3.4.3 2008 Order 1 Soil Survey

The 2008 Order 1 soil survey was completed at the Plant site and MU1. A three-inch diameter hand-held soil auger was used to excavate soil pits up to a depth of 60 inches or the C horizon (whichever was less). Thirty-two soil pits were excavated and described. The pit data and interpretations were then used to select ten larger soil profile excavations. Each profile excavation was approximately 15 feet long, five feet deep, and four to five feet wide.

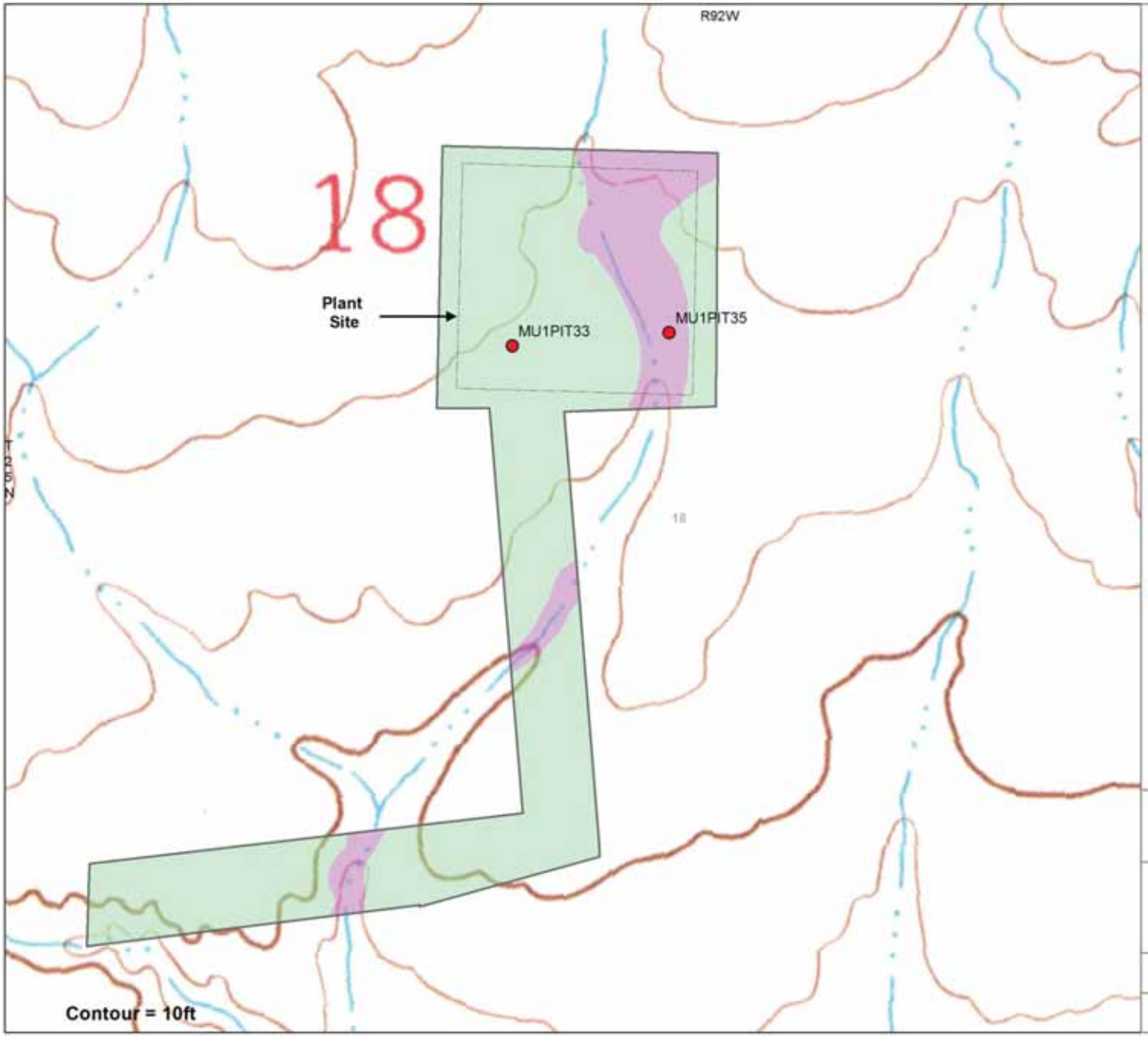
Based on these more detailed survey results, three soil series were identified at the Plant Site and MU1: Pepal Sandy Loam, Poposhia Loam, and Teagulf Sandy Loam. Detailed soils maps were created for the Plant Site and MU1 (**Figures 3.4-3** and **3.4-4**, respectively). Soil samples were analyzed for six of the soil profiles. Laboratory samples were analyzed for WDEQ Guideline No. 1 (1994a) soil texture and soil fertility parameters by Energy Laboratories in Casper, Wyoming. Results of this analysis are presented in **Table 3.4-2**.

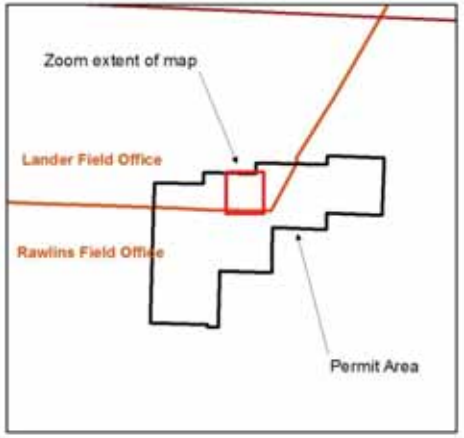
All of the soil types are favorable media for plant growth. Based on the survey results, the Pepal Sandy Loam provides 14 to 18 inches of suitable topsoil; the Poposhia Loam provides about 19 to 24 inches of suitable topsoil; and the Teagulf Sandy Loam provides about six to 12 inches of suitable topsoil (**Figure 3.4-5**). No groundwater was encountered at any of the sampling sites. The complete report for the Plant site is included in Attachment OP-5a in the main portion of the WDEQ-LQD Permit to Mine, and the complete report for MU1 is included in Attachment MU1 3-1 of the MU1 documents in the WDEQ-LQD Permit to Mine (LCI, 2011b).

3.4.4 2009 Order 1 Soil Survey

The 2009 Order 1 soil survey was completed for the deep injection well sites and access corridors within the main Permit Area. A sharpshooter spade and a bucket auger were used to excavate soil pits and characterize the soils. Fifteen locations were selected for backhoe profile excavations (**Figure 3.4-6** through **Figure 3.4-10**). These fifteen profiles were described, documented, and sampled. Samples from fourteen of the soil profiles were analyzed, and the results are presented in **Table 3.4-3**.

The three soil series identified were the same as in the 2008 Order 1 soil survey: Pepal Sandy Loam, Teagulf Sandy Loam, and Poposhia Loam (**Figure 3.4-11**). Based on the survey results, the average recommended topsoil salvage depth is 16 inches for the Pepal Sandy Loam, 22 inches for the Poposhia Loam, and ten inches for the Teagulf Sandy Loam. These depths are similar to those of the 2008 Order 1 soil survey. No groundwater was encountered at any of the sampling sites. The complete report for the 2009 survey is included in Attachment OP-5b of the WDEQ-LQD Permit to Mine (LCI, 2011b).





Legend

- Sample Location
- Poposhia loam, 0-1% slopes
- Pepal sandy loam, 1-3% slopes
- Plant Site (Conceptual)
- Survey Boundary
- Lost Creek Permit Area
- BLM Field Office Boundary

N

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FIGURE 3.4-3
Detailed Soil Survey Map of Plant Site, September 2008

0 0.05 0.1 Miles

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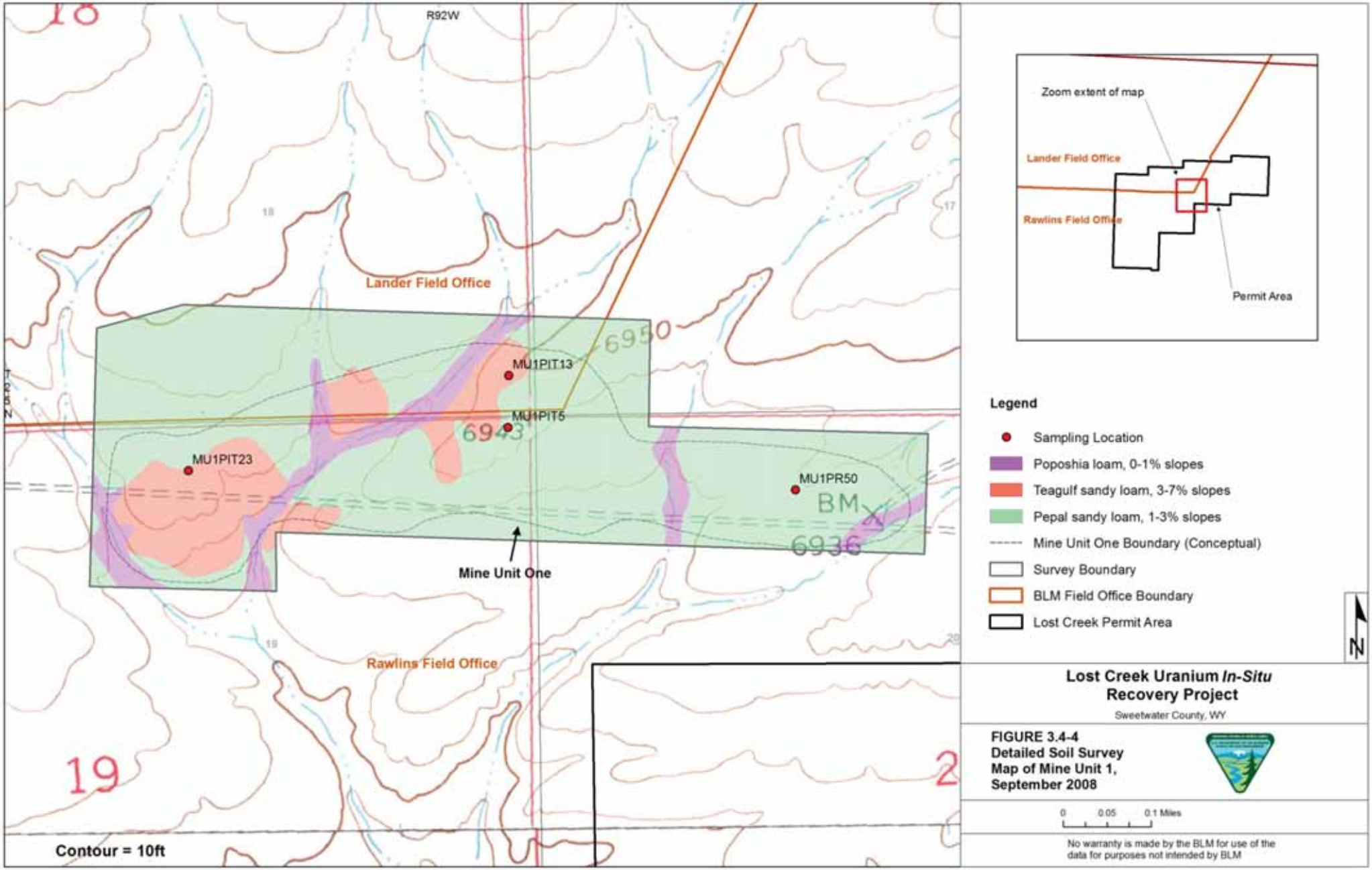
R92W
18
Lander Field Office
MU1PIT13
MU1PIT5
MU1PIT23
MU1PR50
6950
6943
BM
6936
Mine Unit One
Rawlins Field Office
19
2
Contour = 10ft
Zoom extent of map
Lander Field Office
Rawlins Field Office
Permit Area
Legend
Sampling Location
Poposhia loam, 0-1% slopes
Teagulf sandy loam, 3-7% slopes
Pepal sandy loam, 1-3% slopes
Mine Unit One Boundary (Conceptual)
Survey Boundary
BLM Field Office Boundary
Lost Creek Permit Area
N
Lost Creek Uranium In-Situ Recovery Project
Sweetwater County, WY
FIGURE 3.4-4
Detailed Soil Survey Map of Mine Unit 1, September 2008
0 0.05 0.1 Miles
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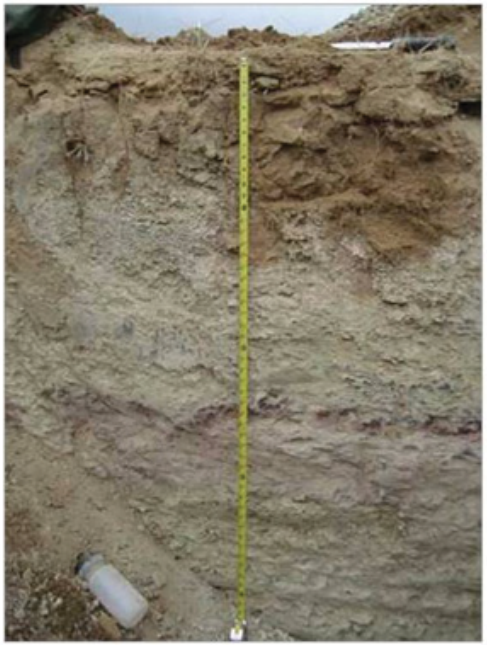
Table 3.4-2 Soil Sampling Results, 2008 Order 1 Soil Survey

Soil Series		Pepal Sandy Loam				Poposhia Loam						Teagulf Sandy Loam		
Profile Number & Location		MU1PR33		MU1PR50		MU1PR15		MU1PR35				MU1 PR13	MU1PR23	
Sample Depth (inches)		0-12	12-33	0-6	6-60	0-24	24-60	0-8	8-18	18-34	34-48	0-10	0-10	10-60
Parameter	Horizon / Units	A, B	B	A, B	C	A, B	C	A	B	B	C	A, B	A, B	C
pH	standard units	7	7	7.8	7.7	7.6	6.9	6.1	6.5	6.3	6.6	7.8	7.3	8
Electrical Conductivity	mmhos/ cm	0.39	0.51	0.47	0.47	0.52	0.57	0.78	0.31	2.77	0.53	0.48	0.55	1.82
Saturation	%	27.1	34.4	41.5	35.1	37	31.6	53.8	34.1	43.2	40.7	27.1	31.7	30.6
SAR	unitless	0.39	0.68	0.84	0.48	0.26	0.34	0.1	0.17	0.25	0.27	0.83	0.52	4.34
Selenium	ppm	<0.002	<0.002	0.007	0.005	0.003	0.004	0.011	0.005	0.009	0.004	<0.002	0.005	0.007
Boron	ppm	<0.20	<0.20	<0.20	<0.20	0.63	0.29	0.78	0.21	0.27	0.22	0.23	<0.20	0.31
Lime as $CaCO_3$	%	1.1	0.9	1	0.7	1	0.7	2	1.1	1.3	1.2	0.8	1.1	0.9
Calcium	meq/L	2.77	3.26	2.54	2.94	4.02	4.14	3.84	1.86	1.96	3.21	3.22	3.56	7.8
Magnesium	meq/L	1.16	1.42	1.13	1.3	1.85	1.69	1.7	0.86	0.8	1.38	1.03	1.83	3.33
Sodium	meq/L	0.55	1.03	1.13	0.7	0.44	0.58	0.17	0.2	0.3	0.41	1.2	0.85	10.2
Organic Matter	%	0.8	0.5	1.5	0.5	2.4	0.9	5.6	1.2	0.9	0.7	1	0.9	0.3
Sand (%)	%	58	84	72	80	42	52	31	38	28	44	66	68	82
Silt (%)	%	24	4	10	6	38	28	44	40	44	33	16	16	6
Clay (%)	%	18	12	18	14	20	20	25	22	28	23	18	16	12
Texture		SL	LS	SL	SL	L	L	L	L	CL	L	SL	SL	SL

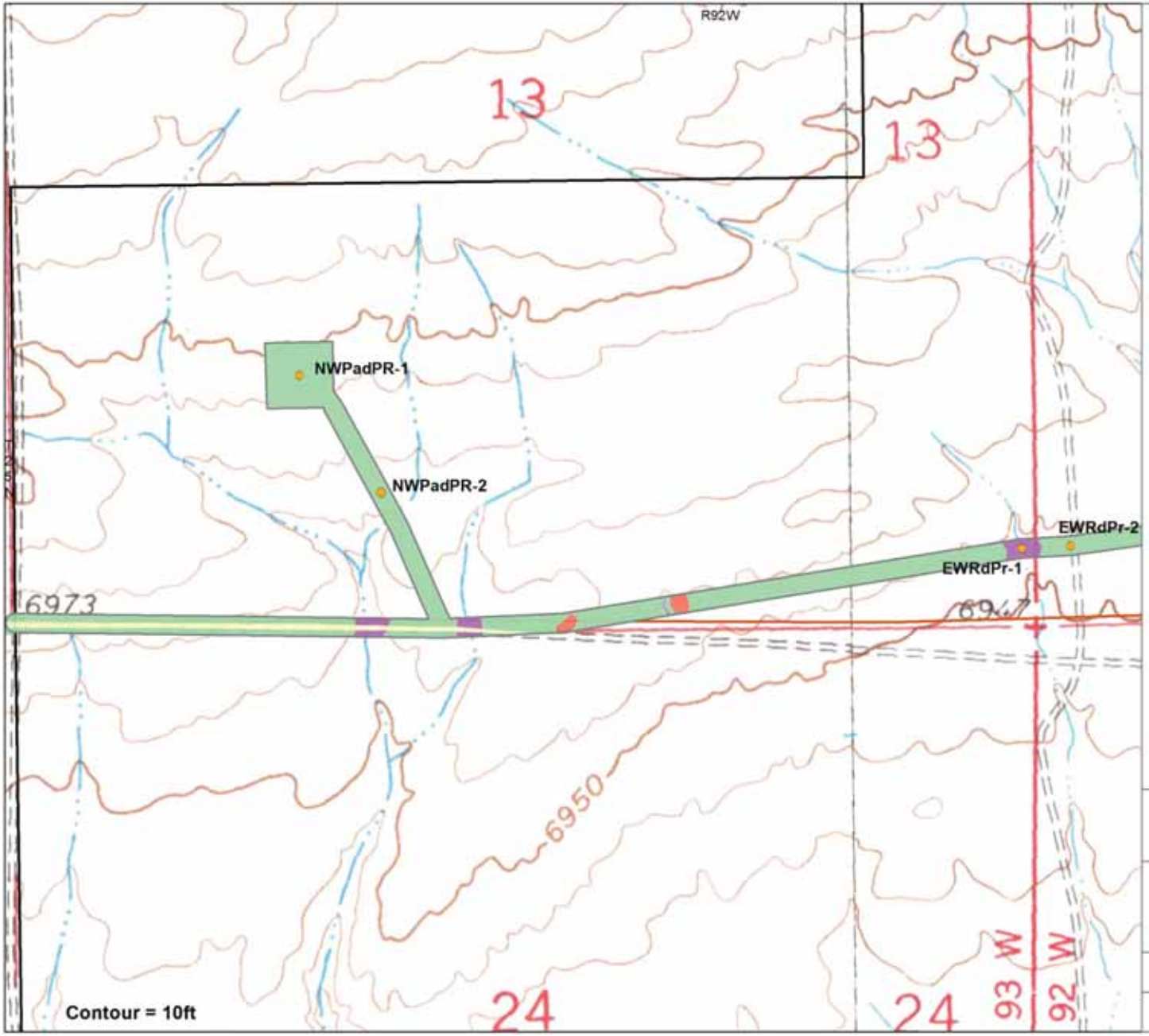
Figure 3.4-5 Photographs of 2008 Soil Survey Sampling Points

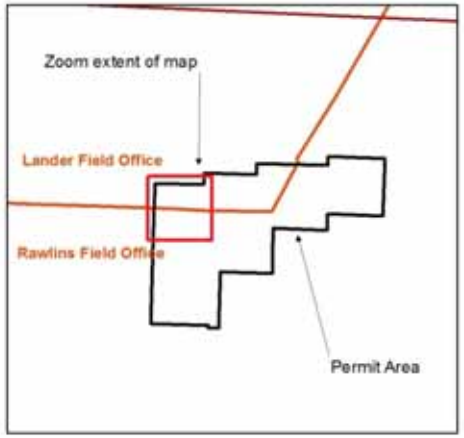
Sample point MU1PR50
Pepal Sandy Loam

Sample point MU1PR15
Poposhia Loam



Sample point MU1PR13
Teagulf Sandy Loam





Legend

- Profile - September 2009
- Survey Boundary - September 2009
- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary

N

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Sweetwater County, WY

FIGURE 3.4-6
Sampling Locations Map - NW

0 0.05 0.1 Miles

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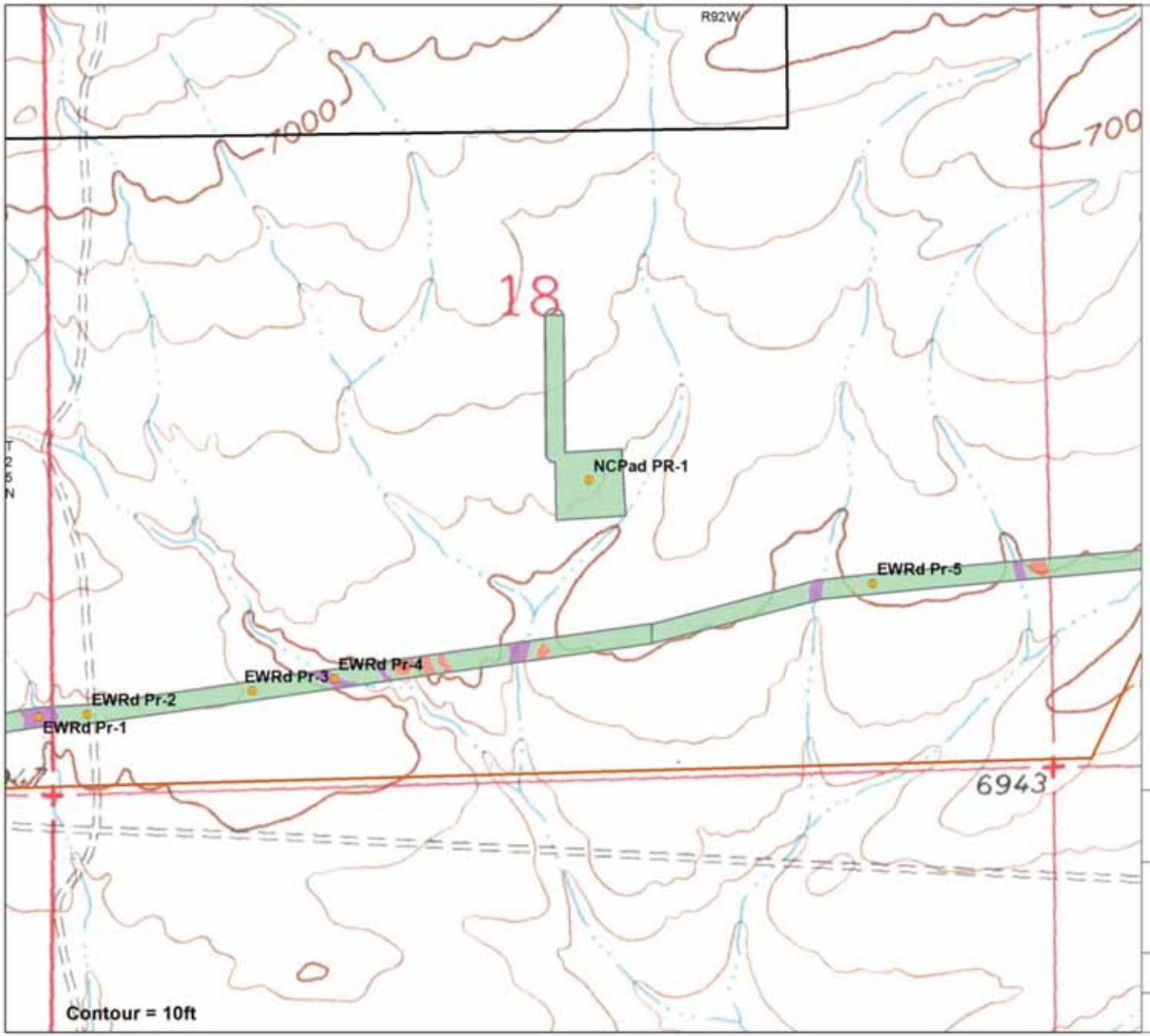

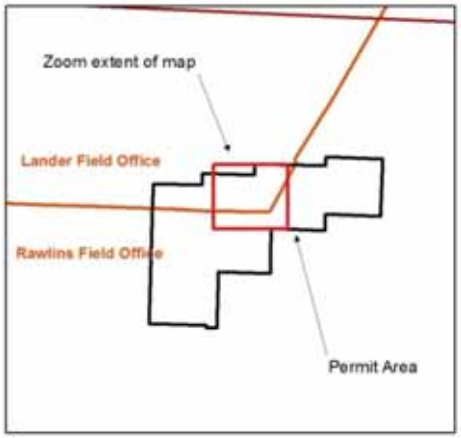

Legend

- Profile - September 2009
- Survey Boundary - September 2009
- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary

N

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Sweetwater County, WY

FIGURE 3.4-7
Sampling Locations Map - Center 1

0 0.05 0.1 Miles

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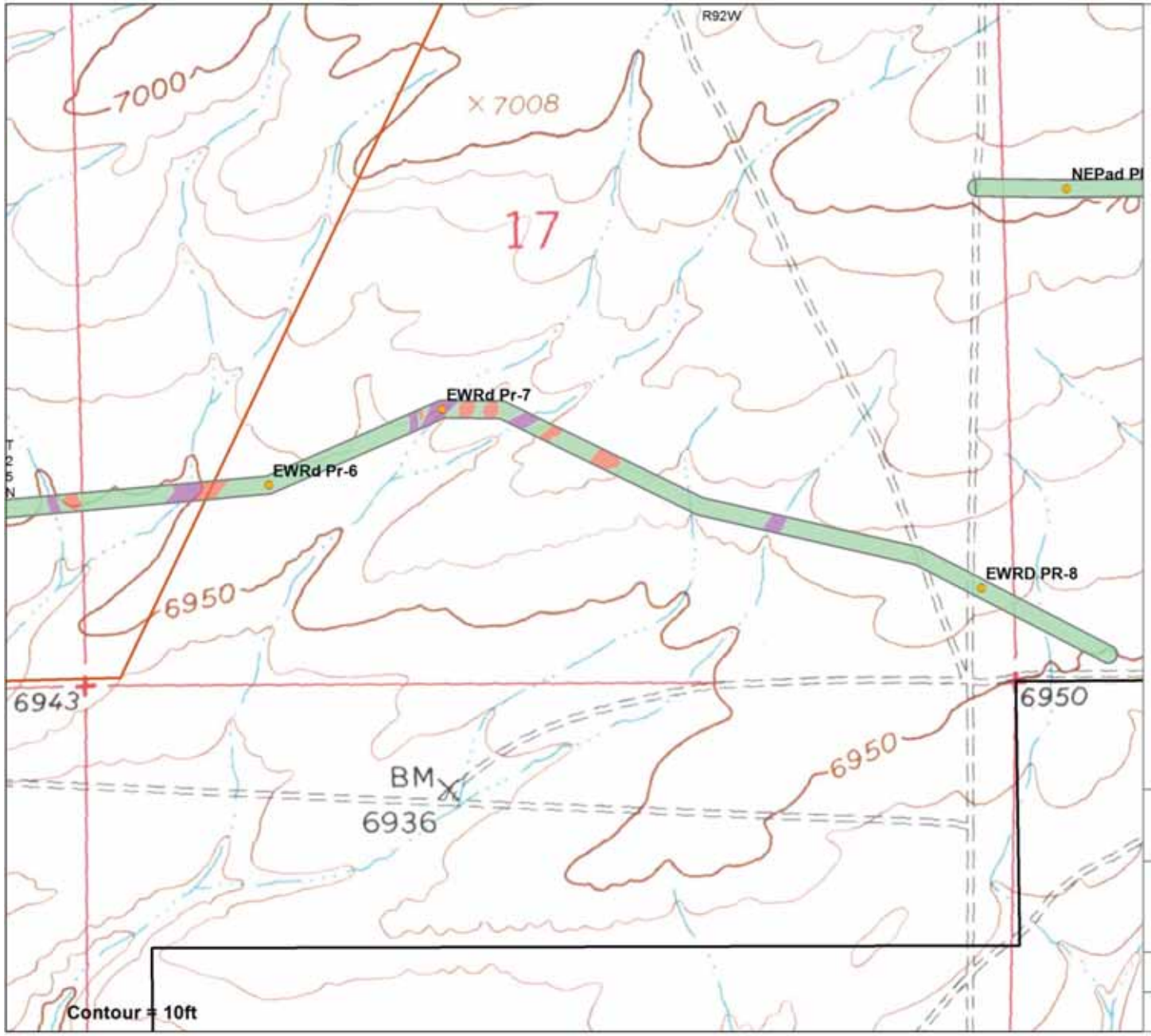

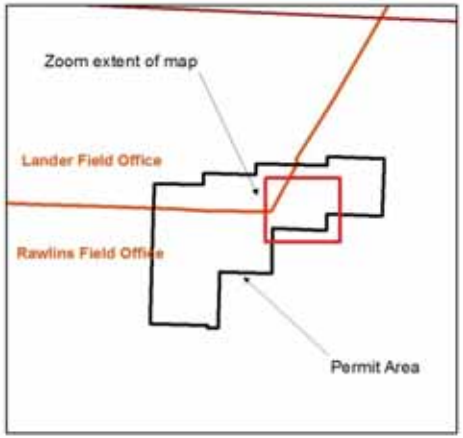

Legend

- Profile - September 2009
- Survey Boundary - September 2009
- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary

N

Lost Creek Uranium *In-Situ* Recovery Project

Sweetwater County, WY

FIGURE 3.4-8
Sampling Locations Map- Center 2

0 0.05 0.1 Miles

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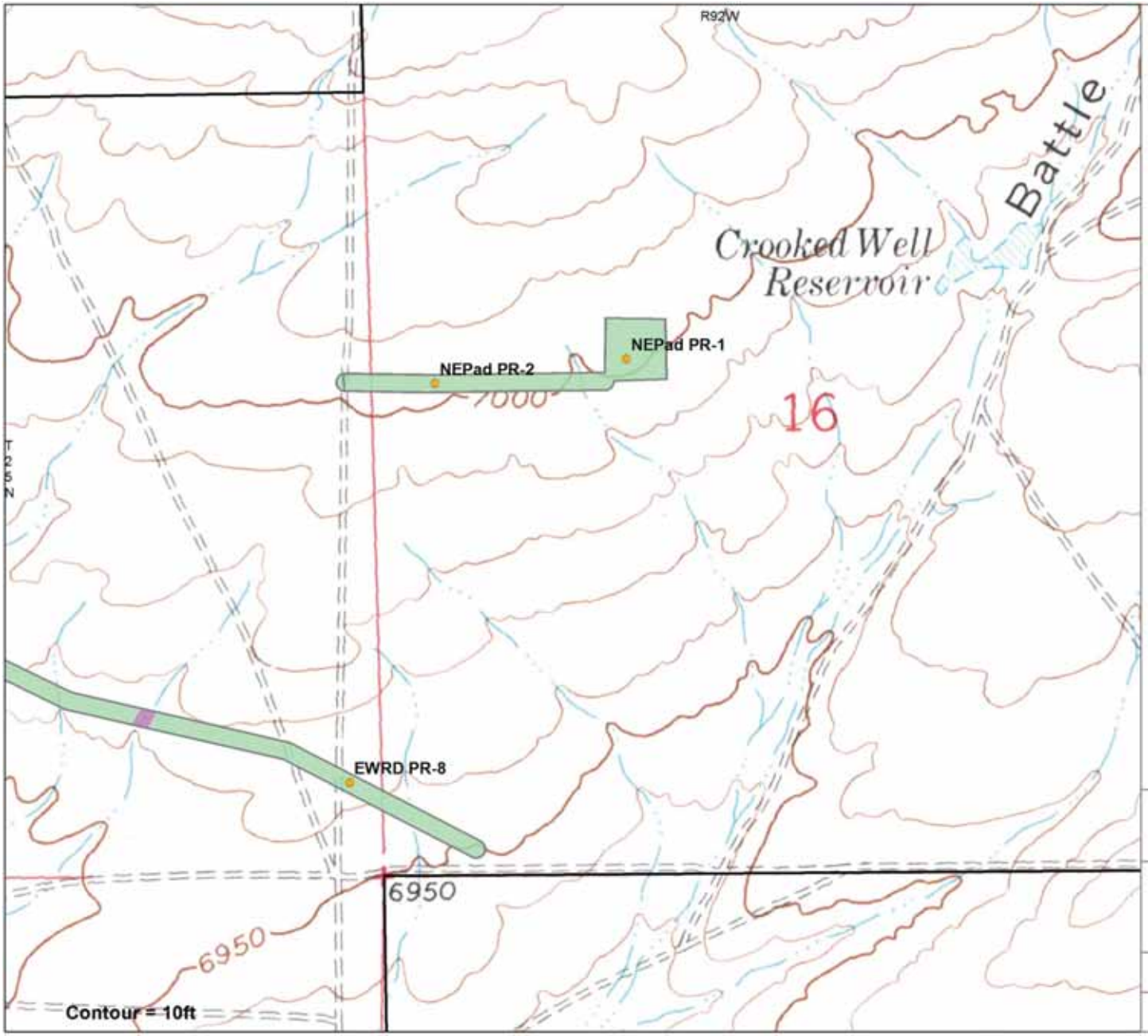

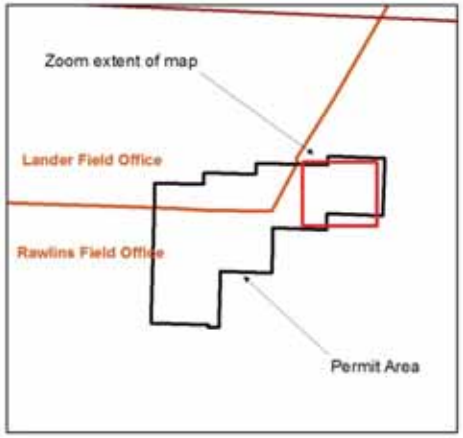

Legend

- Profile - September 2009
- Survey Boundary - September 2009
- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary

N

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FIGURE 3.4-9
Sampling Locations Map - NE

0 0.05 0.1 Miles

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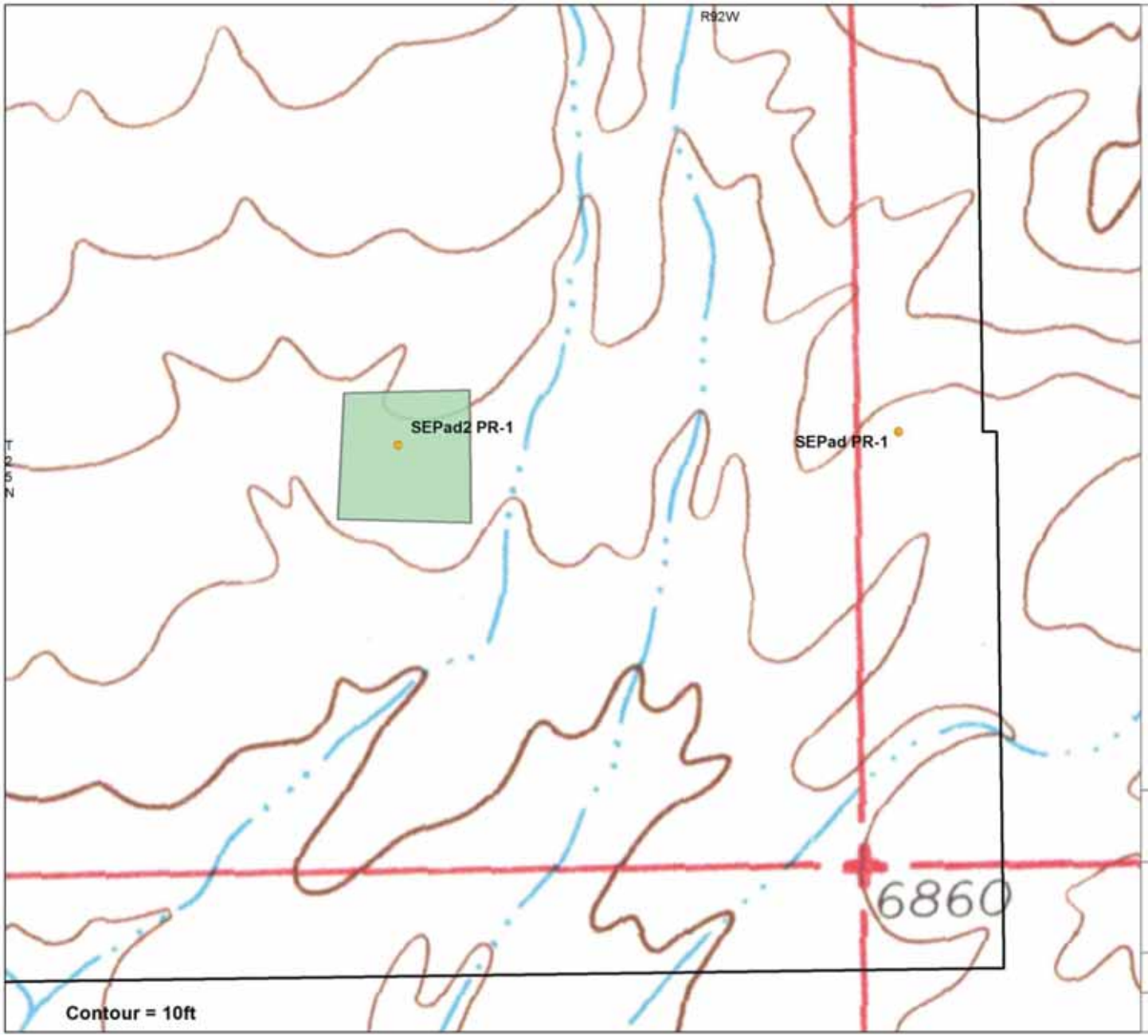

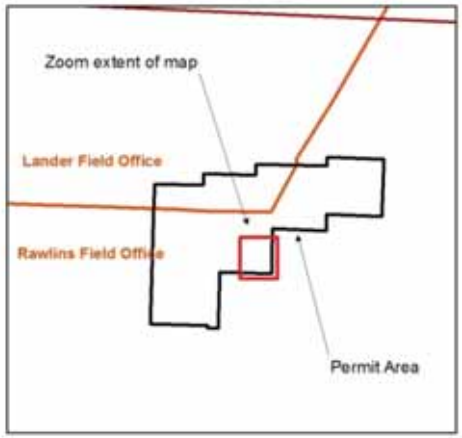

Legend

- Profile - September 2009
- Survey Boundary - September 2009
- Pepal sandy loam, 1-3% slopes
- Lost Creek Permit Area
- BLM Field Office Boundary

N

Lost Creek Uranium *In-Situ* Recovery Project

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FIGURE 3.4-10
Sampling Locations Map - SE

0 0.05 0.1 Miles

No warranty is made by the BLM for use of the data for purposes not intended by BLM

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 1 of 6)

	Soil Type	Pepal Sandy Loam								
	Sampling Location	NW Pad PR-1				NW Pad PR-2				
	Sample Depth (inches)	0-3	3-12	12-16	16-48	0-3	3-10	10-18	18-38	18-38
Parameter	Horizon / Units	A	Bw	Bw	Cr	A	Bw	Bk	C/Cr	C/Cr
pH	standard units	6.3	7.1	7.4	8.8	7.2	7.3	7.8	8.3	8.3
Electrical Conductivity	mmhos/cm	0.1	0.2	0.2	0.7	0.2	0.2	1.9	5.2	5.4
Saturation	%	26.1	30.4	33.8	32.9	24.0	31.2	31.6	38.4	35.3
SAR	unitless	1.2	1.1	0.7	5.0	1.8	3.4	8.6	12.0	12.1
Selenium	ppm	0.049	0.045	0.015	0.040	0.041	0.019	0.032	0.034	0.035
Boron	ppm	0.01	0.03	0.02	0.02	0.03	0.03	0.02	0.11	0.13
Lime Estimate		Low	Low	Low	Very High	Low	Low	Medium	Very High	Very High
Calcium	meq/L	0.4	0.8	1.4	3.0	0.7	0.5	5.7	31.0	31.6
Magnesium	meq/L	0.1	0.2	0.4	0.6	0.2	0.1	1.9	9.2	9.5
Sodium	meq/L	0.6	0.8	0.7	6.7	1.2	1.9	16.7	53.7	54.8
Potassium	meq/L	0.2	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1	0.1
Organic Matter	%	1.0	1.3	0.6	0.9	1.1	0.9	0.7	0.5	0.5
Sand	%	69	51	62	69	59	43	51	50	50
Silt	%	16	26	20	9	27	29	29	37	36
Clay	%	15	23	18	22	14	28	20	13	14
Texture		SL	SCL	SL	SCL	SL	CL	L	L	L
Nitrate NO_3-N	ppm	10.7	4.6	6.6	7.7	5.3	2.2	5.7	8.7	8.9
Phosphorus	ppm	6.2	1.8	0.3	0.6	2.8	0.3	0.3	3.1	3.1
Potassium	ppm	99.2	51.6	24.9	24.4	110	53.3	27.2	17.0	16.9
Zinc	ppm	0.28	0.06	0.06	0.03	0.22	0.11	0.10	0.08	0.08
Iron	ppm	9.43	2.53	0.89	0.45	4.44	2.32	0.90	0.73	0.79
Manganese	ppm	1.93	0.47	0.37	0.21	0.95	0.54	0.29	0.22	0.20
Copper	ppm	0.83	0.75	0.54	0.50	1.19	0.95	0.93	0.67	0.65

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 2 of 6)

	Soil Type	Pepal Sandy Loam								
	Sampling Location	NC Pad PR-1					SE Pad PR-1			
	Sample Depth (inches)	0-3	3-11	11-18	18-40	40-62	0-3	3-16	16-30	30-52
Parameter	Horizon / Units	A	B	Bk	C/Cr	Cr	A	Bw	Bc	C/Cr
pH	standard units	6.9	7.3	8.1	8.5	8.0	6.5	7.1	8.7	8.3
Electrical Conductivity	mmhos/cm	0.2	0.2	0.2	1.1	4.8	0.2	0.1	1.3	0.3
Saturation	%	29.1	29.9	26.4	28.3	29.0	20.6	26.1	29.0	26.5
SAR	unitless	0.9	0.6	3.3	6.1	8.2	1.3	1.6	10.5	1.2
Selenium	ppm	0.019	0.025	0.04	0.022	0.05	0.032	0.028	0.045	0.057
Boron	ppm	0.02	0.03	0.02	0.03	0.16	0.01	0.01	0.03	0.02
Lime Estimate		Low	Low	Low	High	High	Low	Low	Medium	Low
Calcium	meq/L	0.7	1.5	0.4	3.2	44.1	0.7	0.3	3.1	1.3
Magnesium	meq/L	0.2	0.6	0.1	1.4	14.4	0.2	0.0	1.0	0.4
Sodium	meq/L	0.6	0.7	1.7	9.2	44.4	0.8	0.7	14.9	1.1
Potassium	meq/L	0.2	<0.1	<0.1	0.1	0.8	0.2	<0.1	0.1	<0.1
Organic Matter	%	1.1	0.8	0.7	0.5	0.4	0.9	0.5	0.5	0.4
Sand	%	70	61	52	65	65	71	65	70	79
Silt	%	15	15	27	19	19	16	19	15	7
Clay	%	15	24	21	16	16	13	16	15	14
Texture		SL	SCL	SCL	SL	SL	SL	SL	SL	SL
Nitrate NO_3-N	ppm	3.0	3.3	5.9	4.8	8.8	3.9	4.9	2.3	3.5
Phosphorus	ppm	2.5	0.6	0.6	0.6	1.2	3.7	0.9	6.2	2.5
Potassium	ppm	119	50.3	34.1	29.8	76.4	83.9	43.7	54.0	19.3
Zinc	ppm	<0.01	<0.01	0.03	<0.01	0.48	0.17	0.11	0.04	0.03
Iron	ppm	4.85	2.96	2.05	1.61	3.11	7.03	3.47	1.12	1.03
Manganese	ppm	0.83	0.28	0.39	<0.01	0.66	1.27	0.53	0.32	0.20
Copper	ppm	0.88	0.69	0.55	0.41	0.30	0.87	1.18	0.42	0.55

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 3 of 6)

	Soil Type	Pepal Sandy Loam								
	Sampling Location	NE Pad PR-1					NE Pad PR-2			
	Sample Depth (inches)	0-3	3-8	8-16	16-34	34-68	0-3	3-16	16-30	30-62
Parameter	Horizon / Units	A	Bw	BC	C/Cr	Cr	A	Bw	Bk	C/Cr
pH	standard units	7.0	7.4	7.7	8.5	8.8	5.5	7.0	8.2	8.2
Electrical Conductivity	mmhos/cm	0.3	0.1	0.2	0.2	0.3	0.2	0.1	0.3	3.7
Saturation	%	22.1	28.1	28.1	27.8	23.7	28.1	27.2	26.9	27.7
SAR	unitless	1.2	0.9	0.8	0.9	2.0	0.8	1.3	1.3	5.5
Selenium	ppm	0.04	0.04	0.04	0.035	0.036	0.04	0.05	0.05	0.05
Boron	ppm	0.02	0.03	0.02	0.01	0.00	0.03	0.03	0.02	0.11
Lime Estimate		Low	Low	Low	Medium	Medium	Low	Low	High	High
Calcium	meq/L	0.8	0.7	0.8	1.1	1.5	0.6	0.5	1.6	26.7
Magnesium	meq/L	0.3	0.1	0.1	0.1	0.2	0.2	<0.1	0.8	16.6
Sodium	meq/L	0.9	0.5	0.6	0.7	1.9	0.5	0.6	1.4	25.6
Potassium	meq/L	0.2	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.3
Organic Matter	%	1.2	0.9	0.4	0.3	0.2	1.1	0.5	0.7	0.5
Sand	%	67	58	78	84	80	65	58	55	79
Silt	%	21	20	7	4	8	19	25	27	8
Clay	%	12	22	15	12	12	16	17	18	13
Texture		SL	SCL	SL	LS	SL	SL	SL	SL	SL
Nitrate NO_3-N	ppm	5.5	9.2	5.5	6.2	6.7	5.9	10.3	10.3	8.3
Phosphorus	ppm	3.7	0.9	1.2	6.5	7.4	8.1	0.6	0.9	11.2
Potassium	ppm	153	77.4	25.3	19.5	17.3	180	63.8	54.9	51.7
Zinc	ppm	0.27	0.08	0.03	<0.01	0.03	0.76	0.11	0.05	0.10
Iron	ppm	6.17	3.3	1.38	0.88	1.25	20.9	4.75	2.62	2.32
Manganese	ppm	1.13	0.52	0.24	0.15	0.35	5.09	1.04	0.68	0.50
Copper	ppm	1.40	1.10	0.65	0.47	0.57	1.86	1.07	0.75	0.85

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 4 of 6)

	Soil Type	Pepal Sandy Loam												
	Sampling Location	EW Rd PR-3				EW Rd PR-5					EW Rd PR-6			
	Sample Depth (inches)	0-3	3-16	16-30	30-55	0-3	3-10	10-16	16-25	25-53	0-3	3-14	14-28	28-56
Parameter	Horizon / Units	A	Bw	Bck	C/Cr	A	Bw1	Bw2	Bck	C/Cr	A	Bw	Bck	C/Cr
pH	standard units	7.1	7.7	8.3	8.3	7.1	7.6	8.1	8.3	8.3	7.0	7.3	8.6	8.3
Electrical Conductivity	mmhos/cm	0.2	0.2	0.9	5.7	0.2	0.1	0.2	0.2	2.2	0.2	0.1	0.2	2.1
Saturation	%	27.7	26.4	29.8	31.6	23.6	32.2	28.2	22.4	40.7	25.4	27.9	30.4	29.6
SAR	unitless	0.6	1.5	4.9	7.1	1.1	1.4	<0.1	2.5	6.5	0.6	1.1	1.0	8.9
Selenium	ppm	0.028	0.033	0.024	0.030	0.033	0.044	0.036	0.040	0.046	0.015	0.051	0.045	0.030
Boron	ppm	0.03	0.04	0.02	0.11	0.02	0.03	0.02	0.02	0.05	0.03	0.02	0.01	0.05
Lime Estimate		Low	Low	High	High	Low	Low	Low	Very High	Medium	Low	Low	Very High	High
Calcium	meq/L	1.0	0.9	3.0	43.3	0.7	0.4	<0.1	0.8	8.8	0.7	0.3	1.5	6.3
Magnesium	meq/L	0.4	0.3	1.3	21.2	0.3	0.1	<0.1	<0.1	2.7	0.3	0.1	0.3	3.3
Sodium	meq/L	0.5	1.1	7.2	40.3	0.8	0.7	0.0	1.7	15.7	0.5	0.5	0.9	19.5
Potassium	meq/L	1.1	0.1	0.1	0.5	0.2	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.2
Organic Matter	%	1.0	0.7	0.6	0.5	1.0	0.8	0.4	0.8	0.4	1.0	0.6	0.5	0.9
Sand	%	77	54	66	80	72	49	50	61	69	65	59	79	80
Silt	%	13	27	15	6	13	26	30	26	17	18	17	7	8
Clay	%	10	19	19	14	15	25	20	13	14	17	24	14	12
Texture		SL	SL	SL	SL	SL	SCL	L	SL	SL	SL	SCL	SL	SL
Nitrate NO_3-N	ppm	3.8	4.5	5.3	8.0	12.0	3.1	1.2	4.2	7.5	2.8	1.3	4.9	8.3
Phosphorus	ppm	4.3	<0.1	0.9	11.2	2.8	<0.1	<0.1	<0.1	0.6	3.7	0.3	0.3	1.2
Potassium	ppm	235	70.4	29.2	40.9	117	28.0	15.2	11.7	14.0	129	29.1	10.1	47.6
Zinc	ppm	<0.01	<0.01	<0.01	<0.01	0.21	0.09	0.04	0.01	0.01	0.24	0.05	0.04	0.04
Iron	ppm	5.6	3.97	1.62	0.93	3.86	1.44	0.96	1.02	0.77	4.54	1.49	0.48	0.66
Manganese	ppm	1.63	0.28	0.18	0.06	1.19	0.28	0.20	0.18	0.15	1.34	0.28	0.19	0.19
Copper	ppm	1.10	0.91	0.70	0.52	0.97	1.49	1.21	0.60	0.42	0.79	0.61	0.33	1.02

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 5 of 6)

Soil Type		Poposhia Loam												
Sampling Location		EW Rd PR-1				EW Rd PR-4					EW Rd PR-7			
Sample Depth (inches)		0-3.5	3.5-14	14-24	24-35	0-4	4-19	19-34	34-58	34-58	0-4	4-12	12-22	22-47
Parameter	Horizon / Units	A	Bw	Bc	C/Cr	A	Bw	Bc	C/Cr	C/Cr	A	Bw1	Bw2	C
pH	standard units	6.4	6.4	6.9	6.9	6.1	6.7	6.2	6.5	6.3	6.2	5.9	6.4	7.6
Electrical Conductivity	mmhos/cm	0.2	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.2
Saturation	%	31.1	26.8	22.7	34.5	34.6	29.0	25.7	22.4	22.6	47.5	53.1	29.1	28.2
SAR	unitless	1.1	1.5	1.6	1.2	1.1	1.4	2.6	2.7	3.2	1.0	0.9	1.3	0.5
Selenium	ppm	0.03	0.022	0.029	0.019	0.03	0.013	0.016	0.031	0.032	0.038	0.040	0.033	0.027
Boron	ppm	0.03	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.04	0.04	0.02	0.01
Lime Estimate		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Calcium	meq/L	0.6	0.4	0.2	0.2	1.1	0.3	<0.1	<0.1	<0.1	1.2	0.6	0.2	0.9
Magnesium	meq/L	0.1	0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	0.4	0.2	<0.1	0.2
Sodium	meq/L	0.7	0.7	0.5	0.4	0.9	0.6	0.4	0.4	0.4	0.9	0.6	0.5	0.3
Potassium	meq/L	0.3	0.4	<0.1	<0.1	0.5	0.1	0.1	0.1	<0.1	0.3	0.1	<0.1	0.1
Organic Matter	%	2.4	1.0	0.4	0.8	1.7	0.9	0.3	0.5	0.5	4.0	1.6	0.8	0.3
Sand	%	61	63	73	82	49	54	75	79	79	33	38	49	80
Silt	%	27	22	13	4	37	30	8	8	7	52	43	26	6
Clay	%	12	15	14	14	14	16	17	13	14	15	19	25	14
Texture		SL	SL	SL	SL	L	SL	SL	SL	SL	SiL	L	SCL	SL
Nitrate NO_3-N	ppm	6.5	6.0	9.2	4.8	7.7	4.2	8.2	4.3	3.8	11.4	4.7	4.9	8.9
Phosphorus	ppm	7.4	2.5	2.5	1.8	10.6	10.6	3.1	3.1	3.1	14.9	3.1	0.6	0.6
Potassium	ppm	252	190	54.8	32.0	246	122	49.8	42.7	47.0	320	158	92.1	23.5
Zinc	ppm	0.68	0.21	0.06	0.04	0.57	<0.01	<0.01	<0.01	<0.01	1.85	0.24	0.07	0.06
Iron	ppm	22.9	19.1	9.42	3.20	27.7	21.5	5.53	9.32	9.02	39.5	14.6	5.50	1.21
Manganese	ppm	3.85	0.96	0.53	0.25	3.88	0.64	0.18	0.08	0.09	5.83	0.74	0.34	0.16
Copper	ppm	1.67	1.25	0.65	0.98	1.51	0.92	0.87	0.44	0.46	3.04	1.13	0.71	0.48

Table 3.4-3 Soil Sampling Results, 2009 Order 1 Soil Survey (Page 6 of 6)

	Soil Type	Teagulf Sandy Loam									
	Sampling Location	EW Rd PR-2				EW Rd PR-8					
	Sample Depth (inches)	0-2	2-7	7-14	14-27	0-2	2-6	6-15	15-27	27-53	27-53
Parameter	Horizon / Units	A	Bw	Ck	C/Cr	A	B	BC	C/Cr	Cr	Cr
pH	standard units	7.0	7.2	7.4	8.2	7.0	7.4	7.7	8.4	8.5	8.6
Electrical Conductivity	mmhos/cm	0.1	0.1	0.2	0.2	0.2	0.1	0.8	0.2	0.3	0.3
Saturation	%	22.9	31.2	29.3	31.8	21.1	31.1	29.1	27.8	28.2	28.2
SAR	unitless	0.8	0.9	0.7	1.0	1.3	0.4	<0.1	0.6	1.7	1.5
Selenium	ppm	0.01	0.026	0.024	0.023	0.038	0.041	0.040	0.044	0.015	0.016
Boron	ppm	0.02	0.02	0.02	0.01	0.02	0.01	<0.01	0.01	0.01	0.01
Lime Estimate		Low	Low	Low	Medium	Low	Low	Low	High	Medium	Medium
Calcium	meq/L	0.7	0.6	1.1	1.0	0.7	0.1	<0.1	1.8	1.9	1.8
Magnesium	meq/L	0.1	0.1	0.3	0.1	0.2	<0.1	<0.1	0.4	0.3	0.2
Sodium	meq/L	0.5	0.5	0.5	0.8	0.9	0.1	0.0	0.6	1.8	1.6
Potassium	meq/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Organic Matter	%	0.7	0.9	0.4	0.2	0.8	0.7	0.4	0.3	0.2	0.3
Sand	%	73	74	82	86	67	67	80	81	81	80
Silt	%	14	12	5	2	19	15	4	2	4	6
Clay	%	13	14	13	12	14	18	16	17	15	14
Texture		SL	SL	SL	LS	SL	SL	SL	SL	SL	SL
Nitrate NO_3-N	ppm	5.7	4.3	4.3	3.9	7.6	11.2	3.5	6.2	9.2	9.7
Phosphorus	ppm	3.1	1.2	1.2	0.9	2.5	0.6	<0.1	0.3	2.5	2.1
Potassium	ppm	114	42.8	27.6	24.6	84.2	34.0	14.8	8.89	7.06	7.96
Zinc	ppm	0.23	<0.01	<0.01	<0.01	0.23	0.08	0.33	0.08	0.07	0.07
Iron	ppm	6.34	2.67	1.31	0.97	4.46	2.03	1.05	0.52	0.43	0.46
Manganese	ppm	1.11	0.36	0.01	<0.01	0.86	0.38	0.45	0.21	0.17	0.18
Copper	ppm	0.92	1.03	0.89	0.23	0.77	0.70	0.61	0.33	0.54	0.49

Figure 3.4-11 Photographs of 2009 Soil Survey Sampling Points

Sample point NC-1 Pad
Pepal Sandy Loam

Sample point EWRd1
Poposhia Loam

Sample point EWRd8
Teagulf Sandy Loam

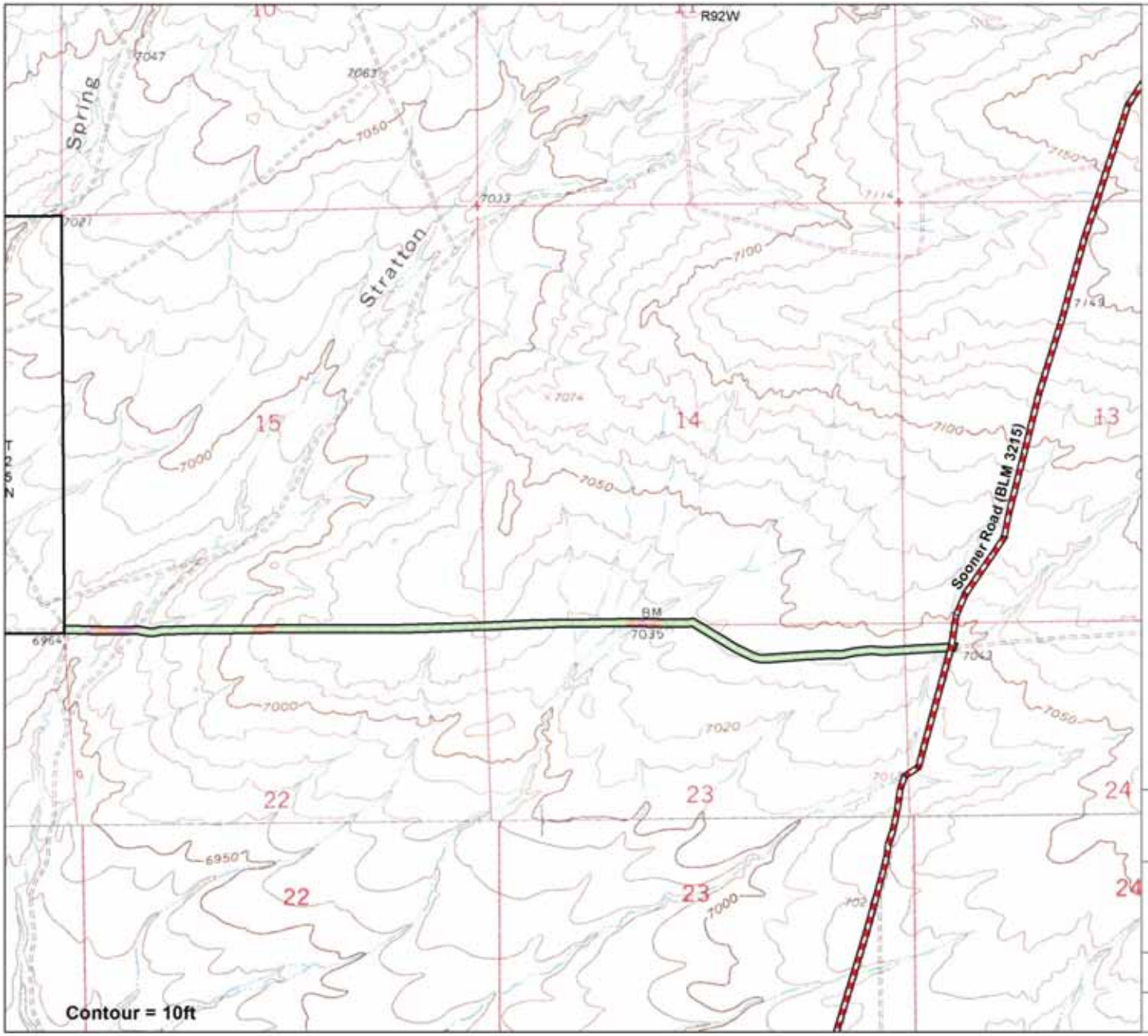
3.4.5 2009 Order 3 Soil Survey

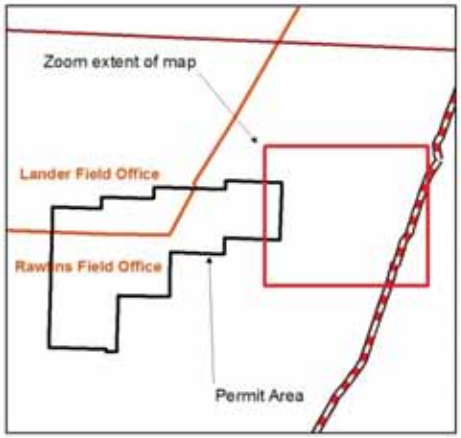
The 2009 Order 3 soil survey was conducted along the East and West Access Roads. Because the study area for the Order 3 survey of the East and West Roads was narrow, the survey was conducted by driving and walking along the existing two-track that bisects the study area. All soils within five feet of each side of the centerline of the two-track were classified as disturbed. Survey results indicated the remainder of the 100-foot-wide corridor Pepal Sandy Loam, Poposhia Loam, or Teagulf Sandy Loam, the three soil types that had previously been identified within the main Permit Area. A soil map was created and is presented in **Figures 3.4-12** and **3.4-13**. Detailed descriptions of the three soil types are presented with the Order 1 survey results.

3.4.6 Areas of Limited Reclamation Potential and Prior Surface Disturbance

No areas of Limited Reclamation Potential, as defined in the Wyoming Reclamation Policy (BLM, 2009b), have been identified in the areas to be disturbed. As discussed in **Section 3.7**, slopes are gentle, and no cliffs or rock outcrops are present. The geological substrates do not change abruptly across the site (**Section 3.3**), and topsoil and subsoil depths are sufficient to support vegetation. The weather conditions, with the potential for wind scour and freezing and thawing cycles, require careful soil protection and reclamation practices.

The soil sample results were within the WDEQ-LQD topsoil suitability guidelines (WDEQ-LQD, 1994a), with a few exceptions that were close to the criteria. No areas of seleniferous soils were found, as evidenced by the lack of selenium indicator vegetation species (**Section 3.7.6**) and low selenium concentrations in the soil samples (**Tables 3.4-1** through **3.4-3**), which were all below the WDEQ-LQD topsoil suitability limit (0.1 parts per million [ppm]). Boron concentrations were also all below the suitability limit (5 ppm). None of the pH results for the topsoil samples were outside the suitability range (5.5 to 8.5). Of the subsoil samples, six were above the pH range with the highest value at 8.8, but these were at disperse locations. None of the electrical conductivity results for the topsoil or subsoil samples were outside the suitability range (0 to 8 millimhos per centimeter [mmhos/cm]). Six topsoil and seven subsoil samples were below the suitability range for saturation (25 to 85 percent), with the lowest value at 20%. No topsoil samples were outside the Sodium Adsorption Ratio (SAR) suitability range (0 to 10), and three subsoil samples had SAR values up to 12.1.





Legend

- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary
- County/BLM Road

N

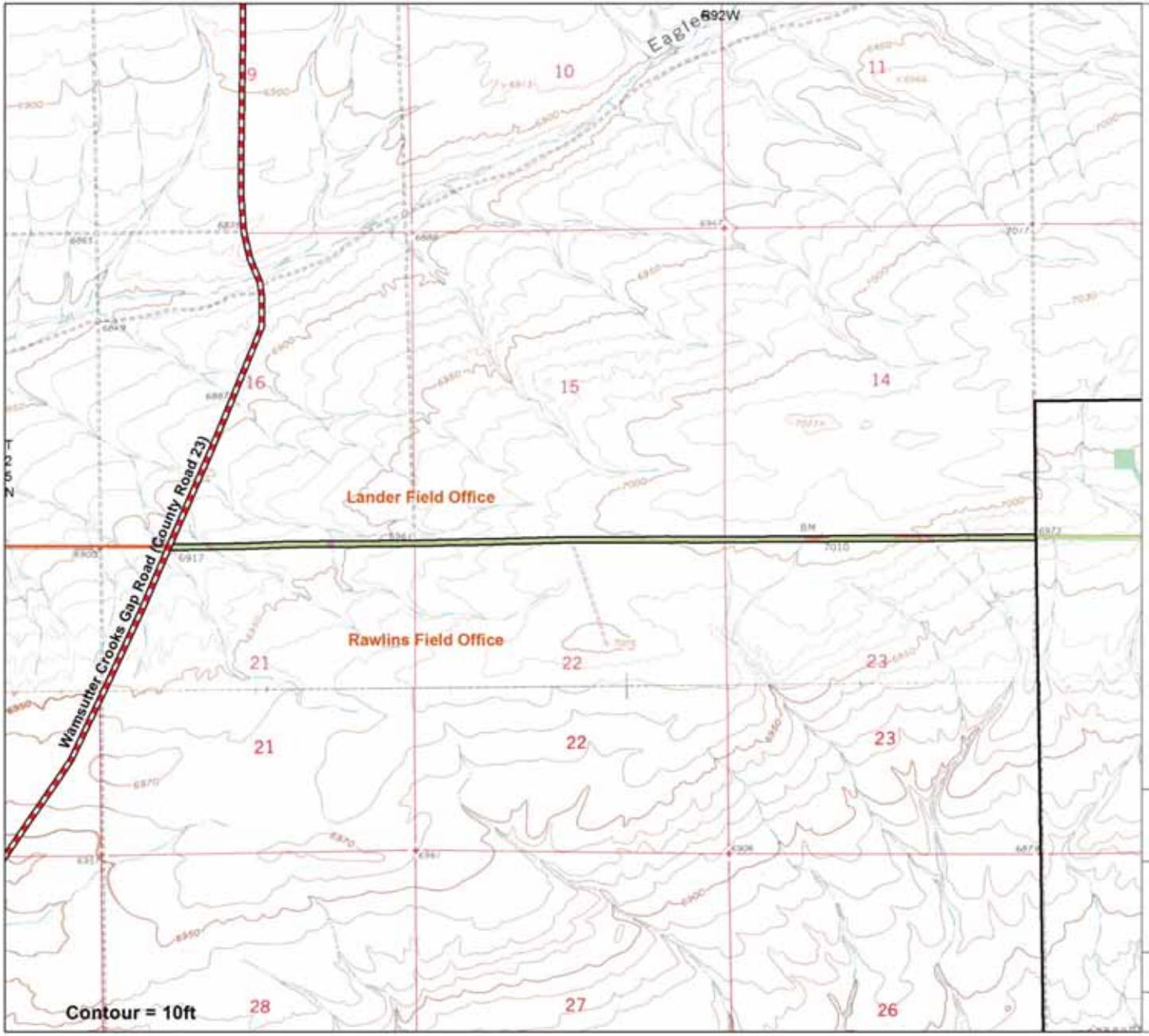
Lost Creek Uranium *In-Situ* Recovery Project

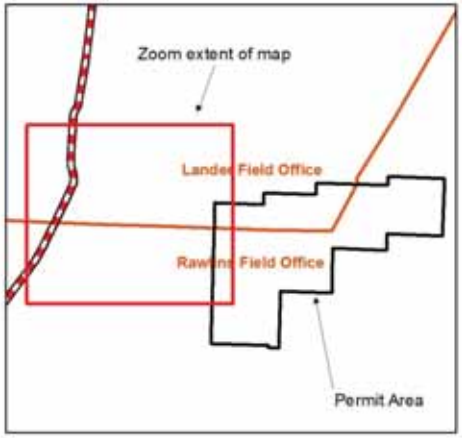
Sweetwater County, WY

Figure 3.4-12
Soil Survey Map for East Road

0 0.5 1 Miles

No warranty is made by the BLM for use of the data for purposes not intended by BLM





Legend

- Poposhia loam, 0-1% slopes
- Teagulf sandy loam, 3-7% slopes
- Pepal sandy loam, 1-3% slopes
- Disturbed Land
- Lost Creek Permit Area
- BLM Field Office Boundary
- County/BLM Road

N

Lost Creek Uranium *In-Situ* Recovery Project

Sweetwater County, WY

Figure 3.4-13
Soil Survey Map for West Road

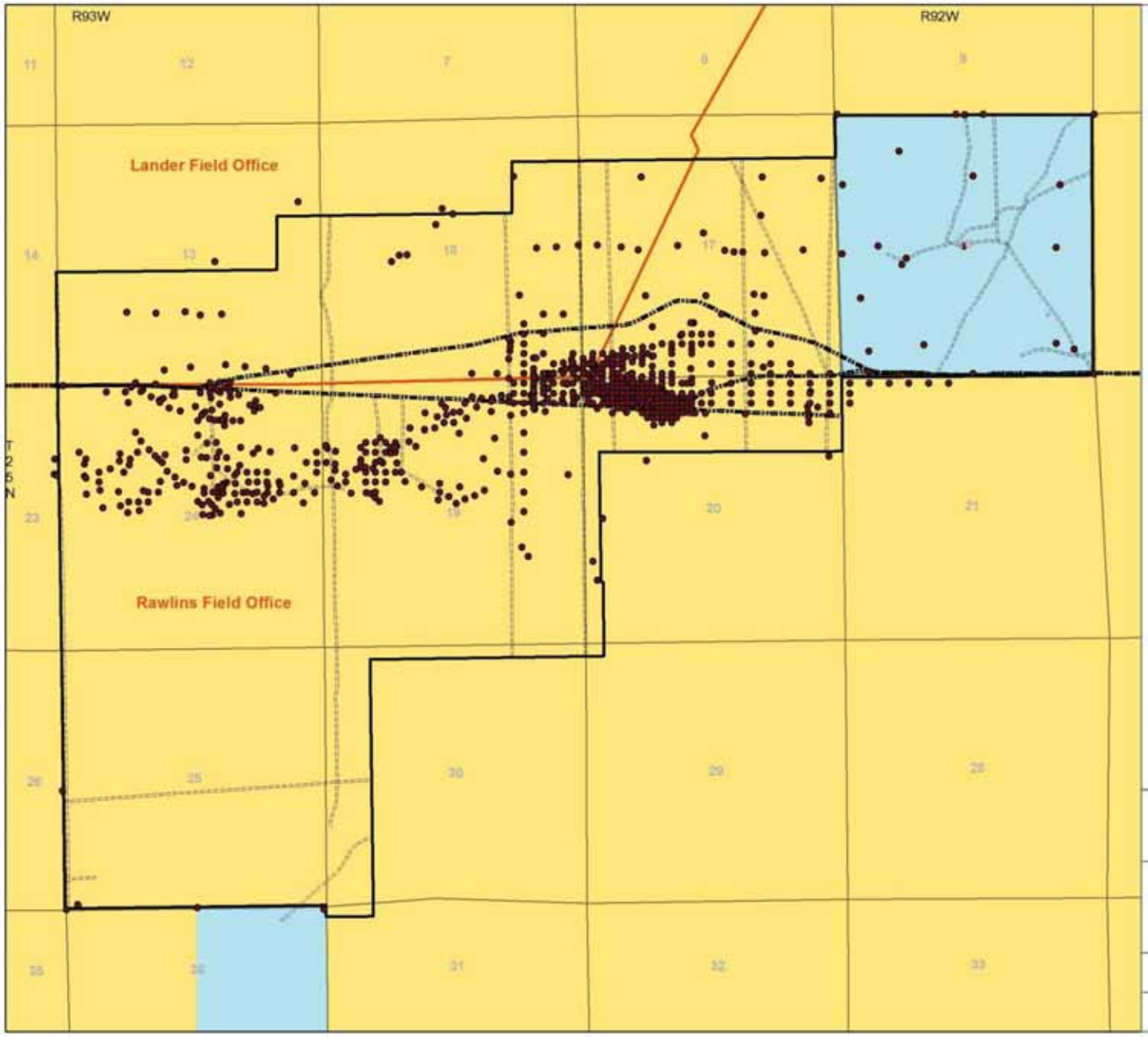
0 0.5 1 Miles

No warranty is made by the BLM for use of the data for purposes not intended by BLM

There was surface disturbance prior to LCI exploration within the Permit Area. Most of this disturbance was due to historical exploration activities for oil and gas, as well as for uranium, and to livestock and wildlife grazing. The primary historic surface disturbance activities included vehicle traffic and drilling-related actions. These activities compacted the soils along two-track roads and at drilling sites, resulting in limited infiltration rates and decreased the vegetation regrowth in those areas. The road surfaces have little to no organic matter, and most of the topsoil has been eroded from them. Approximately 26 miles of existing roads were delineated from the 2002 aerial photo of the Permit Area (**Figure 3.4-14** and **Figure 3.4-15**). Field measurements in 2007 indicate that the roads range from 6.9 to 9.4 feet wide. Using a default width of ten feet, the disturbance associated with the existing two-track roads is on the order of 31 acres. A few of these roads may still be used by grazing lessees, hunters, and for on-going exploration activities. Evidence of abandoned drill sites is more difficult to delineate, but numerous small areas are evident on the aerial photograph. The extent of the historic disturbance in areas to be redisturbed and then reclaimed as part of the proposed action is limited and is not anticipated to interfere with the reclamation.

Figure 3.4-14 Typical Two-Track Road within the Permit Area

* prior to LCI activities



Legend

- Historic Drill Hole

Preexisting Roads Delineated from Aerial Photos

- Little to no current use
- Currently in use
- Lost Creek Permit Area
- BLM Field Office Boundary

Surface Land Owner

- BLM - administered
- State

N

Lost Creek Uranium *In-Situ* Recovery Project

Sweetwater County, WY

FIGURE 3.4-15
Existing Disturbance

0 0.5 1 Miles

No warranty is made by the BLM for use of the data for purposes not intended by BLM