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Interstate Power and Light Company
Sutherland Generating Station,
Marshalltown, Iowa
Site Assessment Investigation
Project 154.006.008
10/12/2016, Revision 0

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Executive Summary

In July and August 2016, Hard Hat Services, contracted by Interstate Power and Light Company, conducted soil investigation activities at the Sutherland Generating Station in Marshalltown, Iowa. The soil investigation activities were conducted in an effort to determine the range in depth and lateral extent of impacted soils located adjacent to an abandoned fuel oil line. The abandoned fuel oil line is connected to a fuel oil bulk tank located in the fuel oil bulk storage area.

This Site Assessment Investigation (Report) has been prepared to summarize the soil investigation and sampling activities performed at Sutherland Generating Station on July 18-20, 2016 and August 16, 2016. This report documents the activities completed during the soil investigation and identifies the extent of impacted soils based on the sampling results obtained during the investigation.

This Report generally follows The Iowa Department of Natural Resources (DNR) Underground Storage Tank (UST) Tier 1 guidance, which utilizes the Risk-Based Corrective Action (RBCA). RBCA assesses the risk(s) posed by petroleum contamination using site-specific conditions and a tiered approach to protect human health and the environment. Based on the results of the tiered assessment, corrective action can then be used to minimize or remove risk(s).

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2.3 Applicable IDNR LUST Tier 1 Standards

This site assessment uses site data to determine whether a site poses an unreasonable risk to public health, safety, and the environment according to IDNR Tier 1 standards for soil and groundwater for diesel fuel and waste oil. All vapor exposure pathways have been excluded from this evaluation.

Tier 1 assessments generally include: conducting a field investigation to determine the maximum concentrations of chemicals of concern in soil and groundwater associated with the petroleum release, surveying the surrounding area for receptors and comparing maximum contaminant concentrations to the Tier 1 Look-up Table to determine which pathways are complete. A completed pathway means that there is potential for a receptor to be exposed to the contaminants of concern.

Generally, Tier 1 assessments assume the worst-case scenario, by evaluating whether actual or potential receptors could be exposed to chemicals of concern through soil and groundwater pathways. The location with the maximum concentrations is assumed to be the point of exposure, i.e., the source.

2.3.1 Pathways Analysis

The pathway analysis results are as follows:

- Groundwater Ingestion Pathway – This pathway is complete because the first encountered groundwater meets the definition of a protected groundwater source. No drinking water wells are located within 1,000 feet of the area of concern. There are several IPL owned non-drinking water wells within 1,000 feet of the area of concern. Therefore, no receptor has "potential" for groundwater ingestion. See Appendix G for the IDNR Well Location Radius Map.
- Groundwater to Water Line Pathway – This pathway is complete for actual receptors because there is an existing water line within 200 feet of the source area and the first encountered groundwater is less than 20 feet below ground surface.
- Groundwater Vapor to Enclosed Space Pathway – not evaluated
- Soil Vapor to Enclosed Space Pathway – not evaluated
- Soil Leaching to Groundwater Pathway – The Groundwater Ingestion Pathway is complete, therefore the Soil Leaching to Groundwater Pathway is complete.

- Soil to Water Line Pathway – This pathway is complete for receptors because a water line is located within 200 feet of the source.
- Surface Water Pathway – The pathway is incomplete because a surface water body isn't present within 200 feet of the source.

2.3.2 Tier 1 Standards for Soil and Groundwater

Given that the contaminant of concern is No. 2 diesel fuel, the Group 1 (gasoline) criteria has not been evaluated for potential exposures. The Group 2 criteria for diesel and waste oil are summarized in the table below. This criteria assumes that there are no drinking water wells within 1,000 feet of the source area. The results of this report will be impacted if, for some reason, a drinking water well is located within 1,000 feet of the source area.

	Exposure Pathway	Receptor	Diesel	Waste Oil
Groundwater (ug/l)	Groundwater Ingestion	Potential	75,000	40,000
	Groundwater to Water Line	All	75,000	40,000
Soil (mg/kg)	Soil Leaching to Groundwater	All	3,800	NA
	Soil to Water Line	All	10,500	NA

For purposes of the report the groundwater contaminant levels used to determine impacts above the Tier 1 standards is **75,000 ug/l**. The soil contaminant levels used to determine impacts above the Tier 1 standards shall be the lesser concentration of the Soil Leaching to Groundwater and the Soil to Water Line pathways, which is **3,800 mg/kg**.

3. Soil Boring and Sampling Activities

In July 2016, IPL contracted HHS to oversee soil investigation activities and conduct soil screening/sampling in order to delineate the lateral extent and depth of the impacted soils located adjacent to the underground abandoned No. 2 fuel oil line. Cabeno Environmental Field Services, LLC (*Cabeno*) was subcontracted to provide soil boring and well installation services.

Soil investigation activities were completed over the course of five days occurring in two separate mobilizations. The first mobilization occurred on July 18-21, 2016. The second mobilization occurred on August 16, 2016. The daily construction reports detailing investigation activities are provided in Appendix D. Photographs of soil investigation activities are attached in Appendix E.

3.1 Utility Location

On July 18, 2016, HHS mobilized personnel, equipment, and supplies to SGS to initiate the soil investigation activities. Equipment and supplies included a Geoprobe® 6620 for conducting the soil borings, a MiniRae 3000 photoionization detector (*PID*) for conducting soil screening head space analysis, and sampling equipment/supplies for collection of soil and water samples for laboratory analysis.

Prior to initiating the soil investigation activities, IPL contracted a utility locating service to locate any underground utility in the anticipated soil boring area. The utility locations included electric service, natural gas service, water service, and underground process piping. IPL also provided detailed drawings of underground service, including the abandoned fuel oil supply and return lines connected to the fuel oil holding tank. However, IPL's locating service was unable to completely locate multiple service locations including a natural gas line and a water service line. All other known utilities were marked with colored pin flags, and paint striping.

HHS marked locations of the proposed soil borings (*See Figure 3*) in areas where there were utility service locates were complete. Each proposed soil boring location was then reviewed by SGS personnel prior to soil boring operations. Due to the incomplete utility service locate, HHS was required to contract a private utility locating service (*Encompass Inspections*) which utilizes ground penetrating radar to locate hard to find underground service utilities. This resulted in the need for a second mobilization to conclude the soil boring investigation on August 16, 2016.

3.2 Soil Boring Installation and Soil Screening Process

Soil investigation activities were initiated in the area immediately adjacent to the abandoned underground fuel oil line east of the former excavation area. Soil borings continued to be advanced in the area surrounding the former excavation area to the north, south, east and west until the extents of impacted soils were identified. Soil borings were advanced in five foot increments approximately twenty feet below ground surface (*bgs*). Each five foot boring sleeve was extracted from the ground and cataloged by a Professional Geologist. Observations of the extracted soil cores showed the majority of the investigation area generally consisted of a silty clay from one foot to nine feet bgs and sand from nine feet to twenty feet bgs. The clay varied in plasticity and color throughout the soil cores. See Appendix A for soil boring logs and geotechnical data collected.

In addition to soil cataloging, each soil boring was inspected for the presence of polycyclic aromatic hydrocarbons (*PAHs*). Preliminary soil screening tools used to identify potentially impacted soils within the soil cores included olfactory and visual observations. Additionally, head space analysis utilizing the PID was conducted for each two-and-a-half-foot section of the extracted soil cores. PID head space analysis assisted with the determination of where soil samples were to be collected from each soil boring. See Appendix B for PID head space analysis results for each soil boring.

A total of thirty-nine soil borings were advanced during the investigation, as depicted in Figure 2, which does not include the four borings during well installation. A minimum of one soil sample was collected from each soil boring, for soil borings SB-1 through SB-39, except for SB-14 which had refusal at four feet. Multiple samples were collected in suspect soil borings consisting of strong odors of PAHs, visually observed discoloration, and/or elevated PID readings. Soil borings in which multiple samples were collected include the following: SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, SB-8, SB-9, SB-10, SB-11, SB-12, SB-13, SB-18, SB-19, SB-20, SB-21, SB-24, SB-26, SB-31, SB-32, SB-33, SB-34, SB-35, SB-36, SB-37, SB-38, SB-39, and MW-3.

The soil borings were screened/sampled in accordance with industry standards based on Tier 1 Site Assessment guidelines. All soil samples were collected for laboratory analysis in accordance with IDNR methods OA-1 and OA-2 (See Appendix C) for PAHs.

After completion of soil sampling activities, the soil boring holes were backfilled with bentonite chips and/or the extracted soil cores. All other remaining soil cores were placed in 55 gallon sealed drums for offsite disposal. Free product was not observed in any of the borings.

3.3 Groundwater Well Installation

In addition to soil sampling activities, four temporary wells were installed to conduct groundwater sampling according to the IDNR LUST Tier 1 Guidance. Three wells (*MW-1, MW-2, and MW-4*) were installed along the perimeter of the investigation area while one well (*MW-3*) was installed in the center of the investigation area where impacted soils were known to be present. The wells were constructed using a hollow core stem auger. The wells were constructed with two inch PVC and were set at a depth of fifteen feet (*bgs*) with a ten-foot screen interval. After the wells were set, the annular space was sealed with bentonite. The wells were all constructed with a protective steel casing, concrete collar at the base, and lockable steel lid. After installation, the wells were surveyed to the top of casing using a known elevation waypoint provided by IPL personnel, as shown on Figure 2. IPL personnel also provided labels and locks that were keyed alike for each of the ground water monitoring wells.

3.4 Groundwater Sampling

Groundwater wells were allowed to equilibrate a minimum of 12 hours prior to measuring the depth of water bgs, as well as conducting low flow water sampling. Groundwater samples were collected at each well location. Groundwater sampled from monitoring well MW-3 contained a sheen water sample although there was no accumulation of free product observed. No visual evidence of PAHs were observed in the groundwater samples from the other wells.

4. Geology and Hydrology

The following subsections discuss the local geology and hydrology within the investigation area.

4.1 Geology

Generally, the soil borings consisted of a silty clay layer from the ground surface to approximately nine feet bgs, which contained trace amounts of sand, gravel, and coal. Below the silty clay layer from approximately nine feet to twenty feet bgs was a fine to coarse grained sand layer with trace amounts of silt. Typically, the subsurface soil matrix consists of a non-plastic silty clay and sand.

4.2 Hydrology

In most cases, the soil borings encountered water at a depth approximately nine feet bgs. Monitoring wells MW-1, MW-2, MW-3, and MW-4 encountered ground water levels at similar depths of seven to eight feet bgs.

The inferred groundwater flow direction at the time of the investigation is south by southwest (*see Figure 2*). The hydraulic gradient based on water elevations collected during the groundwater sampling. Based on the onetime event, the groundwater gradient is about 0.0068.

5. Sampling Results

The following subsections discuss the results from the soil screening and laboratory analytical results for both soil and groundwater.

5.1 Soil Screening Results

A table has been included in Appendix B which illustrates the PID screening results at each interval, in addition to the analytical sample results. In general, elevated PID response within the soil core screening correlated with the laboratory analytical sample results.

Soil borings adjacent to the abandoned fuel oil lines exhibited elevated PID responses closer to the ground surface than the borings further away from the fuel lines. The screening results also indicated that impacted soils were located from the ground surface to a depth of approximately fifteen feet and in a few cases slightly beyond 15 feet bgs. Confirmation was observed that the highest PID responses were in the area closest to the fuel oil pipes and therefore the spill has a high likelihood of originating from fuel oil pipes and historical spill noted by the facility personnel.

5.2 Soil Analytical Results

Once the soil and water samples were collected, HHS completed the required chain-of-custody forms, packaged the samples in coolers filled with ice, and delivered the samples to TestAmerica Laboratories in Cedar Falls, Iowa for analysis. The soil and water samples were analyzed for PAHs in accordance with IDNR test methods OA-1 and OA-2 as shown in Appendix C. Method OA-1 is used to determine the concentration of volatile petroleum hydrocarbons. Method OA-2 is used to determine the concentration of low volatility petroleum products and organic compounds.

TestAmerica's laboratory reported analytical results are provided in Appendix F. A summary of the field screening data associated with the laboratory reported analytical results for each soil boring location is included in Appendix B. Laboratory reported analytical results and field screening data for soil and water samples are summarized in the following subsections.

Based on IDNR Tier 1 LUST standards for contaminated soil leaching to groundwater, diesel is considered above the criteria at or above 3,800 mg/kg (Figure 3). There are eleven locations which meet or exceed the IDNR LUST standard. These locations are SB-1, SB-2, SB-3, SB-6, SB-7, SB-9, SB-10, SB-11, SB-12, SB-19 and MW-3. Also, all of these locations are south of the concrete pad, and directly adjacent to the abandoned fuel oil supply/return line.

5.3 Groundwater Analytical Results

The results for each water sample are illustrated on Figure 4. A total of four water samples were collected during the soil investigation.

The MW-1 sample reported concentration of 717 ug/l for total extractable hydrocarbons, although the laboratory flagged the sample with a "Z" qualifier, which means the chromatographic response does not resemble a typical fuel pattern. Because of this qualifier, the result is considered below laboratory reporting limits.

Water sample MW-3, located in the center of the investigation area, reported concentration was 3,010 ug/l diesel range hydrocarbons. A sheen was observed in the purged and sampled water. The Tier 1 limit is 75,000 ug/l therefore the result is less than the Tier 1 limit.

The MW-2 and MW-4 samples were less than the laboratory reporting limits.

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6. Conclusions and Recommendations

This section discusses conclusions and recommendations for the SGS Soil Investigation.

6.1 Site Investigation Evaluation

Based on the results from Section 5, the impacted area is located completely within the limits of the IPL Sutherland Generating Station property and specifically near the fuel oil piping, which has been isolated and is no longer used by the Sutherland Generating Station. The following subsections discuss conclusions from the groundwater and soil sampling investigation.

6.1.1 Groundwater Investigation Conclusion

The maximum concentrations observed in all groundwater samples do not exceed the applicable IDRN Tier 1 levels for actual or potential receptors. Likely, no further action will be required for the Groundwater Ingestion and Groundwater to Water Line Pathways.

6.1.2 Soil Investigation Conclusion

Both the soil screening and sampling results showed that impacts above the IDNR Tier 1 levels for receptors from Soil Leaching to Groundwater and Soil to Water Line. The exceedances translate to failure of both exposure pathways from Soil Leaching to Groundwater and Soil to Water Line. The exceedances are primarily centered on the fuel oil transport pipe that has been taken out of service. Because the Tier 1 levels have been exceeded, additional steps will be required by the IDNR in order to complete remedial actions at the SGS.

6.2 Tier 2 Requirements

According to the IDNR LUST program, a Tier 2 site assessment must be conducted for all sites when any of the following conditions are present:

- Free phase petroleum product,
- The responsible party decides to bypass the Tier 1 assessment and go directly to the Tier 2 site assessment,
- Failure of a Tier 1 pathway,
- Bedrock is encountered above groundwater, or;
- Explosive vapor levels are documented.

The soil investigation results indicate there is a failure in two pathways and that a Tier 2 evaluation is necessary. A Tier 2 evaluation may be avoided if IPL is in favor of going directly into Corrective Actions. At IPL's direction, HHS could provide a request directly to the IDNR to skip a Tier 2 evaluation and proceed to Corrective Actions.

The objective of a Tier 2 site assessment is to collect site-specific data and, with the use of Tier 2 modeling, provide a Tier 2 Report to document whether actual or potential receptors could be impacted by chemicals of concern. The Tier 2 model predicts what concentrations or site specific target levels (SSTLs) must be achieved at the source and between the source and the receptors to ensure protection of the receptors.

6.3 Expedited Corrective Action

An owner, operator, or responsible party may conduct expedited corrective actions at the site in accordance with IAC 567—135.12(11). The IDNR must be notified within 30 calendar days of commencement. Expedited corrective action does not include active treatment of groundwater other than:

- As previously approved by the DNR
- Free product recovery pursuant to IAC 567—135.7(5)
- Soil excavation

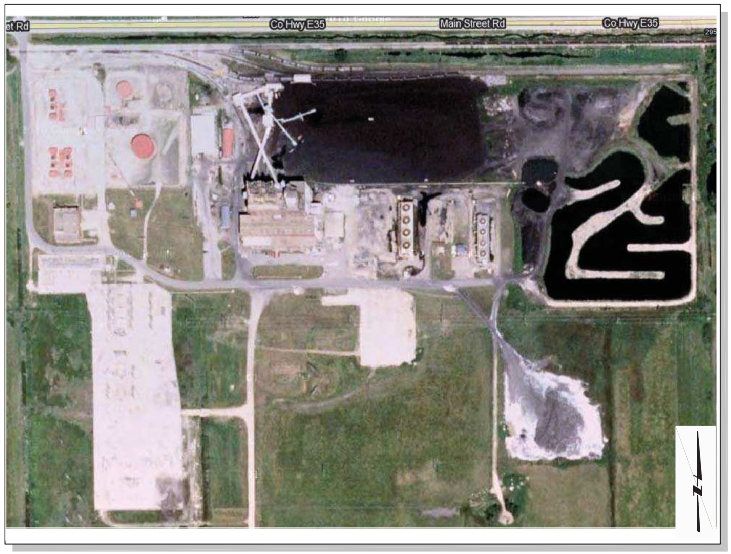
The purpose of expedited corrective action is to provide a mechanism for limited and prompt remediation without unnecessary delays for proposal submittal and DNR review. IDNR does not allow an expedited corrective action as a substitute for completing a Tier 1, Tier 2, or Tier 3 site evaluation and report.

6.4 Corrective Action Options

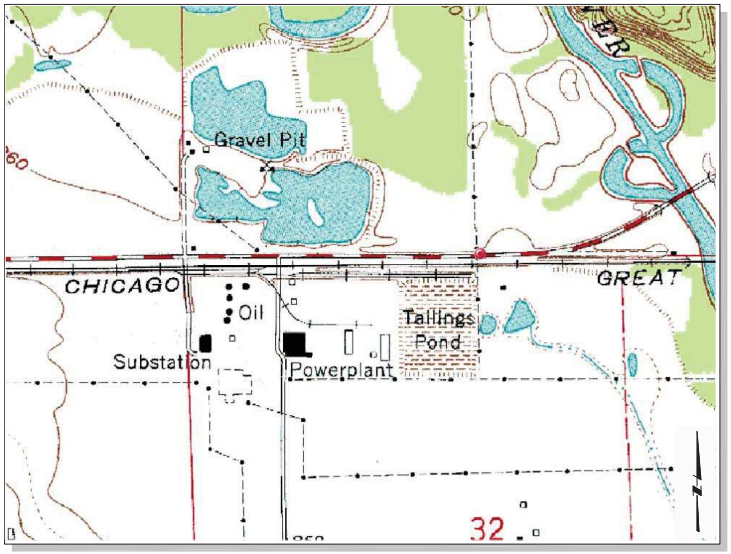
IDNR LUST program guidance indicates that corrective action options can include reducing contamination through active or passive methods, removing or relocating a receptor, using technological or institutional controls, or monitoring.

Corrective action options that are applicable to this site based on the various site conditions are identified in the following subsections and include:

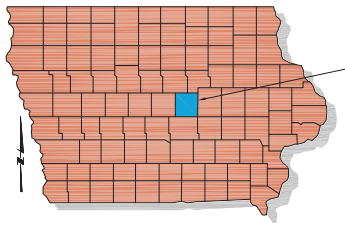
- Natural Attenuation and Monitoring
- Impacted Soils Removal and Disposal
- In-Situ Remediation with Enhanced Bioremediation Technology



SITE AERIAL PHOTOGRAPH
NOT TO SCALE



SITE TOPOGRAPHIC MAP
NOT TO SCALE



INTERSTATE POWER AND LIGHT COMPANY
MARSHALL COUNTY
MARSHALLTOWN, IOWA

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

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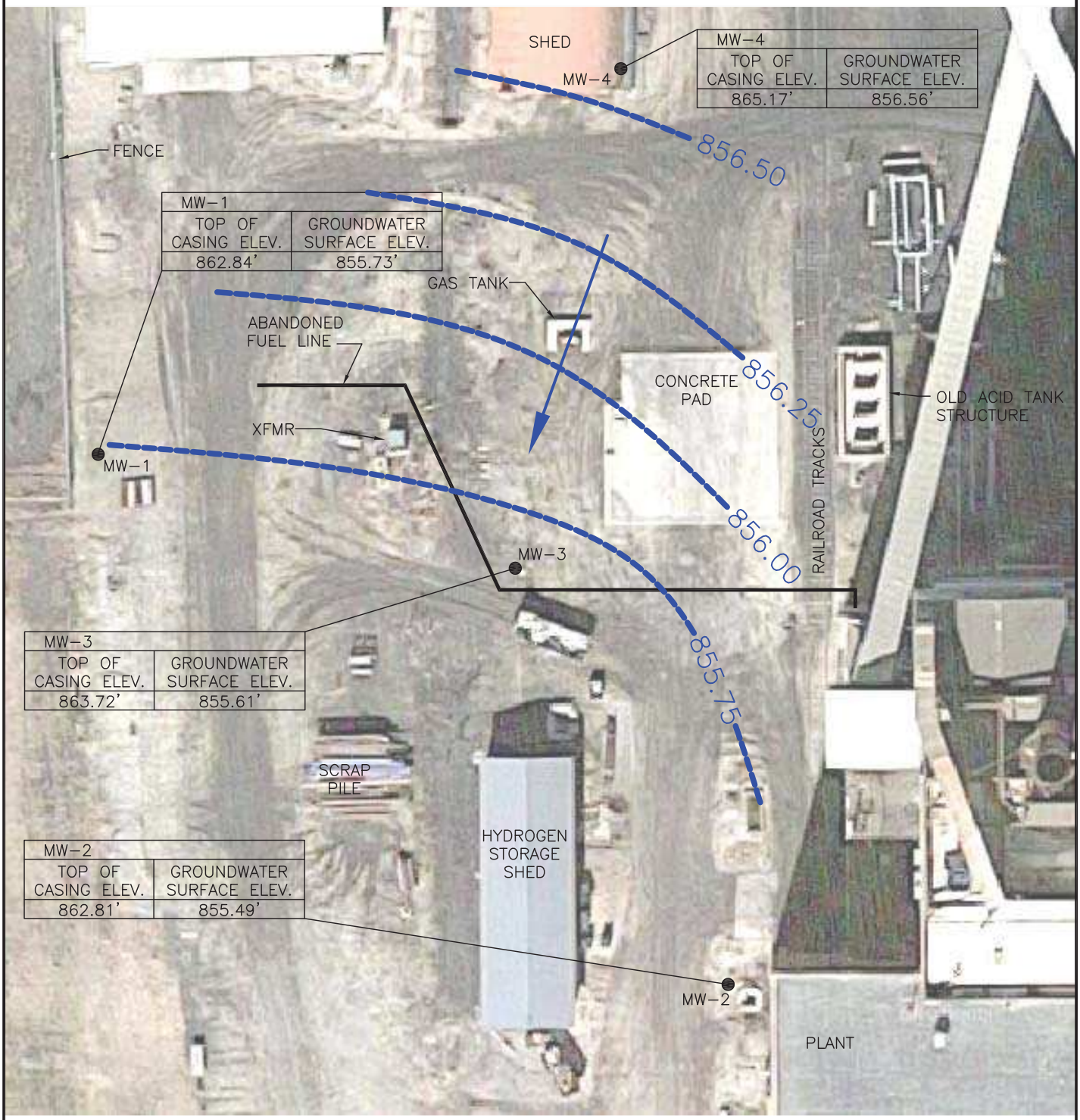
SCALE:	AS SHOWN
DATE:	9-12-16
DRAWN BY:	JFD
CHKD BY:	---
APRVD BY:	---

CLIENT / LOCATION
INTERSTATE POWER AND LIGHT (IPL)
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION
SOIL INVESTIGATION REPORT
SITE LOCATION

JOB 154.006.008
SHT. FIGURE 1
DWG. 154006008-D1



LEGEND:

- MONITORING WELL
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION

PLAN VIEW

0 20' 40'

APPROXIMATE SCALE: 1"=40'

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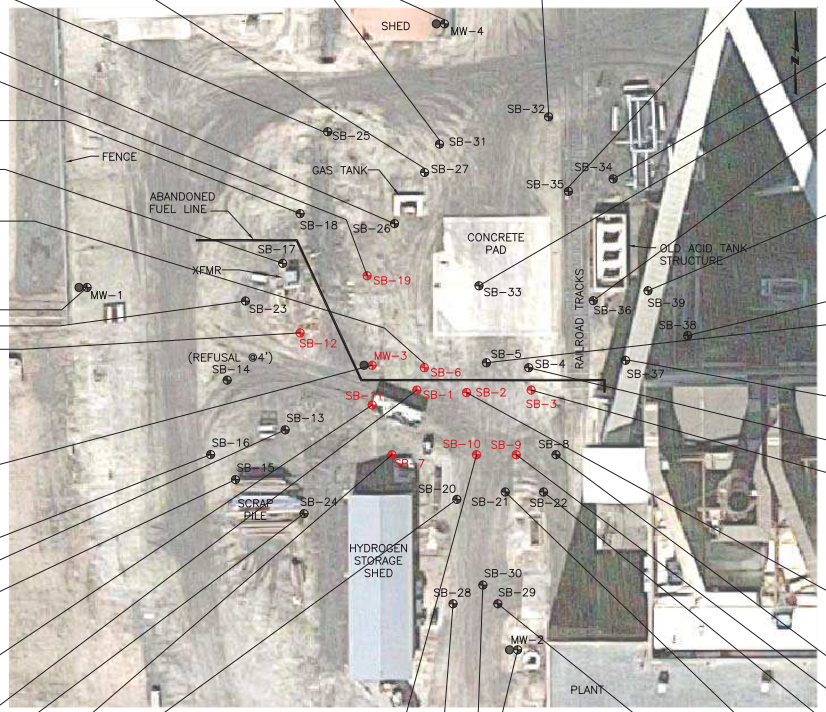
SCALE:	AS SHOWN
DATE:	7-25-16
JOB	154.006.008
SHT.	FIGURE 2
DWG.	154006008-D2

CLIENT / LOCATION	DRAWING DESCRIPTION
INTERSTATE POWER AND LIGHT (IPL) SUTHERLAND GENERATING STATION MARSHALLTOWN, IOWA	SOIL INVESTIGATION REPORT MONITORING WELL LOCATIONS



SB-26	5'–7'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	363.4	4.0
TPH GAS (mg/kg)	180.0	11.4
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	1,770.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-25	5'–7'
METHOD	RESULTS
PID (ppm)	2.1
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-27	5'–7'
METHOD	RESULTS
PID (ppm)	364.4
TPH GAS (mg/kg)	152.0
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	3,660.0
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-31	5'–7'	10'–12'
METHOD	RESULTS	RESULTS
PID (ppm)	100.1	4.3
TPH GAS (mg/kg)	204.0	12.5
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	1,610.0	11.2
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

MW-4	3'–5'	10'–12'
METHOD	RESULTS	RESULTS
PID (ppm)	1.1	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	QUALIFIER	BRL

SB-32	3'–5'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	0.0	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	39.8	BRL
TEH (mg/kg)	BRL	BRL

SB-35	3'–5'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	0.0	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-34	3'–5'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	1.4	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-19	5'–7'	8'–10'	15'–17'
METHOD	RESULTS	RESULTS	RESULTS
PID (ppm)	195.0	201.0	6.3
TPH GAS (mg/kg)	BRL	423.0	BRL
GASOLINE (mg/kg)	BRL	BRL	BRL
DIESEL (mg/kg)	BRL	14,800.0	BRL
WASTE OIL (mg/kg)	BRL	BRL	BRL
TEH (mg/kg)	BRL	BRL	BRL

SB-18	5'–7'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	10.3	1.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-17	NO RESULTS

SB-6	0'–2'	5'–7'	18'–20'
METHOD	RESULTS	RESULTS	RESULTS
PID (ppm)	30.5	641.3	2.7
TPH GAS (mg/kg)	54.7	689.0	BRL
GASOLINE (mg/kg)	BRL	BRL	BRL
DIESEL (mg/kg)	418.0	14,100.0	BRL
WASTE OIL (mg/kg)	443.0	BRL	BRL
TEH (mg/kg)	BRL	BRL	BRL

MW-1	8'–10'
METHOD	RESULTS
PID (ppm)	1.3
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-12	8'–10'	15'–17'
METHOD	RESULTS	RESULTS
PID (ppm)	236.0	4.7
TPH GAS (mg/kg)	231.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	7,780.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-23	3'–5'
METHOD	RESULTS
PID (ppm)	0.8
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

MW-3	5'–7'
METHOD	RESULTS
PID (ppm)	788.0
TPH GAS (mg/kg)	435.0
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	8,540.0
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-16	3'–5'
METHOD	RESULTS
PID (ppm)	8.2
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-15	5'–7'
METHOD	RESULTS
PID (ppm)	5.4
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-13	3'–5'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	316.1	42.9
TPH GAS (mg/kg)	288.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	2,160.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-11	3'–5'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	347.4	312.0
TPH GAS (mg/kg)	267.0	70.8
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	6,870.0	1,270.0
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-24	0'–2'	5'–7'
METHOD	RESULTS	RESULTS
PID (ppm)	8.0	2.9
TPH GAS (mg/kg)	BRL	42.1
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-10	0'–2'	5'–7'	12'–15'
METHOD	RESULTS	RESULTS	RESULTS
PID (ppm)	541.0	405.0	87.6
TPH GAS (mg/kg)	236.0	375.0	BRL
GASOLINE (mg/kg)	BRL	BRL	BRL
DIESEL (mg/kg)	5,590.0	3,180.0	603
WASTE OIL (mg/kg)	BRL	BRL	BRL
TEH (mg/kg)	BRL	BRL	BRL

MW-2	8'–10'
METHOD	RESULTS
PID (ppm)	2.4
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-22	5'–7'
METHOD	RESULTS
PID (ppm)	3.7
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-1	8'–10'	18'–20'
METHOD	RESULTS	RESULTS
PID (ppm)	407.0	5.4
TPH GAS (mg/kg)	492.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	4,980.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-7	5'–7'	15'–17'
METHOD	RESULTS	RESULTS
PID (ppm)	265.0	7.2
TPH GAS (mg/kg)	363.0	31.7
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	13,600.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-20	5'–7'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	218.1	11.8
TPH GAS (mg/kg)	68.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	1,360.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-28	5'–7'
METHOD	RESULTS
PID (ppm)	1.1
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-30	5'–7'
METHOD	RESULTS
PID (ppm)	3.7
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-29	5'–7'
METHOD	RESULTS
PID (ppm)	2.6
TPH GAS (mg/kg)	BRL
GASOLINE (mg/kg)	BRL
DIESEL (mg/kg)	BRL
WASTE OIL (mg/kg)	BRL
TEH (mg/kg)	BRL

SB-21	5'–7'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	6.7	17.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	66.9
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-33	0'–2'	15'–17'
METHOD	RESULTS	RESULTS
PID (ppm)	117.3	3.0
TPH GAS (mg/kg)	226.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	954.0	15.1
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-36	0'–2"	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	41.8	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	441.0	BRL
TEH (mg/kg)	512.0	BRL

SB-39	0'–5'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	0.0	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-38	0'–2'	8'–10'
METHOD	RESULTS	RESULTS
PID (ppm)	0.7	0.0
TPH GAS (mg/kg)	BRL	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	BRL	BRL
WASTE OIL (mg/kg)	254.0	BRL
TEH (mg/kg)	302.0	BRL

SB-5	10'–12'	15'–17'
METHOD	RESULTS	RESULTS
PID (ppm)	515.0	3.2
TPH GAS (mg/kg)	232.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	2,360.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-37	3'–5'	10'–12'
METHOD	RESULTS	RESULTS
PID (ppm)	113.7	1.3
TPH GAS (mg/kg)	93.2	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	1,130.0	15.5
WASTE OIL (mg/kg)	354.0	BRL
TEH (mg/kg)	BRL	BRL

SB-3	8'–10'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	453.0	31.7
TPH GAS (mg/kg)	441.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	10,700.0	20.0
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-4	5'–7'	15'–17'
METHOD	RESULTS	RESULTS
PID (ppm)	481.0	4.5
TPH GAS (mg/kg)	88.8	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	2860.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-2	0'–2'	5'–7'	15'–17'
METHOD	RESULTS	RESULTS	RESULTS
PID (ppm)	15.8	539.0	7.6
TPH GAS (mg/kg)	BRL	400.0	BRL
GASOLINE (mg/kg)	BRL	BRL	BRL
DIESEL (mg/kg)	BRL	10,900.0	BRL
WASTE OIL (mg/kg)	501.0	BRL	BRL
TEH (mg/kg)	BRL	BRL	BRL

SB-8	5'–7'	10'–12'
METHOD	RESULTS	RESULTS
PID (ppm)	329.0	4.7
TPH GAS (mg/kg)	101.0	BRL
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	1,490.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

SB-9	8'–10'	12'–15'
METHOD	RESULTS	RESULTS
PID (ppm)	407.1	29.3
TPH GAS (mg/kg)	796.0	29.2
GASOLINE (mg/kg)	BRL	BRL
DIESEL (mg/kg)	12,900.0	BRL
WASTE OIL (mg/kg)	BRL	BRL
TEH (mg/kg)	BRL	BRL

LEGEND:
- MONITORING WELL
- UNIMPACTED SOIL BORING
- IMPACTED SOIL BORING

NOTE:
1. LUST TIER 1 SOIL STANDARDS DIESEL FUEL 3,800 mg/kg OR ABOVE ARE SHOWN IN RED.

0 25' 50'
APPROXIMATE SCALE: 1"=50'

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat SERVICES

SCALE:	AS SHOWN
DATE:	9–8–16
DRAWN BY:	JFD
CHKD BY:	---
APRVD BY:	---

CLIENT / LOCATION
INTERSTATE POWER AND LIGHT (IPL)
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

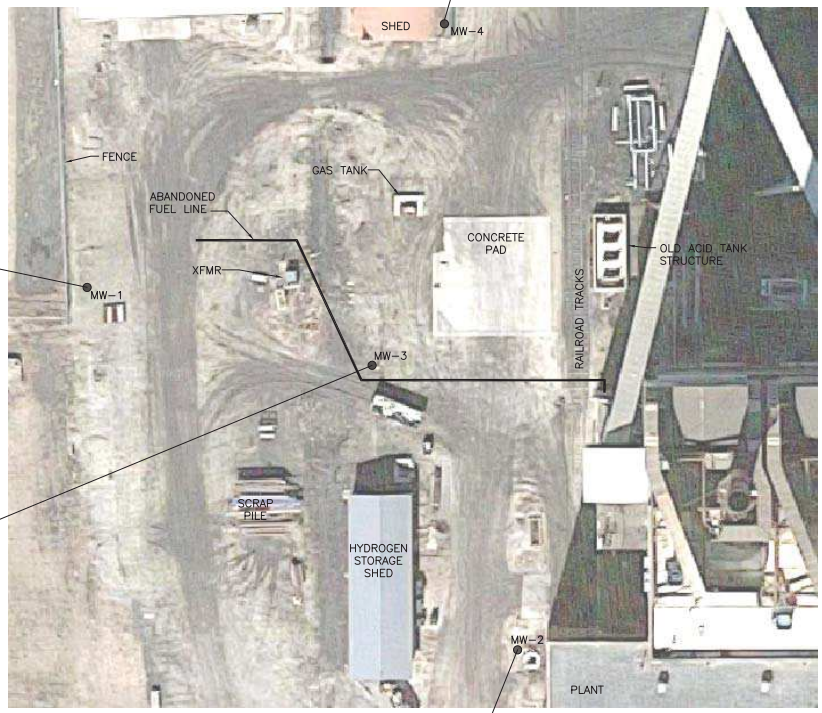
DRAWING DESCRIPTION
SOIL INVESTIGATION REPORT
SOIL SAMPLING RESULTS

JOB 154.006.008
SHT. FIGURE 3
DWG. 154006008–D3

MW-4	GROUNDWATER
METHOD	RESULTS
TPH GAS (ug/L)	BRL
GASOLINE (ug/L)	BRL
DIESEL (ug/L)	BRL
WASTE OIL (ug/L)	BRL
TEH (ug/L)	BRL

MW-1	GROUNDWATER
METHOD	RESULTS
TPH GAS (ug/L)	BRL
GASOLINE (ug/L)	BRL
DIESEL (ug/L)	BRL
WASTE OIL (ug/L)	BRL
TEH (ug/L)	QUALIFIER

MW-3	GROUNDWATER
METHOD	RESULTS
TPH GAS (ug/L)	BRL
GASOLINE (ug/L)	BRL
DIESEL (ug/L)	3010
WASTE OIL (ug/L)	BRL
TEH (ug/L)	BRL



MW-2	GROUNDWATER
METHOD	RESULTS
TPH GAS (ug/L)	BRL
GASOLINE (ug/L)	BRL
DIESEL (ug/L)	BRL
WASTE OIL (ug/L)	BRL
TEH (ug/L)	BRL

LEGEND:
● MONITORING WELL

NOTE:
1. LUST TIER 1 GROUNDWATER STANDARDS DIESEL FUEL 75,000 ug/L.

N

0 25' 50'
APPROXIMATE
SCALE: 1"=50'

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat SERVICES

SCALE:	AS SHOWN
DATE:	9-14-16
DRAWN BY:	JFD
CHKD BY:	---
APRVD BY:	---

CLIENT / LOCATION
INTERSTATE POWER AND LIGHT (IPL)
SUTHERLAND GENERATING STATION
MARSHALLTOWN, IOWA

DRAWING DESCRIPTION
SOIL INVESTIGATION REPORT
GROUNDWATER SAMPLING RESULTS

JOB 154.006.008
SHT. FIGURE 4
DWG. 154006008-D4