

State of Colorado
Oil and Gas Conservation Commission

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



#6826

FOR OGCC USE ONLY

RECEIVED
2/1/2012

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): Pit Closure

OGCC Employee:

☐ Spill ☐ Complaint
☐ Inspection ☐ NOAV

Tracking No:

OGCC Operator Number: <u>100264</u>	Contact Name and Telephone: <u>Jessica Dooling</u>
Name of Operator: <u>XTO Energy Inc.</u>	No: <u>970-675-4122</u>
Address: <u>9127 S Jamacia Drive</u>	Fax: <u>970-675-4150</u>
City: <u>Englewood</u> State: <u>CO</u> Zip: <u>80112</u>	
API Number: <u>05-103-11099</u>	County: <u>Rio Blanco</u>
Facility Name: <u>Freedom Unit</u>	Facility Number: <u>293829</u> Drilling Pit Permit
Well Name: <u>Freedom Unit</u>	Well Number: <u>FRU 197-33A</u>
Location: (QtrQtr, Sec, Twp, Rng, Meridian): <u>SWSE, Sec 33, T1S, R97W, 6th PM</u> Latitude: <u>39.915581</u> Longitude: <u>-108.285658</u>	

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Drill Cuttings and Fluids

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-cropland rangeland

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Rentsac channery loam, 5 to 50% slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): no water wells within 1/4 mile, nearest surface water is over 1/2 mile away

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

Impacted Media (check):

- ☒ Soils
☐ Vegetation
☐ Groundwater
☐ Surface Water

Extent of Impact:

subliner impacts: elevated TPH, pH and SAR

How Determined:

laboratory analysis

REMEDIALATION WORKPLAN

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

See Attachment I for details regarding initial action taken.

Describe how source is to be removed:

Pit contents and liners from the Fresh Water (including subliner impacted soil) and Reserve pits have been removed and transported to an offsite disposal/recycling facility. Cuttings pit #2 pit contents were mix-blended to below Table 910-1 concentrations and will be buried in place. Cuttings pit #1 pit contents (TPH 540 mg/kg) will be treated on site and confirmed to acceptable levels.

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.:

Any remaining impacted soils will either be treated on-site or removed to an offsite disposal/recycling facility.



FRU 197-33A

Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: Location ID # 336018
Facility Name & No: Pit Facility # 293829

Page 2

REMEDIATION WORKPLAN (Cont.)

OGCC Employee: _____

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

Available information indicates that the uppermost groundwater bearing zone is greater than 200 feet below ground surface. Soil samples were collected for laboratory analysis of subliner material (Reserve, Fresh Water and Cuttings pit #2), and from the base of the remedial excavation (Fresh Water pit) where impacted subliner soil was removed to confirm no groundwater impact potential exists.

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.

Reclamation as specified in the Surface Use Plan, the BLM Conditions of Approval, and the COGCC regulations 900 and 1000 series will be completed as applicable.

Please see Attachment 2

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:

Based on subliner testing to be completed beneath the Cuttings pit #1 additional assessment and remediation may be necessary (see Table 1).

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

The synthetic liners from the Reserve, Fresh Water and Cuttings pit #2 were removed and sent for offsite recycling/disposal. After the material has been removed from Cuttings Pit #1 the liner will be removed and sent for offsite recycling/disposal.

Pit contents from the Reserve and Fresh Water pits (including subliner impacted material) were transported to an approved disposal/recycling facility. Cuttings pit #2 material was mix-blended to below Table 910-1 concentrations and will be buried in place (see Table 1). Cuttings pit #1 material will be treated on-site to acceptable levels.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: <u>08/19/11</u>	Date Site Investigation Completed: <u>in progress</u>	Date Remediation Plan Submitted: <u>2/1/2012</u>
Remediation Start Date: <u>pending approval</u>	Anticipated Completion Date: <u>pending approval</u>	Actual Completion Date: <u>TBD</u>

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

Print Name: Jessica Dooling

Signed: _____

Title: Environmental Coordinator

Date: 2/1/2012

OGCC Approved: _____

Title: FOR Chris Camfield

Date: 02/07/2012

EPS NW Region

Please notify COGCC
of advances regarding remediation
of Cutting pit #1.

ATTACHMENT I

FRU 197-33A Pit Closure Workplan, Form 27 Page 1

REMEDIATION WORKPLAN

Describe initial action taken:

- i. The site consists of a Fresh Water pit, a Reserve pit, and 2 Cuttings pits (see Figure 1).
- ii. All pit contents and associated synthetic liners from the Fresh Water and Reserve pits were removed and transported to an offsite permitted disposal/recycling facility.
- iii. Cuttings pit #2 contents were mix/blended with on-site spoils to below Table 910-1 parameters (see Attachment II and Table 1) and relocated to the Reserve pit for burial in place. Cuttings pit #2 was backfilled with clean onsite spoils in April 2011 to facilitate the placement of an aboveground tank in the Cuttings pit #2 area that was needed for operation of the site.
- iv. Subliner composite samples were collected from the beneath the Fresh Water, Reserve, and Cuttings #2 pits and analyzed for Table 910-1 parameters (see Attachment II and Table 1).
- v. Elevated TPH levels above the Table 910-1 concentrations were detected beneath the Fresh Water pit. This material was excavated and transported to a permitted disposal facility. A composite sample was collected at 1.5 ft below the original subliner sample and analyzed for Table 910-1 (see Attachment II and Table 1).
- vi. Elevated TPH levels above the Table 910-1 concentration levels were detected beneath the Reserve pit. This material was mix/blended with on-site material and a composite sample was collected and analyzed for Table 910-1 (see Attachment II and Table 1).
- vii. Elevated arsenic levels above the Table 910-1 concentration were detected beneath the Fresh Water, Reserve, and Cuttings #2 pits. Please refer to associated sundry requesting consideration of background arsenic levels.

ATTACHMENT II

FRU 197-33A Pit Closure Workplan, Form 27 Page 2

REMEDIATION WORKPLAN

Describe Reclamation Plan:

1. Cuttings Pit #2

- Cuttings pit #2 contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for benzene (0.634 mg/kg), SAR (17.9), pH (9.8) and arsenic (5.8 mg/kg). The contents were mix/blended with on-site spoils to below Table 910-1 parameters with the exception of pH (9.93) and Arsenic (5.6 mg/kg) and moved to the reserve pit for burial in place. The synthetic liner was removed and transported to an offsite permitted facility for disposal/recycling. A subliner sample was collected and analyzed for Table 910-1 parameters, results are below the Table 910-1 concentrations with the exception of SAR (14.1), pH (9.77) and Arsenic (5.2 mg/kg).

2. Fresh Water Pit

- Fresh Water pit contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for TPH (309,100 mg/kg) and other constituents (BTEX, etc.). The material was removed and transported offsite for disposal at ECDC landfill. Based on the elevated TPH level (2,761.8 mg/kg) in the initial fresh water pit sub-liner sample, approximately 1.5 feet of these impacted soils were excavated and removed from this pit and transported offsite for disposal at ECDC landfill. Soil samples collected from the bottom of this excavation following this material removal confirmed that TPH levels (83.0 mg/kg) were below the required Table 910-1 concentration level of 500 mg/kg.

3. Reserve Pit

- Reserve pit contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for TPH (304,410 mg/kg) and other constituents (BTX, Barium, etc.). The material was removed and transported offsite for disposal at ECDC landfill. Based on elevated TPH levels (782 mg/kg) from the initial reserve pit sub-liner sample, the base of the reserve pit was scarified to an approximate depth of one foot, using a dozer mounted ripper, then mix/blended with an approximate two-foot thickness of non-impacted spoils. A composite sample was subsequently collected of this material after

ATTACHMENT II

FRU 197-33A Pit Closure Workplan, Form 27 Page 2

REMEDIATION WORKPLAN

Describe Reclamation Plan:

1. Cuttings Pit #2

- Cuttings pit #2 contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for benzene (0.634 mg/kg), SAR (17.9), pH (9.8) and arsenic (5.8 mg/kg). The contents were mix/blended with on-site spoils to below Table 910-1 parameters with the exception of pH (9.93) and Arsenic (5.6 mg/kg) and moved to the reserve pit for burial in place. The synthetic liner was removed and transported to an offsite permitted facility for disposal/recycling. A subliner sample was collected and analyzed for Table 910-1 parameters, results are below the Table 910-1 concentrations with the exception of SAR (14.1), pH (9.77) and Arsenic (5.2 mg/kg).

2. Fresh Water Pit

- Fresh Water pit contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for TPH (309,100 mg/kg) and other constituents (BTEX, etc.). The material was removed and transported offsite for disposal at ECDC landfill. Based on the elevated TPH level (2,761.8 mg/kg) in the initial fresh water pit sub-liner sample, approximately 1.5 feet of these impacted soils were excavated and removed from this pit and transported offsite for disposal at ECDC landfill. Soil samples collected from the bottom of this excavation following this material removal confirmed that TPH levels (83.0 mg/kg) were below the required Table 910-1 concentration level of 500 mg/kg.

3. Reserve Pit

- Reserve pit contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for TPH (304,410 mg/kg) and other constituents (BTX, Barium, etc.). The material was removed and transported offsite for disposal at ECDC landfill. Based on elevated TPH levels (782 mg/kg) from the initial reserve pit sub-liner sample, the base of the reserve pit was scarified to an approximate depth of one foot, using a dozer mounted ripper, then mix/blended with an approximate two-foot thickness of non-impacted spoils. A composite sample was subsequently collected of this material after

mix/blending with TPH results (204 mg/kg) less than the Table 910-1 concentration level of 500 mg/kg.

4. Cuttings Pit #1

- Cuttings pit #1 contents were sampled for Table 910-1, results indicated that the material was in exceedance of Table 910-1 for TPH (540 mg/kg), EC (6.05 mmhos/cm), SAR (89.1), pH (11.85) and arsenic (10.4 mg/kg). The contents will be mix-blended with onsite spoils to reach required Table 910-1 concentration levels. A representative sample of the mix-blended material will be analyzed for select Table 910-1 constituents. Based on these results appropriate disposal and or additional treatment options will be determined. Sub-liner samples will be collected and analyzed for Table 910-1 constituents following removal of and appropriate disposal of the Cuttings pit #1 liner. Based on sub-liner sample results from beneath Cuttings pit #1, the need for additional remedial activities will be evaluated for the site. Identified impacted soils/rock above Table 910-1 concentration levels will either be treated on-site (in-situ bioremediation, mix/blending, thermal desorption, etc.) or excavated and transported to an off-site disposal/recycling facility. On completion of these remedial activities, appropriate confirmation samples will be collected to verify Table 910-1 compliance. Based on these results, the pit will either be closed, or additional assessment and/or remediation plans will be determined. Backfilling of cuttings pit #1 will not be completed until assessment indicates conditions compliant with Table 910-1 concentration levels have been met.
- Elevated arsenic levels above the Table 910-1 concentration level were detected beneath the Fresh Water, Reserve, and Cuttings #2 pits. Please refer to associated sundry requesting consideration of background arsenic levels.
- Please refer to Table 1 for a summary of laboratory results, analytical reports are attached.
- Any remaining elevated levels of SAR and pH detected beneath the pits or in material used for backfill will be covered with a minimum 3 feet of clean, native soils per COGCC guidance. No additional treatment of these soils will be required.
- On completion of required assessment and remedial activities, the pits will be backfilled. Material used to fill the pits will be derived from native on-site material

or material transported to the site. Material used to fill the top three feet of each pit will be found on-site.

- Reclamation activities will be as specified in the Surface use Plan and BLM Conditions of Approval.

Table 1
Location: FRU 197-33A
Lab Summary

Updated: 2/1/2012

Analytical Parameter	Fresh Water Pit				Reserve Pit				Cuttings #1			Cuttings #2			Background 08/30/11					Lone Spoil	COGCC	Background	
(with units)	FW Pit Contents 8/19/11	FW Subliner 11/14/11	FW Subliner - 1.5' 11/30/11	Backfill Material 10/26/11	Res Pit Contents 8/19/11	Res Pit Subliner 11/4/11	Res Pit Subliner Post Mix Blend 11/18/11	Res Backfill Cut #2 Pit MixBlend 10/25/11	Cut #1 Pit Contents 1/06/12	Pit Subliner date	Cut #1 Pit Backfill date	Cut #2 Pit Contents 4/06/11	Pit Subliner 4/06/11	Cut #2 Pit Backfilled April 2011 ⁵								Table 910-1 Allowable Levels	Maximum based on Background
Accutest Job #	D26811	D29455	D29896	D28945	D26811	D29207	D29647	D28910	D30890			D22470	D22470	-						D27140	D28913	-	-
Sample Type (Composite/Discrete)	C	C	C	C	C	C	C	C	C			C	C	-	D	D	D	D	D	C	-	-	
TPH (GRO) (mg/Kg)	21100	51.8	ND	ND	9410	30	14.6	ND	57.0			34.6	ND	-	-	-	-	-	-	ND	-	-	
TPH (DRO) (mg/Kg)	288000	2710	83.0	ND	295000	752	189	ND	483			190	21.4	-	-	-	-	-	-	57.8	-	-	
TPH (GRO + DRO) (mg/Kg)	309100	2761.8	83.0	ND	304410	782	204	ND	540			224.6	21.4	-	-	-	-	-	-	57.8	500	-	
Benzene (mg/Kg)	140	ND	0.0524	ND	39.6	ND	ND	0.122	0.108			0.634	ND	-	-	-	-	-	-	ND	0.170	-	
Toluene (mg/Kg)	1220	ND	0.130	ND	424	ND	ND	0.382	0.845			1.69	0.075	-	-	-	-	-	-	ND	85	-	
Ethylbenzene (mg/Kg)	187	0.043	0.0338	ND	44.2	ND	ND	0.0585	0.243			0.227	ND	-	-	-	-	-	-	ND	100	-	
Xylenes (total) (mg/Kg)	3060	0.973	0.148	ND	1180	0.215	ND	0.432	1.33			1.61	0.144	-	-	-	-	-	-	ND	175	-	
Acenaphthene (mg/Kg)	ND	-	ND	-	2.64	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	1000	-	
Anthracene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	1000	-	
Benzo(A)anthracene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	0.22	-	
Benzo(B)fluoranthene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	0.22	-	
Benzo(K)fluoranthene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	2.2	-	
Benzo(A)pyrene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	0.022	-	
Chrysene (mg/Kg)	ND	-	0.0013	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	22	-	
Dibenzo(A,H)anthracene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	0.022	-	
Fluoranthene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	1000	-	
Fluorene (mg/Kg)	77.9	-	0.0205	-	9.56	0.166	0.080	ND	0.0525			0.0851	ND	-	-	-	-	-	-	-	1000	-	
Indeno(1,2,3,C,D)pyrene (mg/Kg)	ND	-	ND	-	ND	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	0.22	-	
Napthalene (mg/Kg)	103	-	0.021	-	20.6	ND	ND	0.215	0.315			0.353	ND	-	-	-	-	-	-	-	23	-	
Pyrene (mg/Kg)	ND	-	ND	-	0.354	ND	ND	ND	ND			ND	ND	-	-	-	-	-	-	-	1000	-	
Electrical Conductivity (mmhos/cm)	2.02	-	2.11	-	3.98	0.83	1.11	1.42	6.05			3.86	2.15	-	-	-	-	-	-	-	<4 or 2X BG	-	
Sodium Adsorption Ratio (SAR)	23.9	-	7.42	-	34.8	11.9	11.5	11.4	89.1			17.9	14.1	-	-	-	-	-	-	-	<12	-	
pH	7.79	-	9.77	-	9.42	10.06	10.08	9.93	11.85			9.8	9.77	-	-	-	-	-	-	-	6-9	-	
Arsenic (mg/kg)	6.7	-	5.5	-	7	9.4	5.9	5.6	10.4			5.8	5.2	-	5.7	6	12.6	5.4	3.7	-	0.39	13.9	
Barium (mg/kg)	21200	-	420	-	36700	826	1090	5850	3640			4180	1590	-	-	-	-	-	-	-	15000	-	
Cadmium (mg/kg)	<3.9	-	<1.1	-	<4.7	<1.1	<1.1	<1.1	1.8			<1.2	<1.1	-	-	-	-	-	-	-	70	-	
Chromium (III) (mg/Kg)	80.7	-	18.2	-	91.9	32.6	33.1	39.1	12.9			18.7	22.5	-	-	-	-	-	-	-	120000	-	
Chromium (VI) (mg/Kg)	<1.6	-	<0.43	-	2.7	<0.44	<0.44	<0.45	<0.49			0.58	0.8	-	-	-	-	-	-	-	23	-	
Copper (mg/kg)	48	-	<11	-	113	13	11.8	15.1	29.9			22.5	14.4	-	-	-	-	-	-	-	3100	-	
Lead (inorganic) (mg/kg)	<20	-	<55	-	<23	12.1	11.5	13.8	40.5			16.4	13.3	-	-	-	-	-	-	-	400	-	
Mercury (mg/kg)	2.1	-	<0.11	-	1.3	<0.11	<0.11	<0.12	<0.12			<0.12	<0.1	-	-	-	-	-	-	-	23	-	
Nickel (mg/kg)	19.5	-	12.3	-	20.6	18.5	15.6	20.7	13.1			13.5	18.3	-	-	-	-	-	-	-	1600	-	
Selenium (mg/kg)	<98	-	<5.5	-	<120	<5.5	<5.7	<28	<6.1			<12	<5.4	-	-	-	-	-	-	-	390	-	
Silver (mg/kg)	<12	-	<3.3	-	<14	<3.3	<3.4	<3.3	<3.7			<3.6	<3.2	-	-	-	-	-	-	-	390	-	
Zinc (mg/kg)	66.7	-	27.2	-	56.2	45.1	44.1	34.5	37.5			37.3	45.1	-	-	-	-	-	-	-	23000	-	
% Solids	24.6	88.3	92.4	87.9	22.3	88.6	90.1	86.5	79.7			82.5	88.3	-	92	93	93.2	94	95.1	96.8	-	-	

Notes:

1) ND = not detectable to the laboratory detection limit.

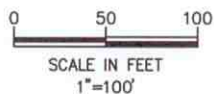
2) Results highlighted in yellow exceed Table 910-1 concentration levels. Results highlighted in Gray exceed Table 910-1, but are below background levels.

3) "-" indicates no analysis.

4) See site map for sample locations

5) Cut 2 Backfilled with on site spoils. No visual staining or odor observed. QA performed by KRW.

s:\proj\exxonmobil environmental\1103-03a fru 197-33a\dwg\sample ars revl.dwg,2/1/12



NOTES:

1. ALL PIT SAMPLES ARE COMPOSITE SAMPLES.
2. BACKGROUND ARSENIC RESULTS ARE FROM DISCRETE SAMPLES.

LEGEND	
---	EDGE OF PAD
---	POND / CUTTINGS
⊗ BK-4	BACKGROUND SAMPLE LOCATION (8/30/11)

DESIGNED: —	CHECKED: DK	FIGURE 1	NOTES:
DATE: 2/1/12	DRAWN: DRF		
FILE NAME: sample ars revl	SHEET NO. 1 of 1	DATE	REVISIONS
PROJECT NO. 1103-03A	SCALE: 1"=100'		

KRW CONSULTING, INC.
8000 W. 14TH AVENUE, SUITE 200
LAKEWOOD, COLORADO
(303) 239-9011

FIGURE 1
PICEANCE CREEK
FRU 197-33A
SAMPLE LOCATIONS WITH
ARSENIC LEVELS
PREPARED FOR XTO ENERGY

