INFORMATION ONLY

1RP-4723
AMENDED DELINEATION REPORT
East Caprock SWD Well #5
Produced Water Spill

Lea County, New Mexico

Latitude: N33° 16' 59.80"
Longitude: W103° 41' 13.20"

LAI Project No. 17-0158-01

August 23, 2017

Prepared for:

Paladin Energy Corporation
10290 Monroe Drive, Suite 301
Dallas, Texas 75229

Prepared by:

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Mark J. Larson, P.G.
Certified Professional Geologist #10490

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Attachments

1.0 INTRODUCTION

This amended delineation report and remediation plan is submitted to the New Mexico Oil Conservation Division (OCD) District 1 on behalf of Paladin Energy Corporation (Paladin). The amended delineation report supersedes the delineation report that was submitted to the OCD on July 21, 2017. The amended delineation report is for a produced water spill (1RP-4723) that occurred at the East Caprock SWD Well #5 (Site) on June 11, 2017. The legal description is Unit B (NW/4, NE/4), Section 14, Township 12 South, Range 32 East, in Lea County, New Mexico. The geodetic position is north 33° 16' 59.80" and west 103° 41' 13.20". Figure 1 presents a location and topographic map. Figure 2 presents an aerial map.

1.1 Background

On June 11, 2017, Paladin personnel discovered the release which was due to a poly injection line that parted at a valve located near SWD well. The spill breeched the berm near the southwest corner of location, allowing produced water to flow east into the pasture approximately 950 feet. Approximately 1,700 bbl of produced water was released with approximately 1,020 bbl recovered. Paladin personnel discovered the release on June 12, 2017. Verbal notification was provided to the OCD District 1, on June 13, 2017. The initial C-141 was submitted to OCD District 1 and approved on June 15, 2017. The release was assigned remediation permit 1 RP-4723 with conditions.

The spill occurred in an unlined area near the well. The spill covered the well location measuring about 33,928 square feet and flowed east into the pasture covering an area approximately 90,000 square feet for a total of approximately 122,928 square feet or about 2.82 acres. The injection pump was shut in and water was recovered to allow repairs to the injection line. Soil was pushed up to repair the berm near the southwest corner to contain fluid to the location. Paladin contracted a vacuum truck to recover standing fluid on the well location and return it to tanks.

On June 21, 2017, LAI, on behalf of Paladin, submitted a plan to the OCD for delineating the spill. Spill delineation was performed on June 28, 2017 and July 7, 2017. On July 21, 2017, LAI submitted the delineation report to OCD. On July 25, 2017, representatives with Paladin and LAI met with OCD (Olivia Yu) to discuss the delineation report and proposed remediation plan. OCD requested further delineation for chloride at three (3) locations including in the vicinity of samples S-2, S-3 and S-4, area around S-6 (SB-2) and S-10 (SB-5). OCD followed up in an email dated August 10, 2017. Attachment A presents the OCD submittal correspondence.

1.2 Physical Setting

The physical setting is as follows:

- Elevation is approximately 4,356 feet above mean sea level (MSL);
- Topography slopes gently toward the east;
- The nearest surface water feature is a playa located about 1,650 feet east of the Site;

- The soils are designated as "Kimbrough Gravelly Loam" and "Kimbrough-Lea complex", consisting of calcareous alluvium derived from reworking the Blackwater Draw (Pleistocene) and Ogallala (Pliocene) formations, in descending order;
- The soil developed over cemented material (caliche);
- The upper geological unit is the Tertiary-age Blackwater Draw and Ogallala formations, in descending order, comprised of very fine to medium-grained quartz sand and gravel, with minor amount of silt and clay with indistinct to massive crossbeds;
- The Ogallala formation is underlain by clay, silty clay, shale and sandstone of the Chinle formation (Triassic) and is about 300 feet thick;
- The nearest fresh water well is located in UnitE (SW/4, NW/4), Section 13, Township 12 South, Range 32 East, about 2,500 feet east - southeast (down gradient) of the Site;
- The well is used for livestock watering and has a reported depth to groundwater of approximately 30 feet below ground surface (bgs);
- Groundwater was not observed above the Dockum Group (shale) observed at approximately 17 feet bgs in boring SB-11 and about 20 feet bgs in borings SB- 10, SB-12 and SB-13.

1.3 Remediation Action Levels

Remediation action levels (RRAL) were calculated for benzene, BTEX and TPH based on the following criteria established by the OCD in *"Guidelines for Remediation of Leaks, Spills and Releases, August 13,* 1993":

Criteria	*Result*	*Score*
Depth-to-Groundwater	<50 feet	20
Wellhead Protection Area	No	0
Distance to Surface Water Body	>1000 Horizontal Feet	0

The following RRAL apply to the release for ranking score: 20

- Benzene 10 mg/Kg
- BTEX 50 mg/Kg
- TPH 100 mg/Kg

Groundwater was no observed above the Dockum Group (shale) encountered in borings SB-11 (17 feet) and SB-10, SB-12 and SB-13 (20 feet) therefore the delineation limit for chloride where groundwater exceeds 50 feet is 600 mg/Kg.

2.0 SPILL DELINEATION

On June 28, 2017, LAI personnel used direct push technology (DPT) to collect soil samples at fourteen (14) locations (S-1 through S-14). Caliche was encountered between about 1 and 2 feet below ground surface (bgs) where refusal occurred. Soil samples were collected in 0.5 and 1 foot increments between 1 and 2 feet bgs. The borings were filled with soil. The samples were delivered under preservation and chain of custody to Permian Basin Environmental Laboratory (PBEL) in Midland, Texas. The laboratory analyzed the upper sample (0 to 0.5 foot or 0 to 1 foot) for total petroleum hydrocarbons (TPH) by EPA

SW-846 Method 8015M, including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO). All samples will be analyzed for chloride by EPA Method 300. Table 1 presents the laboratory analytical data summary.

TPH was reported above the OCD Recommended Remediation Action Level (RRAL) of 100 milligrams per kilogram (mg/Kg) in the following samples:

Sample	Depth (Feet)	TPH (mg/Kg)	Sample	Depth (Feet)	TPH (mg/Kg)
S-1	0 – 1	192.72	S-3	0 – 1	159.692
S-5	0 – 1	115.936	S-8	0.5 – 1.0	6,399.38

Chloride was reported above 250 mg/Kg in the deepest samples from the following locations:

Sample	Depth (Feet)	Chloride (mg/Kg)	Sample	Depth (Feet)	Chloride (mg/Kg)
S-1	1.0 – 2.0	2,100	S-2	0 – 1.0	2,400
S-3	0 – 1.0	3,090	S-4	0 – 1.0	1,650
S-6	0.5 – 1.0	2,690	S-7	0.5 – 1.0	1,940
S-10	0.5 – 1.0	1,570	S-11	1.5 – 2.0	1,050
S-12	0.5 – 1.0	848	S-14	0.5 – 1.0	845

On July 7, 2017, Scarborough Drilling, Inc. (SDI) under supervision for LAI used a truck mounted air rotary rig adjacent to soil sample locations S-1 (SB-1), S-5 (SB-10), S-6 (SB-2), S-7 (SB-4), S-8 (SB-3), S-10 (SB-5), S-11 (SB-6), S-12 (SB-8), S-13 (SB-9) and S-14 (SB-7). Soil samples were with a jam tube sampler to approximately 10 feet (SB-10, SB-3, and SB-9), 15 feet (SB-2, SB-4, SB-5, SB-6, SB-8 and SB-7) and 25 feet (SB-1) feet bgs. Boring SB-10 was drilled about 50 feet west of location S-5. The borings were filled with bentonite chips. The samples were delivered under preservation and chain of custody to PBEL which analyzed the samples for TPH and chloride by EPA SW-846 Method 8015M, including GRO, DRO and ORO, and chloride by EPA Method 300. Table 1 presents the laboratory analytical data summary. TPH was delineated vertically at location S-1, S-5 and S-8. Chloride was delineated vertically and laterally to 250 mg/Kg except at locations S-1 (SB-1), S-2, S-3, S-4, S-6 (SB-12) and S-10 (SB-5).

On August 9, 2017, SDI used an air rotary rig and jam tube sampler to collect soil samples from boring SB-11 located near sample location S-3, boring SB-12 located near sample location S-6 (SB-2), boring SB-13 located near sample location S-10 (SB-5) and the background location (SB-10). Soil samples were collected at SB-10, SB-12 and SB-13 at 20 and 25 feet bgs. Samples were collected at SB-11 from 1, 3, 5, 7, 10, 15 and 20 feet bgs. The borings were filled with bentonite chips. A sample was collected with a sample trowel at S-5 (0 to 1 foot). The samples were delivered under preservation and chain of custody to PBEL in Midland, Texas. The sample from S-5 was for TPH by EPA SW-846 Method 8015M, including GRO, DRO and ORO. The remaining samples were analyzed for chloride by EPA Method 300. Table 1 presents the laboratory analytical data summary. Figure 3 presents the soil sample and boring locations. Attachment B presents the laboratory reports. Attachment C presents the boring logs. Attachment D presents photographs. Attachment E presents the initial C-141 and conditions.

Referring to Table 1, TPH previously reported in sample S-5 (115.936 mg/kg) was less than the method reporting limit (RL) in the sample collected on August 9, 2017.

Chloride was reported in samples from boring SB-10 from 2.43 mg/Kg (15 feet) to 6.19 mg/Kg (5 feet) and increased to 1,190 mg/Kg and 1,100 mg/Kg, in samples from 20 feet and 25 feet, respectively. The elevated chloride correlate with shale (Dockum Group) was encountered in boring SB-10 at 20 feet bgs. Groundwater was not observed above the shale in boring SB-10.

Chloride was reported in samples from boring SB-11 (S-3) at 2,560 mg/Kg (0 feet) and 1,960 mg/Kg (3 feet). Chloride was less than 50 mg/Kg in the remaining samples from SB-11 between approximately 5 and 20 feet bgs. The Dockum Group (shale) was encountered in boring SB-11 at approximately 17 feet bgs. Groundwater was not observed above the shale in boring SB-11.

Chloride was reported in samples from boring SB-12 (S-6 and SB-2) at 29.9 mg/Kg (20 feet) and 942 mg/Kg (25 feet). The Dockum Group (shale) was encountered in boring SB-12 at approximately 20 feet bgs. Groundwater was not observed above the shale in boring SB-12.

Chloride was reported in samples from boring SB-13 (S-10 and SB-5) at 452 mg/Kg (20 feet) and 760 mg/Kg (25 feet). The Dockum Group (shale) was encountered in boring SB-13 at approximately 20 feet bgs. Groundwater was not observed above the shale in boring SB-13.

3.0 REMEDIATION PLAN

Paladin proposes to conduct following remediation:

1. Excavate soil from the area around S-1 (SB-1) to 1 foot bgs to reduce TPH below the RRAL;
2. Excavate soil from spill area in the vicinity of soil sample S-6 (SB-2 and SB-12) to approximately 3 feet bgs and backfill with topsoil;
3. Excavate soil from spill area in the vicinity of soil samples S-3 (SB-8) and S-11 (SB-6) to approximately 2 feet bgs and backfill with topsoil;
4. Excavate soil from spill area in the vicinity of soil sample S-7 (SB-4), S-10 (SB-5 and SB-13), S-12 (SB-8) and S-14 (SB-7) to approximately 1 foot bgs and backfill with topsoil;
5. Dispose of contaminated soil at an OCD approved landfill;
6. Seed remediation areas in pasture according to landowner requirements; and
7. Submit final report to OCD District 1.

Figure 3 presents the proposed exaction areas and summary of excavation depths.

Tables

Table 1
Delineatio Soil Sample Analytical Data Summary
Paladin Energy Corporation, East Caprock SWD Well #5
Lea County, New Mexico
1RP-4723

Sample	Depth (Feet)	Collection Date	Status	C6 - C12 (mg/Kg)	C12 - C28 (mg/Kg)	C28 - C35 (mg/Kg)	TPH (mg/Kg)	Chloride (mg/Kg)
RRAL:							**100**	***600**
S-1	0 - 1	06/28/2017	In-Situ	<26.596	141.02	51.702	**192.722**	9,160
(SB-1)	1 - 2	06/28/2017	In-Situ	<28.409	69.670	<28.409	69.670	2,100
	3	07/06/2017	In-Situ	<31.6	<31.6	<31.6	<31.6	2,710
	5	07/06/2017	In-Situ	--	--	--	--	1,090
	7	07/06/2017	In-Situ	--	--	--	--	1,040
	10	07/06/2017	In-Situ	--	--	--	--	42.1
	15	07/06/2017	In-Situ	--	--	--	--	155
	20	07/06/2017	In-Situ	--	--	--	--	839
	25	07/06/2017	In-Situ	--	--	--	--	803
S-2	0 - 1	06/28/2017	In-Situ	<34.722	<34.722	<34.722	<34.722	2,400
S-3	0 - 1	06/28/2017	In-Situ	<27.473	117.78	41.912	**159.692**	3,090
(SB-11)	0	08/09/2017	In-Situ	--	--	--	--	2,560
	3	08/09/2017	In-Situ	--	--	--	--	1,960
	5	08/09/2017	In-Situ	--	--	--	--	30.8
	7	08/09/2017	In-Situ	--	--	--	--	46.8
	10	08/09/2017	In-Situ	--	--	--	--	23.7
	15	08/09/2017	In-Situ	--	--	--	--	28.9
	20	08/09/2017	In-Situ	--	--	--	--	30.1
S-4	0 - 1	06/28/2017	In-Situ	<27.174	46.337	29.576	75.913	1,650
S-5	0 - 1	06/28/2017	In-Situ	<32.468	67.455	48.481	**115.936**	<1.30
		08/09/2017	In-Situ	<27.5	<27.	<27.5	<27.5	--
S-6	0 - 0.5	06/28/2017	In-Situ	<28.090	<28.090	<28.090	<28.090	6,130
(SB-2)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	2,690
(SB-12)	3	07/06/2017	In-Situ	--	--	--	--	1,050
	5	07/06/2017	In-Situ	--	--	--	--	11.3
	7	07/06/2017	In-Situ	--	--	--	--	<1.11
	10	07/06/2017	In-Situ	--	--	--	--	<1.06
	15	07/06/2017	In-Situ	--	--	--	--	49
	20	08/09/2017	In-Situ	--	--	--	--	29.9
	25	08/09/2017	In-Situ	--	--	--	--	942
S-7	0 - 0.5	06/28/2017	In-Situ	<28.736	56.839	43.276	100.415	2,630
(SB-4)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	1,940
	3	07/06/2017	In-Situ	--	--	--	--	61.4
	5	07/06/2017	In-Situ	--	--	--	--	<1.04
	7	07/06/2017	In-Situ	--	--	--	--	<1.03
	10	07/06/2017	In-Situ	--	--	--	--	<1.06
	15	07/06/2017	In-Situ	--	--	--	--	17.4
S-8	0 - 0.5	06/28/2017	In-Situ	<26.042	<26.042	<26.042	<26.042	2.26
(SB-3)	0.5 - 1.0	06/28/2017	In-Situ	1,445.3	4,413.3	540.78	**6,399.38**	1.29
	3	07/06/2017	In-Situ	<25.8	<25.8	<25.8	<25.8	1.11
	5	07/06/2017	In-Situ	<25.8	<25.8	<25.8	<25.8	<1.03
	7	07/06/2017	In-Situ	--	--	--	--	<1.04
	10	07/06/2017	In-Situ					45.9
S-9	0 - 0.5	06/28/2017	In-Situ	<26.042	<26.042	<26.042	<26.042	<1.04
	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	<1.09
	7	07/07/2017	In-Situ	--	--	--	--	<1.02
	10	07/07/2017	In-Situ	--	--	--	--	<1.08
	15	07/07/2017	In-Situ	--	--	--	--	140
S-10	0 - 0.5	06/28/2017	In-Situ	<29.762	<29.762	<29.762	<29.762	3,930
(SB-5)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	1,570

Table 1
Delineatio Soil Sample Analytical Data Summary
Paladin Energy Corporation, East Caprock SWD Well #5
Lea County, New Mexico
1RP-4723

Sample	Depth (Feet)	Collection Date	Status	C6 - C12 (mg/Kg)	C12 - C28 (mg/Kg)	C28 - C35 (mg/Kg)	TPH (mg/Kg)	Chloride (mg/Kg)
RRAL:							**100**	***600**
(SB-13)	3	07/07/2017	In-Situ	--	--	--	--	22.4
	5	07/07/2017	In-Situ	--	--	--	--	<1.02
	7	07/07/2017	In-Situ	--	--	--	--	<1.02
	10	07/07/2017	In-Situ	--	--	--	--	<1.08
	15	07/07/2017	In-Situ	--	--	--	--	140
	20	08/09/2017	In-Situ	--	--	--	--	452
	25	08/09/2017	In-Situ	--	--	--	--	760
S-11	0 - 0.5	06/28/2017	In-Situ	<30.864	<30.864	<30.864	<30.864	3,510
(SB-6)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	3,200
	1.0 - 1.5	06/28/2017	In-Situ	<30.120	<30.120	<30.120	<30.120	2,300
	1.5 - 2.0	06/28/2017	In-Situ	--	--	--	--	1,050
	3	07/07/2017	In-Situ	--	--	--	--	387
	5	07/07/2017	In-Situ	--	--	--	--	2.76
	7	07/07/2017	In-Situ	--	--	--	--	9.23
	10	07/07/2017	In-Situ	--	--	--	--	<1.05
	15	07/07/2017	In-Situ	--	--	--	--	<1.06
S-12	0 - 0.5	06/28/2017	In-Situ	<26.316	<26.316	<26.316	<26.316	1,140
(SB-8)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	848
	3	07/07/2017	In-Situ	--	--	--	--	75.0
	5	07/07/2017	In-Situ	--	--	--	--	<1.03
	7	07/07/2017	In-Situ	--	--	--	--	<1.05
	10	07/07/2017	In-Situ	--	--	--	--	2.82
	15	07/07/2017	In-Situ					98.5
S-13	0 - 0.5	06/28/2017	In-Situ	<26.596	<26.596	<26.596	<26.596	<1.06
(SB-9)	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	<1.11
	3	07/07/2017	In-Situ	--	--	--	--	6.07
	5	07/07/2017	In-Situ	--	--	--	--	2.03
	7	07/07/2017	In-Situ	--	--	--	--	<1.02
	10	07/07/2017	In-Situ					<1.04
S-14	0 - 0.5	06/28/2017	In-Situ	<29.762	<29.762	<29.762	<29.762	2,040
(SB-7)	0 - 0.5	06/28/2017	In-Situ	<29.762	<29.762	<29.762	<29.762	2,040
	0.5 - 1.0	06/28/2017	In-Situ	--	--	--	--	845
	3	07/07/2017	In-Situ	--	--	--	--	83.6
	5	07/07/2017	In-Situ	--	--	--	--	<1.04
	7	07/07/2017	In-Situ	--	--	--	--	26.1
	10	07/07/2017	In-Situ	--	--	--	--	80.6
	15	07/07/2017	In-Situ					<1.18
SB-10	0-1	07/06/2017	In-Situ	<27.2	<27.2	<27.2	<27.2	<1.09
	3	07/06/2017	In-Situ	<25.5	<25.5	<25.5	<25.5	4.43
	5	07/06/2017	In-Situ	--	--	--	--	6.19
	7	07/06/2017	In-Situ	--	--	--	--	4.07
	10	07/06/2017	In-Situ	--	--	--	--	2.34
	20	08/09/2017	In-Situ	--	--	--	--	1,190
	25	08/09/2017	In-Situ	--	--	--	--	1,100

Notes: Laboratory analysis performed by Permian Basin Environmental Lab, Midland, Texas by EPA SW-846 Method 8015M (TPH) and 300 (chloride)
Depth in feet below ground surface (bgs)
mg/Kg: milligrams per kilogram equivalent to parts per million (ppm)
*: OCD delineation level
Exceeds OCD Recommended Remediation Action Level (RRAL)

Figures

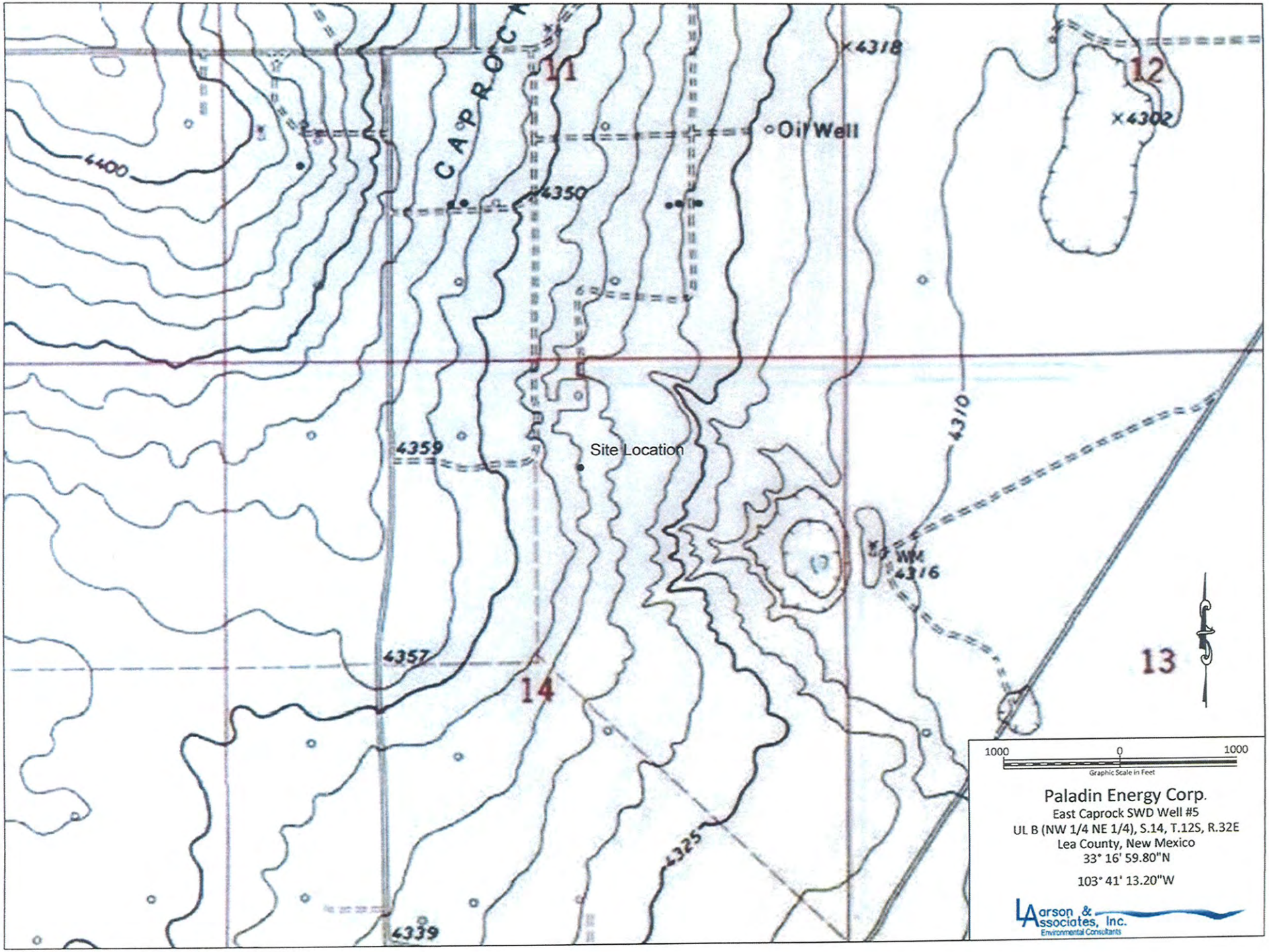


Figure 1 - Topographic Map

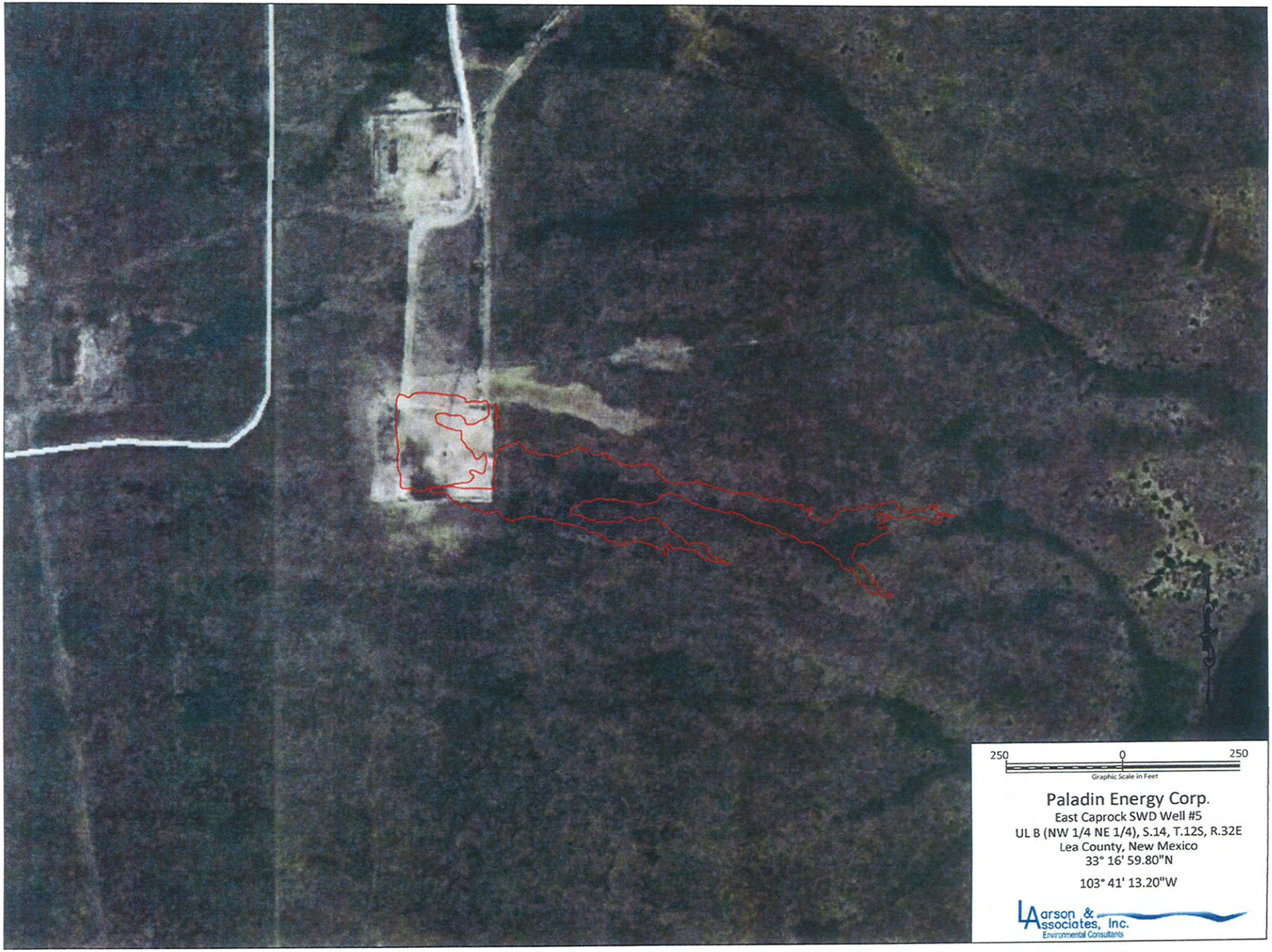
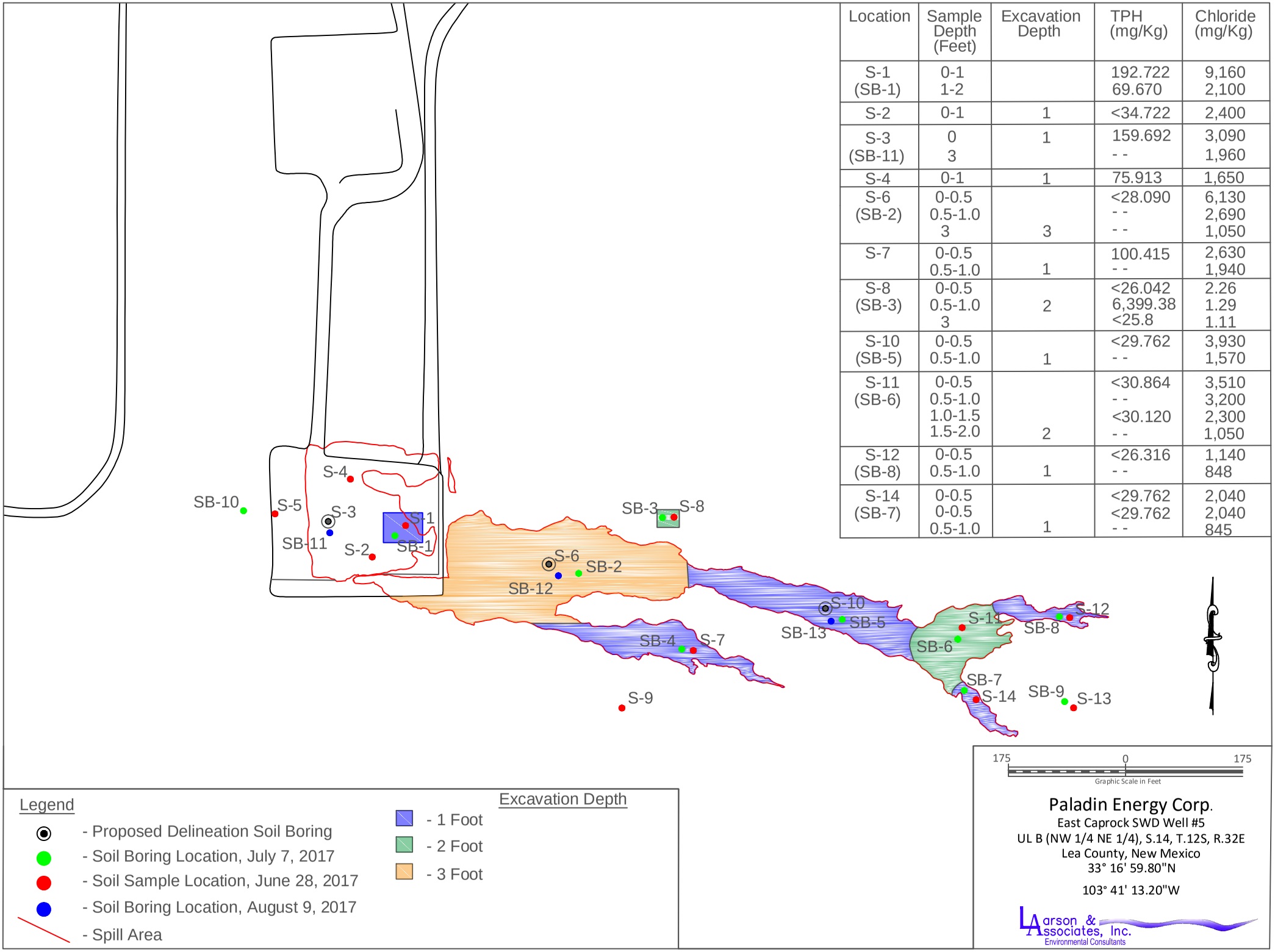


Figure 2 - Aerial Map



Location	Sample Depth (Feet)	Excavation Depth	TPH (mg/Kg)	Chloride (mg/Kg)
S-1 (SB-1)	0-1 1-2		192.722 69.670	9,160 2,100
S-2	0-1	1	<34.722	2,400
S-3 (SB-11)	0 3	1	159.692 - -	3,090 1,960
S-4	0-1	1	75.913	1,650
S-6 (SB-2)	0-0.5 0.5-1.0 3	 3	<28.090 - - - -	6,130 2,690 1,050
S-7	0-0.5 0.5-1.0	 1	100.415 - -	2,630 1,940
S-8 (SB-3)	0-0.5 0.5-1.0 3	 2	<26.042 6,399.38 <25.8	2.26 1.29 1.11
S-10 (SB-5)	0-0.5 0.5-1.0	 1	<29.762 - -	3,930 1,570
S-11 (SB-6)	0-0.5 0.5-1.0 1.0-1.5 1.5-2.0	 2	<30.864 - - <30.120 - -	3,510 3,200 2,300 1,050
S-12 (SB-8)	0-0.5 0.5-1.0	 1	<26.316 - -	1,140 848
S-14 (SB-7)	0-0.5 0-0.5 0.5-1.0	 1	<29.762 <29.762 - -	2,040 2,040 845

Figure 3 - Site Map Showing Proposed Soil Excavation Area

Appendix A

OCD Correspondence

Mark Larson

From: Mark Larson
Sent: Thursday, June 22, 2017 1:26 PM
To: 'Yu, Olivia, EMNRD'
Cc: 'ggfenton@aol.com'; 'David Plaisance'; 'paladinmid@suddenlink.net'
Subject: Re: 1RP-4723, Delineation Plan, East Caprock SWD Well #5 Produced Water Sill, June 21, 2017
Attachments: 1RP-4723, Delineation Plan, East Caprock SWD Well #5 Produced Water Spill, June 21, 2017.pdf

Olivia,
On behalf of Paladin Energy Corporation (Paladin) please find the attached delineation plan for assessing the extent of impact from the produced water spill at the East Caprock SWD Well #5 in Lea County, New Mexico. Please contact Mickey Horn with Paladin at (432) 63406599 or paladinmidland@suddenlink.net or me if you have questions.

Mark J. Larson, P.G.
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LArson & Associates, Inc.
Environmental Consultants

"Serving the Permian Basin Since 2000"

Mark Larson

From: Yu, Olivia, EMNRD [Olivia.Yu@state.nm.us]
Sent: Thursday, August 10, 2017 4:52 PM
To: Mark Larson; Billings, Bradford, EMNRD
Cc: 'ggfenton@aol.com'; 'David Plaisance'; 'paladinmid@suddenlink.net'
Subject: RE: 1RP-4723, Delineation Report, East Caprock SWD #5 Produced Water Spill, July 20, 2017

Dear Mr. Larson:

Please address these concerns regarding 1RP-4723.

1. The area represented by S1 does not have vertical delineation completed. If the groundwater monitoring data from 1RP-4666 is proposed to be utilized for this release, please clearly state this application.
2. S2 , S3, and S4 are not completely delineated vertically. Please provide rationale for 1 ft. excavation for the area represented by S2 - S4.
3. Delineation data indicate that the chloride and/or TPH levels at the proposed excavation depths for the specified areas exceed permissible values. In areas where the bottom of the excavation exceeds permissible chloride and TPH levels, proceed to excavation to the next foot.
4. Each separately defined areas, based on proposed excavation depths as demarcated in Figure 4, must have confirmatory bottom and sidewall samples. Mark confirmation sample locations on another scaled map.

Thanks,
Olivia

From: Mark Larson [mailto:Mark@laenvironmental.com]
Sent: Friday, July 21, 2017 8:40 AM
To: Yu, Olivia, EMNRD <Olivia.Yu@state.nm.us>
Cc: 'ggfenton@aol.com' <ggfenton@aol.com>; 'David Plaisance' <dplaisance@paladinenergy.com>; 'paladinmid@suddenlink.net' <paladinmid@suddenlink.net>
Subject: FW: 1RP-4723, Delineation Report, East Caprock SWD #5 Produced Water Spill, July 20, 2017

Olivia,
Larson & Associates, Inc. (LAI), on behalf of Paladin Energy Corporation (Paladin), submits the above captioned report for delineation of a produced water spill at the East Caprock SWD #5 in Le County, New Mexico. The delineation was performed according to the plan submitted to the OCD on June 21, 2017. Additional samples were collected to assess the vertical limits of the spill. The document presents the proposed remediation plan for the spill. Please use the link below to download the report. Please contact Mickey Horn with Paladin at (432) 63406599 or paladinmidland@suddenlink.net or me if you have questions.

Link: https://files.acrobat.com/a/preview/2511c632-c03c-42ea-b4d6-ef732f7ec48c

Respectfully,

Mark J. Larson, P.G.
President/Sr. Project Manager
507 N. Marienfeld St., Suite 205
Midland, Texas 79701
Office – 432-687-0901
Cell – 432- 556-8656
Fax – 432-687-0456
mark@laenvironmental.com

Larson & Associates, Inc.
Environmental Consultants

"Serving the Permian Basin Since 2000"

From: Mark Larson
Sent: Wednesday, June 28, 2017 7:43 AM
To: 'Yu, Olivia, EMNRD'
Cc: 'ggfenton@aol.com'; 'David Plaisance'; 'paladinmid@suddenlink.net'
Subject: FW: 1RP-4723, Delineation Plan, East Caprock SWD Well #5 Produced Water Sill, June 21, 2017

Olivia,
This is to let you know that personnel from Larson & Associates, Inc. (LAI) will be at the location of the spill (1RP-4723) Wednesday, June 28, 2017, for the purpose of collecting soil sample to delineate the extent of the produced water release at the above-referenced location. Soil samples will be collected according to the attached delineation plan that was submitted to the OCD on behalf of Paladin Energy Corporation (Paladin) on June 22, 2017. Please contact Mickey Horn with Paladin at (432) 63406599 or paladinmidland@suddenlink.net or me if you have questions.
Respectfully,

Mark J. Larson, P.G.
President/Sr. Project Manager
507 N. Marienfeld St., Suite 205
Midland, Texas 79701
Office – 432-687-0901
Cell – 432- 556-8656
Fax – 432-687-0456
mark@laenvironmental.com

Larson & Associates, Inc.
Environmental Consultants

"Serving the Permian Basin Since 2000"

From: Mark Larson
Sent: Thursday, June 22, 2017 1:26 PM
To: 'Yu, Olivia, EMNRD'
Cc: 'ggfenton@aol.com'; 'David Plaisance'; 'paladinmid@suddenlink.net'
Subject: Re: 1RP-4723, Delineation Plan, East Caprock SWD Well #5 Produced Water Sill, June 21, 2017

Olivia,
On behalf of Paladin Energy Corporation (Paladin) please find the attached delineation plan for assessing the extent of impact from the produced water spill at the East Caprock SWD Well #5 in Lea County, New Mexico. Please contact Mickey Horn with Paladin at (432) 63406599 or paladinmidland@suddenlink.net or me if you have questions.

Mark J. Larson, P.G.
President/Sr. Project Manager
507 N. Marienfeld St., Suite 205
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Fax – 432-687-0456
mark@laenvironmental.com

"Serving the Permian Basin Since 2000"

Appendix B

Laboratory Reports

Larson & Associates, Inc	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-7, 15'	7G10001-41	Soil	07/07/17 12:53	07-10-2017 10:00
SB-8, 3'	7G10001-43	Soil	07/07/17 11:31	07-10-2017 10:00
SB-8, 5'	7G10001-44	Soil	07/07/17 11:32	07-10-2017 10:00
SB-8, 7'	7G10001-45	Soil	07/07/17 11:34	07-10-2017 10:00
SB-8, 10'	7G10001-46	Soil	07/07/17 11:35	07-10-2017 10:00
SB-8, 15'	7G10001-47	Soil	07/07/17 11:36	07-10-2017 10:00
SB-9, 3'	7G10001-49	Soil	07/07/17 12:20	07-10-2017 10:00
SB-9, 5'	7G10001-50	Soil	07/07/17 12:23	07-10-2017 10:00
SB-9, 7'	7G10001-51	Soil	07/07/17 12:26	07-10-2017 10:00
SB-9, 15'	7G10001-53	Soil	07/07/17 12:34	07-10-2017 10:00
SB-10, 0'	7G10001-55	Soil	07/06/17 12:10	07-10-2017 10:00
SB-10, 3'	7G10001-56	Soil	07/06/17 12:11	07-10-2017 10:00
SB-10, 5'	7G10001-57	Soil	07/06/17 12:13	07-10-2017 10:00
SB-10, 7'	7G10001-58	Soil	07/06/17 12:15	07-10-2017 10:00
SB-10, 10'	7G10001-59	Soil	07/06/17 12:17	07-10-2017 10:00

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-1, 3'

7G10001-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**2710**	31.6	mg/kg dry	25	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**21.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	31.6	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C12-C28	ND	31.6	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C28-C35	ND	31.6	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*96.7 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*103 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	31.6	mg/kg dry	1	[CALC]	07/10/17	07/10/17	calc	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-1, 5'

7G10001-02 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	1090	5.26	mg/kg dry	5	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	5.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-1, 7'

7G10001-03 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	1040	1.02	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	2.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-1, 10'

7G10001-04 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**42.1**	1.04	mg/kg dry	1	P7G1605	07/10/17	07/11/17	EPA 300.0	
% Moisture	**4.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-1, 15'

7G10001-05 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**155**	1.05	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**5.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-1, 20'

7G10001-06 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**839**	1.10	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	**9.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-1, 25'

7G10001-07 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**803**	5.62	mg/kg dry	5	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	**11.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Capreck SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-2, 3'

7G10001-08 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	1050	1.04	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-2, 5'

7G10001-09 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	11.3	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-2, 7'

7G10001-10 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.11	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**10.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-2, 10'

7G10001-11 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.06	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	6.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-2, 15'

7G10001-12 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	49.3	1.05	mg/kg dry	1	P7G1703	07/12/17	07/18/17	EPA 300.0	
% Moisture	5.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-3, 3'

7G10001-14 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	1.11	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C12-C28	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C28-C35	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*99.3 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*104 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	25.8	mg/kg dry	1	[CALC]	07/10/17	07/10/17	calc	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-3, 5'

7G10001-15 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C12-C28	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C28-C35	ND	25.8	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*97.0 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*103 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	25.8	mg/kg dry	1	[CALC]	07/10/17	07/10/17	calc	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-3, 7'

7G10001-16 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.04	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-4, 3'

7G10001-19 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**61.4**	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**3.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Capreck SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-4, 5'

7G10001-20 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.04	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-4, 7'

7G10001-21 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**3.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-4, 10'

7G10001-22 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.06	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	6.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-4, 15'

7G10001-23 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	17.4	1.04	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-5, 3'

7G10001-25 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	22.4	1.03	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-5, 5'

7G10001-26 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.02	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	2.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-5, 7'

7G10001-27 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.02	mg/kg dry	1	P7G1005	07/10/17	07/11/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-5, 10'

7G10001-28 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.08	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	7.0	0.1	%	1	P7G1103	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-5, 15'

7G10001-29 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	140	1.04	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	14.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-6, 3'

7G10001-31 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	387	1.39	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	28.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-6, 5'

7G10001-32 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	2.76	1.02	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	2.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-6, 7'

7G10001-33 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**9.23**	1.04	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	**4.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-6, 10'

7G10001-34 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.05	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	5.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-6, 15'

7G10001-35 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.06	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	6.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-7, 3'

7G10001-37 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	83.6	1.03	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-7, 5'

7G10001-38 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.04	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-7, 7'

7G10001-39 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	26.1	1.00	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	ND	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-7, 10'

7G10001-40 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	80.6	1.03	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-7, 15'

7G10001-41 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.18	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	**15.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-8, 3'

7G10001-43 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	75.0	1.01	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	1.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-8, 5'

7G10001-44 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.03	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	3.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-8, 7'

7G10001-45 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.05	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	5.0	0.1	%	1	P7G1102	07/12/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-8, 10'

7G10001-46 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	2.82	1.08	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	7.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-8, 15'

7G10001-47 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	98.5	1.06	mg/kg dry	1	P7G1702	07/17/17	07/18/17	EPA 300.0	
% Moisture	6.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-9, 3'

7G10001-49 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	6.07	1.04	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-9, 5'

7G10001-50 (Soil)

Permian Basin Environmental Lab, L.P.

General Chemistry Parameters by EPA / Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chloride	**2.03**	1.02	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-9, 7'

7G10001-51 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.02	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-9, 15'

7G10001-53 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.04	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	**4.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-10, 0'

7G10001-55 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	ND	1.09	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	8.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	27.2	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C12-C28	ND	27.2	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C28-C35	ND	27.2	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*94.8 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*103 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	27.2	mg/kg dry	1	[CALC]	07/10/17	07/10/17	calc	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-10, 3'

7G10001-56 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**4.43**	1.02	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	25.5	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C12-C28	ND	25.5	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
>C28-C35	ND	25.5	mg/kg dry	1	P7G1105	07/10/17	07/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*88.6 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*93.7 %*	*70-130*		*P7G1105*	*07/10/17*	*07/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	25.5	mg/kg dry	1	[CALC]	07/10/17	07/10/17	calc	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-10, 5'

7G10001-57 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	6.19	1.04	mg/kg dry	1	P7G1101	07/11/17	07/11/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-10, 7'

7G10001-58 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**4.07**	1.04	mg/kg dry	1	P7G1110	07/11/17	07/11/17	EPA 300.0	
% Moisture	**4.0**	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-10, 10'

7G10001-59 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	2.34	1.04	mg/kg dry	1	P7G1703	07/17/17	07/18/17	EPA 300.0	
% Moisture	4.0	0.1	%	1	P7G1102	07/11/17	07/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Capreek SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7G1005 - * DEFAULT PREP *** **										
Blank (P7G1005-BLK1)				Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	ND	1.00	mg/kg wet							
LCS (P7G1005-BS1)				Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	412	1.00	mg/kg wet	400		103	80-120			
LCS Dup (P7G1005-BSD1)				Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	415	1.00	mg/kg wet	400		104	80-120	0.902	20	
Duplicate (P7G1005-DUP1)		Source: 7G10001-01		Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	3770	31.6	mg/kg dry		2710			32.5	20	R
Duplicate (P7G1005-DUP2)		Source: 7G10001-15		Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	ND	1.03	mg/kg dry		ND				20	
Matrix Spike (P7G1005-MS1)		Source: 7G10001-01		Prepared: 07/10/17 Analyzed: 07/11/17						
Chloride	6130	31.6	mg/kg dry	2530	2710	135	80-120			QM-05
Batch P7G1101 - * DEFAULT PREP *** **										
Blank (P7G1101-BLK1)				Prepared & Analyzed: 07/11/17						
Chloride	ND	1.00	mg/kg wet							
LCS (P7G1101-BS1)				Prepared & Analyzed: 07/11/17						
Chloride	427	1.00	mg/kg wet	400		107	80-120			
LCS Dup (P7G1101-BSD1)				Prepared & Analyzed: 07/11/17						
Chloride	430	1.00	mg/kg wet	400		108	80-120	0.852	20	

Larson & Associates, Inc.
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Project Manager: Mark Larson

Fax: (432) 687-0456

General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7G1101 - * DEFAULT PREP *** **										
Duplicate (P7G1101-DUP1)		**Source: 7G10001-28**		Prepared & Analyzed: 07/11/17						
Chloride	ND	1.08	mg/kg dry		ND				20	
Duplicate (P7G1101-DUP2)		**Source: 7G10001-43**		Prepared & Analyzed: 07/11/17						
Chloride	64.7	1.01	mg/kg dry		75.0			14.8	20	
Matrix Spike (P7G1101-MS1)		**Source: 7G10001-28**		Prepared & Analyzed: 07/11/17						
Chloride	1030	1.08	mg/kg dry	1080	ND	96.2	80-120			
Batch P7G1102 - * DEFAULT PREP *** **										
Blank (P7G1102-BLK1)				Prepared & Analyzed: 07/11/17						
% Moisture	ND	0.1	%							
Batch P7G1110 - * DEFAULT PREP *** **										
Blank (P7G1110-BLK1)				Prepared & Analyzed: 07/11/17						
Chloride	ND	1.00	mg/kg wet							
LCS (P7G1110-BS1)				Prepared & Analyzed: 07/11/17						
Chloride	419	1.00	mg/kg wet	400		105	80-120			
LCS Dup (P7G1110-BSD1)				Prepared & Analyzed: 07/11/17						
Chloride	410	1.00	mg/kg wet	400		102	80-120	2.29	20	
Duplicate (P7G1110-DUP1)		**Source: 7G10001-58**		Prepared & Analyzed: 07/11/17						
Chloride	3.28	1.04	mg/kg dry		4.07			21.5	20	R3

Larson & Associates, Inc.
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Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
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General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7G1110 - * DEFAULT PREP *** **										
Duplicate (P7G1110-DUP2)	Source: 7G07005-03			Prepared: 07/11/17 Analyzed: 07/12/17						
Chloride	715	1.23	mg/kg dry		705			1.45	20	
Matrix Spike (P7G1110-MS1)	Source: 7G10001-58			Prepared & Analyzed: 07/11/17						
Chloride	1080	1.04	mg/kg dry	1040	4.07	103	80-120			
Batch P7G1703 - * DEFAULT PREP *** **										
Blank (P7G1703-BLK1)				Prepared: 07/17/17 Analyzed: 07/18/17						
Chloride	ND	1.00	mg/kg wet							
LCS (P7G1703-BS1)				Prepared & Analyzed: 07/17/17						
Chloride	416	1.00	mg/kg wet	400		104	80-120			
LCS Dup (P7G1703-BSD1)				Prepared: 07/17/17 Analyzed: 07/18/17						
Chloride	400	1.00	mg/kg wet	400		99.9	80-120	4.04	20	
Duplicate (P7G1703-DUP1)	Source: 7G10001-06			Prepared: 07/17/17 Analyzed: 07/18/17						
Chloride	848	1.10	mg/kg dry		839			0.996	20	
Duplicate (P7G1703-DUP2)	Source: 7G11002-33			Prepared: 07/17/17 Analyzed: 07/18/17						
Chloride	1770	11.0	mg/kg dry		1520			15.2	20	
Matrix Spike (P7G1703-MS1)	Source: 7G10001-06			Prepared: 07/17/17 Analyzed: 07/18/17						
Chloride	1790	1.10	mg/kg dry	1100	839	86.1	80-120			

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7G1105 - TX 1005										
Blank (P7G1105-BLK1)				Prepared & Analyzed: 07/10/17						
C6-C12	ND	25.0	mg/kg wet							
>C12-C28	ND	25.0	"							
>C28-C35	ND	25.0	"							
Surrogate: 1-Chlorooctane	*94.8*		"	*100*		*94.8*	*70-130*			
Surrogate: o-Terphenyl	*51.0*		"	*50.0*		*102*	*70-130*			
LCS (P7G1105-BS1)				Prepared & Analyzed: 07/10/17						
C6-C12	765	25.0	mg/kg wet	1000		76.5	75-125			
>C12-C28	750	25.0	"	1000		75.0	75-125			
Surrogate: 1-Chlorooctane	*91.1*		"	*100*		*91.1*	*70-130*			
Surrogate: o-Terphenyl	*49.3*		"	*50.0*		*98.7*	*70-130*			
LCS Dup (P7G1105-BSD1)				Prepared & Analyzed: 07/10/17						
C6-C12	818	25.0	mg/kg wet	1000		81.8	75-125	6.67	20	
>C12-C28	786	25.0	"	1000		78.6	75-125	4.70	20	
Surrogate: 1-Chlorooctane	*93.2*		"	*100*		*93.2*	*70-130*			
Surrogate: o-Terphenyl	*50.6*		"	*50.0*		*101*	*70-130*			
Matrix Spike (P7G1105-MS1)	Source: 7G10001-01			Prepared: 07/10/17 Analyzed: 07/11/17						
C6-C12	1130	31.6	mg/kg dry	1270	ND	89.5	75-125			
>C12-C28	1100	31.6	"	1270	15.0	85.5	75-125			
Surrogate: 1-Chlorooctane	*129*		"	*127*		*102*	*70-130*			
Surrogate: o-Terphenyl	*61.9*		"	*63.3*		*97.7*	*70-130*			
Matrix Spike Dup (P7G1105-MSD1)	Source: 7G10001-01			Prepared: 07/10/17 Analyzed: 07/11/17						
C6-C12	1190	31.6	mg/kg dry	1270	ND	94.0	75-125	4.89	20	
>C12-C28	1150	31.6	"	1270	15.0	89.8	75-125	4.90	20	
Surrogate: 1-Chlorooctane	*135*		"	*127*		*106*	*70-130*			
Surrogate: o-Terphenyl	*71.2*		"	*63.3*		*112*	*70-130*			

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Project Manager: Mark Larson

Fax: (432) 687-0456

Notes and Definitions

R3	The RPD exceeded the acceptance limit due to sample matrix effects.
R	The RPD exceeded the method control limit. The individual analyte QA/QC recoveries, however, were within acceptance limits.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
BULK	Samples received in Bulk soil containers
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
LCS	Laboratory Control Spike
MS	Matrix Spike
Dup	Duplicate

Report Approved By: _____ Date: 7/20/2017

Brent Barron, Laboratory Director/Technical Director

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants

507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

Data Reported to:

DATE: 7-10-2017 PAGE 1 OF 4
PO #: LAB WORK ORDER #: 1610001
PROJECT LOCATION OR NAME: Paladin East Caprock 5-20
LAI PROJECT #: 17-0158-01 COLLECTOR: TW / ZB

TRRP report? ☐ Yes ☐ No

TIME ZONE: Time zone/State:

S=SOIL P=PAINT
W=WATER SL=SLUDGE
A=AIR OT=OTHER

PRESERVATION: HCl, HNO_3, H_2SO_4 ☐ NaOH ☐, ICE, UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐; TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐; GASOLINE MOD 8015 ☑; DIESEL - MOD 8015 ☑; VOC 8260 ☐; SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐; 8081 PESTICIDES ☐ 8151 HERBICIDES ☐; 8082 PCBS ☐; TCLP - METALS (RCRA) ☐ TCLP VOC ☐; TCLP - PEST ☐ HERB ☐ Semi-VOC ☐; TOTAL METALS (RCRA) ☐ OTHER LIST ☐; LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐; RCI ☐ TOX ☐ FLASHPOINT ☐; TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐; pH ☐ HEXAVALENT CHROMIUM ☐; EXPLOSIVES ☐ PERCHLORATE ☐; CHLORIDE ☑ ANIONS ☐ ALKALINITY ☐; Hold; FIELD NOTES

	Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	ICE	Gasoline MOD 8015	Diesel MOD 8015	Chloride	Hold	Field Notes
1	SB-1, 3'		7/6/17	12:40	S	1	X	✓	✓	✓		
2	5'		↓	12:45	↓	1	↓			✓		
3	7'			12:47		1				✓		
4	10'			12:50		1				✓		
5	15'			12:55		1				✓	[illegible]	[illegible]
6	20'			12:56		1					✓	
7	↓ 25'		↓	13:00		1					✓	
8	SB-2, 3'		7/6/17	13:45		1				✓		
9	5'		↓	13:47		1				✓		
10	7'			13:51		1				✓		
11	10'			13:52		1				✓		
12	15'			13:55		1					✓	
13	↓ 20'		↓	13:57		1					✓	
14	SB-3, 3'		7/7/17	10:04		1		✓	✓			
15	↓ 5'			10:05	↓	1	↓	✓	✓			

TOTAL

RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	7/10/17 9:00	Amanda [signature]
RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY:(Signature) [signature]	DATE/TIME	RECEIVED BY: (Signature)

TURN AROUND TIME
~~NORMAL~~ ☐
1 DAY ☑
2 DAY ☐
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: -4.2°C THERM #: L1 NCF
CUSTODY SEALS - ☐ BROKEN ☑ INTACT ☐ NOT USED
☐ CARRIER BILL #
☑ HAND DELIVERED

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

Data Reported to:

DATE: 7-10-2017 PAGE 2 OF 2
PO #: LAB WORK ORDER #: 1610001
PROJECT LOCATION OR NAME: Valadin / East Caprock Sub
LAI PROJECT #: 17-0158-01 COLLECTOR: TW / ZB

TRRP report? ☐ Yes ☑ No

TIME ZONE: Time zone/State: Mtn/NM

S=SOIL W=WATER A=AIR P=PAINT SL=SLUDGE OT=OTHER

PRESERVATION: HCl | HNO_3 | H_2SO_4 ☐ NaOH ☐ | ICE | UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐ | TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐ | GASOLINE MOD 8015 ☑ | DIESEL - MOD 8015 ☑ GRO DRO | VOC 8260 ☐ | SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐ | 8081 PESTICIDES ☐ 8151 HERBICIDES ☐ | 8082 PCBS ☐ | TCLP - METALS (RCRA) ☐ TCLP VOC ☐ | TCLP - PEST ☐ HERB ☐ Semi-VOC ☐ | TOTAL METALS (RCRA) ☐ OTHER LIST ☐ | LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐ | RCI ☐ TOX ☐ FLASHPOINT ☐ | TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐ | pH ☐ HEXAVALENT CHROMIUM ☐ | EXPLOSIVES ☐ PECHLORATE ☐ | CHLORIDE ☑ ANIONS ☐ ALKALINITY ☐ | 5x) | Hold

	Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	ICE	CHLORIDE	Hold	FIELD NOTES
16	SB-3, 7'		7/6/17	10:08	S	1	X		✓	
17	10'		↓	10:09	↓	1	↓		✓	
18	15'		↓	10:10	↓	1	↓		✓	
19	SB-4, 3'		7/6/17	14:05	↓	1	↓	✓		
20	5'		↓	14:09	↓	1	↓	✓		
21	7'		↓	14:11	↓	1	↓	✓		
22	10'		↓	14:12	↓	1	↓	✓		
23	15'		↓	14:15	↓	1	↓		✓	
24	20'		↓	14:17	↓	1	↓		✓	
25	SB-5, 3'		7/7/17	10:22	↓	1	↓	✓		
26	5'		↓	10:24	↓	1	↓	✓		
27	7'		↓	10:25	↓	1	↓	✓		
28	10'		↓	10:31	↓	1	↓	✓		
29	15'		↓	10:33	↓	1	↓		✓	
30	20'		↓	10:37	↓	1	↓		✓	

TOTAL

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RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature] PBEL		

TURN AROUND TIME
NORMAL ☐
1 DAY ☑
2 DAY ☐
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: -4.4°C THERM #: L1 NCF
CUSTODY SEALS - ☐ BROKEN ☑ INTACT ☐ NOT USED
☐ CARRIER BILL #
☑ HAND DELIVERED

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

Data Reported to:

DATE: 7-10-2017 PAGE 3 OF 3
PO #: LAB WORK ORDER #: 7610001
PROJECT LOCATION OR NAME: Paladin East Caprock SWD
LAI PROJECT #: 17-0158-01 COLLECTOR: Tw/ZB

TRRP report? ☐ Yes ☑ No

TIME ZONE: Time zone/State: Mtn/NM

S=SOIL W=WATER A=AIR P=PAINT SL=SLUDGE OT=OTHER

PRESERVATION: HCl, HNO_3, H_2SO_4 ☐ NaOH ☐, ICE, UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐; TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐; GASOLINE MOD 8015 ☐; DIESEL - MOD 8015 ☑ ORO; VOC 8260 ☐; SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐; 8061 PESTICIDES ☐ 8151 HERBICIDES ☐; 8082 PCBS ☐; TCLP - METALS (RCRA) ☐ TCLP VOC ☐; TCLP - PEST ☐ HERB ☐ Semi-VOC ☐; TOTAL METALS (RCRA) ☐ OTHER LIST ☐; LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐; RCI ☐ TOX ☐ FLASHPOINT ☐; TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐; pH ☐ HEXAVALENT CHROMIUM ☐; EXPLOSIVES ☐ PECHLORATE ☐; CHLORIDE ☑ ANIONS ☐ ALKALINITY ☐; 350; Hold; FIELD NOTES

Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	ICE	Chloride	Hold	Field Notes
SB-6, 3'		7/7/17	10:58	S	1	X	✓		
5'		↓	10:59	↓	1	↓	✓		
7'			11:01		1		✓		
10'			11:02		1		✓		
15'			11:04		1		✓		
20'			11:06		1			✓	
SB-7 3'			12:47		1		✓		
5'			12:48		1		✓		
7'			12:49		1		✓		
10'			12:50		1		✓		
15'			12:53		1			✓	
20'			12:56		1			✓	
SB-8, 3'			11:31		1		✓		
5'			11:32		1		✓		
7'		↓	11:34	↓	1	↓	✓		

TOTAL

RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	7/10/17 10:05	[signature]
RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY:(Signature)	DATE/TIME	RECEIVED BY: (Signature)
PBEL		

TURN AROUND TIME
NORMAL ☐
1 DAY ☑
2 DAY ☐
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: -3.4°C THERM #: L1 NCF
CUSTODY SEALS - ☐ BROKEN ☑ INTACT ☐ NOT USED
☐ CARRIER BILL #
☑ HAND DELIVERED

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

CHAIN-OF-CUSTODY

DATE: 7-10-2017 PAGE 4 OF 4
PO #: LAB WORK ORDER #: 1610001
PROJECT LOCATION OR NAME: Valadin / East Capnock S
LAI PROJECT #: 17-0158-01 COLLECTOR: TW / 2B

Data Reported to:

TRRP report? ☐ Yes ☑ No

TIME ZONE: Time zone/State: Mtn / NM

S=SOIL W=WATER A=AIR P=PAINT SL=SLUDGE OT=OTHER

PRESERVATION: HCl | HNO3 | H_2SO_4 ☐ NaOH ☐ | ICE | UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐ | TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐ | GASOLINE MOD 8015 ☑ | DIESEL - MOD 8015 ☑ (GRO DRO) | VOC 8260 ☐ | SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐ | 8081 PESTICIDES ☐ 8151 HERBICIDES ☐ | 8082 PCBS ☐ | TCLP - METALS (RCRA) ☐ TCLP VOC ☐ | TCLP - PEST ☐ HERB ☐ Semi-VOC ☐ | TOTAL METALS (RCRA) ☐ OTHER LIST ☐ | LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐ | RCI ☐ TOX ☐ FLASHPOINT ☐ | TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐ | pH ☐ HEXAVALENT CHROMIUM ☐ | EXPLOSIVES ☐ PECHLORATE ☐ | CHLORIDE ☑ ANIONS ☐ ALKALINITY ☐ | Hold | FIELD NOTES

Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	ICE	Gasoline MOD 8015	Diesel MOD 8015	Chloride	Hold	Field Notes
SB-8, 10'		7/7/17	11:35		1	X			✓		
15'		↓	11:36		1	↓				✓	
20'		↓	11:38		1	↓				✓	
SB-9 3'		↓	12:20		1	↓			✓		
5'		↓	12:23		1	↓			✓		
7'		↓	12:26		1	↓			✓		
10'		↓	12:32		1	↓				✓	
15'		↓	12:34		1	↓				✓	
20'		↓	12:37		1	↓				✓	
SB-10 0'		7/6/17	12:10		1	↓	✓	✓	✓		
3'		↓	12:11		1	↓	✓	✓	✓		
5'		↓	12:13		1	↓			✓		
7'		↓	12:15		1	↓			✓		
10'		↓	12:17		1	↓				✓	

TOTAL

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	7/10/17 10:00	[signature]
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
PBEL		

TURN AROUND TIME
NORMAL ☐
1 DAY ☐
2 DAY ☑
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: -4.2° THERM #: L4 NCF
CUSTODY SEALS - ☐ BROKEN ☑ INTACT ☐ NOT USED
☐ CARRIER BILL #
☑ HAND DELIVERED

PERMIAN BASIN
ENVIRONMENTAL LAB, LP
1400 Rankin Hwy
Midland, TX 79701

PBELAB

Analytical Report

Prepared for:

Mark Larson
Larson & Associates, Inc.
P.O. Box 50685
Midland, TX 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Location:

Lab Order Number: 7H10007

NELAP/TCEQ # T104704516-16-7

Report Date: 08/14/17

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Project Manager: Mark Larson

Fax: (432) 687-0456

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-10 20'	7H10007-01	Soil	08/09/17 13:14	08-10-2017 11:15
SB-10 25'	7H10007-02	Soil	08/09/17 13:20	08-10-2017 11:15
SB-11 0'	7H10007-03	Soil	08/09/17 11:02	08-10-2017 11:15
SB-11 03'	7H10007-04	Soil	08/09/17 11:03	08-10-2017 11:15
SB-11 5'	7H10007-05	Soil	08/09/17 11:07	08-10-2017 11:15
SB-11 7'	7H10007-06	Soil	08/09/17 11:10	08-10-2017 11:15
SB-11 10'	7H10007-07	Soil	08/09/17 11:15	08-10-2017 11:15
SB-11 15'	7H10007-08	Soil	08/09/17 11:20	08-10-2017 11:15
SB-11 20'	7H10007-09	Soil	08/09/17 11:25	08-10-2017 11:15
SB-12 20'	7H10007-10	Soil	08/09/17 12:10	08-10-2017 11:15
SB-12 25'	7H10007-11	Soil	08/09/17 12:12	08-10-2017 11:15
SB-13 20'	7H10007-12	Soil	08/09/17 12:42	08-10-2017 11:15
SB-13 25'	7H10007-13	Soil	08/09/17 12:50	08-10-2017 11:15
S5-01 0-1'	7H10007-14	Soil	08/09/17 13:25	08-10-2017 11:15

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-10 20'

7H10007-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**1190**	1.16	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**14.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc. P.O. Box 50685 Midland TX, 79710	Project: Paladin East Caprock SWD #5 Project Number: 17-0158-01 Project Manager: Mark Larson	Fax: (432) 687-0456

SB-10 25'

7H10007-02 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**1100**	1.14	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**12.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 0'

7H10007-03 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**2560**	11.1	mg/kg dry	10	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**10.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 03'

7H10007-04 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**1960**	5.49	mg/kg dry	5	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**9.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 5'

7H10007-05 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**30.8**	1.03	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**3.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 7'

7H10007-06 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**46.8**	1.02	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 10'

7H10007-07 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**23.7**	1.02	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**2.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 15'

7H10007-08 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**28.9**	1.14	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**12.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-11 20'

7H10007-09 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**30.1**	1.16	mg/kg dry	1	P7H1011	08/10/17	08/10/17	EPA 300.0	
% Moisture	**14.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-12 20'

7H10007-10 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**29.9**	1.05	mg/kg dry	1	P7H1011	08/10/17	08/11/17	EPA 300.0	
% Moisture	**5.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-12 25'

7H10007-11 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**942**	1.16	mg/kg dry	1	P7H1011	08/10/17	08/11/17	EPA 300.0	
% Moisture	**14.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-13 20'

7H10007-12 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**452**	1.12	mg/kg dry	1	P7H1011	08/10/17	08/11/17	EPA 300.0	
% Moisture	**11.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

SB-13 25'

7H10007-13 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Permian Basin Environmental Lab, L.P.									
General Chemistry Parameters by EPA / Standard Methods									
Chloride	**760**	1.16	mg/kg dry	1	P7H1011	08/10/17	08/11/17	EPA 300.0	
% Moisture	**14.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	

Larson & Associates, Inc.	Project: Paladin East Caprock SWD #5	Fax: (432) 687-0456
P.O. Box 50685	Project Number: 17-0158-01	
Midland TX, 79710	Project Manager: Mark Larson	

S5-01 0-1'

7H10007-14 (Soil)

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
General Chemistry Parameters by EPA / Standard Methods									
% Moisture	**9.0**	0.1	%	1	P7H1102	08/11/17	08/11/17	ASTM D2216	
Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M									
C6-C12	ND	27.5	mg/kg dry	1	P7H1402	08/10/17	08/10/17	TPH 8015M	
>C12-C28	ND	27.5	mg/kg dry	1	P7H1402	08/10/17	08/10/17	TPH 8015M	
>C28-C35	ND	27.5	mg/kg dry	1	P7H1402	08/10/17	08/10/17	TPH 8015M	
Surrogate: 1-Chlorooctane		*107 %*	*70-130*		*P7H1402*	*08/10/17*	*08/10/17*	*TPH 8015M*	
Surrogate: o-Terphenyl		*123 %*	*70-130*		*P7H1402*	*08/10/17*	*08/10/17*	*TPH 8015M*	
Total Petroleum Hydrocarbon C6-C35	ND	27.5	mg/kg dry	1	[CALC]	08/10/17	08/10/17	calc	

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Project Manager: Mark Larson

Fax: (432) 687-0456

General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7H1011 - * DEFAULT PREP *** **										
Blank (P7H1011-BLK1)				Prepared & Analyzed: 08/10/17						
Chloride	ND	1.00	mg/kg wet							
LCS (P7H1011-BS1)				Prepared & Analyzed: 08/10/17						
Chloride	432	1.00	mg/kg wet	400		108	80-120			
LCS Dup (P7H1011-BSD1)				Prepared & Analyzed: 08/10/17						
Chloride	425	1.00	mg/kg wet	400		106	80-120	1.69	20	
Duplicate (P7H1011-DUP1)		Source: 7H10007-01		Prepared & Analyzed: 08/10/17						
Chloride	1200	1.16	mg/kg dry		1190			0.708	20	
Duplicate (P7H1011-DUP2)		Source: 7H10007-11		Prepared: 08/10/17 Analyzed: 08/11/17						
Chloride	971	1.16	mg/kg dry		942			3.04	20	
Matrix Spike (P7H1011-MS1)		Source: 7H10007-01		Prepared & Analyzed: 08/10/17						
Chloride	2340	1.16	mg/kg dry	1160	1190	99.5	80-120			
Batch P7H1102 - * DEFAULT PREP *** **										
Blank (P7H1102-BLK1)				Prepared & Analyzed: 08/11/17						
% Moisture	ND	0.1	%							
Duplicate (P7H1102-DUP1)		Source: 7H09005-06		Prepared & Analyzed: 08/11/17						
% Moisture	11.0	0.1	%		10.0			9.52	20	
Duplicate (P7H1102-DUP2)		Source: 7H09007-02		Prepared & Analyzed: 08/11/17						
% Moisture	5.0	0.1	%		5.0			0.00	20	

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Project Manager: Mark Larson

Fax: (432) 687-0456

General Chemistry Parameters by EPA / Standard Methods - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7H1102 - * DEFAULT PREP *** **										
Duplicate (P7H1102-DUP3)		**Source: 7H10007-14**		Prepared & Analyzed: 08/11/17						
% Moisture	9.0	0.1	%		9.0			0.00	20	

Larson & Associates, Inc.
P.O. Box 50685
Midland TX, 79710

Project: Paladin East Caprock SWD #5
Project Number: 17-0158-01
Project Manager: Mark Larson

Fax: (432) 687-0456

Total Petroleum Hydrocarbons C6-C35 by EPA Method 8015M - Quality Control

Permian Basin Environmental Lab, L.P.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P7H1402 - TX 1005										
Blank (P7H1402-BLK1)				Prepared & Analyzed: 08/10/17						
C6-C12	ND	25.0	mg/kg wet							
>C12-C28	ND	25.0	"							
>C28-C35	ND	25.0	"							
Surrogate: 1-Chlorooctane	*96.7*		"	*100*		*96.7*	*70-130*			
Surrogate: o-Terphenyl	*54.4*		"	*50.0*		*109*	*70-130*			
LCS (P7H1402-BS1)				Prepared & Analyzed: 08/10/17						
C6-C12	915	25.0	mg/kg wet	1000		91.5	75-125			
>C12-C28	1000	25.0	"	1000		100	75-125			
Surrogate: 1-Chlorooctane	*116*		"	*100*		*116*	*70-130*			
Surrogate: o-Terphenyl	*48.2*		"	*50.0*		*96.5*	*70-130*			
LCS Dup (P7H1402-BSD1)				Prepared & Analyzed: 08/10/17						
C6-C12	1010	25.0	mg/kg wet	1000		101	75-125	9.89	20	
>C12-C28	1110	25.0	"	1000		111	75-125	10.7	20	
Surrogate: 1-Chlorooctane	*128*		"	*100*		*128*	*70-130*			
Surrogate: o-Terphenyl	*54.1*		"	*50.0*		*108*	*70-130*			
Duplicate (P7H1402-DUP1)	**Source: 7H09004-01**			Prepared: 08/10/17 Analyzed: 08/11/17						
C6-C12	ND	26.0	mg/kg dry		ND				20	
>C12-C28	33.8	26.0	"		38.4			12.8	20	
Surrogate: 1-Chlorooctane	*104*		"	*104*		*99.9*	*70-130*			
Surrogate: o-Terphenyl	*58.6*		"	*52.1*		*113*	*70-130*			

Notes and Definitions

BULK	Samples received in Bulk soil containers
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
LCS	Laboratory Control Spike
MS	Matrix Spike
Dup	Duplicate

Report Approved By: _____ Date: 8/14/2017

Brent Barron, Laboratory Director/Technical Director

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

Data Reported to:

DATE: 8-10-17 PAGE ___ OF ___

PO #: _____ LAB WORK ORDER #: 717100007

PROJECT LOCATION OR NAME: Paladin East Carrock SWD #1

LAI PROJECT #: 17-0158-01 COLLECTOR: _____

TRRP report? ☐ Yes ☒ No

TIME ZONE: Time zone/State: Mountain NM

S=SOIL P=PAINT
W=WATER SL=SLUDGE
A=AIR OT=OTHER

PRESERVATION: HCl | HNO_3 | H_2SO_4 ☐ NaOH ☐ | ICE | UNPRESERVED

ANALYSES: BTEX ☐ MTBE ☐ | TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐ | GASOLINE MOD 8015 ☐ | DIESEL - MOD 8015 ☐ GRO ☑ | VOC 8260 ☐ | SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐ | 8081 PESTICIDES ☐ 8151 HERBICIDES ☐ | 8082 PCBS ☐ | TCLP - METALS (RCRA) ☐ TCLP VOC ☐ | TCLP - PEST ☐ HERB ☐ Semi-VOC ☐ | TOTAL METALS (RCRA) ☐ OTHER LIST ☐ | LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐ | RCI ☐ TOX ☐ FLASHPOINT ☐ | TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐ | pH ☐ HEXAVALENT CHROMIUM ☐ | EXPLOSIVES ☐ PECHLORATE ☐ | CHLORIDE ☒ ANIONS ☐ ALKALINITY ☐ M300

	Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	BTEX ☐ MTBE ☐	TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐	GASOLINE MOD 8015 ☐	DIESEL - MOD 8015 ☐ GRO ☑	VOC 8260 ☐	SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐	8081 PESTICIDES ☐ 8151 HERBICIDES ☐	8082 PCBS ☐	TCLP - METALS (RCRA) ☐ TCLP VOC ☐	TCLP - PEST ☐ HERB ☐ Semi-VOC ☐	TOTAL METALS (RCRA) ☐ OTHER LIST ☐	LEAD - TOTAL ☐ D.W. 200.8 ☐ TCLP ☐	RCI ☐ TOX ☐ FLASHPOINT ☐	TDS ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐	pH ☐ HEXAVALENT CHROMIUM ☐	EXPLOSIVES ☐ PECHLORATE ☐	CHLORIDE ☒ ANIONS ☐ ALKALINITY ☐ M300	FIELD NOTES
1	SB-10 20'		8-9-17	13:40	S																							✓	
2	SB-10 25'		8-9-17	13:20	S																							✓	
3	SB-11 0'		8-9-17	11:02	S																							✓	
4	SB-11 03'		8-9-17	11:03	S																							✓	
5	SB-11 5'		8-9-17	11:07	S																							✓	
6	SB-11 7'		8-9-17	11:10	S																							✓	
7	SB-11 10		8-9-17	11:15	S																							✓	
8	SB-11 15		8-9-17	11:20	S																							✓	
9	SB-11 20'		8-9-17	11:25	S																							✓	
10	SB-12 20'		8-9-17	12:10	S																							✓	
11	SB 12 25'		8-9-17	12:12	S																							✓	
12	SB-13 20'		8-9-17	12:42	S																							✓	
13	SB-13 25'		8-9-17	12:50	S																							✓	
14	SS-01 0-1'		8-9-17	13:25	S										X														
	TOTAL																												

RELINQUISHED BY:(Signature) DATE/TIME 8-10-17 7:45 RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME 8/10/17 11:15 RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME 8-10-17 11:15 RECEIVED BY: (Signature)

PBEL

TURN AROUND TIME
NORMAL ☐
1 DAY ☒
2 DAY ☐
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: 1.6 THERM # NCFU1
CUSTODY SEALS - ☐ BROKEN ☒ INTACT ☐ NOT USED
☐ CARRIER BILL # _____
☒ HAND DELIVERED

Appendix C

Boring Logs

BORING RECORD

Start: 12:40
Finish: 13:00

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0	Caliche, 7.5YR 7/3, Pink, Fill	Caliche	
	2			
	4	Sand, 7.5YR 5/4, Reddish Brown, Very Fine Grain Quartz Sand, Poorly Graded	SM	
	5			
	7	Caliche, 7.5YR 7/3, Pink, Sandy, Very Fine Grain Quartz Sand, Moderate to Hard	Caliche	
	10			
	15	Sand, 7.5YR 8/2, Pinkish White, Very Fine Grain Quartz Sand, Some Caliche Gravel, Poorly Graded	SM	
	19			
	20	Shale, 2.5YR 4/6, Red, Silty, Dry	Shale	
	25	TD: 25'		
		Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS
			0	12:40
			3	12:45
			5	12:47
			7	12:50
			10	12:55
			15	12:56
			20	13:00
			25	

REMARKS: BACKGROUND PID READING
SOIL _____ PPM
SOIL _____ PPM

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, T. Williams
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-6-2017

BORING NUMBER : SB-1

BORING RECORD

Start: 13:45
Finish: 13:57

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quarts Sand, Dry	CL	
	1.5	Sand, 7.5YR 8/3, Pink, Very Fine Grain Quartz Sand, Poorly Graded	SM	
	5	Caliche, 7.5YR 7/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard and Indurated	Caliche	
	15	Sand, 7.5YR 7/2 to 7/3, Pinkish Gray to Pink, Very Fine Grain Quarts Sand, Poorly Graded, Sub-Angular to Rounded	SM-SP	
	23.5	Shale, 2.5YR 4/6, Red, Silty, Dry	Shale	
	25	TD: 25'		
		Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE: NUMBER | PID READING | RECOVERY | DEPTH

DEPTH	REMARKS: BACKGROUND PID READING (SOIL: _____ PPM, SOIL: _____ PPM)
0	
3	13:45
5	13:47
7	13:51
10	13:52
15	13:55
20	12:00 8/9/2017
25	12:12 8/9/2017

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-6-2017 8-8-2017

BORING NUMBER : SB-2 / SB-12

BORING RECORD

Start: 10:00
Finish: 10:10

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0–1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	1–3		SM	
	3–5	Sand, 7.5YR 7/3, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated		
	5–7		Caliche	
	7–10	Caliche, 7.5YR 7/3, Pink, Sandy, Very Fine Grain Quartz Sand, Poorly Graded		
	10–15	Sand, 7.5YR 8/2 to 8/3, Pink to Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded	SM	
	15	TD: 15'		
		Groundwater Not Observed		

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE: NUMBER | PID READING | RECOVERY | DEPTH

DEPTH	REMARKS: BACKGROUND PID READING
0	
3	10:04
5	10:05
7	10:08
10	10:09
15	10:10

SOIL : _____ PPM
SOIL : _____ PPM

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-7-2017

BORING NUMBER : SB-3

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

BORING RECORD

Start: 14:05
Finish: 14:17

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	1.5	Sand, 7.5YR 8/3, Pink, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated, Dry	SM	
	5	Caliche, 7.5YR 8/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard to Indurated	Caliche	
	10			
	15	Sand, 7.5YR 7/1, Light Gray, Very Fine Grain Quartz Sand, Poorly Graded, Some Caliche Gravels	SM	
	20			
	20.5	Shale, 2.5YR 4/6, Red, Silty, Very Fine Grain Quartz Sand, Dry	Shale	
		TD: 20'		
	25	Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS
			0	
			3	14:05
			5	14:09
			7	14:11
			10	14:12
			15	14:15
			20	14:17

BACKGROUND PID READING
SOIL: _____ PPM
SOIL: _____ PPM

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-6-2017

BORING NUMBER : SB-4

BORING RECORD

Start: 10:20
Finish: 10:37

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	1.5		SM	
	3	Sand, 7.5YR 7/2, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated		
	5	Caliche, 7.5YR 7/3 to 8/3, Pink, Sandy, Very Fine Grain Quartz Sand, Moderately Hard to Indurated	Caliche	
	10	Sand, 7.5YR 8/2, Pink, Very Fine Grain Quartz Sand, Poorly Graded, Loose, Sub-Angular - Rounded	SM	
	15			
	20			
	21	Shale, 2.5YR 4/6, Red, Silty, Dry	Shale	
	25	TD: 25'		
		Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE: NUMBER | PID READING | RECOVERY | DEPTH

REMARKS: BACKGROUND PID READING
SOIL: _____ PPM
SOIL: _____ PPM

DEPTH	REMARKS
0	
3	10:22
5	10:24
7	10:29
10	10:31
15	10:33
20	12:42 8/9/2017
25	12:50 8/9/2017

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-7-2017 8-9-2017

BORING NUMBER : SB-5 / SB-13

BORING RECORD

Start: 10:20
Finish: 10:37

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0			
	1.5	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	3		SM	
	5	Sand, 7.5YR 7/2, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated		
		Caliche, 7.5YR 7/3 to 8/3, Pink, Sandy, very Fine Grain Quartz Sand, Moderately Hard to Indurated	Caliche	
	10			
		Sand, 7.5YR 8/3, Pink, Very Fine Grain Quartz Sand, Poorly Graded, Loose	SM	
	15			
	20		Shale	
	20.5	Shale, 2.5YR 4/6, Red, Silty, Very Fine Grain Quartz Sand, Hard		
		TD: 20'		
	25	Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE: NUMBER | PID READING | RECOVERY | DEPTH

REMARKS: BACKGROUND PID READING
SOIL : _____ PPM
SOIL : _____ PPM

DEPTH	REMARKS
0	
3	10:22
5	10:24
7	10:29
10	10:31
15	10:33
20	10:37

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE :	BORING NUMBER :
7-7-2017	SB-5

BORING RECORD

Start: 10:55
Finish: 11:06

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0			
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	3		SM	
	3	Sand, 7.5YR 7/3, Pink, Very Fine Grain Quartz Sand, Poorly Graded		
	5			
	10	Caliche, 7.5YR 7/3 to 8/3, Pink, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated	Caliche	
	15			
	15	Sand, 7.5YR 8/3 to 8/2, Pink to Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded	SM	
	20			
	20	TD: 20'		
		Groundwater Not Observed		
	25			
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE

NUMBER	PID READING	RECOVERY	DEPTH
			0
			3
			5
			7
			10
			15
			20

REMARKS

BACKGROUND PID READING
SOIL _____ PPM
SOIL _____ PPM

DEPTH	REMARKS
0	
3	10:58
5	10:59
7	11:01
10	11:02
15	11:04
20	11:06

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-7-2017

BORING NUMBER : SB-6

BORING RECORD

Start: 12:45
Finish: 12:56

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0			
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	3		SM	
	3	Sand, 7.5YR 8/2, Pinkish White, Very Fine Grain Quartz Sand, Poorly Graded		
	5			
	10	Caliche, 7.5YR 8/1, White, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated	Caliche	
	15			
	15	Sand, 7.5YR 6/3, Light Brown, Very Fine Grain Quartz Sand, Poorly Graded, Loose	SM	
	20	TD: 20'		
		Groundwater Not Observed		
	25			
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS BACKGROUND PID READING
				SOIL : _____ PPM
				SOIL : _____ PPM
			0	
			3	12:47
			5	12:48
			7	12:49
			10	12:50
			15	12:53
			20	12:56

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE :	BORING NUMBER :
7-7-2017	SB-7

BORING RECORD

Start: 12:45
Finish: 12:56

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0			
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	3		SM	
	3	Sand, 7.5YR 7/2, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded		
	5			
			Caliche	
	10	Caliche, 7.5YR 8/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Hard, Indurated		
	15			
	20	Sand, 7.5YR 8/3, Pink, Very Fine Grain Quartz Sand, Poorly Graded	SM	
	20		Shale	
	20.5	Shale, 2.5YR 4/6, Red, Silty, Very Fine Grain Quartz Sand		
	25	TD: 20'		
		Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS: BACKGROUND PID READING
			0	SOIL: _____ PPM
			3	SOIL: _____ PPM
			3	11:31
			5	11:32
			7	11:34
			10	11:35
			15	11:36
			20	11:38

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE :	BORING NUMBER :
7-7-2017	SB-8

BORING RECORD

Start: 12:16
Finish: 12:37

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0			
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL	
	3		SM	
	3	Sand, 7.5YR 8/2, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded		
	5			
			Caliche	
	10	Caliche, 7.5YR 8/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated		
	15			
	17			
		Sand, 7.5YR 6/3, Light Brown, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated	SM	
	20		Shale	
	20.5	Shale, 2.5YR 4/6, Red, Silty, Dry		
		TD: 20'		
	25	Groundwater Not Observed		
	30			
	35			
	40			

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS: BACKGROUND PID READING
			0	SOIL: _____ PPM SOIL: _____ PPM
			3	12:20
			5	12:23
			7	12:36
			10	12:32
			15	12:34
			20	12:37

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 7-7-2017

BORING NUMBER : SB-9

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, Z. Byars
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

BORING RECORD

Start: 12:08
Finish: 12:17

DESCRIPTION LITHOLOGIC

GEOLOGIC UNIT	DEPTH	DESCRIPTION USCS	GRAPHIC LOG
	0		
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL
	3		SM
	5	Sand, 7.5YR 8/2, Pinkish Gray, Very Fine Grain Quartz Sand, Poorly Graded	Caliche
	7	Caliche, 7.5YR 8/3 to 8/2, Pink to Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated	
	10		SM
	15	Sand, 7.5YR 8/2, Pinkish Gray, Very Fine Grain Quartz Sand, Well Graded	
	17		
	20	Shale, 2.5YR 4/6, Red, Silty, Dry	Shale
	25	TD: 25' Groundwater Not Observed	
	30		
	35		
	40		

PID READING

PPM X _____

2 4 6 8 10 12 14 16 18

SAMPLE

NUMBER	PID READING	RECOVERY	DEPTH
			0
			3
			5
			7
			10
			15
			20

REMARKS

BACKGROUND PID READING

SOIL : _____ PPM
SOIL : _____ PPM

12:20
12:23
12:36
12:32
12:34
12:37

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, T. Williams
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc.
Environmental Consultants

DRILL DATE : 7-6-2017 8-9-2017

BORING NUMBER : SB-10

BORING RECORD

Start: 11:00
Finish: 11:25

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG
	0–2	Caliche, 7.5YR 5/3, Brown, Sandy, Very Fine Grain Quartz Sand, Indurated, Fill	Caliche	
	2–11	Caliche, 7.5YR 8/1, White, Sandy, Very Fine Grain Quartz Sand, Indurated Below 5', 7.5YR 6/2, Pinkish Gray	Caliche	
	11–17	Sand, 5YR 6/3, Light Reddish Brown, Very Fine Grain Quartz Sand, Well Graded, Sub-Angular, Interbedded with Caliche	SM	
	17–21	Shale, 2.5YR 4/6, Red, Silty, Dry	Shale	
	21	TD: 21'		
		Groundwater Not Observed		

PID READING: PPM X _____ (2 4 6 8 10 12 14 16 18)

SAMPLE: NUMBER | PID READING | RECOVERY | DEPTH

DEPTH	REMARKS: BACKGROUND PID READING
1	11:02
3	11:03
5	11:07
7	11:10
10	11:15
15	11:20
20	11:25

SOIL : _____ PPM
SOIL : _____ PPM

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : 17-0158-01 / Paladin
HOLE DIAMETER : 5"
LOCATION : East Caprock SWD #005
LAI GEOLOGIST : M. Larson, S. Johnson
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 8-9-2017

BORING NUMBER : SB-11 (S-3)

BORING RECORD

Start: 11:40
Finish: 12:12

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG	PID READING (PPM X ____)	SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS BACKGROUND PID READING
	0				2 4 6 8 10 12 14 16 18					SOIL : ____ PPM SOIL : ____ PPM
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL							
	5								5	11:40
		Caliche, 7.5YR 8/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated	Caliche							
	10								10	11:45
	15								15	11:50
	16									
		Sand, 7.5YR 7/3, Pink Fine Grain Quartz Sand, Poorly Graded, Sub-Angular - Rounded								
	20								20	12:00
										12:10
		Shale, 2.5YR 5/6, Red, Very Fine Grain Quartz Silty Sand	Shale						21	
	25								25	12:12
		TD: 25'							26	
		Groundwater Not Observed								
	30									
	35									
	40									

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : Paladin Well #5
HOLE DIAMETER : 5.25"
LOCATION : Lea County, NM
LAI GEOLOGIST : M. Larson, S. Johnson
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

Larson & Associates, Inc. Environmental Consultants

DRILL DATE : 8-9-2017

BORING NUMBER : SB-12

BORING RECORD

Start: 12:21
Finish: 12:50

GEOLOGIC UNIT	DEPTH	DESCRIPTION LITHOLOGIC	DESCRIPTION USCS	GRAPHIC LOG	PID READING (PPM X ____)	SAMPLE NUMBER	SAMPLE PID READING	SAMPLE RECOVERY	SAMPLE DEPTH	REMARKS BACKGROUND PID READING
	0				2 4 6 8 10 12 14 16 18					SOIL : ____ PPM SOIL : ____ PPM
	1	Silty Clay, 7.5YR 5/4, Brown, Very Fine Grain Quartz Sand, Loose, Dry	CL							
	5								5	12:27
		Caliche, 7.5YR 8/2, Pinkish Gray, Sandy, Very Fine Grain Quartz Sand, Moderately Hard, Indurated	Caliche							
	10								10	12:30
	15								15	12:32
		Sand, 7.5YR 8/2, Pink Brown, Very Fine Grain Quartz Sand, Poorly Graded, Unconsolidated	SM-SP							
	20								20	12:34
									21	12:42
		Shale, 2.5YR 5/6, Red, Very Fine Grain Quartz Silty Sand	Shale							
	25								25	12:50
		TD: 25' Groundwater Not Observed							26	
	30									
	35									
	40									

ONE CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HRS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
\+ PENETROMETER (TONS/ SQ. FT)
NR NO RECOVERY

JOB NUMBER : Paladin Well #5
HOLE DIAMETER : 5.25"
LOCATION : Lea County, NM
LAI GEOLOGIST : M. Larson, S. Johnson
DRILLING CONTRACTOR : Scarbrough Drilling
DRILLING METHOD : Air Rotary

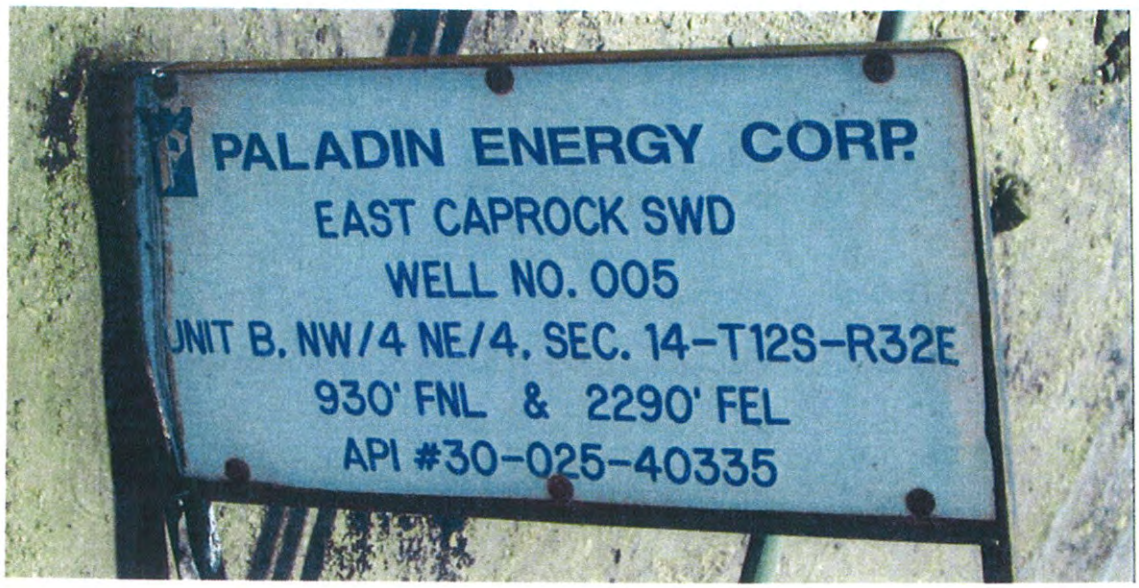
Larson & Associates, Inc.
Environmental Consultants

DRILL DATE : 8-9-2017

BORING NUMBER : SB-13

Attachment D

Photographs



Location Sign

Spill Area near Southwest Corner of Well Pad Viewing North, June 12, 2017

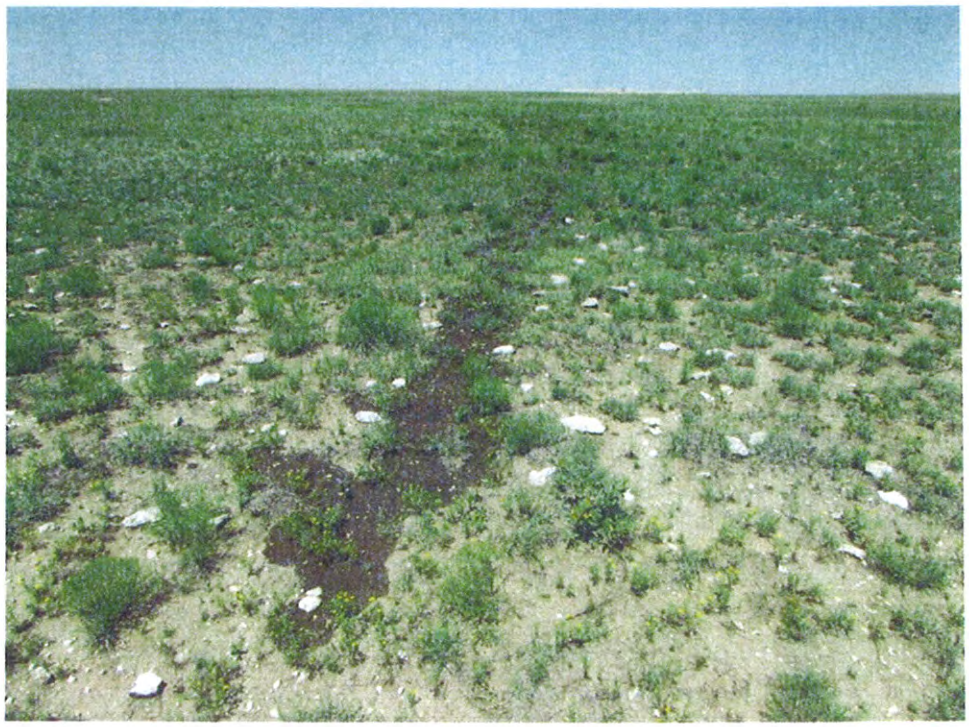
Spill Area West of Well Viewing South, June 12, 2017

Spill Area South of Well Viewing East, June 12, 2017

Spill Area East of Location Viewing West, June 12, 2017

Spill Area East of Location Viewing East, June 12, 2017

Spill Area East of Location Viewing East, June 12, 2017



Spill Area East of Location Viewing West, June 12, 2017

Spill Area South of Location Viewing East, June 20, 2017

Spill Area East of Location Viewing East, June 20, 2017

Spill Area East of Location Viewing East, June 20, 2017

Attachment E

Initial C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Paladin Energy Corporation	Contact: Mickey Horn
Address: 10290 Monroe Drive Suite 301, Dallas, TX 75229	Telephone No.: (214) 352-7273
Facility Name: East Caprock SWD No. 005	Facility Type: SWD Well

Surface Owner: Ricky Pierce	Mineral Owner	Lease No.API No. 3002540335

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
B	14	12S	32E	930	North	2290	East	Lea

Latitude: N33° 16" 59.80" **Longitude: W103° 41' 13.20"**

NATURE OF RELEASE

Type of Release: Produced Water	Volume of Release: 1,700 bbl	Volume Recovered: 1,020 bbl
Source of Release: Poly line parted at valve near well	Date and Hour of Occurrence: 06-11-2017	Date and Hour of Discovery: 06-12-2017; 08:00AM
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu, Environmental Specialist, OCD District 1	
By Whom? Mickey Horn	Date and Hour 6/13/2017; 09:30AM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	
If a Watercourse was Impacted, Describe Fully.*		

RECEIVED
By Olivia Yu at 9:02 am, Jun 15, 2017

Describe Cause of Problem and Remedial Action Taken.* Poly injection line parted at valve near well causing produced water released onto location. Spill breached berm near southeast corner of location allowing produced water to flow east into pasture approximately 950 feet. Injection pump was shut-in and berm repaired to contain fluid to location. Vacuum truck was dispatched to recover standing fluid on location.

Describe Area Affected and Cleanup Action Taken.* Affected area on location is approximately 33,928 square feet. Affected area east of location is approximately 90,000 square feet for a total of approximately 122,928 square feet. Approximately 1,020 bbl of produced water was recovered and returned to tanks. Affected area will be delineated to determine remediation.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	OIL CONSERVATION DIVISION
Printed Name: George G. Fenton	Approved by District Supervisor:
Title: President	Approval Date: 6/15/2017 Expiration Date:
E-mail Address:	Conditions of Approval: see attached directive Attached ☑
Date: 06-13-2017 Phone: (214) 654-0132	

* Attach Additional Sheets If Necessary

1RP-4723 nOY1716632697 pOY1716633006

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _6/13/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number _1RP-4723__ has been assigned. **Please refer to this case number in all future correspondence.**

It is the Division's obligation under both the Oil & Gas Act and Water Quality Act to provide for the protection of public health and the environment. Our regulations (19.15.29.11 NMAC) state the following,

> *The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.* (emphasis added)

Release characterization is the first phase of corrective action unless the release is ongoing or is of limited volume and all impacts can be immediately addressed. Proper and cost-effective remediation typically cannot occur without adequate characterization of the impacts of any release. Furthermore, the Division has the ability to impose reasonable conditions upon the efforts it oversees. **As such, the Division is requiring a workplan for the characterization of impacts associated with this release be submitted to the OCD District _1_ office in __Hobbs____ on or before _7/15/2017_. If and when the release characterization workplan is approved, there will be an associated deadline for submittal of the resultant investigation report. Modest extensions of time to these deadlines may be granted, but only with acceptable justification.**

The goals of a characterization effort are: 1) determination of the lateral and vertical extents along with the magnitude of soil contamination. 2) determine if groundwater or surface waters have been impacted. 3) if groundwater or surface waters have been impacted, what are the extents and magnitude of that impact. 4) The characterization of any other adverse impacts that may have occurred (examples: impacts on vegetation, impacts on wildlife, air quality, loss of use of property, etc.). To meet these goals as quickly as possible, the following items must, at a minimum, be addressed in the release characterization workplan and subsequent reporting:

• Horizontal delineation of soil impacts in each of the four cardinal compass directions. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. This is not an exclusive list of potential contaminants. Analyzed parameters should be modified based on the nature of the released substance(s). Soil sampling must be both within the impacted area and beyond.

• Vertical delineation of soil impacts. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. As above, this is not an exclusive list of potential contaminants and can be modified. Vertical characterization samples should be taken at depth intervals no greater than five feet apart. Lithologic description of encountered soils must also be provided. At least ten vertical feet of soils with contaminant concentrations at or below these values must be demonstrated as existing above the water table.

• Nominal detection limits for field and laboratory analyses must be provided.

• Composite sampling is not generally allowed.

• Field screening and assessment techniques are acceptable (headspace, titration, EC [include algorithm for validation purposes], EM, etc.), but the sampling and assay procedures must be clearly defined. Copies of field notes are highly desirable. A statistically significant set of split samples must be submitted for confirmatory laboratory analysis, including the laterally farthest and vertically deepest sets of soil samples. Make sure there are at least two soil samples submitted

for laboratory analysis from each borehole or test pit (highest observed contamination and deepest depth investigated). Copies of the actual laboratory results must be provided including chain of custody documentation.

•Probable depth to shallowest protectable groundwater and lateral distance to nearest surface water. If there is an estimate of groundwater depth, the information used to arrive at that estimate must be provided. If there is a reasonable assumption that the depth to protectable water is 50 feet or less, the responsible party should anticipate the need for at least one groundwater monitoring well to be installed in the area of likely maximum contamination.

• If groundwater contamination is encountered, an additional investigation workplan may be required to determine the extents of that contamination. Groundwater and/or surface water samples, if any, must be analyzed by a competent laboratory for volatile organic hydrocarbons (typically Method 8260 full list), total dissolved solids, pH, major anions and cations including chloride and sulfate, dissolved iron, and dissolved manganese. The investigation workplan must provide the groundwater sampling method(s) and sample handling protocols. To the fullest extent possible, aqueous analyses must be undertaken using nominal method detection limits. As with the soil analyses, copies of the actual laboratory results must be provided including chain of custody documentation.

• Accurately scaled and well-drafted site maps must be provided providing the location of borings, test pits, monitoring wells, potentially impacted areas, and significant surface features including roads and site infrastructure that might limit either the release characterization or remedial efforts. Field sketches may be included in subsequent reporting, but should not be considered stand-alone documentation of the site's layout. Digital photographic documentation of the location and fieldwork is recommended, especially if unusual circumstances are encountered.

Nothing herein should be interpreted to preclude emergency response actions or to imply immediate remediation by removal cannot proceed as warranted. Nonetheless, characterization of impacts and confirmation of the effectiveness of remedial efforts must still be provided to the OCD before any release incident will be closed.

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