APPROVED
By Olivia Yu at 9:46 am, Oct 05, 2017

NMOCD approves of the proposed second stage of delineation and establishment of the groundwater monitoring wells for 1RP-4789.

1RP-4789
INTERIM DELINEATION REPORT
EMSU B Produced Water Release

Lea County, New Mexico

Latitude: N32° 34' 03.40"
Longitude: W103° 19' 13.08"

LAI Project No. 17-0176-01

September 21, 2017

Prepared for:

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1.0 INTRODUCTION

This interim delineation report is submitted to the New Mexico Oil Conservation Division (OCD) District 1 on behalf of XTO Energy, Inc. (XTO) for a produced water release from a ten (10) inch cement-lined steel line associated with the Eunice Monument South Unit (EMSU) B (Site) in Lea County, New Mexico. The release occurred in Unit P (SE/4, SE/4), Section 14, Township 20 South and Range 36 East in Lea County, New Mexico. The Site is located approximately 500 feet southeast of EMSU B Well No. 890 (API 30-025-04266). The geodetic position is North 32° 34' 03.40" and West 103° 19' 13.08". Figure 1 presents a location and topographic map.

1.1 Background

On June 9 and July 27, 2017[1], XTO verbally reported the release to OCD District 1 in Hobbs, New Mexico. The release was caused by internal corrosion in the bottom of the 10 inch cement-lined steel line. The release was discovered by the lease operator on June 9, 2017. XTO personnel shut-in the wells, isolated the line and replaced the line segment. Vacuum trucks were dispatched to recover water that had accumulated on the surface and in the excavation where the line was replaced. A total of 11,689 barrels (bbl) of water was recovered from the surface and the excavation. The water recovered from the surface is believed to be produced water while the water recovered from the excavation is believed to be a mixture of both produced and fresh water. XTO estimated the affected area at 227,205 square feet (405 feet by 561 feet) or about 5.21 acres. On August 10, 2017, LAI personnel used a Trimble sub-meter handheld global position system (GPS) receiver to map the area of distressed vegetation and calculated the affected area at about 121,628 square feet or approximately 2.79 acres. On August 11, 2017, XTO submitted the initial C-141 and stated LAI would perform an initial evaluation and electromagnetic (EM) terrain conductivity surveys to assess the release and update the estimated loss volume. OCD assigned the release remediation permit number 1RP-4789. Figure 2 presents an aerial map showing the estimated affected area. Appendix A presents the initial C-141. Attachment B presents photographs.

1.2 Physical Setting

The physical setting is as follows:

- Elevation is approximately 3,765 feet above mean sea level (amsl);
- Topography slopes gently toward the east;

1. XTO's form C-141, submitted on August 11, 2017, specifies that verbal notifications of the release were made by XTO on June 9 and June 28. The June 28th date is incorrect. The verbal notifications were made on June 9 and July 27th.

- The nearest surface water feature is a seasonal playa located about 1,200 feet southwest of the Site;
- There is no direct connection with the Site to the seasonal playa;
- The soils are designated "Kermit soils and dune land, 0 to 12 percent slopes" and "Kermit-Palomas fine sands, 0 to 12 percent slopes". The soils originated from calcareous sandy eolian deposits derived from reworking the underlying Pliocene-age Blackwater Draw and Ogallala formation formations, in descending order;
- The soils consist of a surface layer of fine sand about 8 inches thick underlain by fine sand to about 60 inches or about 5 feet and developed over cemented material (caliche);
- The description matches the soil observed at the Site;
- 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 Chinle formation occurs at depths between about 75 and 100 feet below ground surface (bgs);
- The nearest water well is located about 2,000 feet northeast (hydraulically up gradient) in Unit I (NE/4, SE/4), Section 14, Township 20 South, Range 36 East;
- The well is inactive and had a reported depth to groundwater of approximately 30 feet bgs in 1981;
- The well was observed during a reconnaissance visit on September 6, 2017;
- The regional groundwater flow direction is east to southeast.

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

Depth to groundwater less than 50 feet bgs will require delineation for chloride to 250 milligrams per kilogram.

2.0 RELEASE DELINEATION

A delineation plan was submitted to the OCD District 1 on August 22, 2017 and approved on August 25, 2017. Appendix C presents the OCD correspondence.

2.1 EM Terrain Conductivity Surveys

Between August 28 and September 1, 2017, LAI personnel conducted electromagnetic (EM) terrain conductivity surveys using EM-31 and EM-34 instruments manufactured by Geonics Ltd., Mississauga, Ontario, Canada. Subsurface Interference was observed at the background location about 275 feet northwest of the Site during an initial EM survey on August 10, 2017; therefore a new background station was established about 125 feet west of the southwest corner of the surveyed area. The background EM values are compared to the surveyed EM values to establish areas of elevated terrain conductivity in response to elevated chloride in soil and groundwater. The EM method measures the electrical properties of soil and rock, which is influenced by the total dissolved solids (TDS) concentration of formation pore water and groundwater. The EM method utilizes current flow induced into the subsurface by a surface transmitter. The current generates an alternating magnetic field which creates a secondary magnetic field that is sensed by a receiver coil. The depth of exploration is determined by the spatial separation between the transmitter and receiver coils and the orientation of the coils (i.e., horizontal (HD) or vertical dipole (VD)). The EM-31 has maximum depth of exploration capabilities from 0 to about 9.8 feet bgs in the HD mode and 0 to 19.7 feet bgs in the VD mode. The EM-31 HD and VD readings from the Site represent conductivity values in unsaturated soil except near the release point where groundwater may be mounded. The EM-34 has maximum depth of exploration capabilities of 0 to 24.6 feet bgs (HD) and 0 to 49.2 feet bgs (VD) with the 10-meter coil separation and 0 to 49.2 feet (HD) and 0 to 98.4 feet (VD) with the 20-meter coil spacing. The maximum response of the EM-34 in the HD mode occurs near the surface and decreases with depth. The maximum response of the EM-34 in the VD mode occurs at a depth equal to approximately 75 percent of the exploration depth or about 36.9 and 73.8 feet bgs in the 10 and 20 meter coil separations, respectively.

EM measurements were collected over an area measuring approximately 700 x 1,500 feet or about 1,050,000 square feet or about 24.1 acres. The EM measurement stations were spaced about 100 feet apart and locations documented with the Trimble handheld GPS receiver. Conductivity measurements were collected with the EM-31 (HD and VD) and EM-34 10 meter and 20 meter (HD and VD). Figure 3 presents the EM measurement stations. Table 1 presents a summary of the EM-31 conductivity readings. Table 2 presents a summary of the EM-34 conductivity readings.

The EM-31HD, 0 to 9.8 feet bgs, background reading was 10.2 millimhos per meter (mmhos/m) which is equivalent to millisiemens per meter (mS/m). An area of EM-31HD readings between about 4 (40 mmhos/m) to greater than 9 times background (>100 mmhos/m) was observed in the area of the release and extends to about 400 feet east of the release in the apparent groundwater flow direction. The area of elevated EM-31HD readings decreases to background or less about 450 feet east of the point of release. The area of EM-31HD readings, between about 2 and 9 times background, correlates well with the area of distressed vegetation mapped on August 10, 2017 and concludes the release has migrated less than about 500 feet from the point of release. EM-31HD readings greater than seven (7) times background were observed about 1,200 feet east of the point of release and appears to corresponds with a surface impact not associated with the release. An anomaly of EM-31HD readings

greater than twice background was observed north and east of the EMSU "B" Well #890 and may be associated with an old spill. Figure 4 presents the EM-31HD conductivity map.

The EM-31VD, 0 to 19.7 feet bgs, background reading was 29.05 mmhos/m. The maximum EM-31VD reading (155.4 mmhos/m) occurs in the immediate vicinity of the release. EM-31VD readings between about 3 (80 mmhos/m) and 4 (120 mmhos) times background extend from the point of release to about 400 feet east of the point of release and concludes the release has migrated less than about 500 feet from the point of release. The area of elevated EM-31HD readings, between about 2 and 5 times background, correlates with the area of distressed vegetation mapped on August 10, 2017. Anomalies of EM-31VD readings greater than twice background were observed north and east of EMSU "B" Well #890. The anomalies do not appear to be associated with Well #890. Figure 5 presents the EM-31VD conductivity map.

The EM-34 10m HD, 0 to 24.6 feet bgs, background reading was 20.9 mmhos/m. An area of elevated EM-34 10m HD readings about 4 times background (80 mmhos/m) extends from the point of release to 400 feet east of the point of release and suggest lateral dispersion of the release. The area of elevated EM-34 10m HD readings, between about 2 and 4 times background, correlates with the area of distressed vegetation mapped on August 10, 2017. However, the EM-34 10m HD readings conclude the release has not migrated over about 500 feet east of the point of release. An area of EM-34 10m HD readings greater than 2 times background was observed about 800 feet east of the point of release and is not associated with the release. Figure 6 presents the EM-34 10m HD conductivity map.

The EM-34 10m VD, 0 to 49.2 feet bgs, background reading was 31.4 mmhos/m. Several small anomalies of EM-34 10m VD readings greater than 3 times background (>100 mmhos/m) were observed. The EM-34 10m VD readings represent conductivity values from the upper part of the Triassic-age Dockum Group consisting mainly of shale and sandstone. The EM-34 10m VD about two times background extends from the point of release to about 400 feet east of the point of release and concludes the release is confined to unconsolidated sediments overlying the Dockum Group. Figure 7 presents the EM-34 10m VD conductivity map.

The EM-34 20m HD, 0 to 49.2 feet bgs, background reading was 40.4 mmhos/m. An area of EM-34 20m HD readings greater two times background or about 80 mmhos/m extends to about 100 feet east of the point of release. The EM-34 20m HD readings represent conductivity values near the base of the unconsolidated sediments or near the top Dockum Group. The EM-34 20m HD readings greater than about 1.5 times background extend about 200 feet west from the point of release to about 450 feet east of the point of release. The EM-34 20m HD survey concludes the release has migrated east less than about 500 feet from the point of release. An anomaly of EM-34 20m HD readings greater from about 1.5 times background or about 60 mmhos/m to greater than 2.5 times background or about 100

mmhos/m was observed about 950 feet east of the Site and is does not appear to be associated with the release. Figure 8 presents the EM-34 20m HD conductivity map.

The EM-34 20m VD, 0 to 98.4 feet bgs, background reading was 49.1 mmhos/m. The EM-34 20m VD readings are in the Dockum Group (Triassic) consisting mainly of shale and sandstone. Several small anomalies with EM-34 20m VD reading ranging from about 1.5 (75 mmhos/m) to greater than 2 times background (>100 mmhos/m) were observed at various locations and do not appear to be associated with the release. Figure 9 presents the EM-34 20m VD conductivity map.

The results of the EM-31 HD/VD and EM-34 10m HD/VD and 20m HD/VD surveys qualitatively conclude the release has migrated east from the point of release about 450 feet in the apparent groundwater flow direction.

3.0 ADDITIONAL RELEASE DELINEATION

3.1 Soil Samples

Soil samples will be collected from twelve (12) locations within the area of affected vegetation to assess the impact to vadose zone soils. The soil samples will be collected with the air rotary rig and jam tube sampler or equivalent method to approximately 20 feet bgs unless groundwater is observed where soil sample collection will terminate. Soil samples will be collected at 0, 3, 5, 7, 10, 15 and 20 feet bgs unless groundwater is observed. Soil samples and drill cuttings will be examined and logs prepared according to the Unified Sol Classification System (USCS). Drill cuttings will be placed on the ground adjacent to the borings until laboratory analysis of samples is received to determine if disposal is required. The borings will be surveyed for location and elevation by a State of New Mexico Licensed Professional Land Surveyor (LPLS) for preparing geological cross sections. The soil samples will be collected in laboratory containers and delivered under preservation and chain of custody to a qualified laboratory. The upper samples (0 feet) will be analyzed for benzene, toluene, ethylbenzene and xylene (BTEX) and total petroleum hydrocarbons (TPH), including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) by EPA SW-846 Methods 8021B and 8015M, respectively. All soil samples will be analyzed for chloride by EPA Method 300. The laboratory analysis will be compared to the OCD recommended remediation action levels (RRAL) presented in OCD publication *"Guidelines for Remediation of Leaks, Spills and Releases, August 13, 1993"*. Figure 10 presents the proposed locations for the soil borings.

3.2 Monitoring Wells

A background monitoring well will be installed about 300 feet west of the point of release to determine if groundwater is present above the Triassic-age Dockum Group. Five (5) additional monitoring wells will be drilled down and cross gradient to assess the horizontal extent of the release. A State of New Mexico licensed water well driller will use a truck mounted air rotary rig or equivalent to drill borings to the top of the Dockum Group. Drill cuttings will be examined and logs prepared according to the Unified Sol

Classification System (USCS). Drill cuttings will be placed on the ground adjacent to the monitoring wells until disposal is arranged. The wells will be constructed with 2 inch schedule 40 threaded PVC casing and 20 feet of 0.010 inch factory slotted screen. The well screen will be placed above and below the groundwater level observed during drilling. If groundwater is not observed the bottom of the well screen will be placed near the top of the Dockum Group. The well screen will be surrounded with graded silica sand compatible with the screen slot size. The sand will be placed around the screen to a depth about 2 feet above the screen. The annulus above the sand to ground surface will be filled with bentonite chips and hydrated with potable water. The wells will be secured with locking caps. The wells will be developed by pumping with an electric submersible pump until at least 3 casing volumes of groundwater have been removed and groundwater is visibly clear of suspended solids. The purged water will be contained in a 55 gallon drum or in a portable tank and disposed in an OCD permitted disposal well. The wells will be surveyed for location and elevation by a State of New Mexico LPLS for preparing a groundwater potentiometric map and geological cross sections. XTO will submit applications to the State of New Mexico Office of the State Engineer (OSE) to obtain a permit to install the monitoring wells. Figure 10 presents the proposed location for the monitoring wells.

3.3 Groundwater Samples

Groundwater samples will be collected from the monitoring wells following well development. The groundwater samples will be collected with dedicated polyethylene bailers and carefully poured into laboratory containers. The sample containers will be labeled, chilled in an ice filled chest and delivered under preservation and chain of custody to a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory for analysis by EPA methods for BTEX, dissolved (filtered) metals (arsenic, barium, cadmium, chromium, lead, mercury, silver and selenium), cations (calcium, magnesium, potassium and sodium), anions (alkalinity, chloride and sulfate) and TDS. The metals samples will be filtered in the field or by the laboratory within 24 hours following sample collection. The laboratory results will be compared to the New Mexico Water Quality Control Commission (WQCC) human health and domestic water quality standards (Title 20 Chapter 6 Part 2 Subpart III 3103 NMAC) if the background TDS concentration is less than 10,000 milligrams per liter (mg/L).

4.0 REPORT

XTO will submit a final delineation report to the OCD within 45 days following receipt of the final laboratory report. The report will include a summary of the investigations including collection and analysis of soil and groundwater samples, geological cross sections, boring logs and well completion diagrams and drawings showing the extent of the contaminant plume and volumetric estimate for the release. XTO will provide a remediation plan for contaminated soil and groundwater.

Tables

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Table 1

Summary of EM-31 Terrain Conductivity Readings

XTO Energy, Inc., EMSU B Produced Water Release

September 1, 2017

Station	HD (N-S) (mmhos/m)	HD (E-W) (mmhos/m)	HD (Avg) (mmhos/m)	VD (N-S) (mmhos/m)	VD (E-W) (mmhos/m)	VD (Avg) (mmhos/m)
Bkgrd	10.7	9.7	10.2	27.7	30.4	29.05
0-0	-4.5	-3.7	I	27.9	34	30.95
100-0	15.4	13.7	14.5	27.7	23.3	25.5
200-0	-3.4	6.5	I	31.7	30.4	31.05
300-0	16.8	15	15.9	60.5	49.6	55.05
400-0	2.8	8.6	5.7	31.3	31.1	31.2
500-0	13.5	14	13.75	24.6	25.2	24.9
600-0	11.9	14.2	13.05	30.7	29.8	30.25
700-0	0	10.8	I	47.7	39.3	43.5
800-0	9.4	12.7	11.05	28.8	29.3	29.05
900-0	17.6	19.5	18.55	40.6	47.7	44.15
1000-0	18.8	33.6	26.2	50.6	66.5	58.55
1100-0	21.5	26.4	23.95	63.9	64.1	64
1200-0	21	23.1	22.05	44.8	45.4	45.1
1300-0	13.4	19.5	16.45	55.2	54.4	54.8
1400-0	10.6	15	12.8	50.8	54.1	52.45
1500-0	19.2	18.9	19.05	32.8	33.5	33.15
1500-100	18	22.1	20.05	34.3	35.8	35.05
1400-100	16.9	18.3	17.6	54.6	60.7	57.65
1300-100	11.5	20.7	16.1	50.4	62	56.2
1200-100	10.3	17.1	13.7	47.6	48.9	48.25
1100-100	4.7	3.3	4	46.5	59	52.75
1000-100	-7.7	8.8	I	69.4	45.3	57.35
900-100	-6.2	9.3	I	64.7	60.5	62.6
800-100	13.5	18	15.75	45.3	47.1	46.2
700-100	4.5	11.2	7.85	2.6	77.9	40.25
600-100	6.6	-17	I	60	87.5	73.75
500-100	10.2	15.8	13	27.2	32.8	30
400-100	5.1	8.8	6.95	27.3	29.6	28.45
300-100	12	9.5	10.75	33	36	34.5
200-100	6.8	4.9	5.85	16.4	17.5	16.95
100-100	-24.3	-2.1	I	32	20.5	26.25
0-100	-18.5	3.6	I	48.7	24.6	36.65
0-200	-13.3	5.5	I	50.4	30.4	40.4
100-200	2.6	7.6	5.1	28.1	27.9	28
200-200	19.4	54.6	37	12.5	34.1	23.3
300-200	47	24.2	35.6	12.8	76.2	44.5
400-200	34.5	33.4	33.95	62.5	62.3	62.4
500-200	66.5	50.8	58.65	103.3	101.8	102.55
600-200	38.4	36.6	37.5	66.8	73.7	70.25

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700-200	-18.6	-4.8	I	51.7	45.5	48.6
800-200	16.6	14.7	15.65	29.7	29	29.35
900-200	19.1	16.2	17.65	33.3	32.9	33.1
1000-200	11.6	8.5	10.05	34.3	39.8	37.05
1100-200	13.2	14.8	14	22.2	30.4	26.3
1200-200	9.3	12.4	10.85	36.6	37.1	36.85
1300-200	13.2	17.7	15.45	37	40.9	38.95
1400-200	15.8	19.8	17.8	39.3	54.9	47.1
1500-200	22.2	21	21.6	38.3	38.9	38.6
1500-300	24.5	22.1	23.3	46.3	55.6	50.95
1400-300	20.3	-16	I	55.4	77.7	66.55
1300-300	-4.5	3.1	I	54	56.5	55.25
1200-300	-11.6	-11.1	I	46.7	48	47.35
1100-300	-5.5	-8.1	I	43.9	43.1	43.5
1000-300	3.3	1.2	2.25	35.3	38.8	37.05
900-300	12	11.2	11.6	26	29.3	27.65
800-300	11.3	6.5	8.9	33.3	50.3	41.8
700-300	40.6	17.2	28.9	95.1	118.4	106.75
600-300	43.4	44.9	44.15	85.4	86.3	85.85
500-300	42.8	42.7	42.75	74.5	70.1	72.3
400-300	67.7	64.1	65.9	121.4	136.6	129
300-300	58.8	57	57.9	129.5	135.3	132.4
200-300	24.8	25.5	25.15	51	56.5	53.75
100-300	11.6	12.6	12.1	22.8	22.5	22.65
0-300	9.2	8.7	8.95	20	29.1	24.55
0-400	9.6	9.8	9.7	15.8	17.3	16.55
100-400	25.2	19.6	22.4	43.7	39.3	41.5
200-400	35.5	36.7	36.1	76.6	78.2	77.4
300-400	72	69.7	70.85	152.2	158.6	155.4
400-400	73.9	78.5	76.2	145.8	149.5	147.65
500-400	100.3	103.2	101.75	148.5	151.5	150
600-400	59.7	39.6	49.65	118.5	121	119.75
700-400	42.6	39.1	40.85	94.2	106.5	100.35
800-400	16.3	5.9	11.1	36.7	42.2	38.45
900-400	16.7	18.8	17.75	27	33.7	30.35
1000-400	8.2	7.3	7.75	30.5	38.8	34.65
1100-400	7.2	2.1	4.65	35.6	45.2	40.4
1200-400	17.1	19.7	18.4	42.4	47.3	44.85
1300-400	17.8	15	16.4	54.9	58.7	56.8
1400-400	22.9	24.9	23.9	50.4	53.7	52.05
1500-400	29.1	25.2	27.15	49.7	59	54.35

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Station	HD (N-S) (mmhos/m)	HD (E-W) (mmhos/m)	HD (Avg) (mmhos/m)	VD (N-S) (mmhos/m)	VD (E-W) (mmhos/m)	VD (Avg) (mmhos/m)
1500-500	160	10.6	85.3	193.3	24.3	108.8
1400-500	-73	-53.5	I	102.3	82.3	92.3
1300-500	11.3	7.4	9.35	57.2	70	63.6
1200-500	19.7	17.5	18.6	46.8	60.4	53.6
1100-500	13.2	7.9	10.55	40.5	51.6	46.05
1000-500	-10.7	-44	I	48.2	68	58.1
900-500	14.1	20.9	17.5	33.5	50.6	42.05
800-500	12.5	11.8	12.15	43.4	48.3	45.85
700-500	20.6	30	25.3	71.1	68.6	69.85
600-500	32.7	33.3	33	60.8	62.6	61.7
500-500	42.5	40.8	41.65	80.7	79.3	80
400-500	38.4	39	38.7	73.8	78.4	76.1
300-500	49.4	52.9	51.15	115.9	123.8	119.85
200-500	51.7	61.6	56.65	93.7	111.1	102.4
100-500	21.7	21	21.35	44.8	40.3	42.55
0-500	15.5	12	13.75	25.6	22.3	23.95
0-600	1.2	36.3	18.75	33	40.6	36.8
100-600	9.9	7.8	8.85	47.9	49.2	48.55
200-600	-5.1	-26.7	I	37.5	92	64.75
300-600	17.8	17.1	17.45	46.7	47.3	47
400-600	15.3	14.4	14.85	26	25.6	25.8
500-600	50	21.2	35.6	31.4	20.3	25.85
600-600	5.9	5.7	5.8	28.4	28.8	28.6
700-600	11.5	12.2	11.85	22.1	24	23.05
800-600	15.6	15.6	15.6	36.8	40.9	38.85
900-600	20.9	21.4	21.15	44.5	44.7	44.6
1000-600	34	19.2	26.6	42.5	44.1	43.3
1100-600	13.1	-10.7	I	45.3	76.5	60.9
1200-600	19.3	20.6	19.95	40.2	46.8	43.5
1300-600	27.4	27.2	27.3	49.7	49.1	49.4
1400-600	-0.3	-28	I	60.4	58.5	59.45
1500-600	62.2	22.4	42.3	66.2	105.4	85.8
1500-700	28.5	25.5	27	55.1	60.9	58
1400-700	22.3	20.5	21.4	41.7	39.1	40.4
1300-700	16.9	17.3	17.1	40.1	48.4	44.25
1200-700	11.4	11	11.2	47.5	52.1	49.8
1100-700	4.9	-10.5	I	53.6	68.3	60.95
1000-700	33.1	-18.6	I	66.5	89	77.75
900-700	2.2	5.7	3.95	50.2	67.8	59
800-700	10.4	7.1	8.75	44.8	47.6	46.2
700-700	12.7	14.4	13.55	31.6	30.2	30.9

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XTO Energy, Inc., EMSU B Produced Water Release

September 1, 2017

Station	HD (N-S) (mmhos/m)	HD (E-W) (mmhos/m)	HD (Avg) (mmhos/m)	VD (N-S) (mmhos/m)	VD (E-W) (mmhos/m)	VD (Avg) (mmhos/m)
600-700	12.5	13.9	13.2	22.5	24	23.25
500-700	18.9	18.8	18.85	35	32.4	33.7
400-700	10	16.8	13.4	46.3	42.8	44.55
300-700	43	19.9	31.45	46.8	38.6	42.7
200-700	13.7	13.2	13.45	24.3	23.6	23.95
100-700	11.9	12.6	12.25	33.6	33.8	33.7
0-700	15.8	17.7	16.75	31	34.4	32.7

Notes:

I: Interference

1RP-4789

Table 2

Summary of EM-34 Terrain Conductivity Readings

XTO Energy, Inc., EMSU B Produced Water Release

August 30 and 31, 2017

Station	10 mHD (mmhos/m)	10 mVD (mmhos/m)	20 mHD (mmhos/m)	20 mVD (mmhos/m)	Comments
Bkgrd	20.9	31.4	40.4	49.1	
0-0	19.2	27.8	29.5	49.1	
100-0	19.6	22.4	33.5	29.1	
200-0	18.9	26.6	36.1	41.6	
300-0	20	-14.3	31.3	26.2	
400-0	15.5	28.7	36.9	52.9	
500-0	24.5	29.2	39.6	55	
600-0	25.7	35.6	42.2	56.6	
700-0	27	54.4	40.8	40.4	
800-0	22.6	34.4	37.2	61.5	
900-0	29.7	37.1	44.4	102.3	
1000-0	47.7	154.1	68.2	2.4	
1100-0	45.5	141.4	114.2	473(1000s)	
1200-0	42.6	63.1	59.2	95.7	
1300-0	42.9	61.7	49.4	81.6	
1400-0	45.2	64.5	59.4	67.3	
1500-0	39	42.1	62.3	94.5	
1500-100	45	77.8	52.4	43.7	
1400-100	44	52	64.4	67.6	
1300-100	42.4	51.1	60.4	57.9	
1200-100	42.4	59	67.7	57.3	
1100-100	36.7	49.8	60	67.9	
1000-100	34.8	42.5	54.7	57	
900-100	40.6	87.3	56	64.3	
800-100	39.7	54.3	49.7	63.5	
700-100	23.9	86.8	44.2	-53	on pipeline
600-100	34.4	119	60.7	58.4	
500-100	22.8	39.5	44.3	69.7	
400-100	24.9	32.4	31.3	60.1	
300-100	17.4	42.6	37.6	45.4	
200-100	16.2	28.5	33.1	54	
100-100	12.9	23.9	32.2	45.8	
0-100	12.6	17.6	28.3	41.4	
0-200	18.1	32.3	37.6	62.3	
100-200	18.2	38.8	33.4	92.3	Possible pipe
200-200	60.4	-66.1	37.4	-183	Running E-W
300-200	45.4	61	63.3	108.7	Near pipeline
400-200	59.7	73.4	64.2	48.5	
500-200	85.9	49.8	69.1	40.7	
600-200	49.1	56.2	53.1	59.3	
700-200	25.1	43	43.8	62.3	Natural Gas line

1RP-4789

Table 2

Summary of EM-34 Terrain Conductivity Readings

XTO Energy, Inc., EMSU B Produced Water Release

August 30 and 31, 2017

Station	10 mHD (mmhos/m)	10 mVD (mmhos/m)	20 mHD (mmhos/m)	20 mVD (mmhos/m)	Comments
800-200	32.7	44.5	49.2	62.2	
900-200	27.3	53.6	44.2	47.3	
1000-200	29	47.2	47.8	54.8	
1100-200	28.4	42.3	44.2	48.8	
1200-200	30	43.5	50.1	56.7	
1300-200	35.8	42.1	51.4	71.8	
1400-200	45.9	67.7	65.8	45.1	
1500-200	45.6	58.1	62.8	70.2	
1500-300	49	46.8	63.6	50.6	
1400-300	41.3	54.7	54.8	63.1	
1300-300	35.2	40.7	61.3	64.8	
1200-300	29.8	43.5	45.3	48.7	
1100-300	27	39.2	49.2	75.9	
1000-300	24.6	28.6	47.2	51.2	
900-300	16.7	32.6	43.9	66.7	
800-300	26.7	43.4	47.1	51.5	
700-300	81.8	77.3	80.1	35.7	
600-300	75.4	67.8	68.2	51.6	
500-300	60.8	96.9	71.3	79.5	
400-300	83.4	85.2	90.6	45.4	
300-300	81.8	34	82	24.7	
200-300	52.3	121.1	70.2	18	Pipeline Running N-S
100-300	23.9	31.4	42.3	60.6	
0-300	19.1	32.5	37.6	52.5	
0-400	15.4	12	35.1	39.5	
100-400	32.2	39.1	46.3	48.4	
200-400	35.4	115.2	71.8	40.7	
300-400	87.8	-15.8	77.1	-5.1	
400-400	94	35.3	80.6	30.4	
500-400	87.7	73	78.3	60.1	
600-400	80.9	38.7	69.3	34.2	
700-400	69.7	72.6	74	44	
800-400	25.3	32	47.3	66.4	
900-400	29.5	33.5	44.3	49.2	
1000-400	21.3	37.3	42	45	
1100-400	24.4	37.6	45.5	56.4	
1200-400	40.4	43.6	64.6	49.2	
1300-400	48	63.3	68.7	47.9	
1400-400	50.4	67	75.5	63.8	
1500-400	46.1	45.5	72.9	76.2	
1500-500	45.8	63.8	61.1	66	

1RP-4789

Table 2

Summary of EM-34 Terrain Conductivity Readings

XTO Energy, Inc., EMSU B Produced Water Release

August 30 and 31, 2017

Station	10 mHD (mmhos/m)	10 mVD (mmhos/m)	20 mHD (mmhos/m)	20 mVD (mmhos/m)	Comments
1400-500	I	I	78	43.8	
1300-500	47.5	69.2	67.2	78.8	
1200-500	44.2	64.6	71.2	78.2	
1100-500	35.8	47.4	57.2	65.4	
1000-500	28.7	45.3	44.3	35	
900-500	30.6	38.1	44.7	45.6	
800-500	31.2	49.6	36.8	89.4	
700-500	38.5	22.6	50.7	50	
600-500	70.5	89.3	71.5	59.9	
500-500	65.8	76.4	72.4	75.8	
400-500	54.7	55.2	67.5	51.2	
300-500	71.1	8.8	83.7	39.5	
200-500	77.8	65.4	69.1	65.7	
100-500	35.4	27.3	47.6	107.7	
0-500	23.2	34.6	43.2	52.3	
0-600	107.2	99.4	59.3	113.5	
100-600	28.2	8.8	48.1	34.5	
200-600	30.4	40.6	47.4	73.3	
300-600	25.4	-6.9	42.6	45.8	Pipeline
400-600	27.5	43.3	44.7	36.9	
500-600	26.4	-8.3	48.3	44.2	
600-600	23.8	27.6	39.1	52.3	
700-600	20.4	29.1	38	51.2	
800-600	17.8	26.7	32.5	77.2	
900-600	45.2	42.8	63.3	66.2	
1000-600	44	58.1	58.52	67.2	
1100-600	48.3	49.4	57.5	62.5	
1200-600	39.2	65.4	57.4	71.3	
1300-600	48.8	45.4	72.5	47.6	
1400-600	46.7	45.4	69.2	77.3	
1500-600	44.8	46.2	77	78.1	
1500-700	44.3	44.1	71.5	84.5	
1400-700	44.1	60.8	68.3	66.9	
1300-700	39.1	49.5	65.5	73.8	
1200-700	44.1	38.3	65.6	83.6	
1100-700	44.8	57.9	67	66.6	
1000-700	42.4	58.8	61.7	113.3	
900-700	25.2	66.7	34.1	118.1	
800-700	33.9	41.6	52.5	43.2	
700-700	27.8	36.3	47.5	64.2	
600-700	26.7	31.4	42.9	51.1	

1RP-4789

Table 2

Summary of EM-34 Terrain Conductivity Readings

XTO Energy, Inc., EMSU B Produced Water Release

August 30 and 31, 2017

Station	10 mHD (mmhos/m)	10 mVD (mmhos/m)	20 mHD (mmhos/m)	20 mVD (mmhos/m)	Comments
500-700	31.7	29.7	44.6	50.3	
400-700	30.8	56.9	55.2	86.7	
300-700	28.3	-0.7	44.1	30.5	Pipeline
200-700	26.8	23.4	42.5	58.1	
100-700	23.5	-57.2	45.9	25.3	
0-700	31.8	43.8	51	65.2	

Notes:

I: Interference

Figures

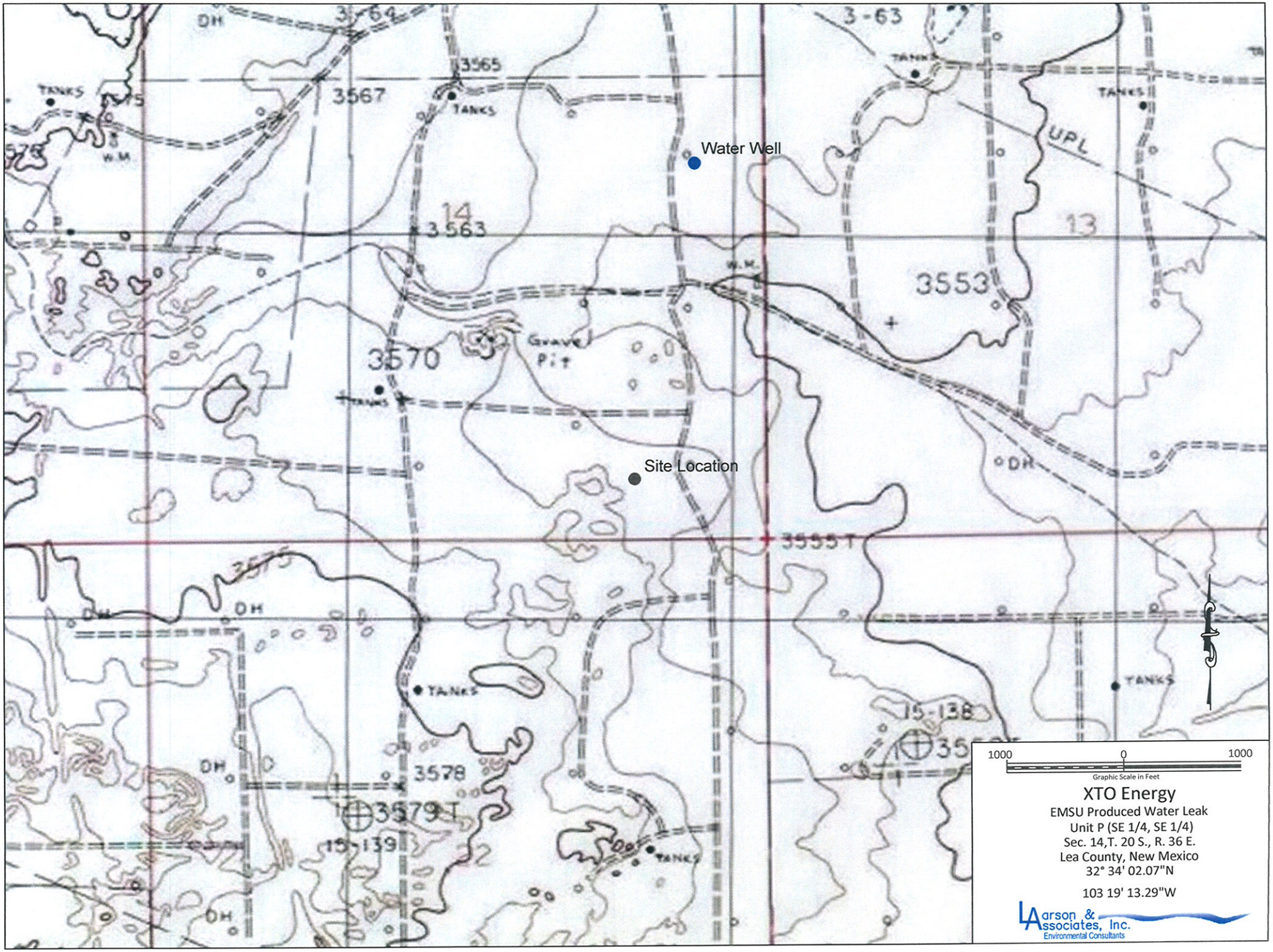


Figure 1 - Topographic Map

Figure 2 - Aerial Map

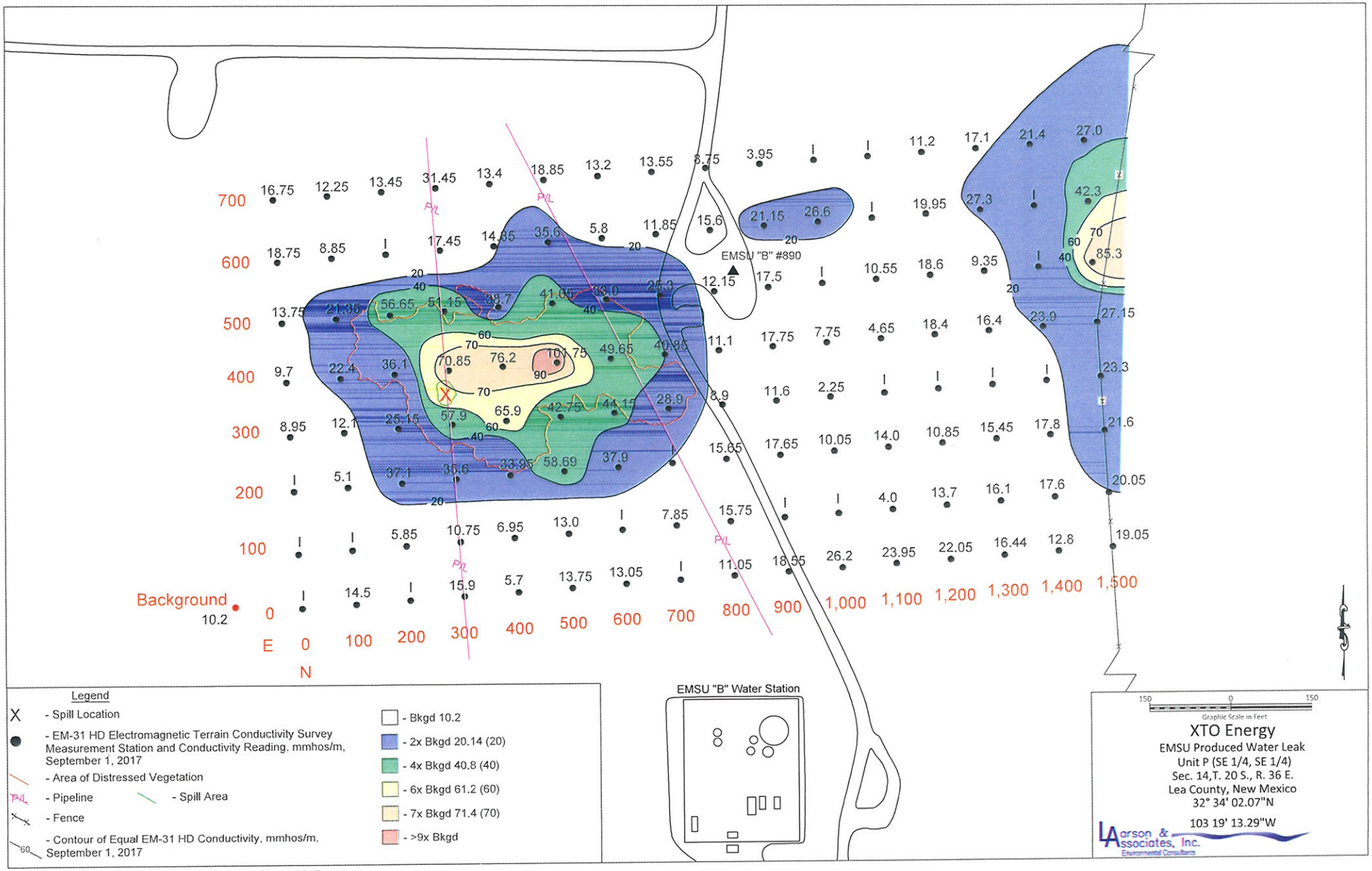


Figure 4 - EM-31 HD Conductivity Map, September 1, 2017

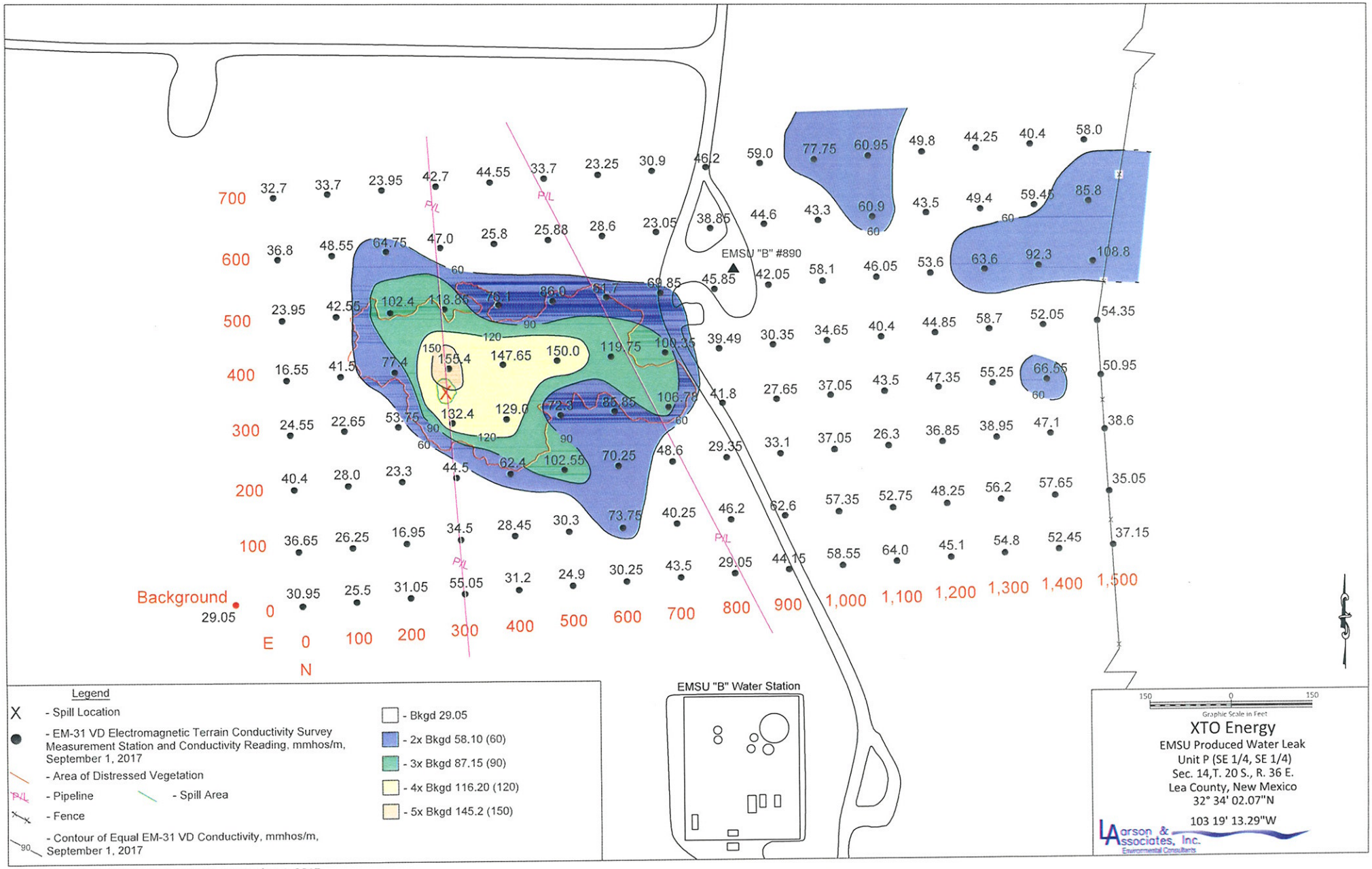


Figure 5 - EM-31 VD Conductivity Map, September 1, 2017

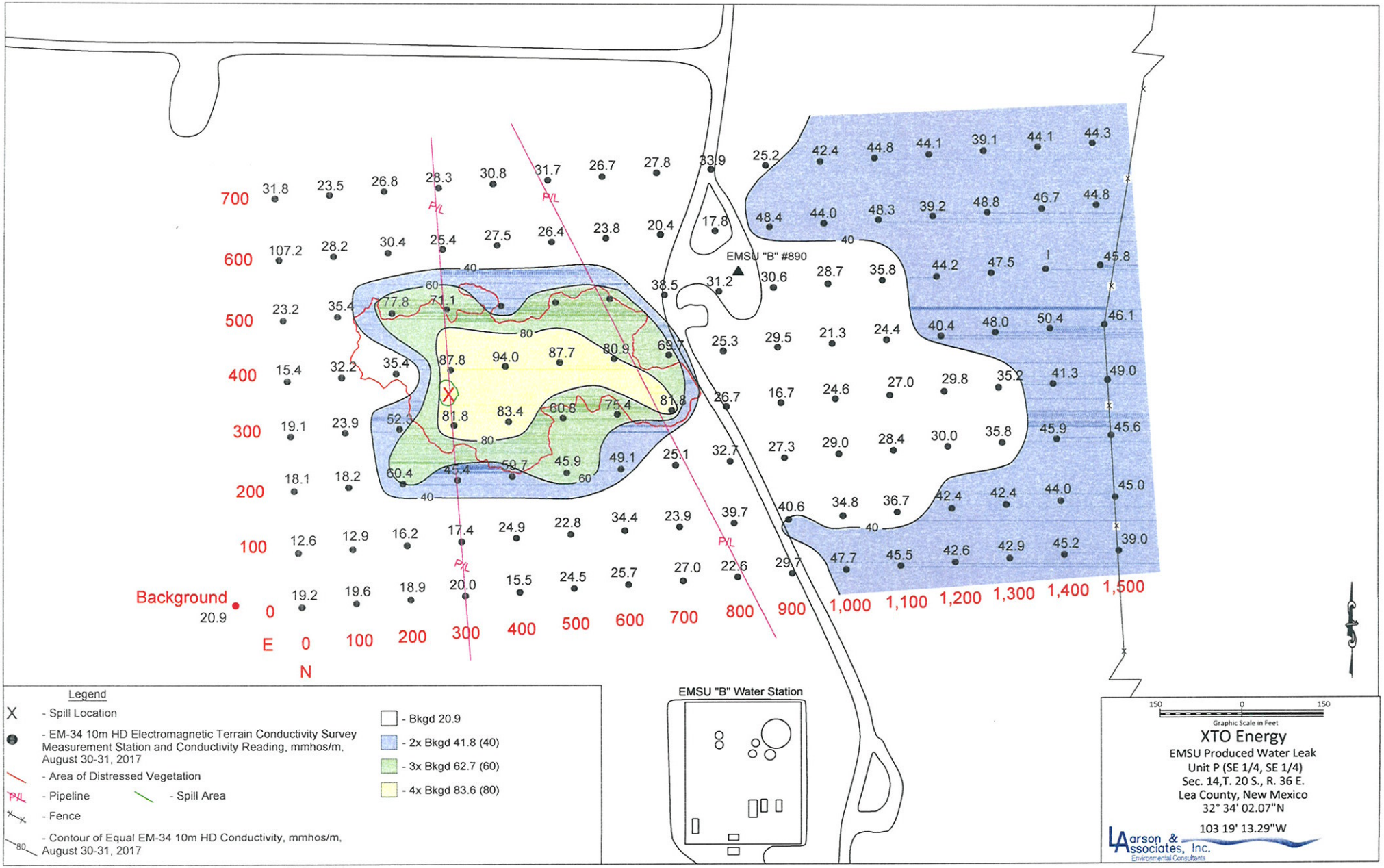


Figure 6 - EM-34 10m HD Conductivity Map, August 30-31, 2017

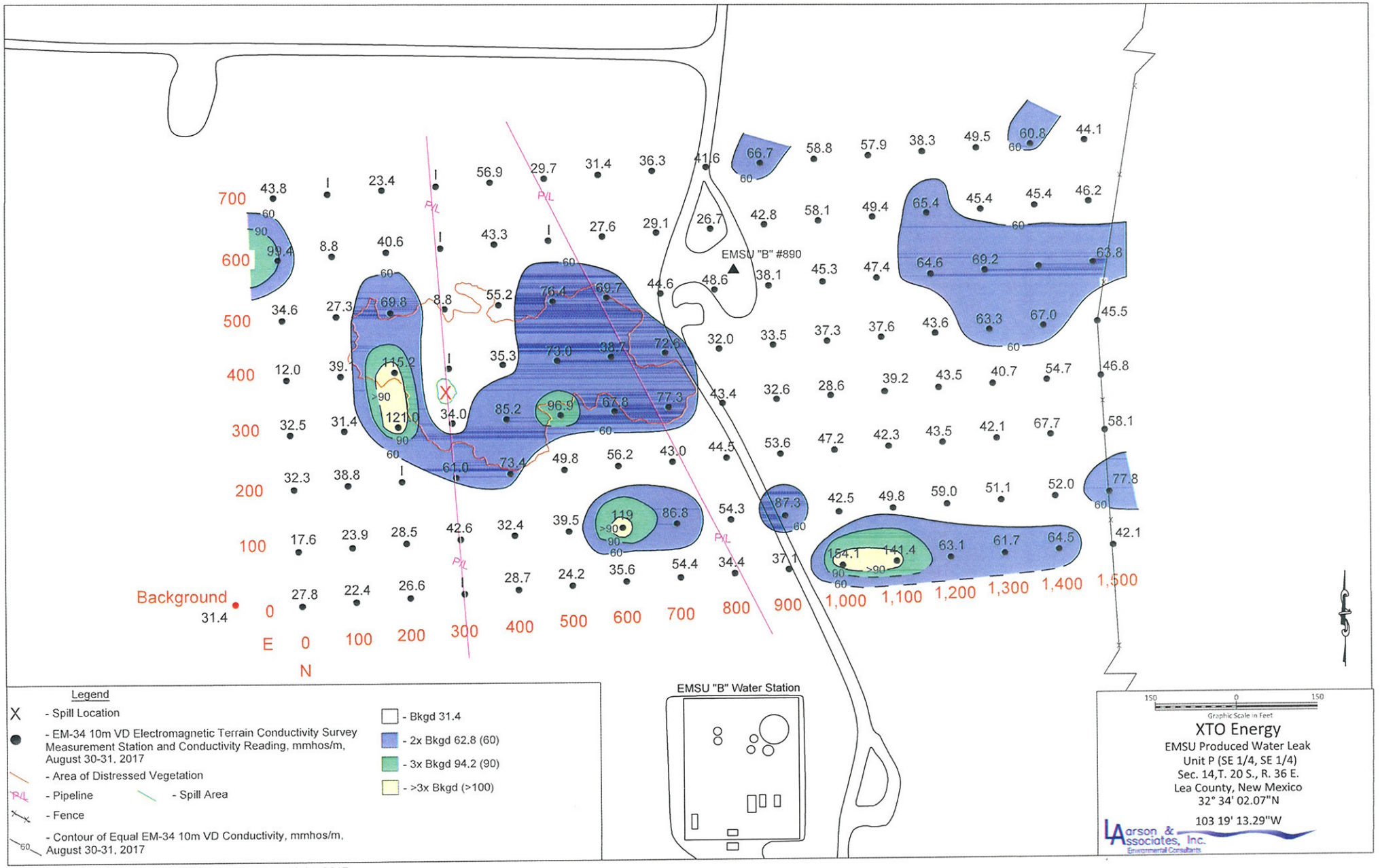


Figure 7 - EM-34 10m VD Conductivity Map, August 30-31, 2017

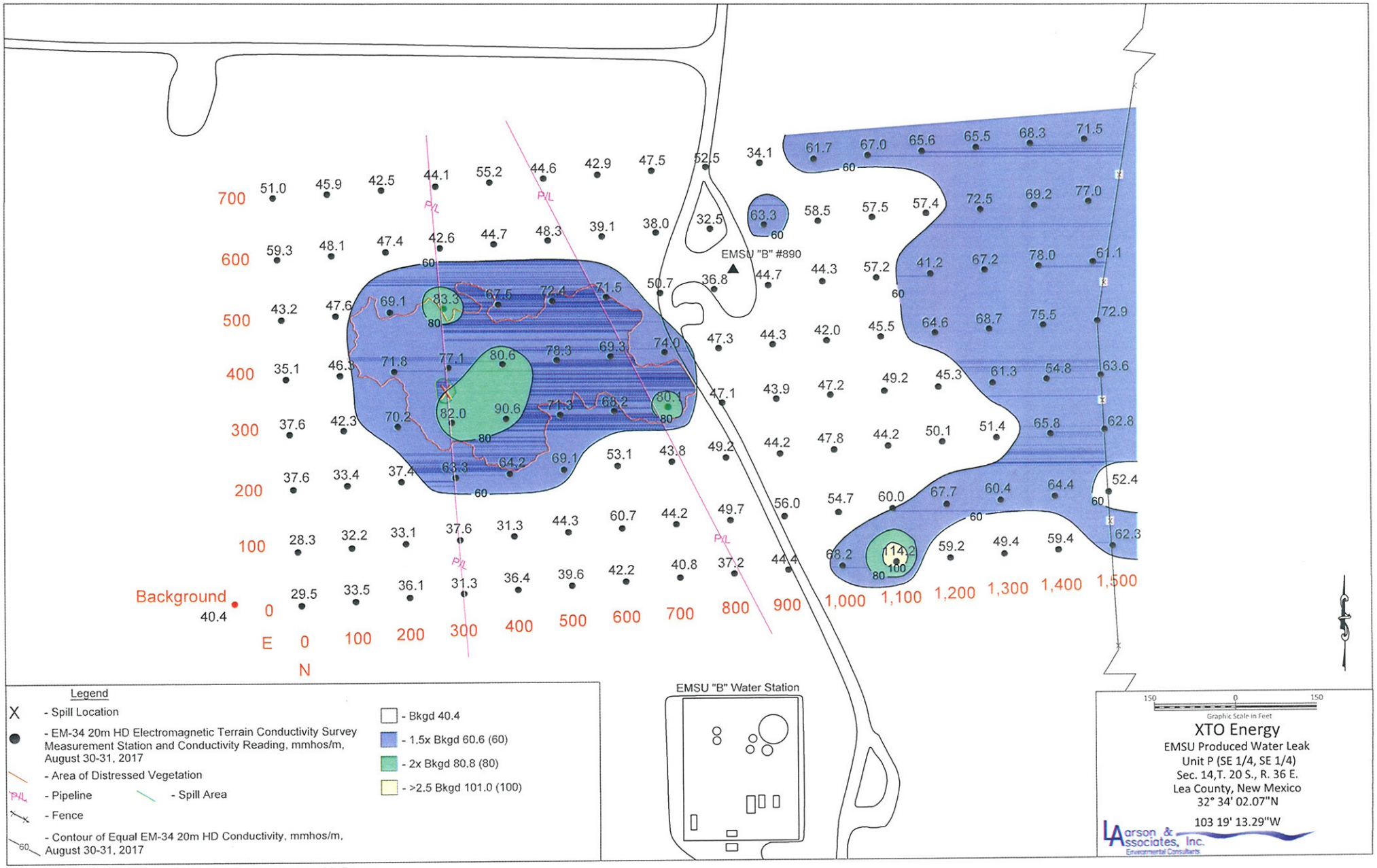


Figure 8 - EM-34 20m HD Conductivity Map, August 30-31, 2017

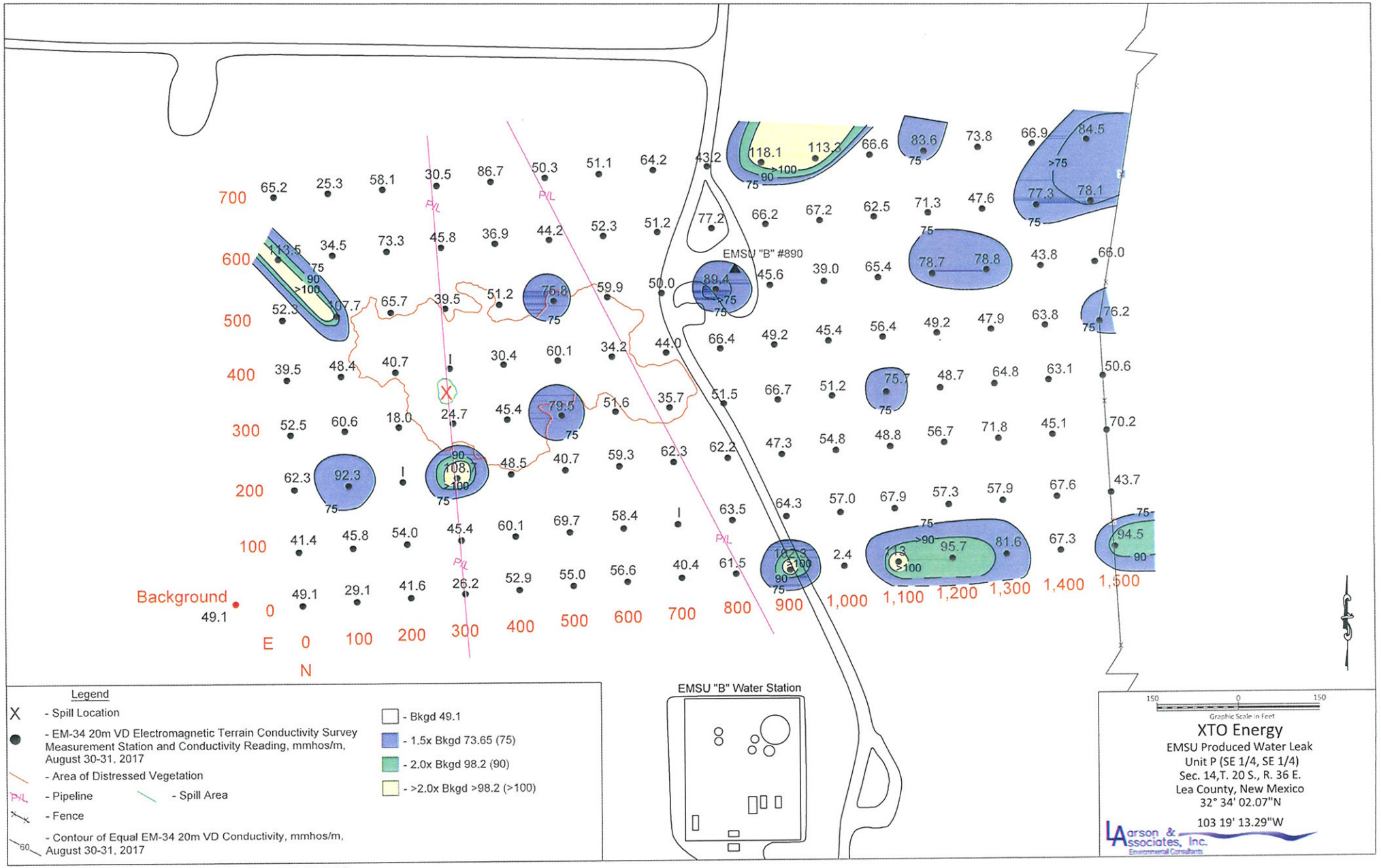


Figure 9 - EM-34 20m VD Conductivity Map, August 30-31, 2017

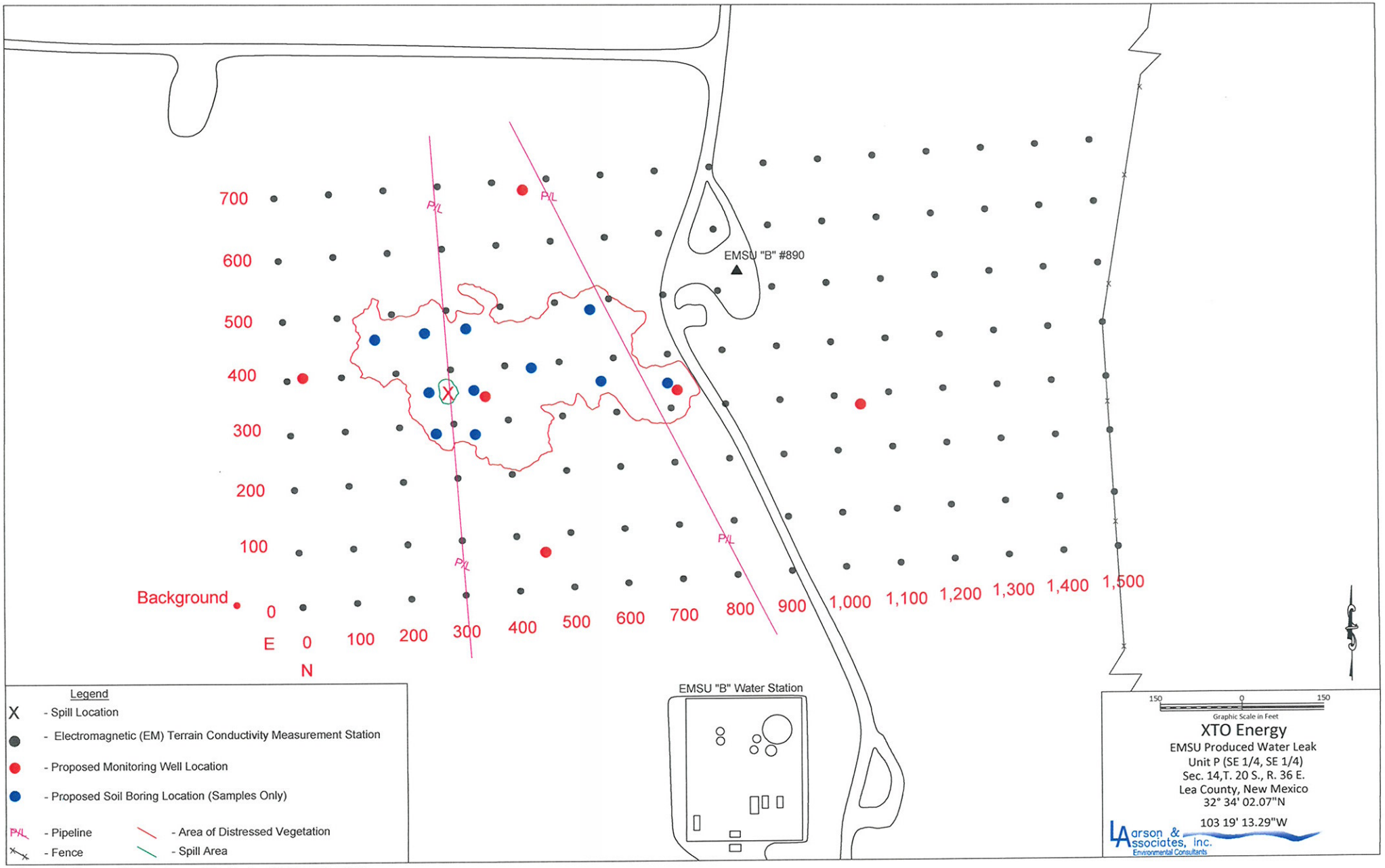


Figure 10 - Proposed Soil Boring and Monitoring Well Location Map

Attachment A

Initial C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., 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 April 3, 2017

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: XTO Energy	Contact: Shannon Walker
Address 500 W. Illinois Suite 100 Midland, TX 79701	Telephone No. : 432-661-4649
Facility Name: EMSU B Injection System	Facility Type: Water Injection

Surface Owner: BLM		Mineral Owner	BLM	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
P	14	20 S	36 E					

Latitude 32°34'03.40"N **Longitude** 103°19'13.08"W NAD83

NATURE OF RELEASE

Type of Release: Produced Water	Volume of Release: Not Yet Determined [see comment below]	Volume Recovered: 11,689 bbls [see comment below]
Source of Release: Injection Line	Date and Hour of Occurrence: Unknown	Date and Hour of Discovery: 6/9/2017
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? On Call Line	
By Whom? Shannon Walker	Date and Hour: 6/9/2017 ~ 1800 hrs MST and again on 6/28/2017	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

RECEIVED
By Olivia Yu at 4:08 pm, Aug 11, 2017

Describe Cause of Problem and Remedial Action Taken.* 10" cement lined steel line, corrosion. Shut field in to isolate leak point. XTO provided immediate verbal notification of the release on 6/9/17 and began recovering water with vacuum trucks. Affected area measures ~405' x 561'. XTO provided updated verbal notification on June 28, 2017, that it had increased its estimate of the release volume to 1,655 bbls. Contacted Mark Larson w/ Larson & Associates to perform initial evaluation and EM surveys of the area. XTO and Larson & Associates are working to update the estimated volume of the release. XTO will submit delineation plan for OCD approval.

Describe Area Affected and Cleanup Action Taken.*

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: Patricia Donald

Printed Name: Patricia Donald

Title: Regulatory Analyst

E-mail Address: Patricia_Donald@xtoenergy.com

Date: 8/11/2017 Phone: (432) 571-8220

OIL CONSERVATION DIVISION

Approved by Environmental Specialist:

Approval Date: 8/11/2017 Expiration Date:

Conditions of Approval: see attached directive

Attached ☑

* Attach Additional Sheets If Necessary

1RP-4789 fOY1722358348 nOY1722358518

pOY1722358879

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _8/11/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number _1RP-4789__ 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 _9/11/2017_. 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.

Jim Griswold
OCD Environmental Bureau Chief
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
505-476-3465
jim.griswold@state.nm.us

Attachment B

OCD Correspondence

Mark Larson

Subject: FW: 1RP-4789 - Release Delineation Plan, EMSU B Produced Water Release, XTO Energy, Inc., Lea County, New Mexico, August 22, 2017

From: Yu, Olivia, EMNRD [mailto:Olivia.Yu@state.nm.us]
Sent: Friday, August 25, 2017 5:04 PM
To: Mark Larson; Billings, Bradford, EMNRD; Griswold, Jim, EMNRD
Cc: 'Hutton, Nina'; 'Askin, David'
Subject: RE: 1RP-4789 - Release Delineation Plan, EMSU B Produced Water Release, XTO Energy, Inc., Lea County, New Mexico, August 22, 2017

Dear Mr. Larson:

NMOCD approves of the proposed delineation plan and proposed installation of a temporary groundwater monitoring well for 1RP-4789. Please be advised that subsequent to data from EM surveys, soil bores, and potentially more permanent groundwater monitoring wells, the proposed placement of the temporary groundwater monitoring well for background assessment may be altered or additional wells may be necessary to evaluate upgradient hydrology.

Please see the attachment for your records.

Thanks,

Olivia Yu
Environmental Specialist
NMOCD, District I
Olivia.yu@state.nm.us
575-393-6161 x113

From: Mark Larson [mailto:Mark@laenvironmental.com]
Sent: Tuesday, August 22, 2017 4:04 PM
To: Yu, Olivia, EMNRD <Olivia.Yu@state.nm.us>; Billings, Bradford, EMNRD <Bradford.Billings@state.nm.us>; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>
Cc: 'Hutton, Nina' <Nina_Hutton@xtoenergy.com>; 'Askin, David' <David_Askin@xtoenergy.com>
Subject: Re: 1RP-4789 - Release Delineation Plan, EMSU B Produced Water Release, XTO Energy, Inc., Lea County, New Mexico, August 22, 2017

All,

Larson & Associates, Inc. (LAI), on behalf of XTO Energy, Inc. (XTO) submits the attached plan to delineate the extent of a produced water release (1RP-4789) from a 10 inch cement line steel line at the Eunice Monument South Unit (EMSU) B in Lea County, New Mexico. LAI, on behalf of XTO, requests approval to begin the delineation according to the attached plan. Please contact Nina Hutton with XTO at Paladin at (817) 885-2274 or Nina_Hutton@xtoenergy.com or me if you have questions.

Respectfully,

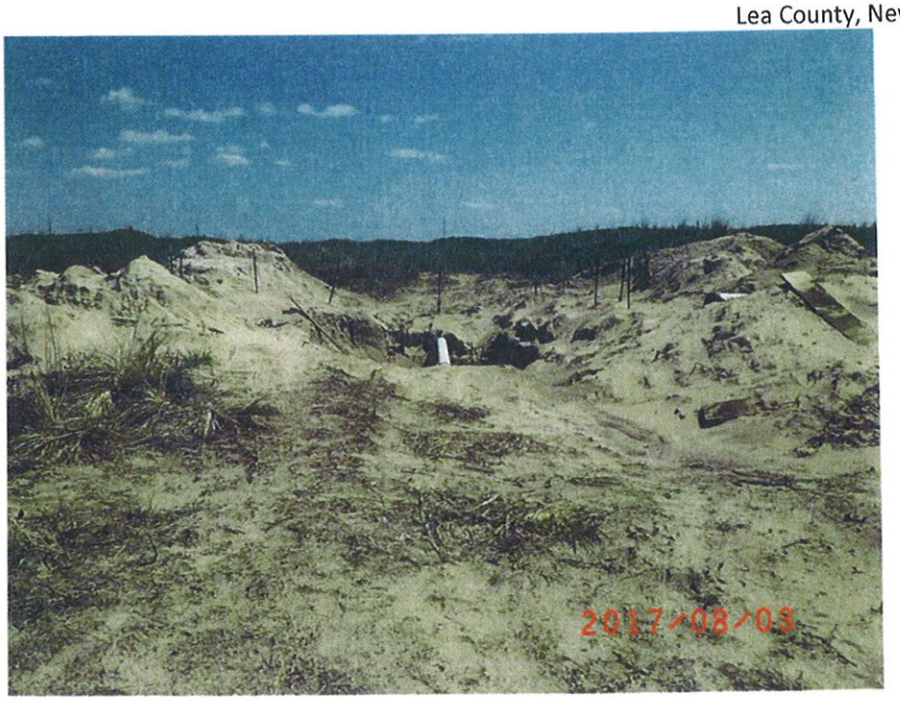
Mark J. Larson, P.G.
President/Sr. Project Manager
507 N. Marienfeld St., Suite 205
Midland, Texas 79701
Office – 432-687-0901
Cell – 432- 556-8656
Fax – 432-687-0456
mark@laenvironmental.com

Larson & Associates, Inc.
Environmental Consultants

"Serving the Permian Basin Since 2000"

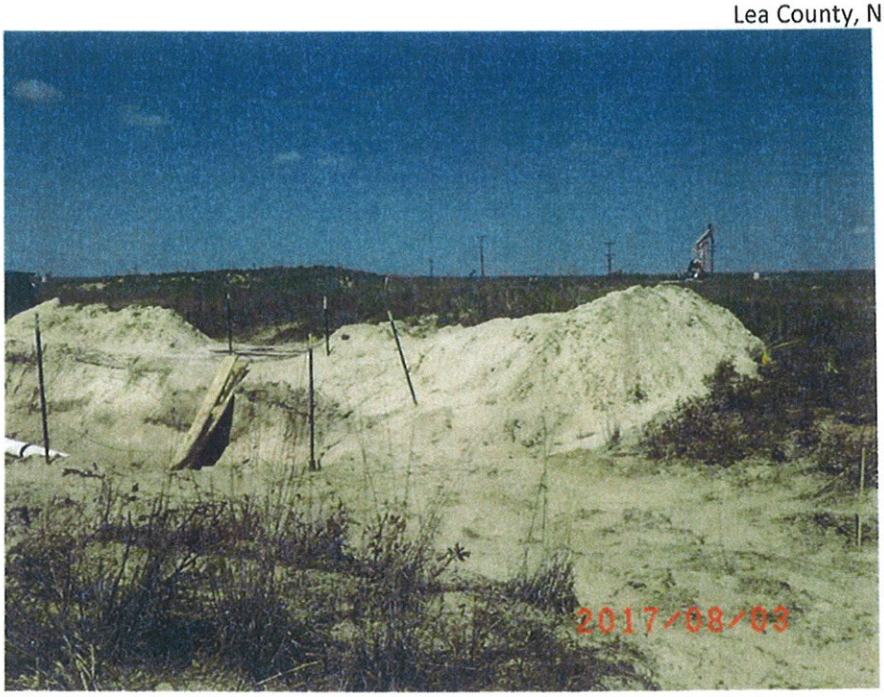
Attachment C

Photographs



Site Viewing South

Site Viewing Southeast



Site Viewing Northeast

Site Viewing North