.39	5.6	7	4.2	5.1	5.48	7.5	7.6	7.7	7.4	7.55	7.58
Barium	15,000											
Boron (Hot Water Soluble)	2 (mg/L)											
Cadmium	70											
Chromium III	120,000											
Chromium VI	23											
Copper	3100											
Lead	400											
Mercury	23											
Nickel	1600											
Selenium	390											
Silver	390											
Zinc	23,000											

Walsh
Environmental Scientists and Engineers, LLC
an **ecology and environment** company

March 30, 2011

Mr. Sean Norris
OXY USA WTP LP
760 Horizon Drive STE 101
Grand Junction, CO 81506

Subject: 620-43-32
Condensate Spill Remediation
Garfield County, Colorado
Walsh Project No. 900546.0014.020

Dear Mr. Norris:

Walsh Environmental Scientists and Engineers, LLC (Walsh) was contracted by you to provide oversight of soil remediation activities at the OXY USA WTP LP (Oxy) 620-43-32 well pad following a release of an estimated 150 barrels of condensate. The release occurred in December 2010 and was reported to the Colorado Oil and Gas Conservation Commission (COGCC) in a Form 27.

Release Confirmation and Initial Subsurface Investigation

In an effort to confirm the release and define the horizontal impacts of the release, Oxy personnel collected surficial soil samples on December 8 and December 16, 2010. Results of the sampling were provided to Walsh by Oxy and are summarized in the attached Table 1. At the direction of Oxy, Walsh collected background soil and water samples from the vicinity of the release on January 5, 2011. In addition, Walsh collected soil samples from an excavation that was installed in an effort to define the vertical extent of contamination. Results from the January 5, 2011 sampling efforts are summarized in the attached Tables 2 and 2a.

Contaminated Soil Removal

Walsh provided oversight of the excavation of approximately 5,300 cubic yards of soil from February 8, 2011 through March 23, 2011. Approximately 1,300 cubic yards of clean overburden was removed from the site to access approximately 4,000 cubic yards of condensate-impacted soil. Walsh screened excavated soils for the presence of contamination during removal activities. Samples of the excavated soils were collected, placed into airtight bags, and allowed to warm thereby volatilizing petroleum constituents. The headspace air in the bag was analyzed on-site with a photo-ionization detector (PID) equipped with a 10.6 electron-volt lamp capable of detecting part-per-million (ppm) range volatile organic compounds (VOCs). Soil characteristics and sample depths were noted during excavation.

535 Grand Avenue Grand Junction, Colorado 81501-2790 Phone (970) 241-4636 FAX (970) 241-4312

The excavation was completed along the west-southwest extent of the well pad and west of the separator unit. The two condensate tanks previously located in the area of the release were emptied and removed from the work area prior to conducting excavation activities. Additionally, buried gas production and produced water pipelines that previously extended through the excavation area and two buried condensate pipelines that extended to the middle of the excavation where they surfaced at the former location of the condensate tanks were removed to facilitate excavation operations.

Typical soil conditions encountered during the excavation included approximately one foot of imported gravel installed on a membrane. The membrane was overlying predominantly native silty clay soil with decomposed shale fragments. Highly fractured shale was encountered along the north and northwest sides of the excavation to the bottom of the excavation. The shale layering angles downward at a generally south to south-southwest direction. No groundwater or saturated soils were encountered during excavation activities to a total depth of approximately 36 feet.

VOC concentrations as measured by the PID identified levels to range from 0.2 to 1,900 ppm. Soils were excavated from the pit and segregated based on odor and visual indicators and VOC readings. Non-impacted soils were stockpiled in the southeast section of the well pad for replacement into the excavation. Contaminated soils were transported to Oxy's adjacent 620-21 well pad located approximately one mile northwest of the excavation. Contaminated soils were placed on an impermeable liner with a bermed perimeter to prevent stormwater entering or exiting the stockpile.

In general when soil headspace samples identified VOC concentrations to be less than 10 ppm, soil samples were collected for laboratory analysis to confirm the extent of contamination. Soil samples were placed into pre-cleaned glass jars, cooled, and delivered to ESC Lab Sciences in Mount Juliet, Tennessee under chain-of-custody for analysis. Samples collected during excavation oversight were analyzed for all of the COGCC Table 910-1 constituents with the exception of boron.

Analytical Results

Initial excavation oversight sampling results identified various petroleum contaminant constituents including benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons (TPH) to exceed the maximum contaminant levels (MCLs). With the exception of the soil and degraded shale interface, the extent of excavation samples confirmed remaining soils to be below their respective MCLs. The fractured shale contact was remediated to practical limits by excavation; however, laboratory analyses indicate that TPH concentrations of up to 1,070 milligrams per kilogram (mg/kg) and benzene concentrations of up to 1.8 mg/kg may remain in the shale. In general, potentially contaminated shale surfaces were remediated to sub-regulatory limits for petroleum constituents. Sample locations are depicted on Figure 1.

Sodium adsorption ratio (SAR) and/or pH were above the COGCC standards in several of the excavation oversight samples. SAR concentrations exceeded the regulatory limit in 12 of the samples collected from the excavation and pH exceeded the regulatory limit in nine of the samples collected from the excavation. Arsenic concentrations exceeded the MCL in all of the excavation oversight samples. Background arsenic samples collected adjacent to the site ranged from 3.3 to 7.4 mg/kg. Eight of the soil samples contained arsenic in concentrations exceeding the background levels.

Remediation and Excavation Backfilling

The fractured shale face remained exposed for one to three weeks depending on depth to allow for aeration of condensate. Prior to backfilling, about 210 pounds of Regenesis ORC® was applied to the exposed portions of shale containing high TPH concentrations located along the north slope of the excavation. Locations that exceeded the arsenic and SAR standards within the extent of the excavation were covered with at least ten feet of backfill. Locations that exceeded the pH standard were covered with at least ten feet of backfill with the exception of the background sample area SHALE BACK that was collected on February 15, 2011 which is located at a higher elevation than the excavation and release.

Backfill material consisted of about 1,300 cubic yards of overburden that was stored on-site. Additional backfill material was collected from the adjacent slope to the north of the area to return the pad site to its approximate former grade. Backfill soils were placed in approximately 6 to 12 inch lifts, leveled, and compacted until grade was reached. The site grading was sloped and diversion channels were re-established for inclusion into the site's stormwater management plan.

Conclusions

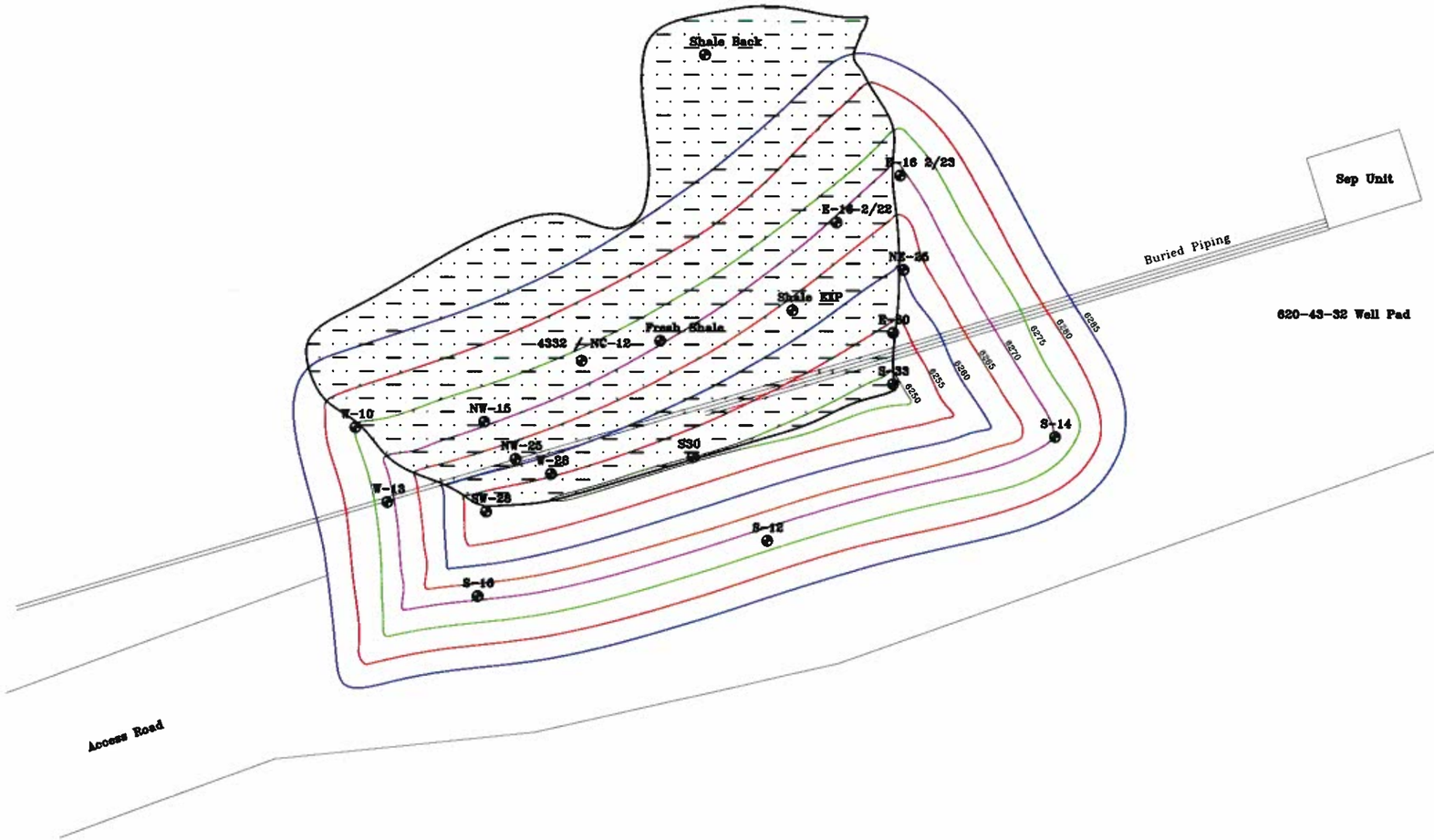
Walsh provided oversight of the removal of approximately 4,000 cubic yards of condensate-impacted soils at the Oxy 620-43-32 well pad located in Garfield County, Colorado between February 8 and March 23, 2011. A total of 41 soil samples were collected by Walsh from the excavation area during this period. Sample analytical results confirmed the presence of condensate contamination in soil. Petroleum contamination was removed from the site with the exception of residual contamination that may remain in the shale layer. The remaining contaminated shale was treated with a commercially available oxygen releasing compound. Soils containing high SAR, pH, and arsenic concentrations were covered with about 10 feet of soil during backfilling operations. No groundwater or saturated soils were encountered during the remediation and therefore no impacts to groundwater are expected.

If you have any questions, please contact me at (970) 241-4636 or by email at rstockton@walshenv.com. Thank you for selecting WALSH for your project.

Sincerely,
Walsh Environmental Scientists and Engineers, LLC

Robert A. Stockton
Environmental Scientist

Attachments: Figure 1 – Soil Sample Location Map
Table 1 – Release Confirmation for 620-43-32
Table 2 – Initial Investigation (Soil)
Table 2a – Initial Investigation (Water)
Table 3 – Laboratory Data for 620-43-32 Release
Laboratory Analytical Data
Chain-of-Custody Forms



Explanation

Shale Back -Sample Location and Identification

-Exposed Shale

Walsh
Environmental Scientists and Engineers, LLC

Sample Location Map
Aerial View
620-43-32 Pad
Garfield County, Colorado

0 20
Approximate Scale (Feet)

Job 900546.0014.020	Date 03/11	Figure 1

Table 1. Release Confirmation for 620-43-32 (Laboratory Results Provided by OXY)

		MCL	#1 (Inside Cont.) 12/08/10	#2 (Inside Cont.) 12/08/10	#3 (Inside Cont.) 12/08/10	#1 (Outside Cont.) 12/16/10	#2 (Outside Cont.) 12/16/10	#3 (Outside Cont.) 12/16/10	#4 (Outside Cont.) 12/16/10	#5 (Outside Cont.) 12/16/10	#6 (Outside Cont.) 12/16/10	#7 (Outside Cont.) 12/16/10	#8 (Outside Cont.) 12/16/10	#9 (Outside Cont.) 12/16/10	#10 (Outside Cont.) 12/16/10	#11 (Outside Cont.) 12/16/10	#12 (Outside Cont.) 12/16/10
Organics (mg/kg)	TPH (GRO and DRO)	500	**17300**	**18000**	**7900**	**7900**	**1310**	5.50	479.0	21.6	18.0	40.0	28.20	1.20	34.0	**19600**	154
	Benzene	0.17	**32**	**46**	**13**	**10**	<0.018	<0.00090	<0.00090	0.0046	<0.00090	0.0021	<0.00090	<0.00090	<0.00090	**2.3**	<0.00090
	Toluene	85	**260**	**270**	**96**	**90**	5.10	<0.0015	0.20	0.048	0.0018	0.065	<0.0015	<0.0015	<0.0015	**100**	0.13
	Ethylbenzene	100	57	68	32	15	1.70	<0.0013	0.12	0.028	<0.0013	0.038	<0.0013	<0.0013	<0.0013	26	0.14
	Xylenes	175	**700**	**680**	**320**	**240**	29.0	0.0062	2.20	0.52	0.0043	0.69	0.011	<0.0028	0.0028	**540**	2.7
Inorganics	EC (mmhos/cm)	<4	2.20	2.4	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	SAR (unitless)	<12	**15**	**14**	10.0	9.70	11.0	1.70	4.80	5.3	1.00	6.30	1.20	1.20	6.0	4.60	1.8
	pH (unitless)	6-9	8.1	8.3	**12**	8.4	8.2	9.0	9.0	8.0	8.0	8.6	8.9	8.8	**9.2**	8.9	8.9
	Arsenic (mg/kg)	0.39	**5.9**	**5.4**	**6.1**	**7**	**6.4**	NA	**5.4**	**5.5**	**5.7**	**6.6**	**4.5**	**7.3**	**5.7**	**8.7**	**6.7**
	Barium (mg/kg)	15000	230	310	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: **BOLD** = Value that exceeds Table 910-1 Standard
MCL = Maximum Contaminant Level based on COGCC Table 910-1
NA = Not Analyzed

Table 2. Initial Investigation (Soil)

		MCL	Background 01/05/11	Pit Bottom 01/05/11	N Wall of Excavation 01/015/11
Organics (mg/kg)	TPH (GRO and DRO)	500	2.9	**5900**	**650**
	Benzene	0.17	0.0027	**4.5**	**0.83**
	Toluene	85	0.037	44.0	8.4
	Ethylbenzene	100	0.0067	9.8	2.1
	Xylenes	175	0.14	160	22.0
Inorganics	EC (mmhos/cm)	<4	0.300	0.680	0.590
	SAR (unitless)	<12	5.3	**13**	11.0
	pH (unitless)	6-9	8.7	8.5	8.6
	Arsenic (mg/kg)	0.39	**7.4**	**7.1**	**7.6**
	Barium (mg/kg)	15000	280	270	620

Note: **BOLD** = Value that exceeds Table 910-1 Standard
MCL = Maximum Contaminant Level based on COGCC Table 910-1

Table 2A. Initial Investigation (Water)

		MCL	Creek 01/05/11
Organics (mg/l)	TPH (GRO and DRO)	----	<0.040
	Benzene	0.005	<0.00013
	Toluene	0.56	<0.00021
	Ethylbenzene	0.70	<0.00021
	Xylenes	1.4	<0.00043

Note: **BOLD** = Value that exceeds Table 910-1 Standard
MCL = Maximum Contaminant Level based on COGCC Table 910-1

Table 3. Laboratory Data for 620-43-32 Release (Excavation Oversight Sampling Results)

		MCL	SHALE BACK 2/15/11	SHALE EXP 2/15/11	FRESH SHALE 2/15/11	OLD PIT 2/15/11	E16 FT 2/22/11	E30 2/22/11	S-32 2/22/11	S-30 2/22/11	NW 25 FT 2/23/11	E 16 FT 2/23/11	S 14 FT 2/23/11	4332 2/23/11	W 28 FT 2/23/11	NC 12 FT 2/23/11	W 10 FT 2/23/11	NE 25 FT 2/23/11	W 13 FT 2/23/11	NW 15 FT 2/23/11	S16 16 FT 3/3/11	S12 12 FT 3/3/11	BG SOIL 3/3/11	SW-28 3/3/11
Organics (mg/kg)	TPH (GRO and DRO)	500	8.1	**1070**	**980**	**4100**	**1850**	21.16	<15.14	4.89	330	<13.5	<7.3	370	293	64.6	<5.4	19.81	14	<10.2	<4.5	<4.5	<4.5	<4.5
	Benzene	0.17	<0.0050	***<0.50***	**1.8**	**6.5**	**0.26**	<0.0009	<0.0009	<0.0009	**0.32**	<0.0050	<0.0050	<0.050	0.057	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Toluene	85	<0.025	6.4	32	**94**	11	<0.0015	<0.0015	<0.0015	4.3	<0.025	<0.025	1.3	0.26	<0.025	<0.025	<0.025	0.046	<0.025	<0.025	<0.025	<0.025	<0.025
	Ethylbenzene	100	<0.0050	1.8	4.1	16	1.9	<0.0013	<0.0013	<0.0013	1.1	<0.0050	<0.0050	0.42	0.28	0.014	<0.0050	<0.0050	0.064	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Xylenes	175	<0.015	32	89	**290**	56	<0.0028	<0.0028	0.0063	22	<0.015	<0.015	11	1.4	0.28	<0.015	0.02	0.92	<0.015	<0.015	<0.015	<0.015	<0.015
Organics (PAH's) (mg/kg)	Acenaphthene	1000	<0.0060	0.027	0.038	<0.12	0.054	<0.0082	<0.0082	<0.0082	0.033	<0.0060	<0.0060	0.0087	<0.0060	0.012	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Anthracene	1000	<0.0060	<0.0060	0.011	<0.12	0.015	<0.0082	<0.0082	<0.0082	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Benzo(A)anthracene	0.22	<0.0060	<0.0060	<0.0060	<0.12	<0.0077	<0.0077	<0.0077	<0.0077	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Benzo(B)fluoranthene	0.22	<0.0060	<0.0060	<0.0060	<0.12	<0.0086	<0.0086	<0.0086	<0.0086	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Benzo(K)fluoranthene	2.2	<0.0060	<0.0060	<0.0060	<0.12	<0.0074	<0.0074	<0.0074	<0.0074	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Benzo(A)pyrene	0.022	<0.0060	<0.0060	<0.0060	***<0.12***	<0.0073	<0.0073	<0.0073	<0.0073	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	***<0.033***	***<0.033***	***<0.033***	***<0.033***
	Chrysene	22	<0.0060	<0.0060	<0.0060	<0.12	<0.0067	<0.0067	<0.0067	<0.0067	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Dibenz(A,H)anthracene	0.022	<0.0060	<0.0060	<0.0060	***<0.12***	<0.0058	<0.0058	<0.0058	<0.0058	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	***<0.033***	***<0.033***	***<0.033***	***<0.033***
	Fluoranthene	1000	<0.0060	0.02	<0.0060	<0.12	<0.0069	<0.0069	<0.0069	<0.0069	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Flourene	1000	<0.0060	0.052	0.11	<0.12	<0.0059	<0.0059	<0.0059	<0.0059	0.075	<0.0060	<0.0060	0.022	<0.0060	0.022	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Indeno(1,2,3,C,D)pyrene	0.22	<0.0060	<0.0060	<0.0060	<0.12	<0.0059	<0.0059	<0.0059	<0.0059	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Napthalene	23	<0.0060	1.1	0.9	2.5	2.9	<0.0074	<0.0074	<0.0074	0.49	0.0099	<0.0060	0.074	0.025	0.028	<0.0060	0.014	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
	Pyrene	1000	<0.0060	0.0098	<0.0060	<0.12	<0.0077	<0.0077	<0.0077	<0.0077	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.033	<0.033	<0.033	<0.033
Inorganics in Soil	EC (mmhos/cm)	<4	0.31	1.8	1.8	0.51	0.57	2.3	2.5	2.4	1	0.95	1.1	1.5	1	1.3	0.84	0.89	0.7	0.75	2.1	0.77	0.17	1.8
	SAR (unitless)	<12	6.6	9.1	8.9	9.3	**15**	11	**13**	11	**14**	**20**	5	1.6	11	**13**	**21**	10	8	**16**	**23**	**12**	2.4	**21**
	pH (unitless)	6-9	**9.3**	8.3	8.1	**9.1**	**9.5**	8.5	8.6	8.5	8.9	8.9	8.2	8.6	8.7	**9**	**9.7**	**9.1**	8.3	**9.6**	**9.1**	**9**	8.9	**9**
	Arsenic (mg/kg)	0.39	**6.4**	***<5.0***	**14**	***<5.0***	**23**	**8.3**	**7.5**	**11**	**12**	**6.5**	**6.7**	**7**	**6.7**	**7.2**	**5.6**	***<5.0***	***<5.0***	**7.2**	**7.3**	**8.8**	**3.3**	**7.5**
	Barium (mg/kg)	15000	210	230	180	220	340	320	220	310	350	370	270	250	310	310	270	370	300	280	250	250	240	240
	Boron-Total (mg/kg)	----	NA	NA	NA	NA	21	22	23	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium (mg/kg)	70	0.83	0.44	0.42	0.41	<0.2	<0.2	<0.2	<0.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	0.63	0.64	0.76	0.71
	Chromium III (mg/kg)	120000	9.8	5.8	9.7	9.1	15	14	14	13	13	13	15	14	13	11	13	12	15	14	15	14	12	15
	Chromium VI (mg/kg)	23	<2.0	<2.0	<2.0	<2.0	<0.42	<0.42	<0.42	<0.42	<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	<2.0
	Copper (mg/kg)	3100	24	5.2	13	13	10	16	15	12	14	10	14	14	12	12	16	10	14	15	13	12	13	13
	Lead (mg/kg)	400	14	12	10	9.6	9.5	9.6	9	9.3	10	9.4	28	22	27	38	24	9.4	29	26	8.9	8.1	14	8.7
	Mercury (mg/kg)	23	<0.020	<0.020	<0.020	<0.020	0.016	0.013	0.013	0.0077	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nickel (mg/kg)	1600	30	12	22	18	8.8	13	11	10	11	9.8	12	12	11	10	11	10	10	12	17	13	10	14
	Selenium (mg/kg)	390	<1.0	<1.0	<1.0	7.4	11	<1.6	<1.6	<1.6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.6	5.6	10	5.7
	Silver (mg/kg)	390	<0.50	<0.50	<0.50	<0.50	<0.16	<0.16	<0.16	<0.16	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.5	<0.5	<0.5
	Zinc (mg/kg)	23000	78	25	52	44	40	54	46	45	47	40	46	47	43	42	50	43	46	50	47	42	48	47

Note: **BOLD** = Value that exceeds Table 910-1 Standard
Italics = Laboratory detection limit exceeds Table 910-1 Standard
MCL = Maximum Contaminant Level based on COGCC Table 910-1
NA = Not Analyzed