

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

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): _____

OGCC Operator Number: _____

Name of Operator: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Name and Telephone: _____

No: _____

Fax: _____

API Number: _____

County: _____

Facility Name: _____

Facility Number: _____

Well Name: _____

Well Number: _____

Location: (QtrQtr, Sec, Twp, Rng, Meridian): _____ Latitude: _____ Longitude: _____

TECHNICAL CONDITIONS

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

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.): _____

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: _____

Potential receptors (water wells within 1/4 mi, surface waters, etc.): _____

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

Impacted Media (check): Extent of Impact: How Determined:

Soils _____ _____

Vegetation _____ _____

Groundwater _____ _____

Surface Water _____ _____

REMEDIALTION WORKPLAN

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

Describe how source is to be removed:

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.:



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

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 approximately 15-20 feet below the bottom of the pits. Soil samples were collected for laboratory analysis of subliner material to confirm no groundwater impact potential exists (see Tables 1 - 4).

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 or North Cuttings Pits (see Tables 1 - 4).

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

Freshwater Pit contents and subliner impacted material, Reserve Pit contents and subliner impacted material, Cuttings Pit contents, Cuttings Stockpile and all pit liners have been removed and transported offsite for disposal at Wray Gulch Landfill near Meeker, CO. North Cuttings Pit contents will be used onsite as fill.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 1/27/11 Date Site Investigation Completed: 3/13/14 Date Remediation Plan Submitted: 11/19/13
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: Piceance EHS Supervisor

Date: 12/19/2014

OGCC Approved: _____ Title: _____ Date: _____

ATTACHMENT I

Love Ranch 8 Pit Closure Workplan, Form 27 Page 1

Background Arsenic:

The site consists of Freshwater, Reserve, Cuttings, and North Cuttings Pits (see Figure 1).

See Form 27 workplan (Rem #8090, Doc. #2147033) that was COGCC approved on 11/20/13 that established a background Arsenic level of 17.5 mg/kg.

During pit subliner assessment and remediation activities, a North Cuttings Pit was discovered. Elevated Arsenic above the Table 910-1 concentration level was detected beneath the North Cuttings Pit (12.6 mg/kg) and in the North Cuttings Pit contents (7.7 mg/kg). This Arsenic concentration is within the allowable background Arsenic concentration of 17.5 mg/kg.

ATTACHMENT II

Love Ranch 8 Pit Closure Workplan Update, Form 27 Pages 1 and 2

Describe initial action taken:

The site consists of Freshwater, Reserve, Cuttings and North Cuttings Pits (see Figure 1).

Below is an update to the Site Investigation and Remediation workplan (Rem #8090, Doc #2147033), COGCC approved on 11/20/13. See Attachment I, Tables 1 through 4, and Figures 1 through 4 (6 total).

1. Freshwater Pit

- Freshwater Pit contents were solidified and sampled for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (16889 mg/kg), Benzene (0.939 mg/kg) and Arsenic (4.9 mg/kg) (see Table 1).
- Freshwater Pit subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (567 mg/kg), SAR (13.3), pH (9.91) and Arsenic (7.1 mg/kg) (see Table 1).
- Freshwater Pit subliner impacted soils were subsequently removed from 0 to -2' and sampled for TPH. Results ranged from 46.1 mg/kg to 474 mg/kg (see Table 2).

2. Reserve Pit

- Reserve Pit contents were solidified and sampled for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (6075 mg/kg), EC (12.400 mmhos/cm), SAR (16.2), pH (11.33) and Arsenic (8.8 mg/kg) (see Table 1).
- Reserve Pit subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (1610 mg/kg), EC (5.380 mmhos/cm), SAR (44.7), pH (11.48) and Arsenic (11.1 mg/kg) (see Table 1).
- Reserve Pit subliner impacted soils were subsequently removed from 0 to -4' and sampled for TPH. Results ranged from 15.1 mg/kg to 279 mg/kg (see Table 3).

3. Cuttings Pit

- Cuttings Pit content composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for Benzene (0.192 mg/kg), SAR (61.5), pH (10.09) and Arsenic (10.9 mg/kg) (see Table 1).
- Cuttings Pit subliner composite samples were collected and analyzed for Table 910-1 parameters. Composite results exceeded Table 910-1 concentration levels for Benzene (0.201 mg/kg), EC (5.750 mmhos/cm), SAR (58.3), pH (10.05) and Arsenic (12.3 mg/kg) (see Table 1).
- Cuttings Pit subliner discrete samples (which made up initial composite sample) were subsequently tested for Benzene and results ranged from ND to 0.0809 mg/kg (see Table 4).

4. Cuttings Stockpile

- Cuttings stockpile material samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for TPH (654 mg/kg), Benzene (0.480 mg/kg), EC (10.300 mmhos/cm), SAR (144), pH (10.76) and Arsenic (8.4 mg/kg) (see Table 1).

During pit subliner assessment and remediation activities, an additional cuttings pit (North Cuttings Pit) was discovered. Form 15 pit report for the North Cuttings Pit is attached.

5. North Cuttings Pit

- The North Cuttings Pit content composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for EC (5.680 mmhos/cm), SAR (21.2), pH (10.25) and Arsenic (7.7 mg/kg) (see Table 1).
 - North Cuttings Pit subliner composite samples were collected and analyzed for Table 910-1 parameters. Results exceeded Table 910-1 concentration levels for EC (7.46 mmhos/cm), SAR (18.5) and Arsenic (12.6 mg/kg) (see Table 1).
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- Freshwater Pit contents, Freshwater Pit subliner material, Reserve Pit contents, Reserve Pit subliner material, Cuttings Pit contents and Cuttings Stockpile material has been removed and transported offsite for disposal at Wray Gulch Landfill near Meeker, CO.

- North Cuttings Pit contents were removed from the pit and sampled to ensure Table 910 compliance. This material will be used onsite for backfill (see Table 1).
- All associated Freshwater, Reserve, Cuttings and North Cuttings Pit synthetic liners were removed and transported offsite for disposal at Wray Gulch Landfill near Meeker, CO.
- Refer to Tables 1 through 4 for a summary of the laboratory results and Figures 1 through 4 (6 total) for layout of the pits and sample locations.
- Elevated Arsenic levels above Table 910-1 concentration were detected beneath the Freshwater, Reserve, Cuttings and North Cuttings Pits. See the COGCC approved Form 27 workplan (Rem #8090) that established a background Arsenic level of 17.5 mg/kg.
- 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.
- 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: Love Ranch 8
Lab Summary

Last update 3/21/2014

Analytical Parameter	Fresh Water Pit		Reserve Pit		Cuttings Pit		Cuttings Stockpile	North Cuttings Pit		Background					COGCC	Maximum based on Background
(with units)	FW Pit Contents	FW Pit Subliner	RP Post Solid.	RP Subliner	Cuttings Contents	Cuttings Subliner	Cuttings Stockpile	North Cuttings Pit Contents	North Cuttings Pit Subliner	#1	#2	#3	#4	#5	Table 910-1 Concentration Levels	
Accutest Job # & Sample Date	D31748 2/8/12	D41662 12/6/12	D42316 1/3/13	D42510 1/7/13	D43722 2/20/13	D43723 2/20/13	D43722 2/20/13	D55961 3/13/14	D55898 3/12/14	D20760 1/27/11					-	-
Sample type (Composite/Discrete)	C	C	C	C	C	C	C	C	C	D	D	D	D	D	-	-
TPH (GRO) (mg/Kg)	489	7.25	225	29.6	14.9	ND	ND	ND	ND	-	-	-	-	-	-	-
TPH (DRO) (mg/Kg)	16400	560	5850	1580	287	211	654	119	8.17	-	-	-	-	-	-	-
TPH (GRO + DRO) (mg/Kg)	16889	567	6075	1610	302	211	654	119	8.17	-	-	-	-	-	500	-
Benzene (mg/Kg)	0.939	ND	ND	ND	0.192	0.201	0.480	ND	ND	-	-	-	-	-	0.170	-
Toluene (mg/Kg)	11.1	ND	0.378	ND	0.568	0.707	1.22	ND	ND	-	-	-	-	-	85	-
Ethylbenzene (mg/Kg)	2.98	ND	0.336	0.0415	0.364	0.157	0.176	ND	ND	-	-	-	-	-	100	-
Xylenes (total) (mg/Kg)	68.8	ND	9.32	0.682	1.12	0.574	0.849	ND	ND	-	-	-	-	-	175	-
Acenaphthene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	1000	-
Anthracene (mg/Kg)	ND	0.0369	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	0.0024	-	-	-	-	-	2.2	-
Benzo(A)pyrene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	0.022	-
Chrysene (mg/Kg)	ND	0.0145	ND	0.0254	0.0303	0.0196	0.0517	0.0093	ND	-	-	-	-	-	22	-
Dibenzo(A,H)anthracene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	0.022	-
Fluoranthene (mg/Kg)	ND	0.0117	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	1000	-
Fluorene (mg/Kg)	3.14	0.0716	0.437	0.198	0.0404	0.0233	0.0356	ND	ND	-	-	-	-	-	1000	-
Indeno(1,2,3,C,D)pyrene (mg/Kg)	ND	ND	ND	ND	ND	ND	ND	ND	0.0033	-	-	-	-	-	0.22	-
Naphthalene (mg/Kg)	5.67	0.0548	1.19	1.07	0.193	0.105	0.244	0.0718	ND	-	-	-	-	-	23	-
Pyrene (mg/Kg)	ND	0.0213	0.0800	0.0313	ND	ND	ND	0.0119	ND	-	-	-	-	-	1000	-
Electrical Conductivity (mmhos/cm)	2.450	1.370	12.400	5.380	3.840	5.750	10.300	5.680	7.46	-	-	-	-	-	4	-
Sodium Adsorption Ratio (SAR)	5.51	13.3	16.2	44.7	61.5	58.3	144	21.2	18.5	-	-	-	-	-	12	-
pH	7.85	9.91	11.33	11.48	10.09	10.05	10.76	10.25	8.63	-	-	-	-	-	6-9	-
Arsenic (mg/kg)	4.9	7.1	8.8	11.1	10.9	12.3	8.4	7.7	12.6	13.5	15.9	9.8	5.5	4.2	0.39	17.5
Barium (mg/kg)	1840	1870	8260	4420	4710	4470	7900	7440	397	-	-	-	-	-	15000	-
Cadmium (mg/kg)	<1.8	<1.1	<1.5	<1.2	<1.3	<1.0	2.9	<1.2	<1.1	-	-	-	-	-	70	-
Chromium (III) (mg/Kg)	39.3	25.7	20.0	24.2	11.9	15.4	18.9	22.6	38.8	-	-	-	-	-	120000	-
Chromium (VI) (mg/Kg)	<0.69	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-	-	23	-
Copper (mg/kg)	28.2	11.4	25.2	15.4	33.0	19.4	28.0	15.3	11.5	-	-	-	-	-	3100	-
Lead (inorganic) (mg/kg)	18.7	10.3	8.9	12.0	33.5	16.8	24.8	14.9	17.9	-	-	-	-	-	400	-
Mercury (mg/kg)	0.24	<0.085	<0.12	<0.096	<0.11	<0.096	<0.11	<0.096	<0.095	-	-	-	-	-	23	-
Nickel (mg/kg)	19.0	13.8	86.2	19.2	17.0	15.1	16.8	15.5	14.9	-	-	-	-	-	1600	-
Selenium (mg/kg)	<9.0	<5.5	<7.7	<5.9	<6.7	<5.0	<6.5	<5.9	<5.4	-	-	-	-	-	390	-
Silver (mg/kg)	<5.4	<3.3	<4.6	<3.5	<4.0	<3.0	<3.9	<3.6	<3.2	-	-	-	-	-	390	-
Zinc (mg/kg)	71.1	37.0	38.5	37.6	55.9	43.5	55.6	41.5	48.3	-	-	-	-	-	23000	-
% Solids	56.4	88.7	63.3	84.4	78.4	87.9	73.9	85.1	87.6	85.9	80.3	82.2	84.3	79.2	-	-

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: Love Ranch 8
Lab Summary - FW Subliner Assessment

Last update 11/11/2013

Analytical Parameter	Fresh Water Pit		FW Discrete Samples					FW Subliner (-2')			FW Ex. Mtrl	COGCC	Maximum based on Background
(with units)	FW Pit Contents	FW Pit Subliner	FW #1	FW #2	FW #3	FW #4	FW #5	FW #1	FW #3	FW #4	FW Ex. MTRL -2'	Table 910-1 Concentration Levels	
Accutest Job # & Sample Date	D31748 2/8/12	D41662 12/6/12	D41661 12/6/12					D42509 1/8/13			D42784 1/21/13	-	-
Sample type (Composite/Discrete)	C	C	D	D	D	D	D	D	D	D	C	-	-
TPH (GRO) (mg/Kg)	489	7.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
TPH (DRO) (mg/Kg)	16400	560	849	474	1530	1090	375	123	46.1	265	150	-	-
TPH (GRO + DRO) (mg/Kg)	16889	567	849	474	1530	1090	375	123	46.1	265	150	500	-
Benzene (mg/Kg)	0.939	ND	-	-	-	-	-	-	-	-	-	0.170	-
Toluene (mg/Kg)	11.1	ND	-	-	-	-	-	-	-	-	-	85	-
Ethylbenzene (mg/Kg)	2.98	ND	-	-	-	-	-	-	-	-	-	100	-
Xylenes (total) (mg/Kg)	68.8	ND	-	-	-	-	-	-	-	-	-	175	-
Acenaphthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	1000	-
Anthracene (mg/Kg)	ND	0.0369	-	-	-	-	-	-	-	-	-	1000	-
Benzo(A)anthracene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	0.22	-
Benzo(B)fluoranthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	0.22	-
Benzo(K)fluoranthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	2.2	-
Benzo(A)pyrene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	0.022	-
Chrysene (mg/Kg)	ND	0.0145	-	-	-	-	-	-	-	-	-	22	-
Dibenzo(A,H)anthracene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	0.022	-
Fluoranthene (mg/Kg)	ND	0.0117	-	-	-	-	-	-	-	-	-	1000	-
Fluorene (mg/Kg)	3.14	0.0716	-	-	-	-	-	-	-	-	-	1000	-
Indeno(1,2,3,C,D)pyrene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	0.22	-
Naphthalene (mg/Kg)	5.67	0.0548	-	-	-	-	-	-	-	-	-	23	-
Pyrene (mg/Kg)	ND	0.0213	-	-	-	-	-	-	-	-	-	1000	-
Electrical Conductivity (mmhos/cm)	2.450	1.370	-	-	-	-	-	-	-	-	-	4	-
Sodium Adsorption Ratio (SAR)	5.51	13.3	-	-	-	-	-	-	-	-	-	12	-
pH	7.85	9.91	-	-	-	-	-	-	-	-	-	6-9	-
Arsenic (mg/kg)	4.9	7.1	-	-	-	-	-	-	-	-	-	0.39	17.5
Barium (mg/kg)	1840	1870	-	-	-	-	-	-	-	-	-	15000	-
Cadmium (mg/kg)	<1.8	<1.1	-	-	-	-	-	-	-	-	-	70	-
Chromium (III) (mg/Kg)	39.3	25.7	-	-	-	-	-	-	-	-	-	120000	-
Chromium (VI) (mg/Kg)	<0.69	<1.0	-	-	-	-	-	-	-	-	-	23	-
Copper (mg/kg)	28.2	11.4	-	-	-	-	-	-	-	-	-	3100	-
Lead (inorganic) (mg/kg)	18.7	10.3	-	-	-	-	-	-	-	-	-	400	-
Mercury (mg/kg)	0.24	<0.085	-	-	-	-	-	-	-	-	-	23	-
Nickel (mg/kg)	19.0	13.8	-	-	-	-	-	-	-	-	-	1600	-
Selenium (mg/kg)	<9.0	<5.5	-	-	-	-	-	-	-	-	-	390	-
Silver (mg/kg)	<5.4	<3.3	-	-	-	-	-	-	-	-	-	390	-
Zinc (mg/kg)	71.1	37.0	-	-	-	-	-	-	-	-	-	23000	-
% Solids	56.4	88.7	90.0	88.8	86.1	87.9	88.8	83.1	90.6	87.6	85.1	-	-

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 3
Location: Love Ranch 8
Lab Summary - RP Subliner Assessment

Last update 11/11/2013

Analytical Parameter (with units)	Reserve Pit		RP Subliner Discrete Samples						Post ex. (-2')					Post ex. (-4')	COGCC	Maximum based on Background
	RES Pit Post Solid.	RES Pit Subliner	RP #1	RP #2	RP #3	RP #4	RP #5	RP #6	RP #1	RP #2	RP #3	RP #5	RP #6	RP #6	Table 910-1 Concentration Levels	
Accutest Job # & Sample Date	D42316 1/3/13	D42510 1/7/13	D42514 1/8/13						D43189 2/4/13					D43594 2/18/13	-	-
Sample type (Composite/Discrete)	C	C	D	D	D	D	D	D	D	D	D	D	D	D	-	-
TPH (GRO) (mg/Kg)	225	29.6	9.64	13.7	61.7	ND	ND	82.8	ND	ND	ND	ND	37.1	ND	-	-
TPH (DRO) (mg/Kg)	5850	1580	630	2850	1660	279	794	1610	81.0	156	88.8	15.1	1800	53.3	-	-
TPH (GRO + DRO) (mg/Kg)	6075	1610	640	2864	1722	279	794	1693	81.0	156	88.8	15.1	1837	53.3	500	-
Benzene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.170	-
Toluene (mg/Kg)	0.378	ND	-	-	-	-	-	-	-	-	-	-	-	-	85	-
Ethylbenzene (mg/Kg)	0.336	0.0415	-	-	-	-	-	-	-	-	-	-	-	-	100	-
Xylenes (total) (mg/Kg)	9.32	0.682	-	-	-	-	-	-	-	-	-	-	-	-	175	-
Acenaphthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	1000	-
Anthracene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	1000	-
Benzo(A)anthracene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.22	-
Benzo(B)fluoranthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.22	-
Benzo(K)fluoranthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	2.2	-
Benzo(A)pyrene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.022	-
Chrysene (mg/Kg)	ND	0.0254	-	-	-	-	-	-	-	-	-	-	-	-	22	-
Dibenzo(A,H)anthracene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.022	-
Fluoranthene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	1000	-
Fluorene (mg/Kg)	0.437	0.198	-	-	-	-	-	-	-	-	-	-	-	-	1000	-
Indeno(1,2,3,C,D)pyrene (mg/Kg)	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	0.22	-
Naphthalene (mg/Kg)	1.19	1.07	-	-	-	-	-	-	-	-	-	-	-	-	23	-
Pyrene (mg/Kg)	0.0800	0.0313	-	-	-	-	-	-	-	-	-	-	-	-	1000	-
Electrical Conductivity (mmhos/cm)	12.400	5.380	-	-	-	-	-	-	-	-	-	-	-	-	4	-
Sodium Adsorption Ratio (SAR)	16.2	44.7	-	-	-	-	-	-	-	-	-	-	-	-	12	-
pH	11.33	11.48	-	-	-	-	-	-	-	-	-	-	-	-	6-9	-
Arsenic (mg/kg)	8.8	11.1	-	-	-	-	-	-	-	-	-	-	-	-	0.39	17.5
Barium (mg/kg)	8260	4420	-	-	-	-	-	-	-	-	-	-	-	-	15000	-
Cadmium (mg/kg)	<1.5	<1.2	-	-	-	-	-	-	-	-	-	-	-	-	70	-
Chromium (III) (mg/Kg)	20.0	24.2	-	-	-	-	-	-	-	-	-	-	-	-	120000	-
Chromium (VI) (mg/Kg)	<5.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	23	-
Copper (mg/kg)	25.2	15.4	-	-	-	-	-	-	-	-	-	-	-	-	3100	-
Lead (inorganic) (mg/kg)	8.9	12.0	-	-	-	-	-	-	-	-	-	-	-	-	400	-
Mercury (mg/kg)	<0.12	<0.096	-	-	-	-	-	-	-	-	-	-	-	-	23	-
Nickel (mg/kg)	86.2	19.2	-	-	-	-	-	-	-	-	-	-	-	-	1600	-
Selenium (mg/kg)	<7.7	<5.9	-	-	-	-	-	-	-	-	-	-	-	-	390	-
Silver (mg/kg)	<4.6	<3.5	-	-	-	-	-	-	-	-	-	-	-	-	390	-
Zinc (mg/kg)	38.5	37.6	-	-	-	-	-	-	-	-	-	-	-	-	23000	-
% Solids	63.3	84.4	83.6	88.2	76.3	85.8	86.6	87.0	89.7	94.4	93.1	90.7	90.2	88.2	-	-

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 4
Location: Love Ranch 8
Lab Summary - Cuttings Subliner Assessment

Last update 11/11/2013

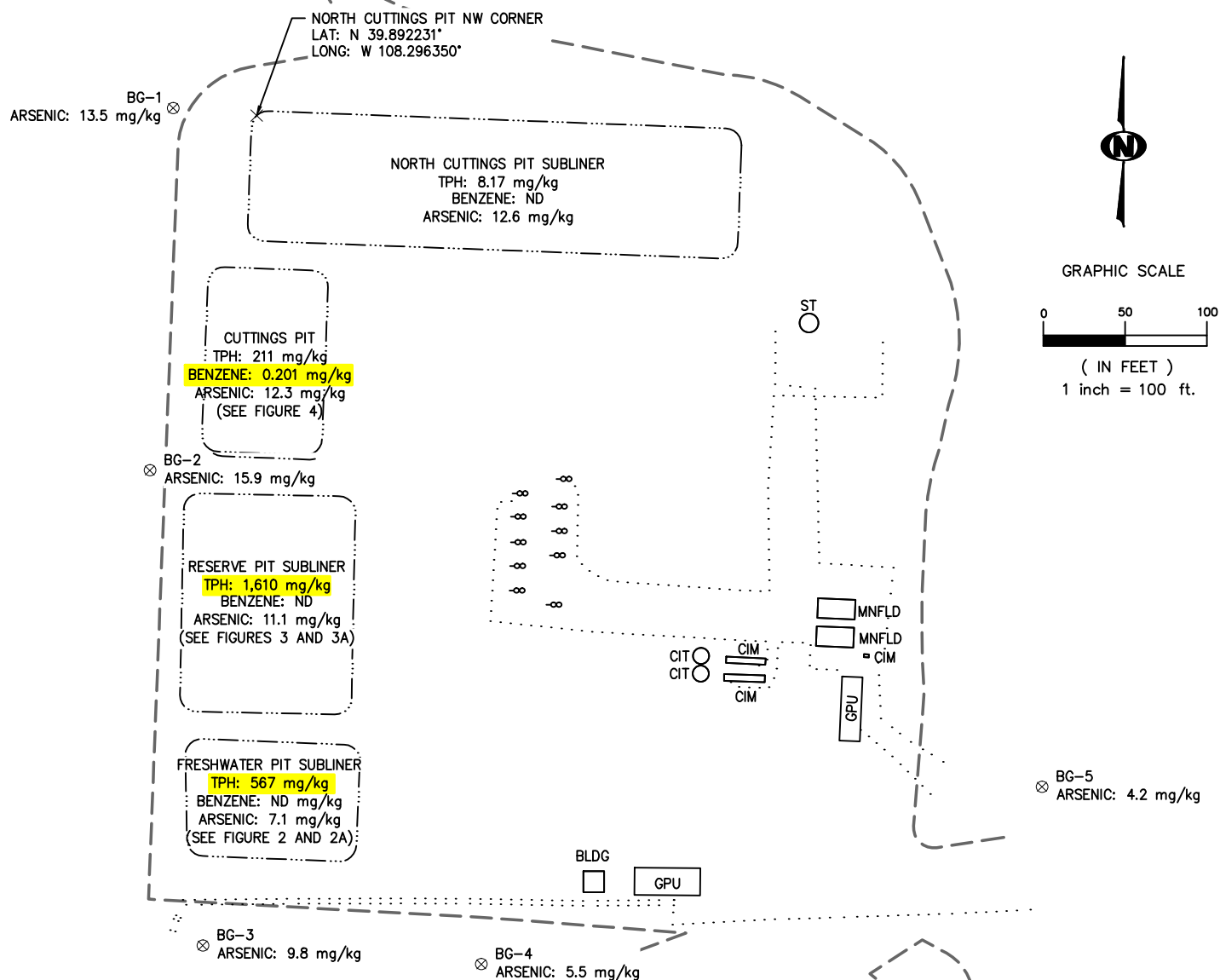
Analytical Parameter	Cuttings	Discrete Samples					COGCC	Maximum based on Background
(with units)	Cuttings Subliner	#1	#2	#3	#4	#5	Table 910-1 Concentration Levels	
Accutest Job # & Sample Date	D43723 2/20/13	D43725 2/20/13					-	-
Sample type (Composite/Discrete)	C	D	D	D	D	D	-	-
TPH (GRO) (mg/Kg)	ND	-	-	-	-	-	-	-
TPH (DRO) (mg/Kg)	211	-	-	-	-	-	-	-
TPH (GRO + DRO) (mg/Kg)	211	-	-	-	-	-	500	-
Benzene (mg/Kg)	0.201	ND	ND	0.0809	ND	0.0308	0.170	-
Toluene (mg/Kg)	0.707	-	-	-	-	-	85	-
Ethylbenzene (mg/Kg)	0.157	-	-	-	-	-	100	-
Xylenes (total) (mg/Kg)	0.574	-	-	-	-	-	175	-
Acenaphthene (mg/Kg)	ND	-	-	-	-	-	1000	-
Anthracene (mg/Kg)	ND	-	-	-	-	-	1000	-
Benzo(A)anthracene (mg/Kg)	ND	-	-	-	-	-	0.22	-
Benzo(B)fluoranthene (mg/Kg)	ND	-	-	-	-	-	0.22	-
Benzo(K)fluoranthene (mg/Kg)	ND	-	-	-	-	-	2.2	-
Benzo(A)pyrene (mg/Kg)	ND	-	-	-	-	-	0.022	-
Chrysene (mg/Kg)	0.0196	-	-	-	-	-	22	-
Dibenzo(A,H)anthracene (mg/Kg)	ND	-	-	-	-	-	0.022	-
Fluoranthene (mg/Kg)	ND	-	-	-	-	-	1000	-
Fluorene (mg/Kg)	0.0233	-	-	-	-	-	1000	-
Indeno(1,2,3,C,D)pyrene (mg/Kg)	ND	-	-	-	-	-	0.22	-
Naphthalene (mg/Kg)	0.105	-	-	-	-	-	23	-
Pyrene (mg/Kg)	ND	-	-	-	-	-	1000	-
Electrical Conductivity (mmhos/cm)	5.750	-	-	-	-	-	4	-
Sodium Adsorption Ratio (SAR)	58.3	-	-	-	-	-	12	-
pH	10.05	-	-	-	-	-	6-9	-
Arsenic (mg/kg)	12.3	-	-	-	-	-	0.39	17.5
Barium (mg/kg)	4470	-	-	-	-	-	15000	-
Cadmium (mg/kg)	<1.0	-	-	-	-	-	70	-
Chromium (III) (mg/Kg)	15.4	-	-	-	-	-	120000	-
Chromium (VI) (mg/Kg)	<1.0	-	-	-	-	-	23	-
Copper (mg/kg)	19.4	-	-	-	-	-	3100	-
Lead (inorganic) (mg/kg)	16.8	-	-	-	-	-	400	-
Mercury (mg/kg)	<0.096	-	-	-	-	-	23	-
Nickel (mg/kg)	15.1	-	-	-	-	-	1600	-
Selenium (mg/kg)	<5.0	-	-	-	-	-	390	-
Silver (mg/kg)	<3.0	-	-	-	-	-	390	-
Zinc (mg/kg)	43.5	-	-	-	-	-	23000	-
% Solids	87.9	81.1	92.6	89.2	86.6	90.1	-	-

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.

\\hyper-v03\kwd-co\sdk\proj\to environmental\1108-07a love ranch 8\civil3d\form 27\samples.dwg,12/17/14

LEGEND	
BLDG	BUILDING
GPU	GAS PROCESSING UNIT
CIM	CHEMICAL INJECTION MODULE
CIT	CHEMICAL INJECTION TANK
MNFLD	MANIFOLD
ST	STORAGE TANK
---	EDGE OF PAD
- - - -	APPROX. PIT LOCATION
.....	UTILITY CORRIDOR
	INDICATES LAB RESULTS ABOVE 500 mg/kg
○	WELL HEAD
⊗	BACKGROUND TEST LOCATION
ARSENIC: mg/kg	WITH LAB RESULTS



NOTES:

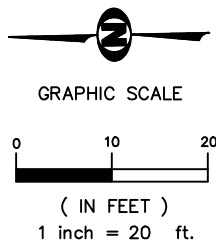
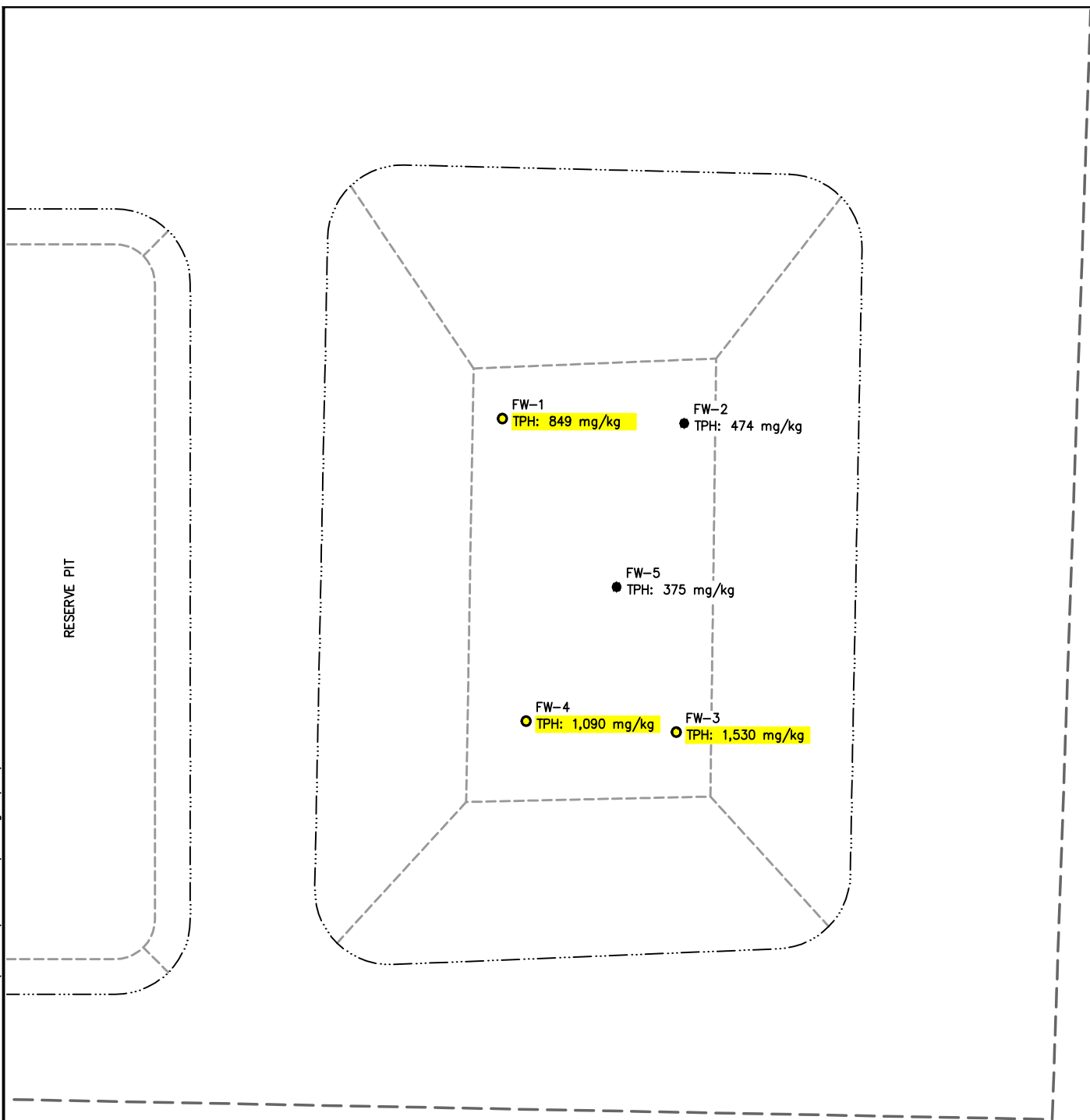
1. ND INDICATES NOT DETECTED WITHIN LABORATORY DETECTION LIMITS.
2. RESULTS SHOWN ARE SUBLINER CONFIRMATION SAMPLES UNLESS OTHERWISE NOTED.

GPS:	CHECKED:	FIGURE	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:	1		
12/17/14	DRF			
FILE NAME:	SHEET NO.	1 of 6		
samples				
PROJECT NO.	SCALE:	1" = 100'		
1108-07A				

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FIGURE 1
PICEANCE CREEK
LOVE RANCH 8
SAMPLE LOCATION MAP WITH
SELECT RESULTS
PREPARED FOR XTO ENERGY

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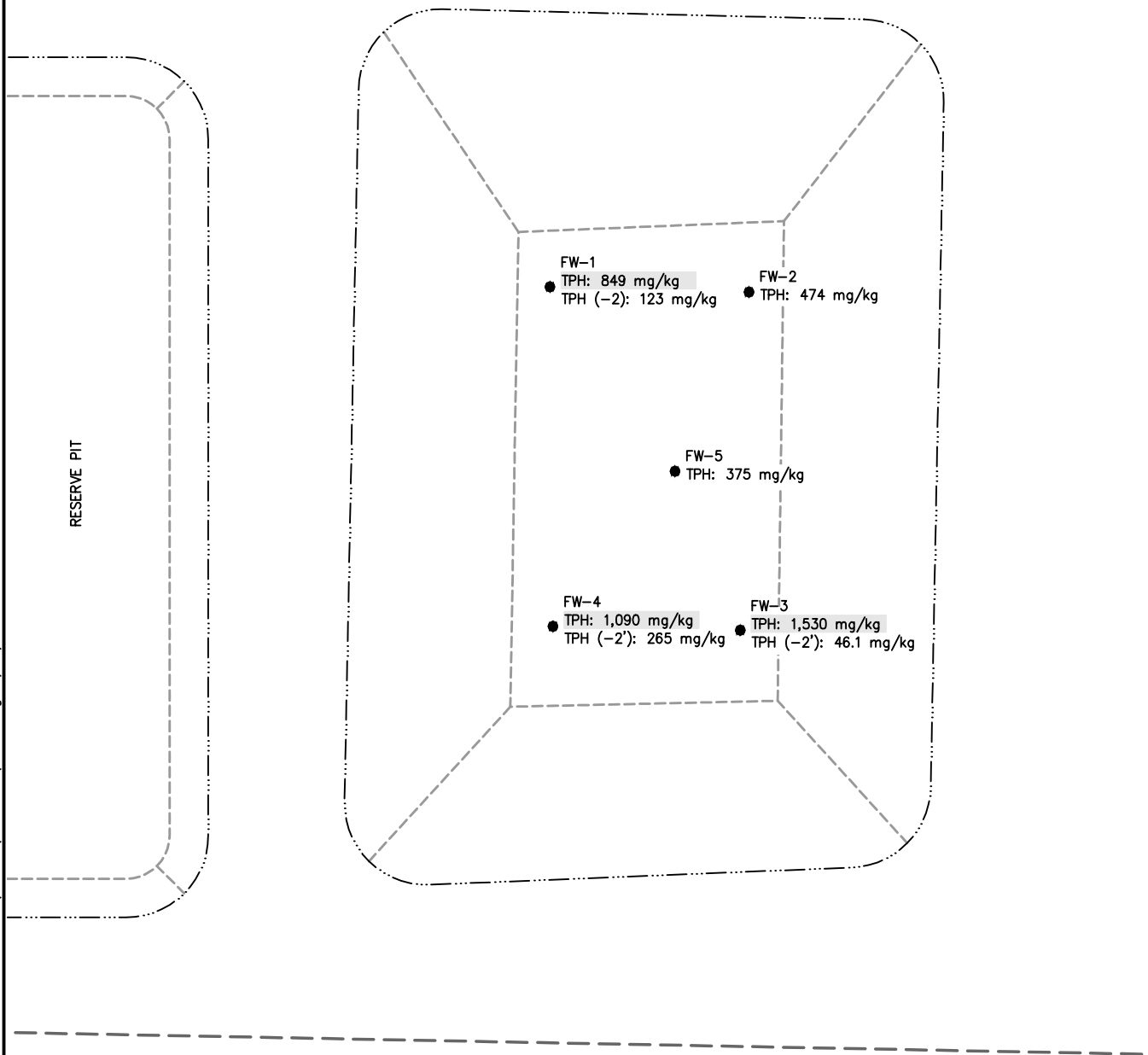
NOTE:
RESULTS SHOWN ARE SUBLINER CONFIRMATION
SAMPLES UNLESS OTHERWISE NOTED.

LEGEND	
---	EDGE OF PAD
---	APPROX. TOP OF PIT
---	APPROX. TOE OF PIT
● D-0 TPH: ≤ 500 mg/kg	DISCRETE SAMPLE LOCATION WITH TPH LAB RESULTS LESS THAN OR EQUAL TO 500 mg/kg
● D-0 TPH: > 500 mg/kg	DISCRETE SAMPLE LOCATION WITH TPH LAB RESULTS GREATER THAN 500 mg/kg

GPS:	CHECKED:	FIGURE 2	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:			
12/17/14	DRF			
FILE NAME:				
fw		SHEET NO. 2 of 6		
PROJECT NO.	SCALE:			
1108-07A	1" = 20'			

KRW CONSULTING, INC. 8000 W. 14TH AVENUE, SUITE 200 LAKEWOOD, COLORADO (303) 239-9011	FIGURE 2 PICEANCE CREEK LOVE RANCH 8 FRESHWATER PIT SUBLINER ASSESSMENT DATA PREPARED FOR XTO ENERGY

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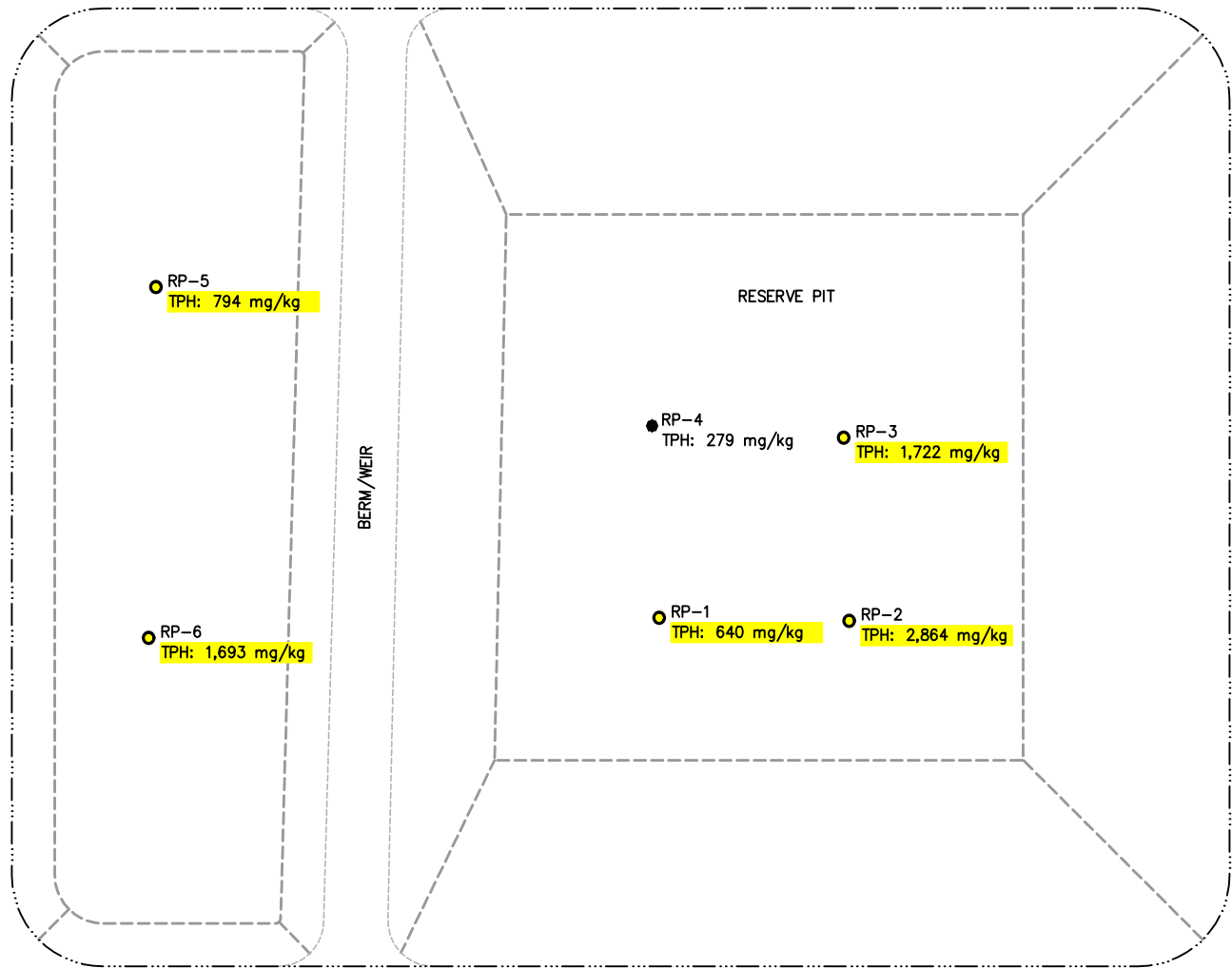
NOTE:
RESULTS SHOWN ARE SUBLINER CONFIRMATION
SAMPLES UNLESS OTHERWISE NOTED.

GPS:	CHECKED:	FIGURE 2A	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:			
12/17/14	DRF			
FILE NAME:				
fw cl		SHEET NO. 3 of 6		
PROJECT NO.	SCALE:			
1108-07A	1" = 20'			

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(303) 239-9011

FIGURE 2A
PICEANCE CREEK
LOVE RANCH 8
FRESHWATER PIT SUBLINER
CONFIRMATION DATA
PREPARED FOR XTO ENERGY

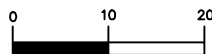
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TO WELL HEADS



GRAPHIC SCALE



(IN FEET)

1 inch = 20 ft.

NOTE:
RESULTS SHOWN ARE SUBLINER CONFIRMATION
SAMPLES UNLESS OTHERWISE NOTED.

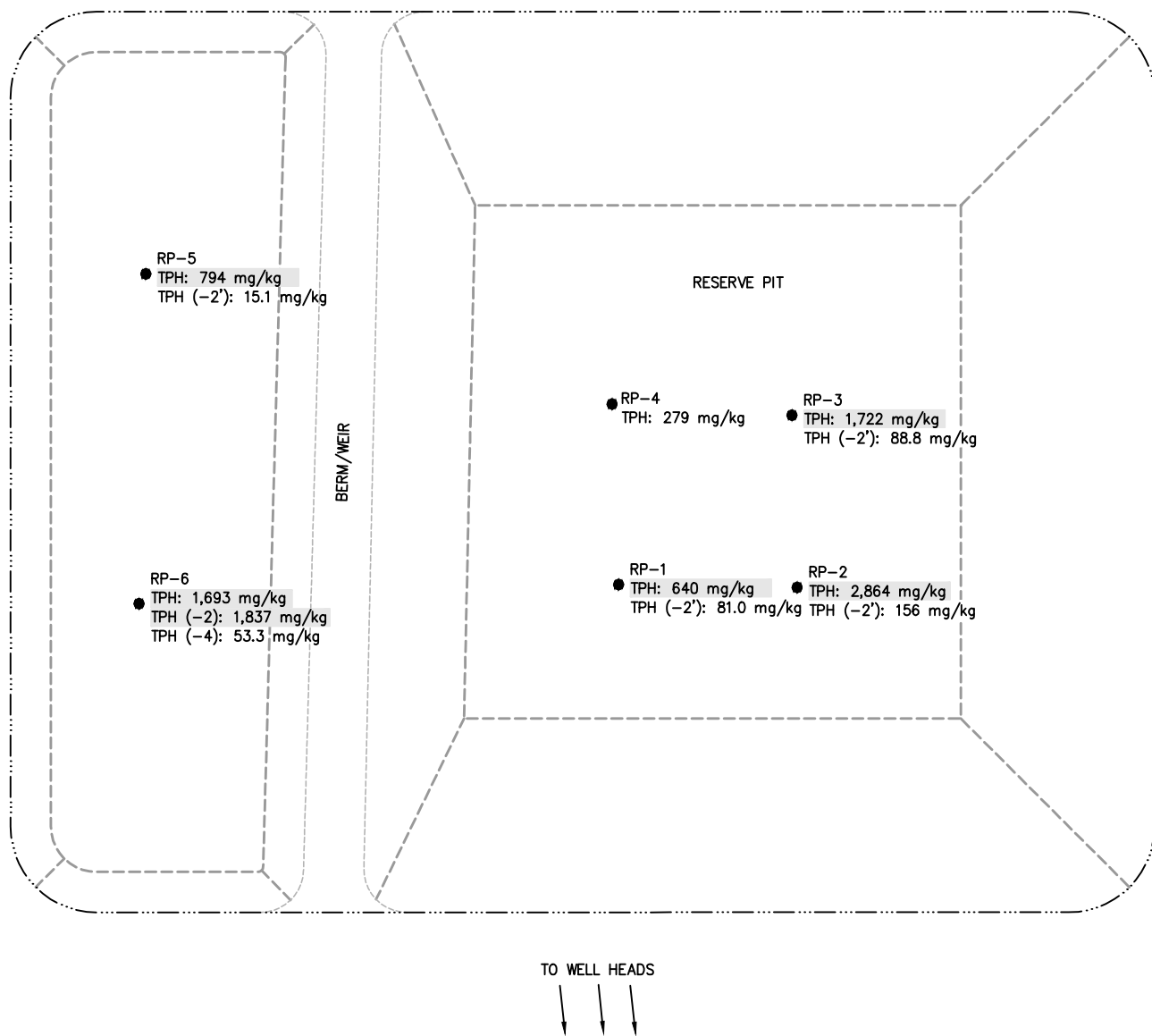
LEGEND	
---	EDGE OF PAD
-.-.-.-	APPROX. TOP OF PIT
-.-.-.-	APPROX. TOE OF PIT
-.-.-.-	BERM/WEIR
● D-0	DISCRETE SAMPLE LOCATION WITH TPH LAB
● TPH: ≤ 500 mg/kg	RESULTS LESS THAN OR EQUAL TO 500 mg/kg
● D-0	DISCRETE SAMPLE LOCATION WITH TPH
● TPH: > 500 mg/kg	LAB RESULTS GREATER THAN 500 mg/kg

GPS:	CHECKED:	FIGURE 3	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:			
12/17/14	DRF			
FILE NAME:				
rp		SHEET NO.		
		4 of 6		
PROJECT NO.		SCALE:		
1108-07A		1" = 20'		

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FIGURE 3
PICEANCE CREEK
LOVE RANCH 8
RESERVE PIT SUBLINER
ASSESSMENT DATA
PREPARED FOR XTO ENERGY

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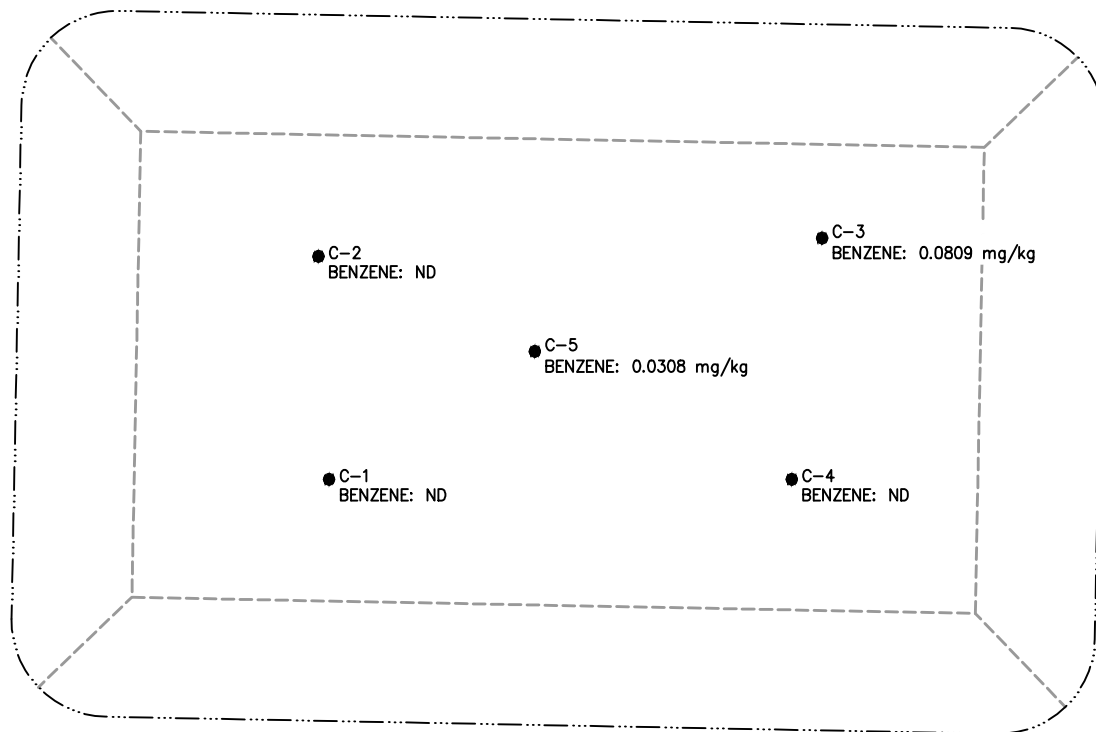
NOTE:
RESULTS SHOWN ARE SUBLINER CONFIRMATION
SAMPLES UNLESS OTHERWISE NOTED.

GPS:	CHECKED:	FIGURE 3A	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:			
12/17/14	DRF			
FILE NAME:	SHEET NO.	5 of 6		
rp cl				
PROJECT NO.	SCALE:			
1108-07A	1" = 20'			

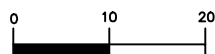
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FIGURE 3A
PICEANCE CREEK
LOVE RANCH 8
RESERVE PIT SUBLINER
CONFIRMATION DATA
PREPARED FOR XTO ENERGY

\\hyper-v03\kwd-co\sdk\proj\cto environmental\1108-07a love ranch 8\civil3d\form 27\cut.dwg,12/17/14



GRAPHIC SCALE



(IN FEET)

1 inch = 20 ft.

NOTES:

1. RESULTS SHOWN ARE SUBLINER CONFIRMATION SAMPLES UNLESS OTHERWISE NOTED.
2. ND INDICATES NOT DETECTED WITHIN LABORATORY DETECTION LIMITS.

LEGEND	
	EDGE OF PAD
	APPROX. TOP OF PIT
	APPROX. TOE OF PIT
	D-0
	BENZENE: < 0.170 mg/kg
	DISCRETE SAMPLE LOCATION WITH BENZENE LAB RESULTS LESS THAN OR EQUAL TO 0.170 mg/kg

GPS:	CHECKED:	FIGURE 4	DATE	REVISIONS
TRIMBLE	DK			
DATE:	DRAWN:			
12/17/14	DRF			
FILE NAME:				
cut		SHEET NO. 6 of 6		
PROJECT NO.	SCALE:			
1108-07A	1" = 20'			

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FIGURE 4
PICEANCE CREEK
LOVE RANCH 8
CUTTINGS PIT SUBLINER
CONFIRMATION DATA
PREPARED FOR XTO ENERGY