

State of Colorado  
**Oil and Gas Conservation Commission**



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

#8510

FOR OGCC USE ONLY

RECEIVED  
12/12/2012

**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.

OGCC Employee:

Spill       Complaint  
 Inspection       NOAV

Tracking No:

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

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

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>PO Box 6501</u>	Fax: <u>970-675-4150</u>
City: <u>Englewood</u> State: <u>CO</u> Zip: <u>80155</u>	

API Number: <u>05-103-11546-00</u>	County: <u>Rio Blanco</u>
Facility Name: <u>Piceance Creek Unit</u>	Facility Number: <u>420010 (Flare Pit), no # (Reserve Pit) approved 8/28/2012</u>
Well Name: <u>Piceance Creek Unit</u>	Well Number: <u>296-6B</u>
Location: (QtrQtr, Sec, Twp, Rng, Meridian): <u>NWSE, Sec. 6, T2S, R96W, 6th P.M.</u> Latitude: <u>39.905268</u> Longitude: <u>-108.204977</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-Crop Land, Rangeland

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Piceance Fine Sandy Loam, 5 to 15 percent slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): ~3314' to nearest water well; 1185' to nearest surface water

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

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>TPH, Benzene and Arsenic</u>	<u>laboratory analysis</u>
<input type="checkbox"/> Vegetation		
<input type="checkbox"/> Groundwater		
<input type="checkbox"/> Surface Water		

**REMEDIALTION 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:  
Synthetic liners from all pits have been removed and will be transported offsite to a permitted disposal facility. Cuttings Pits #1, #2 and #3 contents will be treated onsite with a Temporary Thermal Desorption Unit, by mix/blending to reduce hydrocarbons to below Table 910-1 concentration levels or transported offsite to a permitted disposal facility.

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 onsite or removed to a permitted disposal/recycling facility.



Tracking Number: \_\_\_\_\_  
Name of Operator: XTO  
OGCC Operator No: \_\_\_\_\_  
Received Date: APR 10 3 11 54 6  
Well Name & No: \_\_\_\_\_  
Facility Name & No: 296-6B/Location # 413466

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 208 feet below the ground surface. Soil samples were collected for laboratory analysis of subliner material to confirm no groundwater impact potential exists (see Table 1).

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.

Please see Attachment II

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 sample results no additional assessment will be necessary beneath the Freshwater, Reserve, Cuttings Pit #1, #2 or #3 (see Table 1).

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

Synthetic liners from each of the pits were removed and will be transported to an approved offsite disposal/recycling facility. Cuttings Pit #1, #2 and #3 contents will be mix/blend processed to below Table 910-1 concentration levels or transported to an approved offsite disposal/recycling facility. Mix/blend processed material will be used for on-site fill.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 10/1/2012 Date Site Investigation Completed: in progress Date Remediation Plan Submitted: 12/12/2012  
Remediation Start Date: pending approval Anticipated Completion Date: pending approval Actual Completion Date: TBD

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: 12/12/2012

OGCC Approved: \_\_\_\_\_ Title: For Chris Canfield Date: 12/20/2012  
EPS NW Region

## ATTACHMENT I

### PCU 296-6B Pit Closure Workplan, Form 27 Page 1

#### Describe initial action taken:

- i. The site consists of Freshwater, Reserve and Cuttings Pits #1, #2 and #2 (see Figure 1).
- ii. Freshwater Pit contents (de minimis) and associated synthetic liners were removed and will be transported to an offsite permitted disposal/recycling facility.
- iii. The Freshwater Pit subliner composite sample was collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for pH (9.68) and Arsenic (4.9 mg/kg).
- iv. The Reserve Pit contents were solidified and sampled for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for EC (7.650 mmhos/cm), pH (12.42) and Arsenic (9.0 mg/kg).
- v. Reserve Pit subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for pH (9.85) and Arsenic (6.3 mg/kg).
- vi. Cuttings Pit #1 contents were solidified and composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (590 mg/kg), Benzene (0.422 mg/kg), EC (8.260 mmhos/cm), SAR (17.2), pH (12.49) and Arsenic (7.5 mg/kg).
- vii. Cuttings Pit #1 subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for pH (9.95) and Arsenic (10.9 mg/kg).
- viii. Cuttings spoil pile material (located above Cuttings Pit #1) was composite sampled and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 for Arsenic (9.8 mg/kg).
- ix. Cuttings Pit #2 contents were solidified and composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1

concentration levels for TPH (565 mg/kg), Benzene (0.286 mg/kg), EC (7.910 mmhos/cm), SAR (186), pH (12.41) and Arsenic (12.1 mg/kg).

- x. Cuttings Pit #2 subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for pH (9.94) and Arsenic (4.9 mg/kg).
- xi. Cuttings Pit #3 contents were solidified and composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for Benzene (0.649 mg/kg), EC (5.410 mmhos/cm), SAR (23.2), pH (12.02) and Arsenic (6.9 mg/kg).
- xii. Cuttings Pit #3 subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for pH (9.87) and Arsenic (5.7 mg/kg).
- xiii. Cuttings Pit #1, #2 and #3 contents were removed from the respective pits and will be treated onsite with a Temporary Thermal Desorption Unit, mix/blend processed and sampled to ensure Table 910 compliance or transported to an offsite permitted disposal/recycling facility.
- xiv. Reserve pit, cuttings spoil pile material and mix/blend or Thermal Desorption Unit processed Cuttings Pit #1, #2 and #3 material will be used onsite for backfill.
- xv. All associated Reserve, Cuttings Pit #1, #2 and #3 synthetic liners were removed and will be transported to an offsite permitted disposal/recycling facility.
- xvi. Refer to Table 1 for a summary of the laboratory results and Figure 1 for layout of the pits and sample locations.
- xvii. Elevated Arsenic levels above Table 910-1 concentration were detected beneath the Freshwater, Reserve and Cuttings Pits #1, #2 and #3. Please refer to the associated sundry requesting consideration of background Arsenic levels.

## ATTACHMENT II

### PCU 296-6B Pit Closure Workplan, Form 27 Page 2

#### REMEDIATION WORKPLAN

##### Describe Reclamation Plan:

**1. Fresh Water Pit**

- The pit will be backfilled with Thermal Desorption Unit processed, mix/blended, native onsite material or material transported to the site.

**2. Reserve Pit**

- The pit will be backfilled with Thermal Desorption Unit processed, mix/blended, native onsite material or material transported to the site.

**3. Cuttings Pit #1**

- The pit will be backfilled with Thermal Desorption Unit processed, mix/blended, native onsite material or material transported to the site.

**4. Cuttings Pit #2**

- The pit will be backfilled with Thermal Desorption Unit processed, mix/blended, native onsite material or material transported to the site.

**5. Cuttings Pit #3**

- The pit will be backfilled with Thermal Desorption Unit processed, mix/blended, native onsite material or material transported to the site.
- Elevated Arsenic levels above the Table 910-1 concentration level were detected beneath the Freshwater, Reserve and Cuttings Pits #1, #2 and #3. 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 Electrical Conductivity, 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.

- Material used to fill the top 3 feet of each pit will be found onsite.
- Reclamation activities will be performed in accordance with applicable COGCC 900, 1000 Series rules and as specified in the Surface Use Plan and BLM Conditions of Approval.

Table 1  
Location: PCU 296-6B  
Lab Summary

Analytical Parameter (with units)	Fresh Water Pit		Reserve Pit		Cutting #1		Cuttings #2		Cuttings #3		Background		COGCC Table 910-1 Concentration Levels	Maximum based on Background						
	FW Pit Subliner 11/8/12	FW Pit Contents	RP Post Solid, 11/5/12	RP Subliner 11/8/12	Cut #1 Post Solid, 10/18/12	Cut #1 Subliner 10/18/12	Cut #2 Post Solid, 10/14/12	Cut #2 Subliner 10/10/12	Cut #3 Post Solid, 11/27/12	Cut #3 Subliner 10/10/12	#1	#2			#3	#4	#5	#6	#7	#8
	D40797	D40653	D40799	D39689	D40113	D39440	D39780	D41306	D39780	D39559 (10/15/12)										
Sample type (Composite/Discrete)	C	C	C	C	C	C	C	C	C	C										
TPH (GRO) (mg/Kg)	ND	ND	ND	14.5	ND	ND	38.6	ND	ND	9.92	ND	ND	ND	-	-	-	-	-	-	
TPH (DRO) (mg/Kg)	ND	404	23.1	575	31.2	299	526	24.7	28.1	299	28.1	15.1	15.1	-	-	-	-	-	-	
TPH (GRO + DRO) (mg/Kg)	ND	404	23.1	590	31.2	565	565	24.7	309	309	28.1	15.1	15.1	-	-	-	-	-	500	
Benzene (mg/Kg)	ND	ND	ND	0.422	0.0530	0.286	0.649	ND	ND	0.649	ND	ND	ND	-	-	-	-	-	0.170	
Toluene (mg/Kg)	ND	ND	ND	1.35	0.108	2.24	ND	ND	1.53	ND	ND	ND	ND	-	-	-	-	-	85	
Ethylbenzene (mg/Kg)	ND	ND	ND	0.278	ND	0.502	ND	ND	0.197	ND	ND	ND	ND	-	-	-	-	-	100	
Xylenes (total) (mg/Kg)	ND	ND	ND	1.32	ND	2.50	ND	ND	1.59	ND	ND	ND	ND	-	-	-	-	-	175	
Acenaphthene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	1000	
Anthracene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	1000	
Benzo(A)anthracene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	1000	
Benzo(B)fluoranthene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	0.0131	ND	ND	ND	ND	-	-	-	-	-	0.22	
Benzo(K)fluoranthene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	0.22	
Benzo(A)pyrene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	2.2	
Chrysene (mg/Kg)	ND	ND	ND	0.0567	0.0056	0.0476	ND	ND	0.0623	0.0048	ND	ND	ND	-	-	-	-	-	0.022	
Dibenzo(A,H)anthracene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	22	
Fluoranthene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	0.0058	ND	ND	ND	ND	-	-	-	-	-	0.022	
Fluorene (mg/Kg)	ND	ND	ND	0.119	0.0085	ND	ND	ND	0.0189	ND	ND	ND	ND	-	-	-	-	-	1000	
Indeno(1,2,3-C)Dipyrene (mg/Kg)	ND	ND	ND	0.0092	ND	ND	ND	ND	0.103	0.0079	ND	ND	ND	-	-	-	-	-	1000	
Naphthalene (mg/Kg)	ND	ND	ND	0.754	0.0463	0.391	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	0.22	
Pyrene (mg/Kg)	ND	0.0182	ND	ND	0.0432	ND	0.0390	ND	0.445	0.0406	ND	ND	ND	-	-	-	-	-	23	
Electrical Conductivity (mmhos/cm)	0.348	7.650	1.840	8.260	0.522	7.910	0.514	5.410	0.647	0.647	0.917	0.917	0.917	-	-	-	-	-	4	
Sodium Adsorption Ratio (SAR)	3.08	7.52	6.92	17.2	7.50	3.66	23.2	5.55	5.13	5.13	5.13	5.13	5.13	-	-	-	-	-	12	
pH	9.68	12.42	9.85	12.49	9.95	12.41	9.94	12.02	9.87	9.87	8.76	8.76	8.76	-	-	-	-	-	6-9	
Arsenic (mg/kg)	4.9	9.0	6.3	7.5	10.9	12.1	4.9	6.9	5.7	9.8	7.9	8.6	5.5	5.2	7.8	5.8	6.0	5.9	9.5	
Barium (mg/kg)	293	6720	3540	4910	1440	3680	1380	810	3710	816	816	816	816	-	-	-	-	-	15000	
Cadmium (mg/kg)	<1.1	<1.6	<1.0	<1.2	<1.1	<1.3	<1.3	<1.2	<1.3	<1.1	<1.1	<1.1	<1.1	-	-	-	-	-	70	
Chromium (III) (mg/Kg)	31.4	17.1	28.3	11.6	31.6	14.8	36.2	13.0	29.9	37.3	37.3	37.3	37.3	-	-	-	-	-	120000	
Chromium (VI) (mg/Kg)	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-	-	23	
Copper (mg/kg)	14.1	16.1	10.1	21.0	11.7	27.5	16.8	34.6	16.6	9.7	9.7	9.7	9.7	-	-	-	-	-	3100	
Lead (inorganic) (mg/kg)	11.1	10.9	8.1	13.4	8.4	29.1	13.3	19.8	11.6	7.3	7.3	7.3	7.3	-	-	-	-	-	400	
Mercury (mg/kg)	<0.10	<0.14	<0.086	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	-	-	-	-	-	23	
Nickel (mg/kg)	17.1	114	14.1	10.9	16.1	13.8	23.7	12.1	16.3	15.0	15.0	15.0	15.0	-	-	-	-	-	1600	
Selenium (mg/kg)	<5.5	<8.1	<5.2	<5.9	<5.6	<6.4	<5.8	<5.6	<5.3	<5.6	<5.6	<5.6	<5.6	-	-	-	-	-	390	
Silver (mg/kg)	<3.3	<4.8	<3.1	<3.5	<3.4	<3.8	<3.5	<3.8	<3.2	<3.4	<3.4	<3.4	<3.4	-	-	-	-	-	390	
Zinc (mg/kg)	43.6	45.3	37.8	34.0	38.2	40.5	48.4	37.2	41.4	33.3	33.3	33.3	33.3	-	-	-	-	-	23000	
% Solids	87.0	60.1	92.3	87.1	86.5	77.8	86.0	80.9	91.8	88.6	89.0	94.6	92.8	95.1	91.7	92.0	93.2	94.3	-	

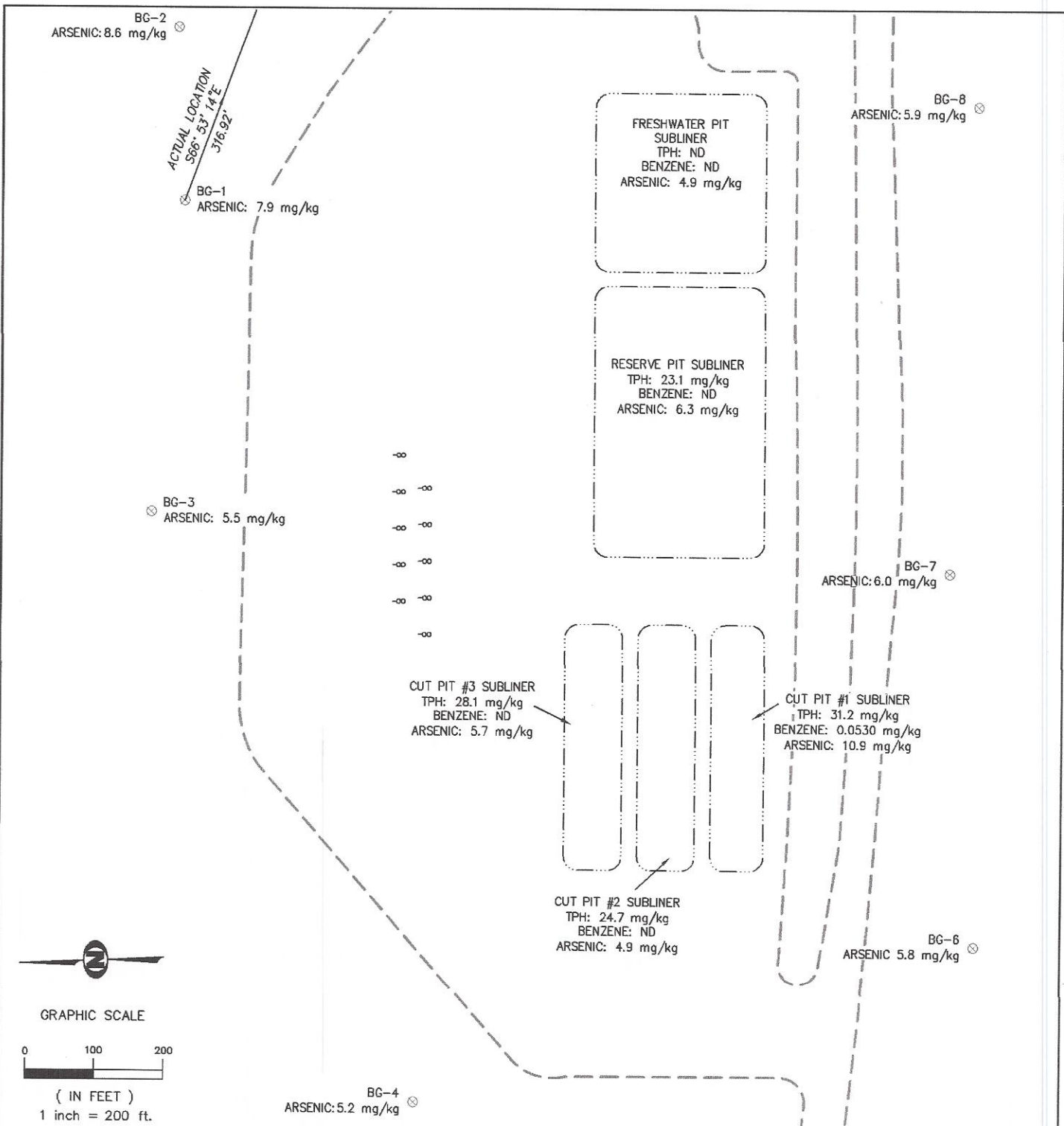
Notes:  
 1) ND = not detectable to the laboratory detection limit.  
 2) Results highlighted in yellow exceed Table 910-1 concentration levels. Results highlighted in Gray exceed Table 910-1, but are below background levels.  
 3) "-" indicates no analysis.  
 4) See site map for sample locations.

**Table 2**  
**Location: PCU 296-6B**  
**Lab Summary - Arsenic Summary**

Analytical Parameter (with units)	Cut #2 Discrete Arsenic											Cuttings Spoil Discrete Arsenic					Background					COGCC Table 910-1 Concentration Levels	Maximum based on Background				
	Cut #2 Post Solid, 10/1/12		D-1	D-2	D-3	D-4	D-5	Cuttings Spoil Pile 10/4/12					D-1	D-2	D-3	D-4	D-5	#1	#2	#3	#4			#5	#6	#7	#8
	D39440	C	D	D	D	D	D	D39589	C	D	D	D	D	D	D	D	D	D	D	D	D			D	D	D	D
Accutest Job #	D39440	C	D	D	D	D	D	D39589	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D		
Sample type (Composite/Discrete)																											
TPH (GRO) (mg/Kg)	38.6								ND																		
TPH (DRO) (mg/Kg)	526							15.1																			
TPH (GRO + DRO) (mg/Kg)	565							15.1																			
Benzene (mg/Kg)	0.286							ND																			
Toluene (mg/Kg)	2.24							ND																			
Ethylbenzene (mg/Kg)	0.502							ND																			
Xylenes (total) (mg/Kg)	2.50							ND																			
Acenaphthene (mg/Kg)	ND							ND																			
Anthracene (mg/Kg)	ND							ND																			
Benzo(A)anthracene (mg/Kg)	ND							ND																			
Benzo(B)fluoranthene (mg/Kg)	ND							ND																			
Benzo(K)fluoranthene (mg/Kg)	ND							ND																			
Benzo(A)pyrene (mg/Kg)	ND							ND																			
Chrysene (mg/Kg)	0.0476							ND																			
Dibenzo(A,H)anthracene (mg/Kg)	ND							ND																			
Fluoranthene (mg/Kg)	ND							ND																			
Fluorene (mg/Kg)	ND							ND																			
Indeno(1,2,3-C,D)pyrene (mg/Kg)	ND							ND																			
Naphthalene (mg/Kg)	0.391							ND																			
Pyrene (mg/Kg)	0.0390							ND																			
Electrical Conductivity (mmhos/cm)	7.910							0.917																			
Sodium Adsorption Ratio (SAR)	186							5.13																			
pH	12.41							8.76																			
Arsenic (mg/kg)	12.1	10.0	9.5	10.0	9.3	8.6	9.8	5.3	7.5	6.8	6.3	6.6	7.9	8.6	5.5	5.2	7.8	5.8	6.0	5.9	6.0	5.9	6.0	5.9	6.0		
Barium (mg/kg)	3680						816																				
Cadmium (mg/kg)	<1.3						<1.1																				
Chromium (III) (mg/Kg)	14.8						37.3																				
Chromium (VI) (mg/Kg)	<1.0						<1.0																				
Copper (mg/kg)	27.5						9.7																				
Lead (inorganic) (mg/kg)	29.1						7.3																				
Mercury (mg/kg)	<0.14						<0.11																				
Nickel (mg/kg)	13.8						15.0																				
Selenium (mg/kg)	<6.4						<5.6																				
Silver (mg/kg)	<3.8						<3.4																				
Zinc (mg/kg)	40.5						33.3																				
% Solids	77.8	83.2	83.0	83.9	84.9	81.5	88.6	87.6	84.8	87.0	88.9	87.4	89.0	94.6	92.8	95.1	91.7	92.0	93.2	94.3	94.3	94.3	94.3	94.3	94.3		

Notes:  
 1) ND = not detectible 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.

\\hyper-v03\kwd-co\sdk\proj\cto\environmental\1004-14\_pcu\_296-6b\samp.dwg.12/12/12



LEGEND	
---	EDGE OF PAD
- - - - -	APPROX. PIT LOCATION
- - - - -	APPROX. WELL HEAD LOCATION
⊗ BG-0	BACKGROUND TEST LOCATION
ARSENIC: mg/kg	WITH LAB RESULTS

**NOTES:**

- BACKGROUND ARSENIC RESULTS ARE DISCRETE SAMPLES.
- ND INDICATES NOT DETECTED WITHIN LABORATORY DETECTION LIMITS.
- RESULTS SHOWN ARE SUBLINER CONFIRMATION SAMPLES UNLESS OTHERWISE NOTED.
- WELL HEAD LOCATIONS ARE APPROXIMATE

GPS: TRIMBLE	CHECKED: DK	FIGURE 1	DATE	REVISIONS
DATE: 12/12/12	DRAWN: DRF			
FILE NAME: samp	SHEET NO. 1 of 1			
PROJECT NO. 1004-14	SCALE: 1" = 100'			

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

**FIGURE 1**  
 PICEANCE CREEK  
 PCU 296-6B  
 SAMPLE LOCATIONS WITH  
 SELECT RESULTS  
 PREPARED FOR XTO ENERGY