NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
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January 30, 2020

Mr. Dan Noll
Labella Associates, D.P.C.
300 State Street, Suite 201
Rochester, New York 14614

Re: Interim Remedial Measures Work Plan RAOC #1
Eldre Corporation
Site No.: C828182
Henrietta (T), Monroe (C)

Dear Mr. Noll:

The New York State Department of Environmental Conservation (Department), in conjunction with the New York State Department of Health (NYSDOH), collectively known as the State, has completed a review of the September 2019 Interim Remedial Measures Work Plan RAOC #1 (IRMWP) for the Eldre Corporation site (Site) located at 1500 Jefferson Road and 55 Hofstra Road in the Town of Henrietta, Monroe County. Based on the information presented in the IRMWP and information relayed during a technical meeting on January 24, 2020, the IRMWP is conditionally approved with the clarifications and modifications presented below.

1. <u>Clarification:</u> Section 3.3 of the IRMWP – There are statements indicating that further remedial investigational activities are not warranted based on the remedial investigation conducted to date. It needs to be noted that the State will determine if additional investigational activities are warranted once the State has completed a review of a comprehensive Remedial Investigation Report for the Site.

2. <u>Clarification:</u> Section 5.1.1 of the IRMWP – Figure 3, not Figure 5, provides a more comprehensive representation of the sewer system at the Site.

3. <u>Clarification:</u> Section 5.1.4 of the IRMWP – The Department understands that Labella's groundwater sampling log forms or equivalent will be used for groundwater sampling events. The Department also understands that the depth of the intake will be noted on the groundwater sampling log.

4. <u>Modification:</u> Section 5.2.10 of IRMWP, Hot groundwater and soil sampling – The groundwater and soil samples will be cooled to 4°C not room temperature prior to collection of the groundwater and soil samples for laboratory analysis.

5. <u>Modification:</u> Section 5.4 of the IRMWP - The Department understands that a contained-in determination(s) will be obtained for the off-site disposal of waste as non-hazardous waste. Contained-in determinations are issued by Mr. Henry Wilke.

6. Clarification: Section 5.5 of the IRMWP – The Department understands that the Construction Completion Report (CCR) will be generated in accordance with DER-10 Section 5.8 and all appropriate electronic data deliverables (EDDs) will be submitted to the State.

7. Clarification: In reviewing Figure 2 on Page 7 of TRS's Emergency Response Plan, the Department understands that the Department and Department's project manager will be contacted/notified within the appropriate timeframes as detailed in the Brownfield Cleanup Agreement and in State regulations.

8. Clarification: The State understands that the 500 ug/L cleanup goal for the interim remedial measure (IRM) activities is the TRS contractual cleanup goal and is not a State remedial goal for the Site.

9. Modification: The State understands that the soil vapor extraction (SVE) system associated with the electrical resistance heating (ERH) system will have a 15-horsepower blower extracting vapors from the subsurface which would overwhelm the fans on the sub-slab depressurization system (SSDS). It is understood that the suction points for the SSDS will be valved and shut off within the treatment area to minimize the influx of outside air into the system. Please install vacuum monitoring points at the edge of the indoor treatment area to verify that vacuum is maintained beneath the building slab. Indoor air sampling must be completed once ERH system is activated and fully operational.

10. Clarification: Based on technical discussions during the January 24, 2020 meeting, the Department understands that breakthrough of the liquid granulated activated carbon (LGAC) system will be monitored via pressure readings as siltation of the LGAC system is common. The Department understands that when pressure reading fluctuations are observed the LGAC system will be backflushed to clean the LGAC system (remove accumulated silts). When backflushing is no longer effective the LGAC system canisters will be changed out. The Department understands that the backflush liquids will be sent to a settling tank and once settling has occurred the fluids will be sent through the LGAC system for treatment and discharge to the sanitary sewer system under permit.

11. Clarification: The State understands that the SVE system will be started at the same time as power being initiated to the subsurface electrodes.

12. Clarification: The State understands that the calculated treatment volume at the Site is 2,200 cubic yards based on the parameters presented in the IRMWP.

13. Modification: A copy of the discharge permit for the sanitary sewer will be provided to the Department prior to any discharges to the sanitary sewer associated with the implementation of the IRM activities.

14. Clarification: Labella and/or TRS must provide a certification that the electrical safety policy for all public areas/zones are met and that all restricted zones are clearly marked and restricted from public access (on-site employees).

15. Modification: The TRS weekly reports/updates provided to Labella will also be provided to the State project managers at the same time.

16. Clarification: The Site's SSDS will be restarted immediately after the shut down of the SVE system.

17. Clarification: The State understands that the TRS final report for the implementation of the ERH at the Site will be provided as an appendix in the IRM CCR for the Site with all supporting documentation.

18. Clarification: The Department understands that the concrete waste generated as part of the ERH installation will be either disposed at a permitted landfill facility in accordance with applicable local, State, and Federal regulations or at a registered concrete recycler if there is no evidence of contamination/impacts.

19. Modification: Interim groundwater sampling conducted during the IRM will include both groundwater monitoring wells (MW-15 and MW-20). Department approval must be obtained to modify the interim groundwater sampling events.

20. Clarification: The State understands that a complete TRS Health and Safety Plan (HASP) with all supporting appendices and documents will be available on-site during the operation of the ERH system.

21. Clarification: The Department understands that the secondary containment for the ERH system components will meet the State's requirements.

22. Clarification: The State understands that TRS's remote access will take the necessary precautions necessary to prevent cyber-attacks on the system.

23. Clarification: The State understands that the alarm system in place at the Site will alert personnel if the ERH or the SVE system are shut down due to power outages, equipment failure, intruder detection, etc. If the SVE system is down for an extended period, then the SSDS will need to be reactivated within the treatment area until the SVE system is restored and operational. Community air monitoring will need to be initiated if the SVE system and SSDS are operating for extended periods of time.

24. Clarification: The State understands that TRS's construction logs may contain proprietary information and will be marked as confidential in all submittals to the State.

25. Modification: The SVE system will be operated at the Site until subsurface temperatures decrease below the boiling points as presented on Table 3, Page 18 of the TRS work plan and subsurface temperatures vapor temperatures will not damage the SSDS.

26. Clarification: All decontamination material will be containerized, characterized, and disposed off-site in accordance with all applicable local, State, and Federal regulations.

27. Clarification: Labella's HASP reference to DER-10 on Page of the Community Air Monitoring Plan provided in the IRMWP should read May 2010.

28. Clarification: In reviewing the figure presenting the process flow on P-1 of the TRS work plan the process water flow line from the cooling tower to the condenser is non-contact cooling water; therefore, should be shown as softened/potable/clean water not as process water.

29. Modification: During all field work activities associated with the IRM completed under an approved State work plan there will be a qualified environmental professional as defined in 6 NYCRR Part

375-1.2(ak) or an individual who is a direct report to the QEP on the property to supervise the activities undertaken.

30. Clarification: The State understands that the effluent point will be within the following guidelines:
    a. Above the eave of the rood (preferably above the highest eave of the building at least 12 inches above the surface of the roof).
    b. At least 10 feet above ground level.
    c. At least 10 feet away from any opening that is less than 2 feet below the exhaust point.
    d. 10 feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers.

31. The Department would like to be notified of the date of the ERH pre-operation safety meeting so that the Department representatives can be in attendance.

Within fifteen (15) days of the date of this letter and prior to energizing the ERH system as detailed in the September 2019 Interim Remedial Measures Work Plan RAOC #1, the Applicant must elect in writing (electronic notification is acceptable) one of the following options:

- Option A: Accept the modified work plan;
- Option B: Invoke dispute resolution as set forth in 6 NYCRR Part 35-1.5(b)(2); or
- Option C: Terminate the Brownfield Cleanup Agreement in accordance with 6 NYCRR Part 375-3.5.

If the Applicant chooses to accept Option A then this letter becomes part of the approved the September 2019 Interim Remedial Measures Work Plan RAOC #1. Also, if Option A is chosen then a copy of the approved September 2019 Interim Remedial Measures Work Plan RAOC #1 along with this letter attached must be placed in the document repository within 1 week of accepting Option A and prior to energizing the ERH system as detailed in the September 2019 Interim Remedial Measures Work Plan RAOC #1. Please provide notification to the Department that the September 2019 Interim Remedial Measures Work Plan RAOC #1 and a copy of this letter have been placed in the document repository (electronic notification is acceptable).

The State seeks to resolve the outstanding differences in a mutually agreeable manner, which addresses the requirements of the Brownfield Cleanup Agreement and associated work plans. If you have any questions, concerns, or need further assistance with the Site, please feel free to contact me at 585-226-5354 or via e-mail at charlotte.theobald@dec.ny.gov.

Sincerely,

Charlotte B. Theobald

Charlotte B. Theobald
Assistant Engineer

ec:
Harvey Erdle (Eldre Corporation)
Sarah Lobe (Nixon Peabody LLP)
Scott H. Reisch (Hogan Lovells LLP)
Charles Rine (Groundwater Sciences)
Alex Kralles (MERSEN USA)
Ann Aquilina (Labella)

Justin Deming (NYSDOH)
Julia Kenney (NYSDOH)
John Frazer (MCHD)
Wade Silkworth (MCHD)
Lisa Schwartz (NYSDEC)
David Pratt (NYSDEC)
Todd Caffoe (NYSDEC)

September 3, 2019

Charlotte B. Theobald
New York State Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414

Re: Interim Remedial Measures Work Plan – RAOC #1
Eldre Corporation
1500 Jefferson Road & 55 Hofstra Road, Henrietta, New York 14623
NYSDEC BCP Site C828182
LaBella Project No. 212721.01

Dear Ms. Theobald,

LaBella Associates, D.P.C. (LaBella) is pleased to submit this Interim Remedial Measures (IRM) Work Plan for Remedial Area of Concern (RAOC) #1 for Eldre Corporation, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site C828182 located at 1500 Jefferson Road and 55 Hofstra Road in the Town of Henrietta, New York, herein after referred to as "the Site."

The planned IRM for RAOC #1 is electrical resistance heating (ERH). Based on recent discussions with NYSDEC and in an effort to keep the project on track for a Certificate of Completion in 2020, LaBella plans to proceed with Site preparation tasks detailed in Section 5.1 of the IRM Work Plan and requests approval to complete the tasks outlined in Section 5.1 prior to the public comment period and formal approval of the complete IRM Work Plan. Site preparation tasks are to be completed prior to ERH infrastructure is installed and will include utility locating and scoping, ceiling tile removal, select well decommissioning and replacement, and baseline soil and groundwater sampling.

A meeting is scheduled with the NYSDEC for September 20, 2019 to review the ERH design and discuss any substantial comments to the IRM Work Plan. If during this meeting the NYSDEC is in general agreement with the ERH system design (e.g., treatment volume, number of electrodes, etc.), Eldre plans to execute a contract with the thermal vendor, TRS Group, Inc. (TRS), for system installation and proceed with procuring equipment and materials for the ERH system, in order to begin operation following formal Work Plan approval.

If you have any questions, or require additional information, please do not hesitate to contact me at (585) 295-6611.

Respectfully submitted,
LABELLA ASSOCIATES, D.P.C.

Daniel P. Noll, PE
Project Manager

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Interim Remedial Measures Work Plan
RAOC #1
Eldre Corporation
NYSDEC BCP Site No. C828182

Location:

Eldre Corporation
1500 Jefferson Road & 55 Hofstra Road
Town of Henrietta
Monroe County, New York

Prepared for:

Mr. Harvey Erdle
16622 Sweet Bay Drive
Delray Beach, FL 33445
&
Alex Kralles
Mersen USA SPM Corp.
1500 Jefferson Road
Rochester, NY 14623

LaBella Project No. 212721.01

September 2019

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Certification

I, DANIEL NOLL certify that I am currently a NYS registered professional engineer and that this Interim Remedial Measures Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

081996	09/03/19	
NYS Professional Engineer #	Date	Signature

1.0 INTRODUCTION

LaBella Associates, D.P.C. ("LaBella") is submitting this Interim Remedial Measures (IRM) Work Plan for the property located at 1500 Jefferson Road and 55 Hofstra Road, located in the Town of Henrietta, Monroe County, New York, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C828182. Hereinafter, this property will be referred to as "the Site." A Project Locus Map is included as Figure 1. This IRM Work Plan is for Remedial Area of Concern (RAOC) #1, at 1500 Jefferson Road.

1.1 Site Description and History

The Site consists of four (4) contiguous tax parcels totaling approximately 6.72 acres, as summarized in the following table and shown on Figure 2.

Parcel Address (collectively the "Site")	Section No.	Block No.	Lot No.	Acreage
1500 Jefferson Road, Henrietta, NY 14623	162.08	1	27.11	1.82
1500 Jefferson Road, Henrietta, NY 14623			27.12	0.14
1500 Jefferson Road, Henrietta, NY 14623			27.21	1.46
55 Hofstra Road, Henrietta, NY 14623			24	3.30

The 1500 Jefferson Road parcels are improved with a ±97,250 square foot, split-level building that is primarily utilized for industrial/manufacturing purposes, with office space in the southern portion and manufacturing areas in northern portion of the building. This main manufacturing building (i.e., the "1500 Jefferson Road building") is comprised of four (4) separate additions. The 1500 Jefferson Road building has a concrete slab-on-grade foundation, with the exception of the southern portion of the structure, which has a basement underneath the office space. Asphalt-paved parking lots and driveways are located north, south, and east of the 1500 Jefferson Road building. There is limited vegetative cover on the 1500 Jefferson Road parcels, with the exception of a small grassy area on the southwestern portion of the parcels and some small landscaped areas near Jefferson Road.

The 55 Hofstra Road parcel is improved with a ±6,860 square foot building, and asphalt-paved parking lots and driveways surround this structure. This smaller building is not routinely occupied but used as a maintenance and storage building for the Site. There are some vegetated drainage swales on the southwestern portion of the 55 Hofstra Road parcel, as well as along its western and northern property lines. In addition, there is approximately 0.6 acres of vegetated area on the eastern portion of the 55 Hofstra Road parcel.

The Site is currently zoned for commercial (55 Hofstra Road parcel) and industrial uses (1500 Jefferson Parcels) and is located in an urban area of the Town of Henrietta.

The parcels comprising the Site are owned and operated by Mersen USA SPM, Corp. ("Mersen"), formerly known as Mersen USA Rochester-NY Corp. and Eldre Corporation. A Site access agreement is in place between Mersen, Eldre, LaBella, and TRS Group, Inc. (TRS). According to Mersen, current manufacturing activities at the Site produce electrical components (i.e., bus bars), which require a sheet metal fabrication operation that involves the use of chemicals during the plating process. According to Mersen, the use of TCE at the Site was ceased in January 2015.

All of the properties immediately adjacent to the Site are industrial and commercial. The closest residential zoned property is approximately 0.3 miles to the east of the Site. The nearest agricultural use is approximately 1.25 miles to the north of the Site. The properties bordering the Site are summarized in the following table.

Direction From Site	Owner	Address	Property Usage
North	3131 Winton Road Assoc., LLC	3131 Winton Road	Wegmans Distribution Center
Northwest	Harris Communications	100 Hofstra Road	Undeveloped Land
South	1555 Jefferson Road, LLC	1555 Jefferson Road	Manufacturing
Southwest	Sugar Creek Stores, Inc.	1477 Jefferson Road	Retail Gasoline Station
East	Plaza at Win-Jef, LLC	1-37 Hofstra Road	Retail Plaza
East	Bowl A Roll, Inc.	1560 Jefferson Road	Bowling Alley, Commercial Retail
East	Atlantic Refining & Marketing Corp	1540 Jefferson Road	Retail Gasoline Station
East	1530 Jefferson Road, LLC	1530 Jefferson Road	NYSDOT Regional Headquarters
West	Harris Corporation (Formerly Xerox)	1400 Jefferson Road	Industrial*

* Parcel is in the State Superfund Program and is listed as a Class 4 Inactive Hazardous Waste Disposal Site (Site #828069). The impacts at the Site include chlorinated solvents (PCE, TCE, 1,1,1-TCA, 1,1-DCE, 1,1-DCA, Methylene Chloride and Vinyl Chloride).

Based upon review of previous environmental documents, the Site was utilized as farmland until the 1950s, when the Site was first developed by Fannon Metal Industries. According to historical records, the property appears to have been shared with P&F Metal and Finishing during the late 1960s. There appears to be no readily available historical information regarding whether the former occupants of Site used hazardous chemicals or generated hazardous waste. Review of an aerial photograph of the Site dated 1970 identifies an apparent retention pond in the northwestern portion of the 1500 Jefferson Road Parcel with a potential drainage feature from the building to the pond area. These features also are present in aerial photographs dated 1961 and 1976.

Mr. Jack Erdle transferred the property to Norma Erdle in 1974 and Norma transferred the property to Eldre Corporation in 2006. The County of Monroe Industrial Development Agency (COMIDA) transferred title to the 55 Hofstra Road Parcel to Eldre Corporation in late 2011. In November 2012, in a stock transaction, Eldre Corporation was sold to new ownership, but the company continued to own the Site. In 2016, Eldre Corporation changed its name to Mersen USA Rochester-NY, Corp. and in 2019 changed it to Mersen USA SPM Corp.   The Site is currently owned and operated by Mersen USA SPM Corp., Corp., formerly known as Eldre Corporation and Mersen USA Rochester-NY Corp.

2.0 STANDARDS CRITERIA AND GUIDANCE

This section identifies the Standards, Criteria and Guidelines (SCGs) for this IRM. It should be noted that the SCGs are for comparison purposes and do not reflect the cleanup goals. The SCGs for soil, groundwater and soil gas/soil vapor for this IRM are provided below.

Soil SCGs

The SCGs for this IRM are:

- 6 NYCRR Subpart 375-6.8(b) Remedial Program Soil Cleanup Objectives (RPSCOs) for the Protection of Groundwater
- 6 NYCRR Subpart 375-6.8(b) RPSCOs for the Protection of Public Health –Industrial Use

Groundwater SCGs

The SCGs for groundwater used in this IRM are the 6 NYCRR Part 703 Groundwater Quality Standards.

Soil Gas and Vapor SCGs

Currently, no state regulatory (NYSDEC or New York State Department of Health (NYSDOH)) guidance values exist for soil gas.

Sub-Slab Soil Vapor and Indoor Air SCGs: The NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006 and all subsequent updates (including the USEPA Building Assessment and Survey Evaluation (BASE) Database (90th Percentile), in Appendix C of the NYSDOH document) is utilized for the SCG for soil vapor and indoor air.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

3.1 *Remedial Investigation Fieldwork*

The BCP RI fieldwork included advancing soil borings, installing temporary overburden groundwater monitoring wells, constructing permanent shallow and deep overburden groundwater monitoring wells at the Site, collecting surface soil samples from the Site, and conducting a SVI evaluation in the 1500 Jefferson Road building. RI groundwater sampling was conducted during several distinct events. The first round of groundwater sampling was conducted in May, 2014 and a second round of groundwater sampling was conducted in September, 2014. The following table indicates the total number of samples collected and analyzed during previous investigations.

Sampled Media	Sample Quantities
Surface Soil Samples	13
Test Boring Soil Samples	97
Open Borehole Groundwater Samples	4
Permanent/Finished Monitoring Well Groundwater Samples	19

Temporary/Removed Monitoring Well Groundwater Samples	16
Sub-slab Soil Vapor/ Indoor Air/ Outdoor Air	12/ 16/ 2

Notes:
Test boring soil samples exclude PNOD and TOC samples which were collected for remedial design purposes.
Surface soil sample quantity includes total number of discrete sample locations; some samples were composited for analysis of parameters other than VOCs. One planned sub-slab soil vapor sample could not be collected due to water in the tubing during the attempted sample collection.

Although most soil and groundwater samples were submitted for analysis of volatile organic compounds (VOCs) only, select soil and groundwater samples collected during the RI were submitted for analysis of the following "full suite" laboratory parameters which include:

- United States Environmental Protection Agency (USEPA) Target Compound List (TCL) VOCs and tentatively identified compounds (TICs)
- USEPA TCL semi-volatile organic compounds (SVOCs) and TICs
- Target Analyte List (TAL) Metals and Cyanide
- Polychlorinated biphenyls (PCBs)
- Pesticides

3.2 *Remedial Alternatives Analysis Investigation*

A RAA Investigation was completed in November 2017 in accordance with the RAA Investigation Work Plan dated August 2015 and approved by the NYSDEC in a letter dated October 23, 2015. In addition, two pilot tests were completed during the pre-remedial design phase as discussed in Section 3.4.

During the RAA investigation, overburden soil borings were completed to further define the vertical and horizontal extent of VOC impacts proximate the northern portion of the 1500 Jefferson Road building and to collect samples for total organic content (TOC) analysis for remedial design purposes. Two (2) interior (SB-235 and SB-236) and two (2) exterior (SB-234 and SB-237) soil borings were advanced to depths ranging from 30-31 ft bgs.

VOCs detected above the 6 NYCRR Part 375-6.8(a) RPSCOs for Unrestricted Use and 375-6.8(b) RPSCOs for Protection of Groundwater include TCE in SB-234 (12'), SB-235 (14'), SB-235 (18'), SB-235 (21.5'), Duplicate (SB-235 [21.5']) and SB-236 (14') and cis-1,2-dichloroethene in SB-235 (14'), Duplicate (SB-235 [21.5']), and SB-235 (21.5'). The concentration of TCE in SB-236 (14') was 1,620 ppm, which represents the greatest concentration of TCE in soil identified at the Site to date.

Eight (8) soil samples were also analyzed for TOC by Accutest Laboratories using ASTM method D2974 for remedial design purposes. TOC ranged from 0.2% to 16.2 % with an average (mean) of 8.2% and median of 9.2%.

In order to assist with remedial selection and design, falling head hydraulic conductivity slug testing was completed for select groundwater monitoring wells at the Site. Hydraulic conductivity was calculated for each well tested using AQTESOLV (version 4.5) software and the Bouwer and Rice (1976) Method. Hydraulic conductivity ranged from 1.689×10^{-7} to 2.86×10^{-5} feet/ second or 0.01 to 2.5 feet/day.

3.3 *Remedial Investigation Findings*

The RI evaluated three Areas of Concern (AOC) at the Site. The Conceptual Site Model below summarizes the overall RI findings and it is based on historic information, RI data, and modeling of contaminant patterns:

1. **AOC 1 – Current Operations (including recent TCE Degreasing; according to the current owner, the use of TCE at the Site ceased in January 2015):** Soil borings (MW-14, LB-1, SB-206, SB-1, SB-222) and monitoring wells (MW-1, MW-11, MW-14 and MW-26) installed in proximity to and downgradient of the TCE degreasing area do not indicate that a release from this degreaser has resulted in any significant impacts (although some low-level impacts were identified in several of these borings/wells). Moreover, this degreaser was enclosed with secondary containment and was not connected to any exterior piping. As such, the degreasing area in the eastern portion of the building does not warrant any further investigation or remediation given the industrial use of the Site now and for the foreseeable future and an anticipated Site Management Plan.

2. **AOC 2 - Historic Operations (including former Pond Area**):

   Former Pond Area: Numerous soil borings and wells were advanced/installed as part of the RI to evaluate the historic use of the Site and the former pond area. CVOCs were identified in the borings/wells advanced in the former pond area (SB-212/MW-16 and SB-230A/MW-33); however, these impacts are considered to be associated with an historical source area in soil emanating from beneath the northern portion of the building.

   Other Historic Operations:

   SB-226 and SB-236 VOC Impacts: The impacts within the northern portion of the building appear to be associated with historic (pre-Eldre) operations. The extent of impacts in the soil at significant concentrations is limited to beneath the structural fill materials as observed during the RI work. The structural fill materials were installed at the Site as part of the 2000 building addition which removed soils above this area at that time. Based on the RI findings, the source area impacts are limited to approximately 8 to 16 feet below ground surface (bgs) (or about 500 feet to 492 feet mean sea level (MSL)). Vertical soil sampling from worst-case locations (e.g., SB-226 and SB-236) indicated decreasing concentrations of TCE at the 15 feet depth with concentrations of TCE tapering off to below 6 NYCRR Part 375-6.8 Unrestricted and Protection of Groundwater SCOs at 21.5 feet below finished floor.

   The highest concentrations of CVOCs in soil identified during the RI are located proximate SB-226 and SB-236 and between depths of 12 feet to approximately 15 feet bgs. These impacts have not migrated any significant distance. This is based on numerous soil samples in and around the identified source area. Specifically, the highest CVOC concentration detected during the RI was in sample SB-236 (14') at 1,673 ppm total CVOCs, but samples collected laterally from within 10 feet to 15 feet and at similar depth intervals and from samples above and below this interval were significantly lower. Samples SB-216 (12'-13'), SB-217 (12'-12.5'), SB-224 (8'-10' & 15'), SB-225 (7'-8' & 16'), SB-228 (11'-12'), SB-235 (26' and 31') and SB-236 (24' and 31') had detected CVOC concentrations that were orders of magnitude lower than the concentrations detected in sample SB-236 (14'). . The limited migration of impacts within the soil matrix may be due to fine grained soils (clays and silts) which tend to retard contaminants (refer to soil boring logs for samples SB-216, SB-224, SB-225, SB-228, SB-235 and SB-236 which note the presence of fine clays and silts from 9 to 16 feet in depth). However, TCE concentrations identified are greater than 1% of the solubility of TCE (1,100 mg/L) and thus Dense Non-Aqueous Phase Liquid (DNAPL) is likely to be present in this area (although not observed directly).

The migration of CVOCs in dissolved phase groundwater from this source area is presumed to be influenced by the overall groundwater flow at the Site to the north and due to sand and gravel lenses identified in numerous soil borings. Specifically, lenses of gravel and/or sand at depths greater than 9 feet bgs have been observed in proximity to and downgradient of the source area and are summarized below:

- SB-6 (pre-BCP) between 15 to 16 feet.
- SB-208/MW-15 between 8 to 10 feet and between 13 to 14 feet.
- SB-218/MW-21 between 13 to 13.5 feet.
- SB-224 at 15.5 feet and to the bottom of the boring at 16 feet.
- SB-226/MW-30 between 12 to 13 feet.
- SB-230A/MW-33 between 11.5 and 15 feet.
- SB-233/MW-36 between 11 to 14 feet and between 20 to 34 feet.
- SB-234 between 9 and 10 feet and 20 to 24 feet (no recovery from 20 feet to the bottom of the boring at 30 feet).
- SB-235 between 20 and 24 feet and 28 feet to the bottom of the boring at 31 feet.
- SB-236 between 19 and 23 feet and 27 feet to the bottom of the boring at 31 feet.
- SB-237 between 18 feet and the bottom of the boring at 30 feet.
- SB-238 between 17 feet and the bottom of the boring at 20 feet.
- SB-239 between 11 and 13.5 feet.
- SB-240 between 9 and 9.5 feet and between 16 and 17 feet.
- SB-241 between 16 and 17 feet.

The sanitary sewer transects the site from the west to the northeast as shown on Figure 5. Groundwater contouring completed during the RI indicates that the sanitary sewer influences the groundwater flow at the site in the uppermost portions of the water table. However, the data obtained through the RI does not indicate that contaminants migrate within the sanitary sewer bedding at significant levels. Although some migration via this pathway may occur, the lack of CVOCs in samples in proximity to the sanitary sewer (e.g., SB-201 and MW-32) and in soil and groundwater samples from beneath the invert of the sewer (and collected from between the sewers, SB-229/MW-2), indicate that this pathway does not represent a significant concern for downgradient impacts. Rather, CVOCs have been documented to be to the north and west of the sewer and it is presumed that the numerous lenses of gravel/sand convey the CVOCs beneath the sewer line and to the north of the sewer.

Although the connectivity of the sand and gravel lenses was not confirmed through direct testing, connections between these lenses can be inferred from the contaminant distribution pattern and the number of lenses identified supporting the likelihood that such sand and gravel lenses provide preferential pathways for migration to the north and northwest consistent with the groundwater flow direction and the fact that the contaminants are migrating beyond the sanitary sewer. These interpretations can be further confirmed during the remedial design process.

MW-12 VOC Impacts: The source of CVOC impacts within this portion of the building are unknown; however, based on interviews with Eldre representatives, it is likely these are associated with historic operations prior to Eldre ownership since there are no known operations during Eldre ownership that utilized TCE in this area. The impacts appear centered around the area of MW-12 and extend to the north and northeast. Based upon available data this appears to be a separate source area. Specifically MW-22 was non-detect for CVOCs and is located between the source in the area of SB-236 and MW-12. The concentrations in this area are significantly lower than the SB-236 area and appear highly degraded (50% breakdown compounds).

Miscellaneous Discrete Impacts: Several miscellaneous areas of impacts were also identified:

a. Surface Soils - low levels of pesticides (SS-1 and SS-2 at 1500 Jefferson Road and C1 and C2 at 55 Hofstra Road), metals (SS-1, SS-2, SS-3 and SS-4 at 1500 Jefferson Road and C1, C2 and C3 at 55 Hofstra Road) and SVOCs (SS-2 at 1500 Jefferson Road and C1, C2, and C3 at 55 Hofstra Road) were identified in surface soil and are likely associated with historic operations (such as pesticide applications), fill materials (SVOCs) and/or naturally occurring conditions (metals). The soil samples collected at 1500 Jefferson Road do not indicate significant or site-wide impacts and with the exception of one sample (SS-2) are all below the 6 NYCRR Part 375-6.8(b) Industrial Use SCOs. All three (3) composite sample locations collected from 55 Hofstra Road exceed 6 NYCRR Part 375-6.8(b) Commercial Use SCOs for at least one (1) depth interval.
b. Metals in Groundwater - Several metals were identified in groundwater at concentrations slightly above the Part 703 Groundwater Standards; however, these were not consistently detected and significant concentrations were not identified and metals in groundwater are not recommended for further evaluation or remediation.
c. MTBE in Groundwater - MTBE was identified in low levels in several groundwater samples -- specifically, monitoring wells MW-2, MW-16, and MW-35. The concentrations of MTBE are above the Part 703 Groundwater Standard (particularly the October 2013 and September 2014 groundwater samples from MW-16 at 16 ppb and 22 ppb, respectively, September 2014 groundwater sample from MW-2 at 660 ppb and May 2014 groundwater sample from MW-35 at 85.2 ppb); however, the fact that MTBE use and gasoline dispensation never occurred at the Eldre property, the location of these wells and groundwater flow direction all suggest that the detection of MTBE is due to an off-site source to the south. A gasoline filling station is located approximately 450 feet to the south.

3. **AOC 3 – Off-Site** – Borings SB-211, SB-231 and monitoring well MW-34 were completed along the western property line of the Site in proximity to the sanitary sewer in order to evaluate whether the VOCs that are being remediated by the adjacent property owner were potentially migrating onto the Site via groundwater or a preferential pathway associated with the sewer or sewer bedding. However, groundwater flow direction and lack of detected VOCs in MW-34 along the western property line suggests that there are no significant contributions from the sewer and bedding material from off-site sources onto the Site. Based upon laboratory analytical results associated with soil and groundwater samples collected from SB-229/MW-32 (advanced on the northeastern portion of the Site and between the pair of sewer lines that cross the Site) these sewer lines and any associated bedding materials are not considered to be acting as a significant preferential

pathway for CVOCs to migrate to the northeast or off-Site in this direction. No further evaluation of off-site impacts is recommended.

The following summarizes the RI groundwater sampling results:

<u>May 2014 Groundwater Sampling Results</u>

The highest concentration of trichloroethene (TCE) (114 ppm) was reported in the groundwater sample collected from SB-225/MW-29. This temporary well was located in close proximity (±9 feet) to SB-216/MW-20, the TCE-impacted well installed inside the northern portion of the 1500 Jefferson Road building. TCE was also reported at elevated concentrations (i.e., above the NYSDEC Part 703 Groundwater Standard) in the three other wells installed in this interior area of the Site (SB-223/MW-27, SB-224/MW-28, and SB-226/MW-30).

TCE was also reported at concentrations above the NYSDEC Part 703 Groundwater Standard in permanent well SB-230A/MW-33 (installed in the soil boring near the western property boundary that was observed to contain a lens of gravel) and in temporary well SB-232/MW-35 (installed near the northeastern corner of the 1500 Jefferson Road building, to the east of the loading dock's concrete pad). The groundwater sample collected from temporary well SB-232/MW-35 was also reported to contain tetrachloroethene (PCE) and methyl tert-butyl ether (MTBE) at concentrations of 90.3 and 85.2 ppb, respectively, above NYSDEC Part 703 Groundwater Standards.

Cis-1,2-dichloroethene was reported at concentrations above the NYSDEC Part 703 Groundwater Standard in interior wells SB-223/MW-27, SB-224/MW-28, and SB-226/MW-30, as well as exterior wells SB-230A/MW-33 and SB-232/MW-35. Trans-1,2-Dichloroethene was also reported at a concentration slightly above the NYSDEC Part 703 Groundwater Standard in the groundwater sample collected from exterior permanent well SB-230A/MW-33.

Vinyl chloride, another TCE degradation product, was reported at a concentration slightly above the NYSDEC Part 703 Groundwater Standard (25.3 ppb) in interior well SB-224/MW-28.

No CVOCs were detected above laboratory detection limits in the groundwater sample collected from deep overburden well SB-233/MW-36.

<u>September 2014 Groundwater Sampling Results</u>

Most of the laboratory analytical results associated with the September 2014 Second Round of Groundwater Sampling are comparable to results obtained from prior rounds of groundwater sampling. The following exceptions should be noted:

- A reduction in the reported concentration of TCE in groundwater collected from interior well SB-222/MW-20, from 114 ppm in January 2014 to 25 ppm in September 2014;
- A reduction in the reported concentration of TCE in groundwater collected from interior well SB-216/MW-26, from 21.6 ppb in January 2014 to 3.7 ppb (i.e., below the NYSDEC Part 703 Groundwater Standard for TCE) in September 2014;
- A reduction in the reported concentration of TCE in groundwater collected from exterior well 230A/MW-33, from 87.3 ppb in May 2014 to 10 ppb (i.e., only slightly above the NYSDEC Part 703 Groundwater Standard for TCE) in September 2014; and

- An increase in the reported concentration of TCE in groundwater collected from exterior deep well SB-233/MW-36, from "non-detect" in June 2014 to 6.1 ppb (i.e., slightly above the NYSDEC Part 703 Groundwater Standard for TCE) in September 2014.

3.4 *ISCO Pilot Test Findings*

During the pre-remedial design phase, two (2) pilot tests were implemented to evaluate the effectiveness of ISCO injections using pneumatic and hydraulic injection methods. Pneumatic injection methods were implemented in March 2018 in accordance with a *Pilot Test Work Plan* dated August 19, 2017. As documented in a *Pilot Test Work Plan Addendum* dated May 8, 2018, pneumatic injection methods were unsuccessful in achieving the uniform distribution of the oxidant; as such, hydraulic injection methods were tested in August 2018. The findings of each pilot test are summarized below:

<u>Pneumatic Injections</u>
The pneumatic injection pilot test was conducted on the northern exterior of the 1500 Jefferson Road Building and consisted of pneumatic enhancement of soils using nitrogen gas, followed by injection of a propant mixture consisting of water, sand, guar and a breaker enzyme to increase surface area by creating fractures in the subsurface silt and clay. Pneumatic enhancement and injection of the propant mixture was completed in 3.5-foot (ft) vertical intervals at depths ranging from approximately 7.5 to 18-ft below ground surface (bgs) starting at the bottom of the injection point and working towards the ground surface. Packers were inflated above and below the injection nozzle in attempts to seal off the formation and isolate a 3.5-ft interval. Subsequently, 2-inch pre-packed injection wells were constructed and sodium permanganate was pumped into the injection wells. Three (3) pneumatic injections were completed using pressures up to 200 pounds per square inch (psi) and a total of approximately 385 gallons of sodium permanganate was injected to the subsurface. All of the planned treatment chemical was distributed into the subsurface and daylighting of sodium permanganate did not occur. Structural monitoring was conducted in accordance with the Pilot Test Work Plan and movement of the building (walls, columns, floor) was not observed. Movement of exterior infrastructure including asphalt pavement and concrete pads beneath a HVAC unit and trash compactor was observed; however, all movement recorded was below the 0.5-inch action level as specified in the Pilot Test Work Plan.

A Geoprobe 6620DT was utilized to advance a series of nine (9) soil borings at varying distances from the injection wells to visually assess for distribution of the sodium permanganate as demonstrated by its purple color. Sodium permanganate was observed in two (2) of the nine (9) soil borings (SB-246 and SB-247) and was only observed in the highly conductive sand and gravel lenses.

The lack of propant and sodium permanganate observed in the silt and clay indicates the pneumatic enhancement was unsuccessful in creating fractures within the tightly packed silt and clay. The pneumatic fracturing equipment required a minimum 3.5-ft injection interval and this entire vertical interval became pressurized. Based on the distribution of the treatment chemical into only the sand and gravel lenses, and based on discussions with the pneumatic injection contractor, because the sand and gravel lenses were present at a frequency greater than the thickness of the injection interval, the 3.5-ft interval was not made up to entirely silt and clay. This caused the pressure and treatment chemical to short-circuit into the sand and gravel lenses during each injection interval. Furthermore, the pneumatic injection equipment is capable of reaching pressures up to 600 psi; however, pressures up to only approximately 200 psi were achieved. This indicates the injection fluids short-circuited before higher pressures could be achieved. The sand and gravel lenses served as a preferential pathway for the propant mixture and treatment chemical, which prevented pressures from building up to levels which would fracture the silt and clay material. Based on investigative work completed at the Site, the sand and gravel lenses are frequent but are inconsistent and vary in thickness and elevations; as such, the 3.5-ft pneumatic injection interval was too large to isolate intervals with only silt and clay which prevented sufficient pressures from building up to fracture the silt and clay.

Hydraulic Injections

In attempts to target smaller intervals for injection and isolate the silt and clay layers, hydraulic injection methods were tested in the 55 Hofstra Road parking lot. This location was selected to eliminate structural concerns and limit disruption to Site operations. A Geoprobe was used to advance a Geoprobe Systems® Pressure Activated Injection Probe to a depth of approximately 15-ft bgs. The diameter of the borehole is the same diameter as the injection probe which limits the void space around the tooling to prevent daylighting around the outside of the tooling and short circuiting into highly conductive zones. In addition, the narrow valve opening (1.5-inches) targets narrower intervals during injection.

Four (4) injection points were completed at approximate 5- feet (ft) horizontal spacing to depths of approximately 15 ft below ground surface (bgs) using hydraulic injection methods.
Dyed water was injected in 0.5 to 1-ft intervals from approximately 15 to 8-ft bgs. A total of 204 gallons of water was injected (between 34 and 70 gallons per point). Water was injected at pressures up to approximately 80 psi. Based on an assumed 2.5-ft radius of influence, 10.9 gallons of water was placed per cubic yard of soil. The hydraulic injection method placed more material than the pneumatic injection method per volume of soil.

Three (3) soil borings were completed outside of the injection area and two (2) soil borings were completed between injection points. Dyed water was observed in water recovered from two (2) borings advanced between injection points. Dyed water was not observed in the water recovered from the three (3) borings advanced outside of the injection area. It should be noted that the dyed water was difficult to observe when mixed with the soil; as such, the soil samples obtained from the borings were inconclusive in determining the exact vertical distribution of the dyed water. Based on the findings of the hydraulic injection pilot test, this method is more effective than the pneumatic injection in distributing the treatment chemical, but would require horizontal spacing of approximately 5-ft.

3.5 *Remedial Areas of Concern*

The cumulative investigative work performed during the pre-BCP investigations and the RI work performed under the BCP identified the following areas that exceed the NYSDEC Part 375-6.8(b) Unrestricted Use SCOs and/or Part 703 Groundwater Standards and thus require evaluation in the Remedial Alternatives Analysis:

1. RAOC #1 - SB-226 and SB-236 VOC Area (1500 Jefferson Road): Chlorinated VOCs in soil and groundwater in the source area (i.e., SB-226 and SB-236) and migrating north in the parking lot. A SSDS was installed in the northern portion of the1500 Jefferson Road building to mitigate SVI in this area.
2. RAOC #2 - MW-12 VOC Area (1500 Jefferson Road): Chlorinated VOCs in soil and groundwater in proximity to MW-12 and migrating north into the parking lot. A SSDS was installed in the northern portion of the1500 Jefferson Road building to prevent SVI in the building.
3. RAOC #3 - Miscellaneous Discrete Soil Areas (1500 Jefferson Road and 55 Hofstra Road): Surface soil samples with SVOCs above Part 375-6.8(b) Commercial Use SCOs at 55 Hofstra Road and above Part 375-6.8(b) Industrial Use SCOs at 1500 Jefferson Road.

Fish and wildlife impacts were not identified during the RI.

3.6 *Geology & Hydrology*

Information on the geologic and hydrogeologic conditions presented herein are based upon previous environmental investigations of the Site and the subsurface investigations performed as part of the RI and pre-remedial design. Subsurface investigation methods have primarily included direct-push soil borings, rotary drill rig soil borings, and the installation of 1-inch and 2-inch diameter groundwater monitoring wells. Most subsurface investigation work has been limited to approximately 20 feet bgs, and investigations have been limited to the overburden soil formation beneath the Site. SB-233 extended to 34 ft. bgs, SB-234 and SB-237 extended to 30 ft. bgs, SB-235 and SB-236 extended to 31 ft. bgs and SB-241 extended to 25 ft. bgs.

Interior soil borings beneath the northernmost portion of the 1500 Jefferson Road building encountered a thick layer of sub-slab structural fill material (gravel with some sand) immediately below the concrete floor slab to approximately 8 to 9 feet below the finished floor elevation. Native soils, generally silty clay and clayey silt soils with lesser amounts of sand and/or gravel were encountered beneath the apparent sub-slab structural fill material in these soil borings. Interior soil borings that were completed to the south and within an older portion of the 1500 Jefferson Road building did not encounter this thick layer of sub-slab structural fill material; rather, native soils were generally encountered between 1.5 and 3 feet beneath the finished floor elevation.

Beneath exterior asphalt pavement areas, soil borings have documented a layer of Sand and Gravel fill material that varies from approximately 1 to 4 feet in thickness. Underlying this fill material, native material consist of generally silty clay and clayey silt soils with lesser amounts of sand and/or gravel.

Several interior and exterior soil borings encountered a lens of gravel and/or sand at depths greater than 9 feet bgs. A layer of sand with lesser amount of silt and gravel has been found in some soil borings at depths between 15 and 20 feet bgs. In addition, several soil borings have noted a clay layer between 5 and 6 feet bgs.

The 2011 GSC investigation included installation of ten overburden groundwater monitoring wells and these wells indicated that groundwater beneath the Site generally flows to the north-northwest.

Groundwater contour maps have been generated as part of the RI using static water level data collected from accessible wells on the following dates:

- On June 27, 2014, static water levels were collected from fifteen (15) exterior and eight (8) interior groundwater monitoring wells; and
- On November 24, 2014, static water levels were collected from sixteen (16) exterior and eight (8) interior groundwater monitoring wells.

The June 2014 static water level data indicated groundwater generally flowing to the north-northeast at the Site; however, there is some influence on the groundwater flow by the sanitary sewer that bisects the Site. There are two sewer lines that cross the Site in a generally west-southwest to east-northeast orientation. Based on the available data, the sewer piping, and more likely the bedding material around the piping, influences groundwater flow at the Site. Based upon available mapping, instrument survey elevations, and field measurements, the invert elevations of the deeper sewer piping are at an elevation of ±490.75 feet to 490.15 feet, whereas groundwater elevations in the area of the sewer are modeled to be approximately +/- 497 feet in the area of the sewer. However, the groundwater elevation measured at MW-2 (located in proximity to the sanitary sewer) was substantially lower than the other wells located away from the sanitary sewer; which indicates that the sanitary sewer influences groundwater. To further evaluate this, a second groundwater contour map was developed that includes utilizing the invert elevations of the sewer manholes (i.e., assuming that the inverts are the groundwater elevation). Based on this assessment, additional contours were developed which show groundwater in the northern portion of the Site flowing south towards the sanitary sewer and south of the sewer groundwater flowing north towards the sewer (i.e., the sewer acting as a linear feature). The uppermost groundwater flow in the area of the sewer is to the northeast (i.e., groundwater above the sewer/bedding).

4.0 OBJECTIVES

The objective of this IRM for RAOC #1 is to significantly reduce the concentrations of CVOCs in the subsurface by removing source material via the installation of an Electrical Resistance Heating (ERH) system within the apparent source area beneath the northern portion of the 1500 Jefferson Road Building.

TRS must operate the ERH system until the groundwater remediation goal (500 µg/L TCE) has been achieved or the design remediation energy (610,000 kWh) has been applied, whichever occurs first. The ERH system is anticipated to operate for between 116 and 154 days and to remove a substantial amount of contaminant mass. Once the system is about three weeks away from achieving either 500 µg/L TCE in groundwater or the design remediation energy has been applied, TRS will inform LaBella, and LaBella will inform the former Eldre Shareholders, Mersen and NYSDEC that the system may be approaching a point of diminishing returns. LaBella will schedule a meeting with NYSDEC to discuss potentially ceasing system operation. Diminishing returns, in the context of the IRM, is defined as the point at which the additional energy and associated cost of continuing to operate the ERH system are not commensurate with the anticipated remedial benefit. The overall objective is to decrease CVOCs to a level which will allow monitored natural attenuation to effectively further reduce CVOCs in the subsurface. Refer to Section 5.2.11 for additional details on system shutdown.

5.0 PLANNED INTERIM REMEDIAL MEASURE

The following tasks will be completed to implement the IRM in RAOC #1.

5.1 Site Preparation

The following activities will be completed in preparation for the ERH system operation. Note that any IDW generated during these activities will be properly managed for future disposal (refer to Section 5.4).

5.1.1 Utility Locating and Scoping

Prior to initiating ERH system installation, a utility locating company will be retained to locate all underground utilities within the treatment area (i.e., 2,700 square feet as shown on Figure 5) and a radius of 15-feet outside of the treatment area. A known sewer line runs north-south through the oven room within the treatment area and connects to an east-west lateral immediately to the north of the treatment area. The lateral connects to the sewer main shown on Figure 5. A plumber will be retained to scope the line within the treatment area (and any others identified by the utility locator) to determine depth and material type. It is anticipated this sewer line is not within the treatment volume (i.e, the treatment area to depths of 5-25-ft bgs) and may remain in place; however, if the line is plastic and within the treatment volume, this line may be replaced or temporarily re-routed.

5.1.2 *Ceiling Tile Removal*

The suspended ceiling within the oven room, with the exception of the portion directly over the ovens, will be disassembled and stored for the duration of the ERH system installation and operation to provide for the necessary ceiling clearance for the drill rig to operate. The ceiling will be reinstalled in the same manner it was initially installed following system shut down and decommissioning, and temporary lighting will be installed in the meantime.

5.1.3 *Select Well Decommissioning and Replacement*

On-Site wells are constructed of PVC, which is not anticipated to survive the heat to be introduced by the ERH system. Prior to system installation, existing monitoring wells within the treatment volume and 15-feet outside of the treatment volume, which includes MW-6, MW-15 and MW-20, will be replaced with stainless steel monitoring wells that can withstand the subsurface temperatures (refer to Appendix 7 for well construction details). The three (3) exterior ISCO pilot test injection wells (refer to Section 3.4) will be decommissioned but will not be reinstalled. These six (6) existing wells will be decommissioned in accordance with CP-43, Groundwater Monitoring Well Decommissioning Policy (Nov. 2009). MW-6, MW-15 and MW-20 will be reinstalled to the same depths with the same screened intervals as the original construction. Specifically, the well casings will be removed and the appropriate grout mixture will be added to the remaining borehole from the bottom to the top of the borehole. If the well casings cannot be removed, they may be over drilled. The PVC well casings/screen will be decontaminated using an Alconox® and water solution and disposed of.

Replacement wells will be installed using a Geoprobe® with hollow stem augers within 5 lateral feet of each original well to be decommissioned. The replacement wells will have the same construction as the original wells except all newly installed wells will be constructed of 2-inch diameter stainless steel. The original well construction logs for MW-6, MW-15 and MW-20 are included in Appendix 7. MW-15 and MW-20 will be replaced to 12-ft bgs with 5-ft of screen and MW-6 will be replaced to 20-ft. bgs with 15-ft. of screen.

A total of four (4) soil samples may be collected from MW-15 and MW-20 during well replacement/ installation to document baseline soil conditions (refer to Section 5.1.4). MW-6 is outside of the treatment volume and will not be used for performance monitoring of the ERH system.

5.1.4 *Baseline Soil and Groundwater Sample Collection*

<u>*Soil:*</u>
During well installation described in Section 5.1.3, four (4) soil samples are planned to be collected; two (2) from MW-15 and two (2) from MW-20. MW-6 is outside of the treatment volume and will not be used for baseline/ confirmatory soil sampling.

Three (3) additional soil borings will be advanced via direct push methods using a Geoprobe® for baseline purposes and up to two (2) soil samples per boring will be collected (refer to Figure 5 for locations). A total of up to ten (10) soil samples (2 per baseline location) will be analyzed for baseline purposes for the following:

- Target Compound List (TCL) VOCs and up to 20 tentatively identified compounds (TICs) using USEPA Method 8260.

Soil samples collected for VOC analysis will be collected via USEPA Method 5035. One (1) soil sample per boring will be collected from the worst-case depth interval of each boring based on visual and olfactory observations and PID readings. A second soil sample will be collected from each boring with varying depths across all five (5) baseline locations. Interim/ confirmation soil sampling will be completed in close proximity (within 5-feet) to the five (5) baseline soil borings (i.e., borings for MW-15 and MW-20 and 3 other proposed baseline borings, refer to Figure 5). Refer to Section 5.2.10 for interim/ confirmation sampling procedures.

Groundwater:
Baseline groundwater samples will be collected via low flow methodology from wells MW-15 and MW-20. Wells will be sampled following replacement (refer to Section 5.1.3) and again approximately 2-weeks prior to ERH system startup for baseline purposes. Groundwater sampling procedures are as follows:

- Following installation, overburden groundwater monitoring wells will be developed by purging a minimum of three (3) well volumes or until dry using a dedicated bailer or pump (depending on well volumes).
- Following development, wells will be allowed to recharge for a minimum of 1 week prior to sampling.
- Wells will be sampled using low-flow techniques (i.e., peristaltic pump). Water quality parameters including turbidity, pH, temperature, specific conductivity, dissolved oxygen, oxidation reduction potential, and depth to water will be recorded at five (5) minute intervals. Samples will be collected when the parameters have stabilized for three (3) consecutive 5-minute intervals to within the specified ranges below:

    - Water level drawdown (<0.3')
    - Turbidity (+/- 10%, <50 NTU for metals)
    - pH (+/-0.1)
    - Temperature (+/- 3%)
    - Specific conductivity (+/- 3%)
    - Dissolved Oxygen (+/- 10%)
    - Oxidation reduction potential (+/- 10 millivolts)

One (1) MS/MSD and one (1) blind duplicate sample will be collected in addition to the proposed samples and analyzed for TCL VOCs including TICs at a rate of one (1) per twenty (20) samples or one (1) per shipment, whichever is greater. In addition, one (1) trip blank per shipment of groundwater samples will be analyzed for TCL VOCs including TICs.

All baseline samples will be analyzed by an Environmental Laboratory Accreditation Program (ELAP) certified laboratory. ASP Category B data deliverables will be provided by the laboratory. A Data Usability Summary Report (DUSR) will be developed by a third party for all baseline samples.

5.2 Electrical Resistance Heating

In situ-thermal remediation (ISTR) will be completed for the source area by applying ERH. The ERH vendor, TRS, has developed a detailed design which is included as Appendix 1. TRS will complete the installation, operation and decommissioning of the system, with LaBella providing oversight, air monitoring, documentation, interim sampling and waste disposal.

The ERH system is summarized below. Refer to TRS's work plan in Appendix 1 for additional details regarding system installation, safety features, system operation, system components and demobilization.

5.2.1 ERH System Overview

As noted in TRS's work plan;

> "*ERH is a process whereby soils and groundwater are heated by creating a voltage gradient to induce current flow through the subsurface volume to be remediated. Electrical energy is introduced to the subsurface at electrodes, and it is the resistance by the soil matrix to the flow of electricity between electrodes that heats the subsurface and boils a portion of the soil moisture into steam. This* in situ *steam generation occurs in all soil types, regardless of permeability. The heat generated by resistance to the induced electrical current also volatilizes the target contaminants. The* in-situ *steam generated by ERH acts as a carrier gas to sweep contaminant vapors to negative pressure vapor recovery (VR) wells.*
>
> *Recovered steam and soil vapors are then transported via chlorinated polyvinyl chloride (CPVC) plastic piping headers to the ERH condenser where the recovered mixture is passed through a vapor/liquid separator and heat exchanger. The condensate generated following the heat exchange process is captured and conveyed for subsequent treatment and the extracted air is treated using the best applicable technology or methods, such as vapor-phase granular activated carbon (VGAC) or thermal oxidation."*

The ERH treatment area will extend across the entire oven room (approximately 40-ft by 40-ft) and north outside of the 1500 Jefferson Road building into the parking lot. The ERH system for this Site will consist of 18 electrodes (8 interior and 10 exterior) within the treatment area (approximately 2,700 sq. ft.) installed to approximately 28-ft below finished floor with treatment occurring from 5 to 25-ft below finished floor (approximate 2,200 cubic yard treatment volume). Although the targeted treatment zone is from 5-ft to 25-ft below finished floor, the heating element will extend to 28-ft below finished floor in order to ensure that the entire vertical limit of impacts is heated/treated. Electrodes will be spaced approximately 15-ft apart. The exterior portion of the ERH treatment volume is approximately 3-ft below finished floor. Depths discussed herein are referenced below finished floor. Refer to Figure 5 for the treatment area and general layout. Specific system details are included in Appendix 1.

TRS must operate the ERH system until the groundwater remediation goal (500 µg/L TCE) has been achieved or the design remediation energy (610,000 kWh) has been applied, whichever occurs first. The ERH system is anticipated to operate for between 116 and 154 days and to remove a substantial amount of contaminant mass. Once the system is about three weeks away from achieving either 500 µg/L TCE in groundwater or the design remediation energy has been applied, TRS will inform LaBella, and LaBella will inform the former Eldre Shareholders, Mersen and NYSDEC that the system may be approaching a point of diminishing returns. LaBella will schedule a meeting with NYSDEC to discuss potentially ceasing system operation. Diminishing returns, in the context of the IRM, is defined as the point at which the additional energy and associated cost of continuing to operate the ERH system are not commensurate with the anticipated remedial benefit. The overall objective is to decrease CVOCs to a level which will allow monitored natural attenuation to effectively further reduce CVOCs in the subsurface. Refer to Section 5.2.11 for additional details on system shutdown.

Treatment system equipment including the condenser with cooling towers, carbon vessels, blower system, power control unit (PCU) and step down transformers will be located on the northern exterior of the building in close proximity to the exterior treatment area. Refer to Figure Y-6 in Appendix 1 for the planned equipment layout.

The ERH system interior installations will occur during off hours (generally on weekdays after 3:30 pm to 6:30 am the following weekday, on Friday from 3:30 pm to 11:30 pm, and/or weekends with owner permission in accordance with the Site Access Agreement with Mersen). Electrodes will be finished as above grade on the exterior, and below grade on the interior. All interior installations will be within the oven room (refer to Figure 5). Vapor recovery piping will be trenched below grade on the interior to allow continued use of the space by Mersen. The piping will be routed through the northern exterior wall to the exterior treatment system equipment. Refer to Figure 5, and Figure Y-3 in Appendix 1 for the planned trenching locations and Figure Y-4 in Appendix 1 for the planned vapor recovery piping layout. Exterior connections will be completed above grade and will not be trenched. At the end of each work day the interior work area will be restored with temporary steel plates, or similar, to allow for continued use of the space by Mersen during normal business hours and system installation during off-hours .

The existing on-Site transformer for the building will be utilized to power the system. This transformer currently provides power to the building and has sufficient capacity to power the ERH system; however, the transformer requires some modifications and the utility provider (RG&E) is working with TRS to complete this work RG&E will make a new connection to the transformer to provide power to the input of the PCU. The PCU provides and regulates power to each electrode and will be located on the northern exterior of the building. The connection to the transformer will be completed by RG&E and will take place during a weekend when the facility is not operating as it will require temporary loss of power to the facility.

5.2.2 Safety

This section contains a brief overview of safety and security procedures to be implemented as part of the ERH treatment. Additional details regarding these procedures are included in TRS's Emergency Response Plan and Health and Safety Plan (HASP) included as Appendix 2 and Appendix 3, respectively. The Emergency Response Plan includes procedures to be implemented in the event of an emergency including but not limited to fire, unplanned release to the environment, injury or damage to equipment or property, vandalism, theft, unauthorized Site entry, severe weather or natural disaster, unplanned loss of power, or acts of violence. TRS's HASP includes Site-specific procedures for identifying physical and health hazards and procedures to be implemented if incidents occur.

TRS will be primarily responsible for safety associated with the ERH system operation and will perform safety checks prior to and during ERH system operation. In addition, specific safety protocols to be employed by LaBella during IRM implementation are detailed in LaBella's HASP included in Appendix 4.

All interior subsurface work including drilling, electrode installation, and trenching will occur between the hours of 3:30 PM and 6:30 AM Monday through Thursday, between 3:30 PM Friday and 11:30 PM Friday, and/or weekends with owner permission in accordance with the Site Access Agreement with Mersen when there are no regular shifts for Mersen employees. During this time, the oven room and the immediate vicinity of the ERH treatment area will not be regularly occupied by Mersen employees. Safety cones will be used to restrict access during interior work. Exterior work may be completed during regular work shifts. Fencing and safety cones will be used to restrict access to the exterior work area.

During the installation process, barriers including safety cones, steel plates, etc. will be utilized to cover boreholes and/or trenching before they are sealed at the floor surface to prevent tripping hazards. It is anticipated trenching will occur over multiple work days but the concrete finish will be completed over a weekend (but before 11 pm on Sunday) when access to the oven room is not needed by Mersen to allow for the concrete to properly cure.

During subsurface work, LaBella will implement the CAMP included in Appendix 5. CAMP monitoring will include monitoring for dust and VOCs within the work area and surrounding area. A four-gas meter will also be used within the interior work area to monitor for combustible gases, hydrogen sulfide, carbon monoxide, and oxygen. Equipment will be filtered or vented outside and fans will be used as needed to direct the equipment exhaust outside. The ERH system installation and operation will not impact the surrounding community. The Site-specific CAMP will be implemented to monitor the surrounding area and a Community and Environmental Response Plan (CERP) is not warranted per DER-10 5.1 (f).

Redundant safety systems will be in place during ERH system operation to create a high level of safety for Site occupants including Mersen employees, LaBella, and TRS personnel. Access to the exterior treatment area will be gated and locked during non-working hours. Only authorized personnel will be able to enter the exterior treatment area with TRS approval. Secure fencing will be placed around the exterior ERH treatment area and exterior system components. The security system layout is depicted on Figure Y-7 in Appendix 1. Fencing details are depicted on Figure M-10 in Appendix 1. The safety and security system will include numerous emergency stop buttons, signage, motion sensors and cameras. The security systems will automatically stop the ERH power application should an intruder enter the treatment area. The interior components will all be sealed below-grade; thus, interior fencing will not be required during operation since the building is already secured.

Following installation and prior to applying electrical power, safety checks will be performed by TRS to demonstrate all design safety features have been completed and are operating properly. Safety features include access guards, interlocks between system components, over-temperature gauges, and E-stop switches.

Following successful completion of the pre-startup checks, the ERH system will be energized and TRS personnel will complete a second phase of inspection to verify compliance with allowable surface voltages under actual operating conditions. All non-TRS personnel will be excluded from the ERH remediation area during the initial system energization and associated voltage safety survey. Additional voltage safety surveys will be conducted on a weekly basis during normal working hours, or anytime power input is increased. Refer to Appendix 1 for further details regarding voltage limit requirements.

5.2.3 Electrodes

A total of eighteen (18) electrodes will be installed via hollow stem auger drilling. Eight (8) electrodes will be interior and ten (10) electrodes will be exterior. Two (2) exterior electrodes along the northern exterior wall will be angled towards the south beneath the ovens. The angled electrodes are designed to provide sufficient heating beneath the ovens which will remain in place (refer to Figure 5 for electrode and oven locations).

Vertical electrodes will consist of a 12-inch diameter borehole and angled electrodes will consist of a 10-inch diameter borehole. All electrodes will be backfilled with conductive backfill and an electrode element. The heating element will be installed to a depth of 28-ft bgs (below the finished floor) and backfilled with a proprietary conductive material. The conductive backfill will be placed to a depth of approximately 5-ft bgs and will be overlain by a silica sand layer.

In addition to the electrode element and drip tube, a vapor recovery screen will be installed in each electrode borehole. A small diameter polyethylene pipe will be used to convey “drip” water to electrodes to supply water to the electrodes if needed. The drip water will be from a potable water source. Refer to Figures M-1 and M-2 in Appendix 1 for vertical electrode construction details. Refer to Figures M-3 in Appendix 1 for angled electrode construction details.

5.2.4 Vapor Recovery Wells

A vapor recovery well will be installed in each of the electrode boreholes. These wells will generally consist of a screen located towards the top of each electrode borehole, within the silica sand layer, and attached piping. Refer to Figures M-1 through M-3 in Appendix 1 for construction details.

Steam, vapors and groundwater will be removed from the subsurface via the vapor recovery wells and piped to the on-site treatment system located on the exterior of the 1500 Jefferson Road building. Sampling ports, sensors and gauges will be installed to measure vacuum at the blower inlet. Vacuum readings will be obtained to ensure the vacuum is equal to or greater than that of the SSDS system. The vapor removed from the subsurface is anticipated to contain the majority of CVOC mass. The vapor recovering piping connecting the vapor recovery wells within the treatment zone to the exterior condenser will be warm to the touch and will be labeled as such. Both liquid and vapor phases will be treated using granular activated carbon (GAC).

5.2.5 Condensate Treatment and Discharge

Vapors will be collected via vapor recovery wells and condensed. The condensate will be treated via liquid-phase GAC and discharged to the sanitary sewer via a Monroe County Specialty Short Term Discharge Permit. The Town of Henrietta will also be contacted to confirm the sewer discharge point and allowable flowrate as the collection system is owned by the Town of Henrietta. It is anticipated a sanitary sewer cleanout immediately to the north of the treatment area will be utilized, pending Town of Henrietta approval.

To obtain the permit, the treated water will initially be stored in a temporary holding tank pending sampling and permit issuance from Monroe County. Per the permit requirements, one (1) sample will be analyzed for the following to obtain the initial permit:

- Priority Pollutant List (PPL) Metals via USEPA Method 200.7/245.1
- PPL VOCs via USEPA Method 624
- PPL Acids, Base/Neutrals (including PAHs) via USEPA Method 625

- PCBs and Pesticides via USEPA Method 608

The liquid phase (i.e., condensate) treatment system will consist of two (2) 200-lb liquid GAC vessels plumbed in series with discharge routed to the sanitary sewer. There will be two (2) spare 200-lb liquid GAC vessels on-site should change out be necessary.

Based on discussions with Monroe County, it is anticipated that after the initial characterization sample and permit issuance, VOC analysis of the treated water will be required on a weekly basis to start out, then reduced to a monthly basis, and containerization prior to discharge will not be required. LaBella will coordinate with Monroe County to determine the sampling frequency upon startup based on the analytical results. As estimated by TRS, up to 800,000-gallons of water are anticipated to be discharged to the municipal system during ERH system operation (from vapor recovery and hydraulic control wells). A flow meter will be placed on the discharge piping to document effluent volumes.

5.2.6 Vapor Treatment and Discharge

The contaminated vapors recovered from the treatment zone will be sent through vapor-phase GAC via a blower prior to being released. The TRS vapor treatment design incorporates two (2) 2,000-pound vessels in series to treat the estimated 560 lbs of contaminant mass. Influent, mid-fluent and effluent concentrations will be monitored by TRS at least bi-weekly using a PID. It is understood a new air permit is not required by NYSDEC; however, vapor sampling will be completed periodically to document the effluent concentrations are within acceptable levels established by NYSDEC and to document the flowrate. Vapor sampling of the effluent will be completed bi-weekly using Summa® canisters and analyzed for VOCs via USEPA Method TO-15. This data will be provided to NYSDEC as it becomes available.

The sub-slab depressurization system is anticipated to remain in operation with the exception of two (2) depressurization points on the east and west walls of the oven room. These two (2) depressurization points will be fitted with valves and temporarily shut off during system operation. This area will be under a vacuum much greater than that of the SSDS. Sub-slab vapors will be captured via vapor recovery piping at each electrode during ERH system operation. A 15-horsepower (hp) blower will be used and the estimated air flow rate is 260 standard cubic feet per minute (scfm). Routine checks of the SSDS will be completed to confirm the remainder of the SSDS outside of the ERH treatment area is operating during ERH system operation. Indoor air quality is not anticipated to decrease during ERH system operation due to the vacuum applied for the ERH system.

5.2.7 Temperature Monitoring Points

Three (3) temperature monitoring points (TMPs) will be installed to monitor subsurface temperature within the treatment volume. These points will be installed using hollow stem augers in locations shown on Figure 5. Boreholes for the TMPs will be 4-in in diameter, extend to 25-ft bgs and be backfilled with cement grout (refer to Figures M-5 and M-6 in Appendix 1). Each TMP will include four (4) temperature sensors spaced at different depths to monitor temperatures throughout the treatment volume.

5.2.8 Hydraulic Control Wells

Four (4) hydraulic control wells will be installed on the perimeter of the treatment volume to ensure there is an influx of water into the treatment volume as opposed to heated water moving away from the treatment volume. Solubility is expected to increase and viscosity decrease with increased temperatures. The wells will consist of 4-inch diameter stainless steel well screen installed using hollow stem augers in locations shown on Figure 5. Boreholes for the hydraulic control wells will be 10-in in diameter, extend to 25-ft bgs and be backfilled with sand (refer to Figure M-7 and M-8 in Appendix 1 for construction diagrams). The wells will be pumped at a low rate to minimize heat loss from the treatment volume. The water will be treated via carbon and discharged to the sanitary sewer (refer to Section 5.2.5).

5.2.9 Routine Reporting

Weekly reports will be provided by TRS during system installation and operation. The reports will include average power input, cumulative energy applied, average subsurface temperature, total condensate production, mass removed estimates, mass discharged estimates, operational notes, anticipated down time (for sampling, etc.) and recommendations for confirmatory sampling and system optimization. LaBella will continue to provide monthly progress reports as required by the BCP.

5.2.10 Interim/ Confirmation Soil and Groundwater Sampling

Biweekly PID effluent readings to be collected by TRS on the vapor phase discharge and LaBella will be collecting weekly water samples of the influent and effluent of the carbon system. This data will be utilized to help assess treatment performance and estimate mass removal. In addition, interim soil and groundwater sampling will be completed by LaBella personnel. Pending PID effluent readings and mass removal estimates, the first round of interim groundwater sampling is anticipated to begin approximately 2-3 months into system operation; however, the actual sampling time will depend on the actual system monitoring performance (including temperature data). LaBella will discuss the timing of sampling events with TRS based on the data obtained and also discuss timing with NYSDEC. It is anticipated subsequent sampling events will occur every 2-4 weeks until the system is shutdown in accordance with Section 5.2.1. LaBella will notify NYSDEC in advance of sampling events, once the dates are determined.

Up to four (4) interim groundwater and three (3) interim soil sampling events are anticipated to be completed (after system startup and before system shutdown). Fewer soil sampling events are planned due to the complexity of the hot soil sampling procedures and the ability to collect groundwater samples quicker. It is anticipated one (1) to two (2) rounds of groundwater sampling will be completed prior to soil sampling.

The ERH system will be shutoff for a minimum of 12 hours prior to sampling; however, subsurface temperatures will remain elevated (up to 100°C); as such, the following special procedures will be utilized for the “hot soil” and “hot groundwater” sampling (refer to Appendix 1 for Sampling Standard Operating Procedures).

<u>Hot Groundwater Sampling</u>
Groundwater sampling will be conducted prior to soil sampling. Groundwater sampling will be conducted in accordance with the Hot Groundwater Sampling SOP included in Appendix 1. Samples will be collected using a peristaltic pump and stainless steel tubing. Tubing will be placed in the well for sample collection at the same depth as the baseline groundwater sampling. When it is time to sample, additional stainless steel tubing will be connected to the fitting on the monitoring well head. Extracted groundwater will be cooled by coiling the tubing

and placing it in an ice bath to cool to room temperature prior to handling. The following wells will be monitored:

- MW-15
- MW-20

Water quality parameters will be recorded at 5 minute intervals. Samples will be collected once the parameters have stabilized as noted below:

- Water level drawdown (<0.3')
- Temperature (+/- 3%)
- pH (+/- 0.1 unit)
- Dissolved oxygen (+/- 10%)
- Specific conductance (+/- 3%)
- Oxidation reduction potential (+/- 10 millivolts)
- Turbidity (+/- 10%, <50 NTU for metals)

Once parameters have stabilized, a sample will be collected from each well for analysis of USEPA TCL VOCs including TICs via USEPA Method 8260. 72-hour turnaround time will be requested.

Hot Soil Sampling

Soil borings will be completed using a Geoprobe® direct push sampling system in which up to five (5) soil borings per sampling event will be advanced within the treatment area to assess mass removal. Interim soil boring locations will be advanced in the immediate vicinity of the three (3) unnamed baseline soil borings (refer to Section 5.1.3), as well as baseline soil borings associated with MW-15 and MW-20. Soil sampling will be conducted in accordance with the Hot Soil Sampling SOP included in Appendix 1. Stainless steel macrocore liners will be used for sample collection. 6-inch lengths of stainless steel liners will be placed in the macro-core. When the macro-core is retrieved, the liners will be removed from the macro-core, labeled with the depth, capped and placed on ice. A thermometer will be inserted through the cap to monitor temperature. Once the soil temperature has reached 20 degrees Celsius, samples may be collected.

Up to five (5) soil samples will be collected during each round of interim borings for analysis of TCL VOCs including TICs via USEPA method 8260. Interim soil samples will be collected from the same locations and depths as corresponding baseline soil samples. 72-hour turnaround time will be requested.

Due to the short timeframe between sampling events and constantly changing subsurface concentrations, ASP Category B data deliverables will be provided for only the last round of confirmation sampling for both soil and groundwater samples. A DUSR will be developed by a third party for the last round of confirmation sampling. Decisions to cease system operation will be made with NYSDEC approval based on data prior to validation. If data validation significantly changes any of the final confirmation sample results and the system has already been shut down, the NYSDEC will be notified to discuss. Subsequent long-term monitoring requirements will be specified in the Site Management Plan under separate cover.

5.2.11 *System Shutdown*

TRS must operate the ERH system until the groundwater remediation goal (500 µg/L TCE) has been achieved or the design remediation energy (610,000 kWh) has been applied, whichever occurs first. Operation of the ERH system for between 116 and 154 days is anticipated. Soil and groundwater analytical data will be reviewed by LaBella and TRS in accordance with the site objectives described in Section 4.0 and remediation goals identified in Section 5.2.1. Once either 500 ug/L TCE in groundwater has been achieved or the design remediation energy has been applied, the system will operate until a point of diminishing returns is reached and then discontinuing the system operation will be evaluated, discussed with Mersen, and then proposed to NYSDEC for approval. Diminishing returns, in the context of the IRM, is defined in Section 5.2.1. It should be noted that the subsurface will cool at a rate of approximately 1°C per day which will allow for further reductions in CVOCs post-ERH system shutdown.

LaBella will provide analytical data to the NYSDEC following each interim sampling event. In addition, weekly reports will be provided in accordance with Section 5.2.9. It is anticipated regular meetings or calls will be scheduled with NYSDEC to discuss the system operation performance, analytical data, and upcoming sampling. At a point in which diminishing returns is approaching (anticipated being between 116 and 154 days of operation) based on analytical data, energy input, and mass removal, LaBella will schedule a meeting with NYSDEC to discuss ceasing system operation as described in Section 5.2.1.

5.2.12 *Demobilization and Restoration*

Following discussion with NYSDEC on ceasing system operation, TRS will disconnect the system and demobilize the majority of equipment from the Site. All above grade components will be removed from the Site. Electrodes will be abandoned in place and the vapor recovery hose, screen and drip tubes will be grouted in place. The Site will be restored to pre-ERH operation conditions in accordance with the Site Access Agreement with Mersen. Interior components within trenches will remain in place and the concrete-filled trenches will be considered final restoration. The ceiling tiles will be reinstalled in a manner similar to pre-ERH conditions.

5.3 Quality Control Program

LaBella's Quality Control Program (QCP) included in Appendix 6 will be followed during all sample collection. The Hot Soil and Groundwater SOPS will be followed for sample collection during ERH system operation (refer to Appendix 1).

5.4 IRM-Derived Waste

All waste generated during this IRM including soil, groundwater, concrete, and decontamination water will be containerized on-Site and characterized for disposal in accordance with applicable regulations. Lined roll-off containers will be utilized for soil cuttings. Roll-offs will be temporarily staged on the 55 Hofstra Road parcel within the BCP Site to limit loss of parking near the 1500 Jefferson Road Building. Approximately 62 tons of soil/ concrete are anticipated to be generated. Approximately 48,000 gallons of water area anticipated to be generated. A Contained-In Determination request may be submitted to the NYSDEC for disposal of soil. Refer to Section 5.2.5 for information regarding discharge of water to the sanitary sewer.

5.5 Schedule and Deliverables

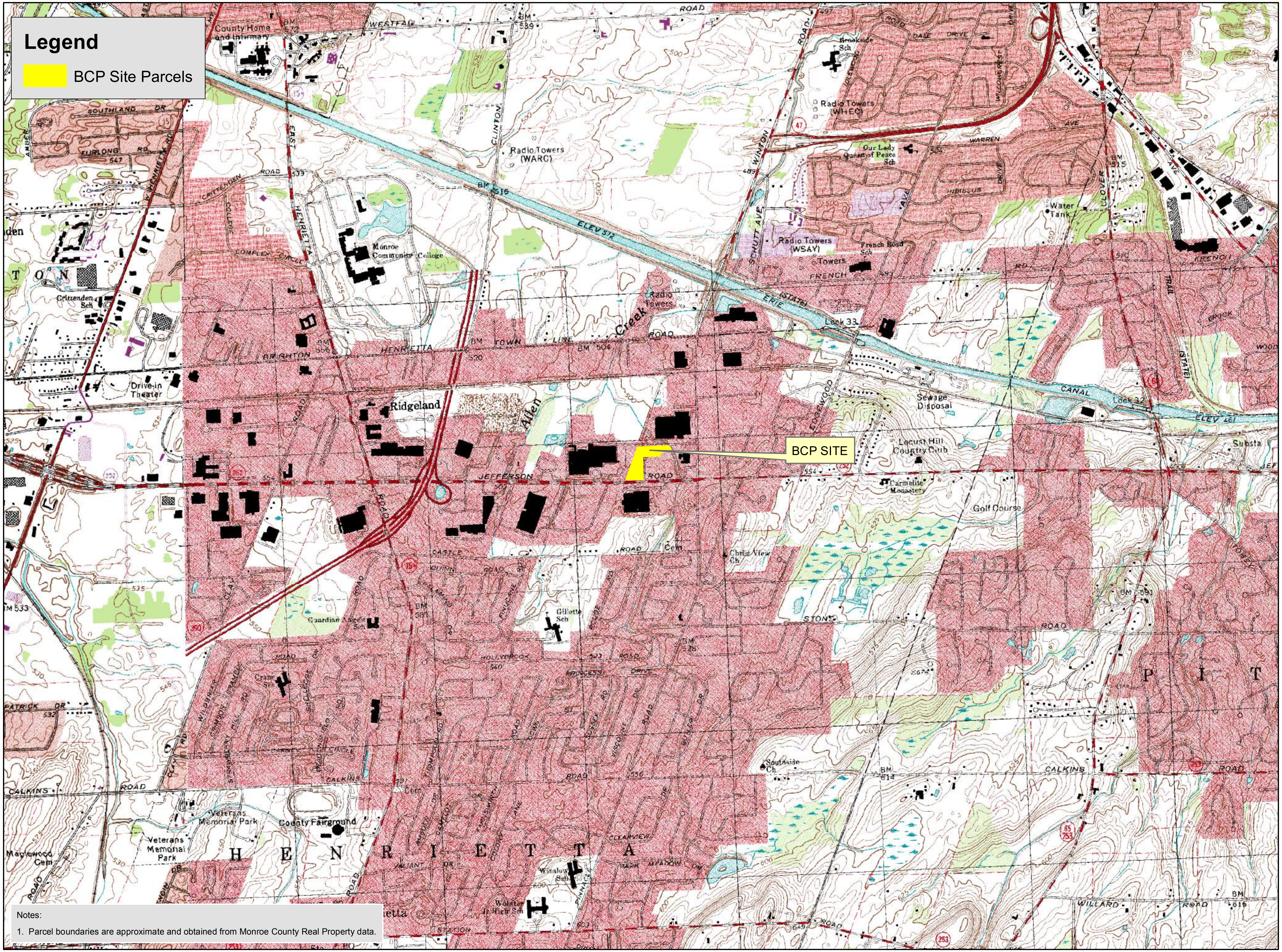
NYSDEC will be notified 30 days prior to implementing the remedial action in accordance with DER-10 Section 5.1(b). The IRM is anticipated to take approximately 10.5 months to complete from installation to demobilization. A Final Engineering Report (FER)/ Construction Completion Report (CCR) will be submitted within 45 days of receipt of validated confirmation sampling data. An approximate timeline for this IRM is provided below. This schedule is for RAOC #1 only and the durations are approximate and based on the longest possible operation time.

Approximate RAOC #1 IRM Schedule

Task	Approximate Duration
Drilling, Trenching	4 weeks
Installation	8 weeks
Operation	16 - 22 weeks
Demobilization	8 weeks

I:\ELDRE CORPORATION\212721.01 - BCP REMOVAL PHASE\REPORTS\IRMWP - RAOC #1\SENT TO DEC 2019.09.03\C828182 ELDRE IRMWP RAOC#1.DOCX

FIGURES



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ELDRE CORPORATION
BCP SITE C828182

1500 JEFFERSON ROAD
AND 55 HOFSTRA ROAD

INTERIM REMEDIAL
MEASURES WORK PLAN
RAOC #1

Site Location Map

N S E W

0 1,000 2,000 Feet

1 inch = 2,000 feet

Intended to print as 11" x 17".

212721.01

FIGURE 1

Path: I:\Eldre Corporation\212721.01 - BCP Removal Phase\Drawings\IRMWP RAOC #1\Figure 1.mxd

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ELDRE CORPORATION
BCP SITE C828182

1500 JEFFERSON ROAD
AND 55 HOFSTRA ROAD

INTERIM REMEDIAL
MEASURES WORK PLAN
RAOC #1

BCP Site and
Surrounding Parcels

212721.01

FIGURE 2

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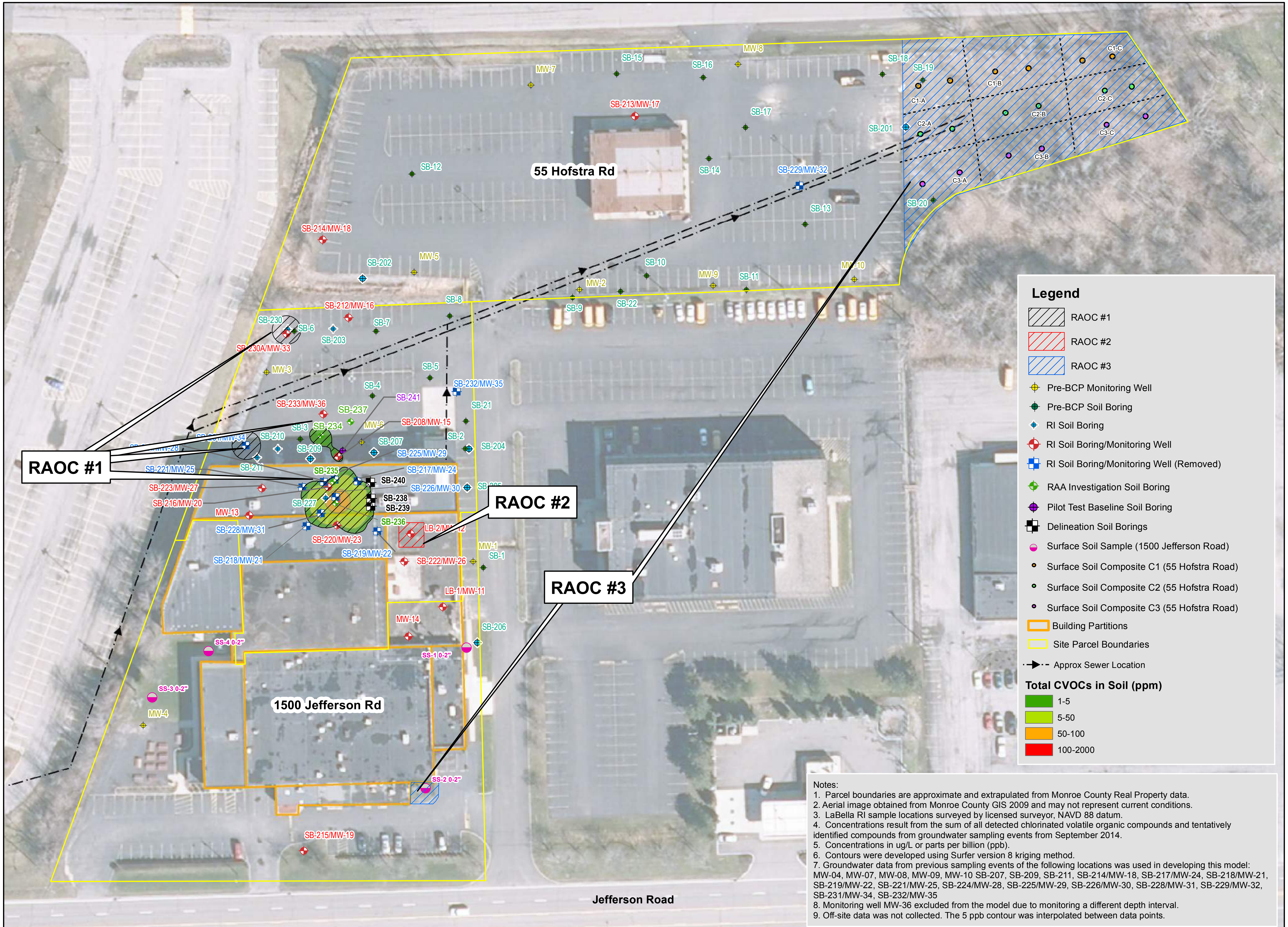

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ELDRE CORPORATION
BCP SITE C828182

1500 JEFFERSON ROAD
AND 55 HOFSTRA ROAD

INTERIM REMEDIAL
MEASURES WORK PLAN
RAOC #1

Remedial Areas of Concern

N
W E
S

0 40 80
Feet

1 inch = 80 feet

Intended to print as 11" x 17".

212721.01

FIGURE 3

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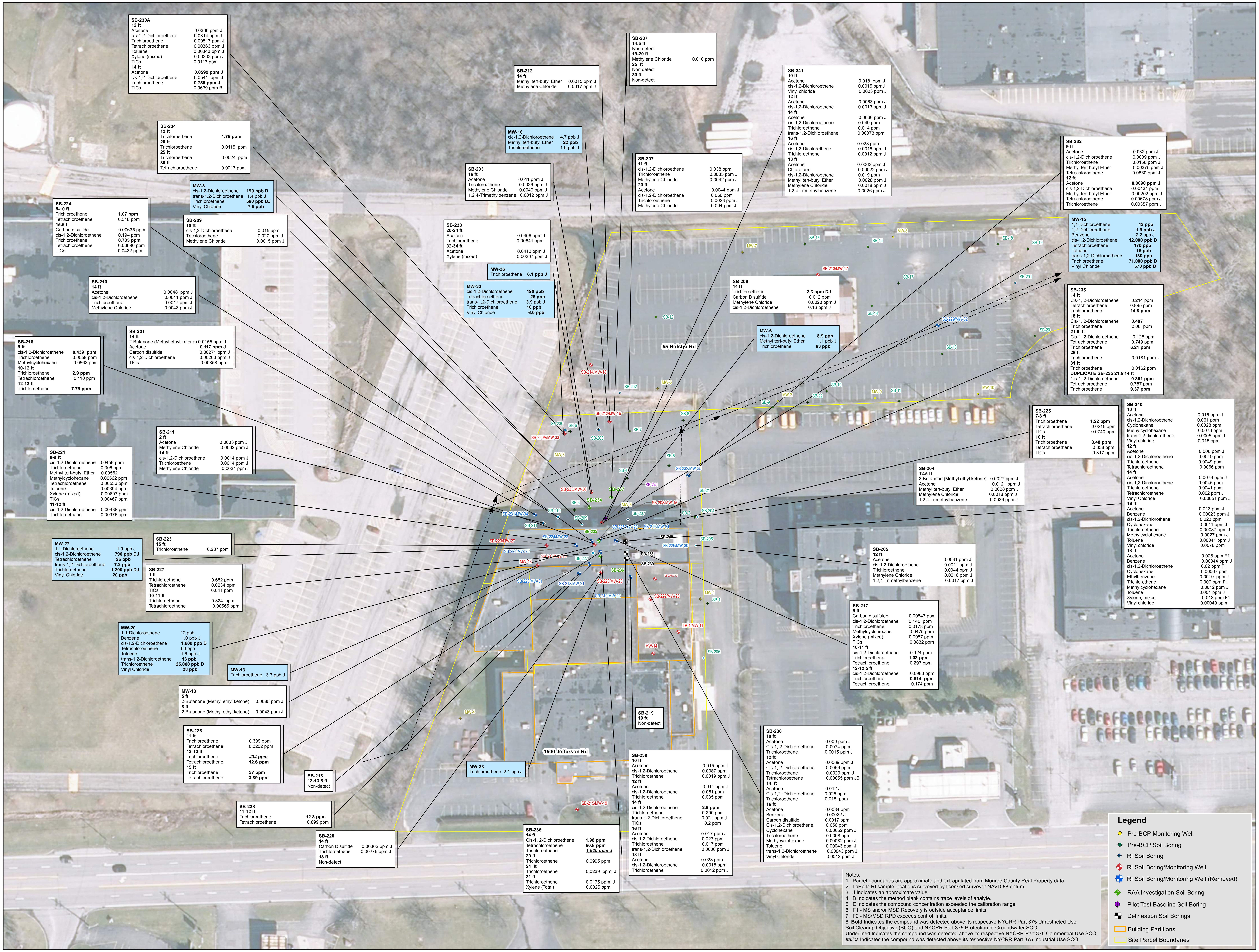

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ELDRE CORPORATION
BCP SITE C828182

1500 JEFFERSON ROAD
AND 55 HOFSTRA ROAD

INTERIM REMEDIAL
MEASURES WORK PLAN
RAOC #1

Summary of VOCs in Soil and Groundwater - RAOC #1

N
W E
S

0 50 100
Feet

1 inch = 50 feet

Intended to print as 24" x 36"

212721.01

FIGURE 4

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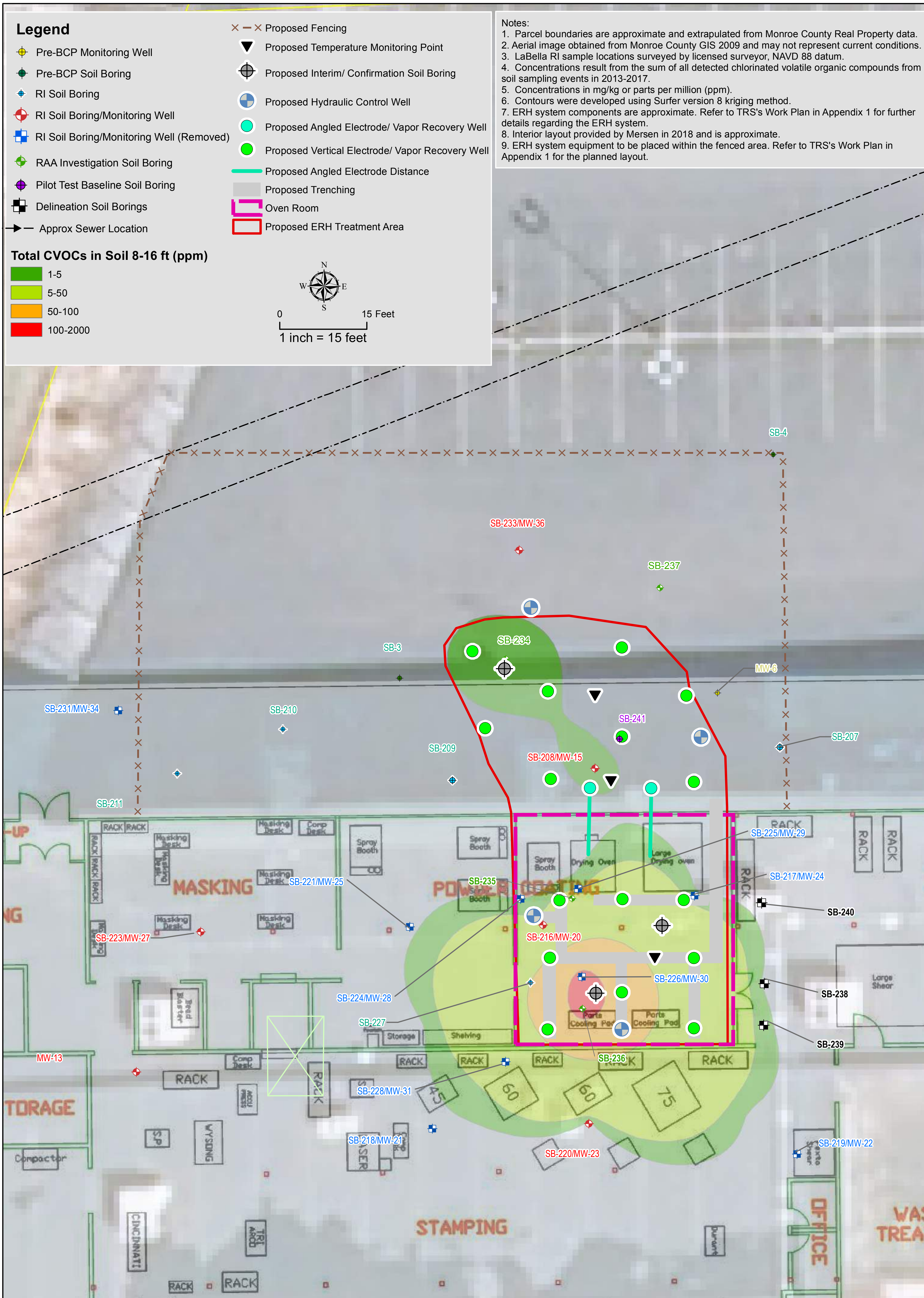

Legend

- Pre-BCP Monitoring Well
- Pre-BCP Soil Boring
- RI Soil Boring
- RI Soil Boring/Monitoring Well
- RI Soil Boring/Monitoring Well (Removed)
- RAA Investigation Soil Boring
- Pilot Test Baseline Soil Boring
- Delineation Soil Borings
- Approx Sewer Location
- Proposed Fencing
- Proposed Temperature Monitoring Point
- Proposed Interim/ Confirmation Soil Boring
- Proposed Hydraulic Control Well
- Proposed Angled Electrode/ Vapor Recovery Well
- Proposed Vertical Electrode/ Vapor Recovery Well
- Proposed Angled Electrode Distance
- Proposed Trenching
- Oven Room
- Proposed ERH Treatment Area

Total CVOCs in Soil 8-16 ft (ppm)

- 1-5
- 5-50
- 50-100
- 100-2000

N W E S

0 15 Feet

1 inch = 15 feet

Notes:
1. Parcel boundaries are approximate and extrapulated from Monroe County Real Property data.
2. Aerial image obtained from Monroe County GIS 2009 and may not represent current conditions.
3. LaBella RI sample locations surveyed by licensed surveyor, NAVD 88 datum.
4. Concentrations result from the sum of all detected chlorinated volatile organic compounds from soil sampling events in 2013-2017.
5. Concentrations in mg/kg or parts per million (ppm).
6. Contours were developed using Surfer version 8 kriging method.
7. ERH system components are approximate. Refer to TRS's Work Plan in Appendix 1 for further details regarding the ERH system.
8. Interior layout provided by Mersen in 2018 and is approximate.
9. ERH system equipment to be placed within the fenced area. Refer to TRS's Work Plan in Appendix 1 for the planned layout.

FIGURE 5

212721.01

DRAWING TITLE

RAOC #1 INTERIM REMEDIAL MEASURE ELECTRICAL RESISTANCE HEATING

ISSUED FOR: FINAL

DATE: 08.06.2019

DESIGNED BY: DPN
DRAWN BY: AA
REVIEWED BY: DPN

Intended to print as 11" x 17".

PROJECT / CLIENT

**ELDRE CORPORATION
BCP SITE C828182
1500 JEFFERSON ROAD
AND 55 HOFSTRA ROAD
INTERIM REMEDIAL MEASURES
WORK PLAN RAOC #1**

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APPENDIX 1

TRS Work Plan

TRS Group, Inc.

Electrical Resistance Heating Work Plan

Former Eldre Corporation

Rochester, New York

Issued: August 2019

TRS Group, Inc.
Accelerating Value

Safe. Fast. Certain.
Guaranteed.
An Employee Owned Company

P.O. Box 737
Longview, WA 98632
www.thermalrs.com

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Abbreviations and Acronyms

°C	degrees Celsius
µg/L	micrograms per liter
cis-1,2-DCE	cis-1,2-dichlorethene
COC	contaminant of concern
CPVC	chlorinated polyvinyl chloride
CVOC	chlorinated volatile organic compound
Eldre	Eldre Corporation
ERH	electrical resistance heating
E-Stop	emergency stop
ft^2	square foot
ft bgs	feet below ground surface
HCW	hydraulic control well
hp	horsepower
ISTR	*in situ* thermal remediation
kW	kilowatt
kWh	kilowatt hours
kWh/yd	kilowatt hours per cubic yard
lbs	pounds
LGAC	liquid granular activated carbon
mg/kg	milligrams per kilogram
NEC	National Electric Code
NYSDEC	New York State Department of Environmental Conservation
PCU	Power Control Unit
PEX	cross-linked polyethylene
PID	photoionization detector
PLC	programmable logic controller
PVC	polyvinyl chloride
RI	remedial investigation
RTD	resistance temperature detector
scfm	standard cubic feet per minute
SERT	soil electrical resistivity test
SOP	standard operating procedure
TCE	trichloroethylene
TMP	temperature monitoring point
TRS	TRS Group, Inc.
USDOT	United States Department of Transportation
VAC	volts alternating current
VC	vinyl chloride
VGAC	vapor-phase granular activated carbon

VOC	volatile organic compound
VR	vapor recovery
WP	Work Plan
yd^3	cubic yard

1.0 INTRODUCTION

TRS Group, Inc. (TRS) has entered into a contract with the Former Shareholders of Eldre Corporation (Eldre) to perform *in situ* thermal remediation (ISTR) of chlorinated volatile organic compounds (CVOCs) in soil and groundwater. The Eldre facility (the Site) is located at 1500 Jefferson Road Parcel in Rochester, New York. LaBella Associates (LaBella) will be the onsite representative for Eldre during all phases of the remediation. The ISTR will be completed by applying electrical resistance heating (ERH). ERH is an *in situ* thermal process for the remediation of volatile organic compounds (VOCs) in soil and groundwater.

This Work Plan (WP) describes the Site background, the TRS ERH process, and ERH remediation system construction, operation, and demobilization.

2.0 SITE DESCRIPTION

The 97,250 square foot property includes a split-level building that is primarily used for industrial purposes. The building is constructed with a concrete slab-on-grade foundation. An asphalt-paved parking lot and driveways are located at the north side of the building. Currently, the building is used for manufacturing activities and operations will be ongoing throughout the ERH system construction and remediation. A portion of the ERH treatment volume is located below the north side of the building and extends to the north into the parking lot. The treatment volume contains soil and groundwater that are impacted with trichlorethylene (TCE), cis 1,2-dichloroethene (cis-1,2-DCE), vinyl chloride (VC), and other breakdown compounds and is considered the source for the CVOC contamination. **Figure 1** shows the remediation area and investigation sample locations.

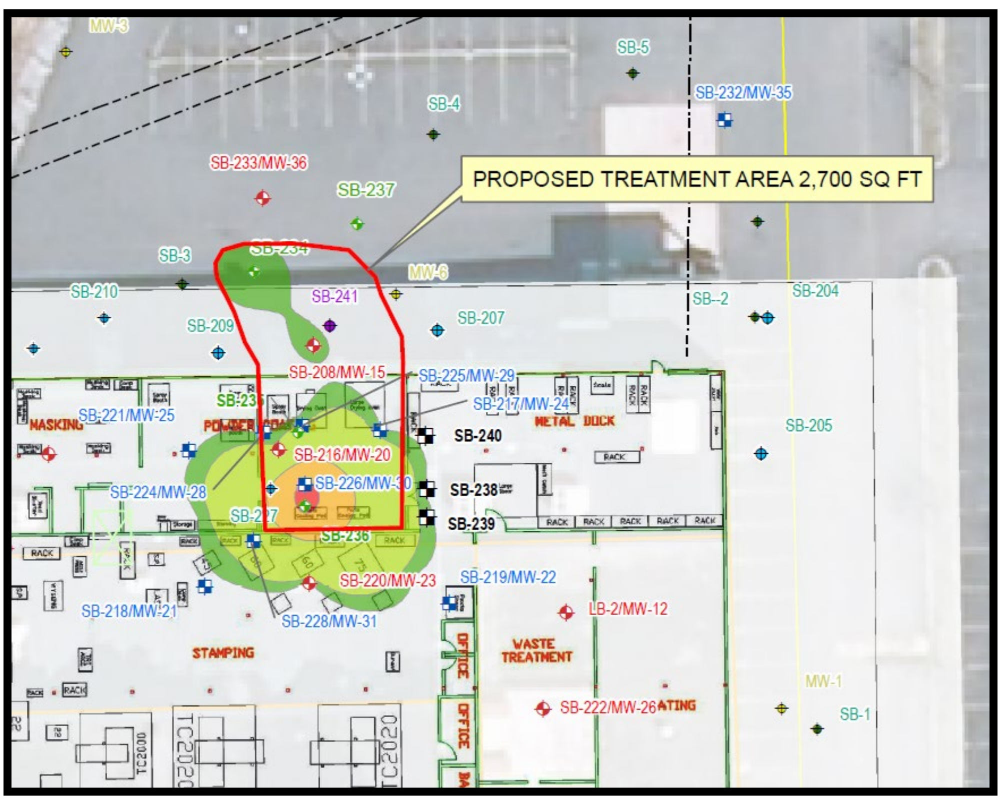


Figure 1. Remediation Area

The CVOC plume in **Figure 1** uses color to depict concentrations that exceed 1 milligram per kilogram (mg/kg) in the 8-16 feet below ground surface (ft bgs) depth range. Portions of the remedial treatment area not shown in color also contain CVOCs at concentrations that exceed clean-up objectives.

The area proposed for ISTR treatment can be found in **Figure Y-1. Figure Y-1** and the complete design package can be found in Appendix A**.**

Table 1 summarizes the ERH treatment area, quantity of ERH electrodes, treatment interval, and treatment volume.

Table 1 - ERH Treatment Areas

	Electrodes (Quantity)	Treatment Interval (ft bgs)	Treatment Area (ft^2)	Treatment Volume (yd^3)
ERH Treatment Area	18	5-25	2,700	2,000

Acronyms: ft bgs = feet below ground surface; ft^2 = square feet; yd^3 = cubic yards

2.1. Site Contaminants

The primary contaminants of concern (COC) in the ERH treatment volume are TCE and its breakdown products. Other contaminants within the ERH treatment volume, but at much lesser concentrations, are cis-1,2-DCE, 1,1-dichloroethene, 1,2-dichloroethane, trans-1,2-dichloroethene, tetrachlorethene, and VC. These contaminants only have minor exceedances.

The maximum TCE concentration in soil at the Site is 1,620 mg/kg. The highest groundwater concentration for TCE is 144,000 µg/L.

2.2. Lithology

According to the remedial investigation (RI) report, the treatment volume under the building consists of a sub-slab structural fill (gravel with some sand) to approximately 8 to 9 ft bgs. Native soils, generally silty clay and clayey silt with lesser amounts of sand and/or gravel are encountered below the structural fill. The treatment volume outside of the building footprint consists of a sand and gravel fill layer that varies in thickness from approximately 1 foot to 4 feet thick. Underlying this fill material is a native soil that is generally silty clay and clayey silt with lesser amounts of sand and/or gravel. This native fill extends to at least 20 ft bgs. Most borings terminated at 20 ft bgs, but when logged deeper, a sand and gravel layer with lesser amounts of silt and clay was reported from approximately 20 ft bgs to 34 ft bgs, where refusal was encountered due to apparent bedrock.

Groundwater in the treatment volume may range from 3 to 9 ft bgs; however, it is typically at 5 to 7 ft bgs. The subsurface descriptions are based on investigations summarized in the RI Report (New York Department of Environmental Conservation [NYSDEC] BCP Site No. C828182) dated February 2015.

3.0 ERH PROCESS

ERH is a process whereby soils and groundwater are heated by creating a voltage gradient to induce current flow through the subsurface volume to be remediated. Electrical energy is introduced to the subsurface at electrodes, and it is the resistance by the soil matrix to the flow of electricity between electrodes that heats the subsurface and boils a portion of the soil moisture into steam. This *in situ* steam generation occurs in all soil types, regardless of permeability. The heat generated by resistance to the induced electrical current also volatilizes the target contaminants. The *in-situ* steam generated by ERH acts as a carrier gas to sweep contaminant vapors to negative pressure vapor recovery (VR) wells.

Recovered steam and soil vapors are then transported via chlorinated polyvinyl chloride (CPVC) plastic piping headers to the ERH condenser where the recovered mixture is passed through a vapor/liquid separator and heat exchanger. The condensate generated following the heat exchange process is captured and conveyed for subsequent treatment and the extracted air is treated using the best applicable technology or methods, such as vapor-phase granular activated carbon (VGAC) or thermal oxidation.

4.0 TECHNICAL APPROACH

4.1. Remedial Approach

The soil and groundwater at the Site are primarily impacted with TCE. Site data indicates a maximum concentration of 1,620 mg/kg TCE in soil and 144,000 μg/L of TCE in groundwater. TRS estimates that there are approximately 560 pounds (lbs) of CVOCs within the ERH treatment volume with the majority being TCE. The remediation goal is to reduce contaminant concentrations to 500 μg/L in groundwater.

TRS' heating approach targets the contaminants using steam stripping as the primary mechanism for remediation. The TRS design calculates that approximately 610,000 kilowatt hours (kWh) of energy will be required to achieve the remedial goal, including operation of the ERH equipment. Energy will be used by ERH surface equipment during the project for vapor recovery, vapor cooling, and vapor treatment.

The target energy density for this project is approximately 277 kWh per cubic yard (kWh/yd^3) of soil, which TRS plans to input over the course of approximately 129 days of operations. TRS will evaluate system performance data including temperature, electrical energy, and mass recovery values to determine the optimal time for confirmatory sampling.

5.0 SEQUENCE OF WORK

The general sequence of construction and system installation is as follows and described in more detail in the sections that follow:

- Design
- Mobilization and Site Preparation
- Subsurface Installation
- Surface Installation

- ERH System Startup and Operations
- Demobilization and Final Report

5.1. Basis of Design

The ERH target remediation area and volume at the Site is 2,700 square feet (ft^2) and 2,200 cubic yards (yd^3). respectively. The site-specific ERH system is designed to deliver 610,000 kWh of electrical energy to the treatment volume via a total of 18 electrodes. **Figure Y-1** and **Figure Y-2** shows the treatment area with the pre-ERH soil and groundwater analytical results, respectively. Electrode construction details are provided in **Figure M-1** through **Figure M-4**.

The spacing, depth, and diameter of the electrodes were determined by the thickness of the contaminated soil in each area, the depth to water, the concentration and distribution of the contaminants, the soil type, and several other factors. The total electrode depth will be three feet deeper than the treatment interval to ensure efficient heating within the lower treatment interval. Over-drilling the electrodes by three feet mitigates convective and conductive heat losses that can occur at the bottom of the treatment volume. A total of three temperature monitoring points (TMPs) will be installed to monitor heating progress through the heated depth to help guide optimization and confirmation sampling efforts. TMP details are provided in **Figure M-5** and **Figure M-6**.

The ERH VR system will bring the steam and volatilized CVOCs from the subsurface to the vapor treatment system. The VR system will consist of a VR header connected to condensing unit where steam will be condensed into water. Condensate water will be treated with liquid-phase granular activated carbon (LGAC) and discharged to the sanitary sewer. The vapors will continue through the VR blower and be sent through VGAC for treatment prior to release. An ERH system process flow diagram and mass balance are presented in **Figure P-1** and **Figure P-2**, respectively.

One hydraulic control well (HCW) will be installed on each side of the treatment area for a total of four HCWs. These wells will help to provide a net influx of groundwater during the early stages of heating, before the treatment volume reaches boiling temperatures. Once boiling temperatures are reached, ERH typically creates a natural gradient into the treatment volume due to water removal in the form of steam.

The monitoring and operation of the heating, VR, and vapor treatment system will be performed by a combination of on-site labor and remote monitoring and control equipment.

5.2. ERH System Components

The TRS ERH system consists of the primary system components identified in **Table 2**. The components are described in detail in subsequent sections. The equipment layout is shown in **Figure Y-3.**

Table 2 - ERH System Components

Primary System Component	Quantity
ERH Power Control Unit	1
Monitoring, control, and data acquisition system	1
Remote access and control system	1
Electrodes	18
Co-located Vapor Recovery Wells	18
Electrode Wetting System	1
Temperature Monitoring Points (TMPs)	3
Hydraulic Control Wells	4
ERH Condenser & Cooling Tower Unit(s)	1
Vapor Recovery Blowers	1
Vapor Treatment System – Vapor-Phase Granular Activated Carbon (VGAC)	1

5.2.1. Power Control Unit & Data Acquisition

The ERH Power Control Unit (PCU) will deliver electrical energy to the electrodes to heat the treatment volume. A PCU is best described as a variable transformer system capable of providing power output by adjusting voltage levels to the electrode field.

Three-phase 480-volt electrical power will be provided to the PCU, condenser, and blower from the building electrical service. Electrical one-line details are presented is presented in **Figure E-1** through **Figure E-4.**

The PCU is individually housed in a weather-tight steel enclosure that provides both security and electrical insulation. The PCU is designed for 100 percent cycle duty and is sized for a maximum power output of 500 kilowatts (kW). During ERH operation, the primary voltage is reduced to the appropriate level for optimum subsurface heating. As the subsurface is heated, this optimum voltage typically changes, and the PCU is adjusted to match those changes.

PCU control and data acquisition are performed on dedicated computers and associated programmable logic controllers (PLC). Remote data acquisition software is used to collect and store subsurface temperatures, power, voltage, amperage, and operational status data for the entire ERH system. Off-site project personnel can view and download this information in real time using a high-speed, wireless modem. The software also allows for control and/or monitoring of power application, vapor condensation, and wastewater pumping functions (as applicable).

The PCU is equipped with an emergency stop (E-Stop) button on the exterior of the PCU, next to the control room entrance door of the PCU. Depression of the E-stop immediately terminates power application to the subsurface. All other functions, such as control computer operation and the VR and treatment system, are not affected and remain operational. An additional E-stop button will be made available at the main entrance of the equipment compound.

Power delivery to the electrodes is accomplished directly from the PCU. Connections between the PCU and the electrodes are accomplished using fine strand, weather-rated power cable. Cable sizes are determined upon the completion of soil electrical resistivity testing (SERT). See **Section 5.4.4** for further information on the SERT process. All cable connections between the PCU, and electrodes are completed using bolted connections and comply with National Electric Code (NEC) standards on bolted electrical connections.

5.2.2. Electrodes

The ERH electrodes are the key component to a successful ERH remediation. The electrodes must efficiently transfer power from the PCU to the soil with minimal power losses. A total of 18 electrodes will deliver energy to the treatment volume targeted for remediation. The single element design will consist of a metal conductor and granular conductive backfill that will occupy the annular space. The electrodes will be spaced approximately 15 feet apart.

The deep extent of the thermal treatment extends to 25 ft bgs, while the shallow extent is at 5 ft bgs. The electrode conductive interval will extend from 3 ft bgs to 28 ft bgs to ensure a heated VR zone and adequate heating at the base of the treatment interval. The target treatment depth of 25 ft bgs is based on the building floor elevation. The treatment area north of the building is approximately 3 ft lower in elevation than the building. Therefore, treatment will be limited to 22 ft bgs for the treatment area outside of the building. For simplicity, all references in this Work Plan to depth of treatment or depth of components will be relative to the building elevation. All corresponding depths for components outside of the building will be adjusted by 3 ft, due to the change in surface elevation.

The electrode layout is an overlapping triangle pattern to provide the best approach for even heating in the soil formation. Electrode location details can be found in **Figure Y-3**.

Electrodes will be installed into the subsurface via a hollow stem auger drill rig. The installation procedure of the ERH electrode is very similar to the procedure for the installation of a groundwater monitoring well. Each electrode will consist of one continuous, electrode element set into a 12-inch borehole. Once the electrode element is in place, the annulus is back-filled with TRS' patented conductive backfill material. A silica sand layer is placed above the conductive backfill and a co-located stainless-steel VR well screen and a section of chemical-rated vacuum hose is set within the sand layer. The vent consists of a specially designed screen that maximizes steam recovery and minimizes groundwater entrainment. The electrode vent is constructed of 6-inch long, 6-inch diameter, stainless steel, 0.020-inch slotted well screen.

Electrodes installed outside of the facility are completed at grade and sealed to the surface with neat cement grout. The grout provides a barrier to prevent entrainment of ambient air in the VR network and to prevent steam from migrating into the atmosphere.

Electrodes installed in the inside the facility are sealed and completed in a subsurface trench network, which conveys all subsurface infrastructure to the exterior of the building to the north. The trenches are electrically bonded to the existing rebar network in the floor. This will ensure an equipotential zone throughout the treatment area mitigating the risk of voltage within the work zone above the treatment volume.

During ERH application, some electrodes may experience a loss of soil moisture at the interface between the conductive backfill of the electrode and the native soil matrix. When this occurs, electrical conductivity reduces, and the electrode may become less effective. This is referred to as "dry-out". To minimize dry-out, TRS may periodically introduce small amounts of water (drip) to the interface between the electrode and surrounding soil to keep it moist for optimum electrical conductivity. The amount of water added to the electrode is typically in the gallons per hour range.

A small diameter cross-linked polyethylene (PEX) distribution system will be used to convey drip water to each individual electrode as determined by the ERH operator. An in-line drip solenoid will be installed at each electrode as needed and will be wired to a field control box to regulate the volume of water distributed to electrodes via a 0.5-inch PEX tube. Total water usage and individual electrode water usage for drip is monitored using a totalizing flowmeter. The current ERH design incorporates an electrode wetting system for every electrode.

5.2.3. Temperature Monitoring Points

Three TMPs will provide temperature data collection within the treatment volume. Temperature data from the TMPs will be automatically recorded at least once per day. Each TMP will be constructed within a 4-inch borehole (minimum). The TMP casing will be schedule 80 black iron, set in the borehole and the annulus backfilled with neat cement grout from total depth to grade. A string of resistance temperature detector (RTD) sensors will be placed in the TMPs casing with the sensors spaced in five-foot vertical increments that will monitor subsurface temperatures at various intervals throughout the remediation volume as shown on **Figures M-2** and **Figure M-6**.

Exterior TMPs will be finished at grade with a polyvinyl chloride (PVC) pipe over sleeve set over the TMP casing and extended into the grout seal approximately 6 inches. The over sleeve will extend to approximately 6 inches above the TMP casing. A PVC cap will be placed on the over sleeve to provide electrical and thermal protection. Interior TMPs will have the RTD strings grouted in the casing and routed through the subsurface trench with the other ERH system infrastructure before surfacing at the trench exit on the exterior of the building to the north **(Figure Y-4).**

5.2.4. Vapor Recovery System

Steam is generated in all soil types during ERH, regardless of saturation level or permeability. The generation of *in situ* steam makes up much of the subsurface flow and therefore governs the small-scale flow patterns in soil. During ERH, a vacuum is applied to the vertical VR wells.

The approximate 15-foot spacing of the VR wells provides an extensive radius of influence overlap to ensure complete vapor capture and an inward vapor flow gradient to prevent steam from moving outside the remediation region. The ability to recover soil gas and steam directly at the electrode borehole reduces the risk of vapor leaks to the breathing space at the electrode penetrations and enhances VR in the shallow vadose zone.

The surface VR piping will be constructed of chemical-resistant hose and CPVC. The subsurface recovery piping will utilize the same materials but will be routed in the trench network to the trench exit on the exterior of the building to the north. The VR manifold layout can be found in **Figure Y-4**.

Design specifications for the vacuum blower and the vapor treatment systems used during ERH are based on the combined flow of air and steam. At start-up of ERH, no steam is generated in the subsurface. The blower exerts a vacuum on the VR wells and air in the subsurface flows toward the

VR well screens. As ERH continues, steam is generated. That steam rises into the vadose zone and is swept toward the VR wells by the air flowing to the VR well screens.

Vapor recovery will be performed using a 15-horsepower (hp) positive displacement blower placed on the upstream side of the vapor treatment system. The estimated air flow rate is 260 standard cubic feet per minute (scfm). Sampling ports, sensors, and gauges will be installed to measure vacuum, flow, and temperature at the blower inlets. Temperature will be measured by gauge at the blower outlet and flow will be measured using a pitot tube.

The condenser system consists of one ERH condenser and cooling tower unit. Each condenser is comprised of an inlet air/water separation vessel or knockout pot, a plate and frame heat exchanger, a condensate recovery tank, a cooling tower unit, an outlet air/water separation system, and ancillary pumps and controls. The condenser systems will be placed within a secondary containment berm that is designed to hold 100 percent of the liquid capacity of the system. Should a spill occur, the source of the spill will be identified and repaired, and the contained liquids will be either returned to the condenser system or vacuumed into approved containers for off-site disposal.

Air and contaminant vapors are pulled through the condenser by the applied vacuum of the VR blower. The inlet separation vessel removes entrained water from the influent vapor stream. Air and steam then enter the airside of the heat exchanger, where steam is converted to condensate as heat is removed from the mixture. An important consideration for the condenser is the Henry's Law coefficient of the contaminants routed through the condenser. As the fine water droplets condense from the steam, they do so in concentration equilibrium with the gaseous phase that includes air. The energy balance inside the condenser is such that the amount of water evaporated from the cooling tower is almost exactly equal to the amount of steam condensed.

5.2.5. Vapor-Phase Granular Activated Carbon Unit

Recovered air, steam, and contaminant vapors, once passed through the ERH condenser and vacuum blower, will be routed to the VGAC units for treatment via adsorption. The TRS vapor treatment design incorporates two 2,000-pound vessels in series to treat the estimated 560 lbs of contaminant mass at the Site.

Influent, mid-fluent, and effluent concentrations will be monitored, at least bi-weekly, by a photoionization detector (PID).

5.2.6. Water Treatment System

An estimated 48,000 gallons of water will be removed from the subsurface during remediation in the form of steam. In addition, up to one gallon per minute (gpm) will be pumped from each of the hydraulic control wells. At this pumping rate, an estimated additional 750,000 gallons of groundwater will be extracted. The steam, air, and any entrained water will pass through the ERH condenser where most of the VOCs will remain in the vapor phase. Henry's Law describes the operation of the heat exchanger. Based on the partition coefficient of TCE, less than 1 percent of the total TCE mass will leave the condenser in the liquid phase, with the remainder leaving in the vapor phase for subsequent vapor treatment via VGAC.

The condenser will be equipped with a LGAC system. It will consist of (2) 200-pound LGAC vessels plumbed in series with discharge routed to the sanitary sewer. There will be two (2) spare 200-pound LGAC vessels on-site to facilitate a quick change out if necessary.

TRS will monitor the total volume of water generated by the system using totalizers for each separate stream of water (i.e. condensate, makeup, and electrode drip). Pressure gauges will be used to monitor pressure of the water conveyance lines.

5.3. Mobilization and Site Preparation

This section details the initial on-site activities prior to ERH system installation.

5.3.1. Initial Site Activities

TRS will attend project kick-off and pre-construction meetings with LaBella personnel and other relevant parties, as determined by LaBella at a later date. TRS will prepare design drawings for LaBella review to allow for rapid advancements into the field. TRS will attend bi-weekly conference calls, organized by LaBella, to discuss project developments.

5.3.2. Site Survey

Prior to commencing construction activities, a surveyor will mark the installation locations for the electrodes, TMPs, and general locations of the ERH equipment.

Following completion of the location marking, TRS personnel will designate final material staging and storage areas. A designated area for staging electrode construction materials and other non-contaminated construction materials such as sand and gravel will be established. No hazardous waste will be stored in the construction staging area(s). A waste storage area will also be designated to ensure ease of soil waste roll-off pick-up and delivery.

Placement locations for the ERH equipment will be general locations and final placement may be dependent on the exact equipment received at the Site.

5.3.3. Utility Locating Services

TRS will coordinate a utility locate survey for the treatment area. Once all utilities are marked, TRS will then evaluate if any subsurface ERH components require re-locating to accommodate any conflicts with subsurface, surface, or overhead utilities.

Once all utilities have been marked and the ERH subsurface component locations are finalized, TRS will walk the Site with a LaBella representative to confirm all marked locations.

5.3.4. Fencing and Site Security

Once all utilities have been marked and electrode locations finalized, TRS will begin installation activities for the perimeter fence around the ERH remediation area. The exterior fence will be a temporary type fence, with moveable feet secured by sandbags. After construction is complete, the fence will be replaced with a permanent fence. Fence details can be found on **Figure M-10.** Signs will be placed on the fence at a high frequency to warn Site workers and non-project personnel of the electrical hazards within the fenced area. Additional signage will provide notice that a 50-foot buffer zone around the fence is a no-dig zone. The sign will also provide contact phone numbers of TRS project personnel to request permission to dig within this zone.

TRS will deploy two independent security systems during the project. The first system is a motion-detecting, infrared perimeter system that will automatically stop ERH power application to the treatment volume in the event of an intruder. This system will be active during the ERH operations phase.

The second system includes motion detectors and cameras. If an intruder triggers the camera sensor, it automatically transmits a silent alarm and captured video footage to a remote facility that is manned 24 hours a day. Personnel at the remote facility review the video footage and alert local police if the intruder trespasses the secured area. This type of silent alarm leads to rapid police response to increase the potential for police to prevent loss or vandalism of property. This secondary system is primarily for theft prevention in nature and is not configured to stop ERH power application in the event of an unauthorized entry, as such this system will be in place from system installation through site demobilization. A site plan showing sensor and camera locations is provided in **Figure Y-7**.

Access to the remediation area will be gated and locked during non-working hours. All visitors will be required to check in with TRS prior to entry and/or conducting any work. No unauthorized entry into the work area will be allowed at any time. All safety measures create redundant layers of protection to ensure the safety of those working within and around the ERH treatment compound, as well as the public.

For the portion of the treatment area within the Eldre facility, no additional security measures will be required. All of the ERH components and infrastructure within the building will be below ground surface and as such do not present a theft or electrical risk to personnel accessing the building.

5.3.5. Electrode Prefabrication

Following material receipt and prior to mobilizing the drilling subcontractor to the Site, TRS will begin electrode pre-fabrication at the Site. It is not the intent to complete fabrication of all electrode elements prior to mobilizing the drilling subcontractor. This is done to ensure that there are adequate downhole materials ready for the drilling subcontractor and eliminate down-time or standby for material preparation. Electrode prefabrication activities will continue through most of the subsurface installation effort.

5.3.1. Facility Access

The primary facility access for remediation work will be through the loading dock doors located on the north side of the facility. Both man doors and overhead doors will be used. Most activities will be completed during hours when the facility is not operating or has reduced operations. In general, any intrusive work, such as drilling, coring, or trenching will be performed between the hours of 3:30 PM and 6:00 AM on Monday through Thursday or between 3:30 PM Friday and 6:00 AM Monday. Each day the remediation area will be cleaned and returned to Mersen in a condition acceptable for facility operations. Some limited interior work, see Section 5.6.7 below, will take place during normal working hours. This work is non-intrusive and will still be coordinated with Mersen to minimize the impact to Mersen activities.

Given the hours for interior work, TRS will use safety cones to restrict access to the work area. Additional precautions such as noise management will not be required.

5.3.2. Concrete Cutting

Prior to mobilizing the drilling subcontractor, a concrete coring subcontractor will be mobilized to the Site. The concrete coring subcontractor will begin coring the concrete at each ERH subsurface component location as needed to allow for unrestricted drilling access. The concrete will be cut in 14 to 18-inch diameter cores. The subcontractor will also cut the trench network.

Concrete coring will require the use of water to manage dust, heat generation, and tool protection. Water will be managed by creating temporary berms around the area for containment. Water will be removed via a wet-vacuum. Once cutting is complete, the floor will be cleaned.

Whenever possible, TRS will elect to leave the concrete cores in place until just prior to drilling activities at that location. If the concrete cores require removal prior to drilling at that location, safety cones and steel plating will be placed around and over the open holes. Once removed, the concrete cores will be removed and stacked on pallets and stored in the pre-designated waste area. All interior drilling locations will be covered, cleaned, and made safe for the next work shift at the end of each TRS working day.

5.4. Subsurface Installation

Once the ERH subsurface component locations have been marked and approved, subsurface features and utilities have been marked, and the concrete cuts completed, the drilling subcontractor will be mobilized to the Site to begin subsurface installation.

Any boring will be hand-cleared or air-knifed to 5 ft bgs to provide assurance that no subsurface utilities are present prior to drilling.

5.4.1. Interior Drilling

The interior remediation area has a low ceiling clearance due to a drop ceiling. Prior to any drilling work, LaBella will remove the drop ceiling tiles and grid to facilitate unobstructed access during drilling.

A four-gas meter will be used during interior drilling to monitor combustible gases, hydrogen sulfide, carbon monoxide, and oxygen. Exhaust gas from equipment will be filtered or vented to outside. Additional ventilation will be provided, via high capacity fans, if determined to be necessary.

5.4.2. Electrode and Record Keeping

Once the design depth is reached during borehole advancement, the electrode element is placed into the borehole to the desired depth and the annular space is filled with conductive backfill material as specified in **Figures M-1** to **Figure M-4**.

The VR well and drip water screen will be placed into the borehole at the appropriate depth and the borehole completed with backfill of non-conductive material (10 x 30 silica sand) to the bottom of the grout seal. Exterior electrodes will be completed at grade, while interior electrodes will be completed in the trench network. A trench network detail showing the orientation of subsurface infrastructure is provided in **Figure M-9.**

Construction logs will be generated for each electrode installed at the Site. Each log will have a visual representation of the element as well as the information noted below. These documents are considered confidential and will be noted and managed as such. The log will document the following:

- Starting and completion date and times
- Any deviations from the marked locations (measured in feet)
- Periodic breathing zone PID readings
- Total borehole depth
- Borehole diameter
- Drilling method and type of rig
- Drilling contractor and personnel
- Any subsurface anomalies encountered
- Electrode element placement (ft bgs)
- Backfill material quantity
- Cement/grout mixture and quantity
- Any deviations from design

5.4.3. Temperature Monitoring Points

The TMPs will be installed within a 4-inch diameter borehole created using a hollow stem auger drill rig. For exterior TMPs, the annular space surrounding the casing will be backfilled with neat cement grout from depth to grade. A 4-inch PVC over sleeve will be inserted into the grout seal to protect the TMP casing at the surface. Interior TMPs will have both the annular space, as well as the RTD strings grouted in the casing, and routed through the subsurface trench with other infrastructure before surfacing at the trench exit on the exterior of the building to the north (**Figure Y-4).**

A basic construction log of the TMPs will be generated. The logs will include the following information:

- Starting and completion date and times
- Any deviations from the marked locations (measured in feet)
- Periodic breathing zone PID readings
- Total borehole depth
- Borehole diameter
- Drilling method and type of rig
- Drilling contractor and personnel
- Any subsurface anomalies encountered
- TMP casing placement (ft bgs)
- Backfill material type and quantity
- Neat cement grout mixture and quantity
- Any deviations from design

The RTD strings will be lowered into the TMP casings (exterior) after drilling activities are complete to prevent inadvertent damage to the RTD strings by nearby vehicle traffic and/or other Site activities. Once the RTD strings are lowered into the TMP casings and set to the desired intervals, the TMP over sleeve will be capped and secured to prevent inadvertent contact with the TMP steel casing by Site personnel during ERH operations. A warning placard will be put on all TMP casings indicating “High Voltage” or “Shock Hazard”.

5.4.4. Hydraulic Control Wells

TRS will install four hydraulic control wells (HCW) on the perimeter of the treatment volume. As there are elevated concentrations on the perimeter of the treatment volume, these HCWs will be used to ensure there is an influx of water into the treatment volume and not heat and warm water spreading away from the treatment volume. These HCWs will be pumped at a low rate to minimize heat loss from the treatment volume. The HCW design details are provided in **Figures M-7** and **M-8**.

The HCW wells will be installed within a 10-inch diameter borehole. A 4-inch stainless steel casing will be installed in the borehole, and the annular space of the HCW wells will be backfilled with sand from depth to 4 ft bgs. Exterior wells will be completed to the surface with a grout seal from 4 ft bgs to ground surface. Interior wells will be completed below grade in a traffic rated vault. The HCW piping details are provided in **Figure Y-5.**

A basic construction log of the HCWs will be generated. The logs will include the following information:

- Starting and completion date and times
- Any deviations from the marked locations (measured in feet)
- Periodic breathing zone PID readings
- Total borehole depth
- Borehole diameter
- Drilling method and type of rig
- Drilling contractor and personnel
- Any subsurface anomalies encountered
- TMP casing placement (ft bgs)
- Backfill material type and quantity
- Neat cement grout mixture and quantity
- Any deviations from design

5.4.5. Trenching

Once interior drilling activities are completed, the locations will be trenched. Trench dimensions will vary as shown in **Figure M-9**. Once the trenches are excavated, they will be backfilled in multiple lifts, with appropriate backfill. Trenches will be finished with a concrete layer with a rebar network for structural integrity.

The concrete seal will be mixed with an accelerant to speed cure time to allow for a quick turn over of the remediation area back to Mersen. TRS anticipates that trenching will be conducted over multiple days, but the final trench work and concrete finish will be conducted over a weekend to allow for the concrete to cure.

5.4.6. Soil Electrical Resistivity Testing

TRS personnel will conduct SERT testing post-electrode installation. SERT testing will verify the subsurface resistivity within the treatment volume and confirm that resistivity collected from historical Site data is correct. By confirming the resistivity of the subsurface, TRS can verify:

- The integrity of each electrode
- Determine in advance of ERH operations if there are subsurface regions that differ from the rest of the Site
- Confirm the surface cabling for each electrode
- Determine if additional field transformers may be required to complete the ISTR in the schedule provided

SERT testing may commence prior to completion of the ERH treatment area. TRS personnel may at times perform SERT tests after drilling activities have concluded for the day (after hours) to maintain the project installation schedule.

SERT results will be reviewed and evaluated by the Project Engineer and the TRS Project Manager. Any adjustments for the operational phase of the project will be instituted if needed. SERT results are deemed confidential and will not be shared with personnel outside of TRS.

5.4.7. Installation Waste Management

TRS estimates that there will be approximately 26 tons of soil cuttings from drilling activities at the Site and 36 tons of trenching spoils and concrete cores. The drilling subcontractor will transport the cuttings from the drilling area(s) and place them into on-site roll-off bins. Roll-off bins will be staged in a designated area away from clean material and supplies.

All soil roll-off bins will be lined prior to the placement of soil into the roll-off bins. Roll-off bins will remain covered when not being filled or emptied. Roll-off bins will be inspected at the end of each work day to confirm the lids are closed, areas around the bins are clean and free of waste, and that no leaks are present in any of the roll-off bins. Deviations from these criteria will be addressed immediately.

When all intrusive activities are completed, LaBella will be responsible for correctly characterizing the soil cuttings, trench spoils, and concrete cores and to determine disposal (hazardous or non-hazardous). LaBella will manage disposal of the wastes.

Water/sediments generated from decontamination activities related to subsurface installation will be collected and stored in United States Department of Transportation (USDOT) rated 55-gallon drums. The quantity of decontamination water generated is difficult to estimate, but TRS estimates 50 to 200 gallons of decontamination water will be generated. All drums will be labeled appropriately as based on its contents and as “Pending Analysis”. LaBella will sample, profile, and dispose of generated waste water.

5.5. Surface Installation

About half way through subsurface installation, TRS will begin mobilizing the ERH system components to the Site and initiate surface installation. The ERH equipment will be offloaded and placed at the Site using a subcontracted rigging service. Once the equipment has been placed at the

Site, TRS will complete electrical connections to the ERH equipment, except the primary electrical service connection. It is likely that equipment receiving will occur in stages over several weeks. Some of the designated equipment for the project may become available and be received at the Site in advance of the anticipated need date(s).

TRS will connect the ERH electrodes in accordance with the NEC, where applicable. TRS uses portable, outdoor weather-rated power cables well suited for ERH applications to deliver electrical energy to the electrodes and the subsurface.

5.5.1. Vapor Recovery System

The VR manifold system will be constructed with CPVC pipe (schedule 40 and schedule 80) and CPVC fittings (schedule 80). Joints will be made using CPVC cement. Prior to cementing any joints, pipe ends will be confirmed to be free of burs or debris. CPVC primer will be applied to sections of pipe/fittings prior to applying cement.

Pipe diameters from the electrodes to the ERH condenser will range from 1-inch to 4-inch in diameter. Construction of the manifold system will initiate at the ERH condenser and move towards the electrodes in the treatment area. The VR piping plan is shown in **Figure Y-4.** The remaining equipment piping details are shown in **Figure Y-6.**

5.5.2. Instrumentation and Controls

Remote field boxes will be distributed throughout the treatment area and the ERH equipment compound to provide direct communication between ERH field components, ERH equipment, and the PCU control computers. Via the field boxes, the PCU computer will be able to:

- Monitor subsurface temperatures
- Control electrode drip solenoids
- Monitor safety interlock status
- Remote control capability of the ERH condenser and VR blower

The field boxes are vertically mounted, weather-tight, and will operate in all ambient temperature conditions in all seasons. The field boxes are powered via weather-rated, 120-volt power cable and power is supplied directly from the ERH PCU.

5.5.3. Utility Installation

TRS will coordinate power connections from the existing RG&E on-site transformer. This transformer currently provides facility power, however has capacity to power the ERH remediation as well. RG&E will make new connections to the existing transformer to provide power to the input disconnect of the PCU. TRS will make all downstream connection between the PCU and the condenser, blower, and cooling tower. TRS will assist with equipment specific information as needed for the power connection. A preliminary electrical one-line diagram is shown in **Figure E-2**, with the corresponding legend sheet shown in **Figure E-1**.

5.6. ERH System Start-Up and Operations

5.6.1. Pre-Start-Up Activities

Prior to start-up, a final quality assurance inspection of vapor piping connections, all water piping connections, and electrical connections will be made. Quality assurance inspections and testing will be completed on the electrode cable connections, TMP field box connections, drip solenoids and drip box connections, condenser components, and the PCU. All equipment will be visibly inspected for exterior damage, cracks or breaks, scrapes of protective coating, corrosion, structural damage, and inadequate installation or construction such as cracks, punctures, and damaged fittings.

Once final inspections are complete, TRS will perform system start-up testing. Once testing is complete and operational readiness is approved, power application to the remediation volume will be continuous except for system adjustments, routine maintenance, and scheduled soil sampling events.

Prior to start-up, TRS will provide written notification to all involved parties that TRS must be notified before any digging or drilling activities occur within 50 feet of the ERH system. This “no-dig” notification requirement is also described on warning signs that TRS will post on the remediation area fences at the Site.

5.6.2. Equipment Prove-Out

Each component of the ERH remediation system will be tested for functionality of all controls, pressure tested for leaks (water bearing systems only), rotations checked (as applicable), and interlocks tested to verify proper operation and result(s). A comprehensive equipment prove-out checklist (a TRS internal and confidential document) is completed as a final quality assurance that the system is ready for operation. Testing will be performed on the ERH condenser, VR blower, PCU (except power application to the treatment volume), and field boxes (RTD, Drip, and interlock).

5.6.3. ERH System Start-Up

Prior to energizing the ERH system, a two-step Site Quality and Safety Inspection will be performed to ensure personnel safety at the time of initial power application. The first phase of this inspection demonstrates that all design safety features have been completed and are operating properly prior to applying electrical power to the treatment volume. Examples of these safety features include access guards, interlocks between system components, over-temperature gauges, and E-stop switches.

With the first phase of the inspection satisfactorily completed, the ERH system will be energized, and the second inspection phase initiated. All non-TRS personnel will be excluded from the ERH remediation area during this phase of the inspection. During this phase of the inspection, compliance with allowable surface voltages under operating conditions is verified at increasing power application voltages. Surface voltage readings are recorded until the design input energy is reached. Any issues with surface voltages above the TRS allowable limit of 10 volts alternating current (VAC) within the ERH restricted zones and 5 VAC in public areas will be resolved prior to unattended operation of the ERH system.

The second inspection phase will be conducted during non-standard working hours for the facility. In general, these non-standard working hours are between 3:30 PM and 6:00 AM on any given week day or starting at 3:30 PM on Friday and concluding at 6:00 AM Monday.

The safety start-up testing includes a ground-level voltage monitoring program as described in TRS Standard Operating Procedure (SOP) 1.3 Voltage Surveys.

The TRS electrical safety policy limit for exposed voltage is:

- **Public Zone:** 5-Volt Step-and-Touch, 10-Volt utility ground Survey
- **TRS Restricted Zone:** 10-Volt Step-and-Touch, 30-Volt utility ground Survey
- **TRS Controlled 30-Volt Zone:** 30-Volt Step-and-Touch, 30-Volt utility ground Survey (This zone requires TRS upper management approval for implementation)
- **Exclusion Zone:** No entry allowed with ERH electrical power applied to the subsurface

Voltage safety surveys for start-up confirmation will be performed in dry and wet conditions. In some cases, areas of the treatment area and/or equipment compound will be wetted with a hose to simulate a rain event or spill.

Upon completion of the two phases of start-up, the TRS PM will confer with an authorizing TRS employee to review and document operational readiness. Upon concurrence of operational readiness and with approval from the authorizing TRS employee, the ERH system will segue into full-time ERH operations.

5.6.4. ERH System Operations

During ERH operations, TRS will monitor the system locally and remotely and will provide weekly updates to LaBella via electronic letter reports. TRS personnel will monitor the ERH system and perform system optimization adjustments, visual inspections, data collection, and maintenance of the ERH system. The weekly reports will contain the following:

- Average power input
- Cumulative energy applied
- Average site subsurface temperature
- Total condensate production
- Mass removed estimates (from PID or laboratory analytical)
- Mass discharged estimates (from PID or laboratory analytical)
- Significant operational notes like equipment shut downs
- Anticipated downtime, e.g. for sampling or as requested by Mersen

TRS estimates that a total of 610,000 kWh of electrical energy will need to be input into the treatment volume to achieve the established remedial goals. The time to apply this amount of energy to the subsurface will be approximately 129 days.

5.6.5. ERH Operations Hazards

There are certain hazards associated with ERH during the remediation of soil. These hazards include possible contact with hazardous voltage, steam, hot water, or hazardous chemicals. Exposure to these hazards can be mitigated through engineering controls and strict adherence to documented procedures and safety protocols. Examples of safety restrictions include:

- Only trained, authorized personnel shall enter an ERH restricted area to complete project tasking. If an ERH exclusion zone is created due to high voltage potential readings, no personnel shall be permitted in this area during operations without authorization from the TRS Vice President of Operations.
- As noted previously, no drilling or digging shall occur within 50 feet of any operating electrodes without written approval by TRS. Signs will be posted indicating a no-dig zone around the perimeter of the Site.

5.6.6. Subsurface Temperatures

Subsurface temperatures will slowly increase during the first few days of power application. Steam generation is non-existent during the early days of the remediation. As the remediation progresses, subsurface temperatures will increase more rapidly, particularly in areas of heavier contamination and steam generation will begin. Steam generation should begin a couple of weeks into operation but could occur sooner.

When a CVOC is immersed in water, the combined boiling point of the CVOC and water is depressed as described by Dalton's Law of Partial Pressures. Consequently, the CVOC/water interface will boil when the vapor pressure of the CVOC plus the vapor pressure of water are equal to the ambient pressure. TCE has a boiling point temperature of 87 degrees Celsius (°C) at standard pressure but will boil at a temperature of only 72°C in water. **Table 3** shows the boiling point of the Site COCs at the Site elevation.

Table 3 - Boiling Point of Site COCs at Site Elevation

Contaminant	Boiling Point (°C)	CVOC/Water Boiling Point (°C)	CVOC/Water Boiling Point at 19 ft bgs (°C)
Trichloroethene	86	73	81
cis 1,2-Dichloroethene	58	54	62
Vinyl Chloride	-14	-14	-7
Pure Water	99.5	99.5	108.3

5.6.7. Voltage Surveys

To ensure the safe application of electrical energy to remediate subsurface soils, TRS will perform voltage safety surveys initially, and as power input to the treatment volume is increased. These surveys are referred to as "step-and-touch", "step-and-step" and "touch-and-touch" voltage surveys. The purpose of these voltage safety surveys is to identify the location(s) of possible voltage hazards on or directly adjacent to an operating ERH Site. In recording step-and-touch potentials, extra readings will be taken at locations where objects that could carry voltage extend from the subsurface.

No voltage potentials greater than the TRS electrical safety policy limits (**Section 5.6.3**) will be permitted outside of any ERH exclusion or restricted zone during operations. If voltage potentials are detected above these limits, actions will be taken to remove or isolate the problem location(s).

TRS will perform voltage safety surveys once a week during Site visits or anytime power input is increased to the treatment volume. Voltage surveys are non-intrusive during normal operating conditions. The ongoing voltage surveys will be performed during normal working hours, defined as 7:00 AM to 5:00 PM. The voltage surveyor will work with Mersen to minimize disruptions to facility activities.

5.6.8. ERH System Monitoring

System performance monitoring is critical to the operation of the project. This activity provides the information necessary for the project team to make informed decisions concerning the safe, efficient, and effective operation of the ERH system. The types of performance monitoring to be completed include:

- ERH treatment system operation data (electronic and manual collection), including power and energy input, water addition totals, and analysis and response to system alarms
- Temperature measurements from each TMP measured in °C each day and at the same time each day
- Individual electrode amperage surveys
- ERH condenser and VR system monitoring
- Performance sampling (vapor)
- Water balance monitoring

PCU control and data acquisition are performed on a dedicated computer and associated PLCs. Remote data acquisition software is used to collect and store subsurface temperatures, power, voltage, amperage, and operational status data for the ERH system. Off-site project personnel can view and download this information in real time using a high-speed, wireless modem. The software also allows for control, monitoring, and optimization of power application.

5.6.9. ERH System Inspections & Maintenance

When personnel are on-site, daily inspections of the ERH treatment system will be performed. Daily inspections include completing visual inspection of the PCU, ERH condenser, VR blower, electrode cabling, drip water system, and water treatment system.

TRS will perform regularly scheduled inspections and maintenance on the PCU, condenser, VR blower, water treatment system, and all conveyance piping systems consistent with manufacturer's recommendations or previously noted historical performance. Data gathered during system monitoring, including visual inspections, may also indicate that additional maintenance will be required. Each maintenance event will be noted in a maintenance log that is specific to that piece of equipment. The log will include: the date the maintenance was performed, the task, parts replaced, and who performed the task. Any concerns identified during inspections will be brought to the attention of the TRS PM and an appropriate course of action, including repairs, shall be completed as soon as possible.

Daily, personnel will confirm electronic data collection is occurring according to design. This may be completed on-site or remotely by logging into the PCU control computer. Based on available data, personnel will make any necessary changes to power application to the treatment volume or electrode water addition.

6.0 REMEDIATION COMPLETION

6.1.1. Confirmation Groundwater Sampling

All confirmation groundwater sampling will be done via low-flow groundwater sampling techniques. Low-flow sample collection will be completed using peristaltic pumps. The TRS Hot Groundwater Sampling standard operating procedure (SOP) is attached in Appendix B for review.

There are certain hazards associated with ERH during the remediation of soil and groundwater. These hazardous include possible contact with hazardous voltage, steam, hot water, or hazardous chemicals. To mitigate these risks, the standard low-flow sampling procedure is modified to include a cooling coil and ice bath to rapidly lower the temperature of the groundwater before it is sampled. Groundwater temperatures greater than 70˚C will use the cooling bath for sample collection.

The first round of sampling will likely be conducted when 50 percent to 70 percent of the design energy has been input to the treatment volume. Although TRS does not expect that all regions of the Site will meet the remediation goal on this first event, the sample results will inform TRS where to shut down the portions of the treatment volume that are clean, reducing power input and saving on energy costs. In addition, shutting down a portion of the system allows TRS to concentrate efforts in a smaller region(s) and may allow faster progress on the remaining region(s). Such iterative sampling saves time, energy, and money.

Subsequent sample events will be determined based on energy input, subsurface temperatures, and mass removal rates. TRS anticipates at least four sample events will be required. Only locations that are above the treatment goals will be re-sampled in subsequent sample events, as confirmatory sampling in areas already designated clean is unnecessary. TRS will communicate regularly with LaBella on the predicted sampling schedule.

6.1.2. Soil Sampling

There are no remediation goals for soil for the ERH system at the Site though LaBella will sample soil during the remediation to monitor progress. Confirmatory groundwater sampling will be performed first due to the relative cost of groundwater sampling compared to soil sampling. Once groundwater samples indicate an area is clean, soil samples will be collected for monitoring. The TRS Hot Soil Sampling SOP is attached in Appendix B for review.

Direct push technology using metal sampling cores will be used to collect hot soil samples. The cores are brought to the surface, capped, and a meat thermometer is inserted through the cap into the core. The sample core is then placed on ice to cool.

Based on the standard procedure, when the sample has cooled to below ambient temperatures, the core is opened and a sub-sample will be collected from near the center of the core barrel for laboratory submission. However, for the Site, samples will be cooled to 4°C before sample collection to minimize any volatilization during handling and sample collection. Because of the fast-track nature of the project, all soil sampling events will use a 72-hour turnaround time for preliminary results.

6.1.3. Project Completion

TRS will continue operations until the groundwater remediation goal (500 µg/L TCE) has been achieved or the design remediation energy (610,000 kWh) has been input to the subsurface, whichever occurs first. If the design remediation energy is achieved, but the groundwater remediation goals have not been achieved, LaBella can direct TRS to continue operating the system for a weekly rate, as defined in the contract. This rate does not include energy requirements or additional VGAC for vapor treatment, as only part of the site may be operating. LaBella would still be responsible for items within its scope, as indicated above.

The system will operate until the design energy has been applied or the groundwater remediation goal of 500 µg/l has been met. Eldre, with support from LaBella and TRS, will consult with NYSDEC regarding whether the system may be shutdown. If NYSDEC approves Eldre may terminate operations or Eldre may continue to operate the ERH system.

Once Eldre determines to cease power application to the treatment area, TRS will continue to operate the vapor recovery system for five days. This extended VR period will provide several pore volume exchanges.

7.0 DEMOBILIZATION & SITE RESTORATION

Upon completion of the ERH remediation and extended VR, TRS will begin Site restoration and equipment demobilization tasks. All surface temporary structures, equipment, and conveyance piping will be removed from the Site.

All TMPs will be abandoned in place. TMP casings will be grouted to ground surface. Subsurface lines and infrastructure in the trench network will be abandoned by grouting in place. Electrodes will be abandoned by grouting the VR hose, VR screen, and drip tubes in place. Overdrilling will not be performed. Hydraulic control wells will be turned over to LaBella for future project use.

The VR manifold and fittings, drip piping and ERH system-associated water conveyance piping will be disposed at the end of the project as non-hazardous waste. The Site will be restored in accordance with the terms of the site access agreement with the site owner. Upon completion of all Site restoration and demobilization tasks, the TRS PM will meet with LaBella to inspect the Site for concurrence of completion.

After ERH remediation is complete, the subsurface will slowly cool at about 1°C per day. Additionally, bioremediation will occur during this cool-down period and further reductions in CVOCs may be observed.

8.0 REPORTING

8.1. ERH Operations Reporting

TRS will furnish weekly status reports in electronic format. These reports will describe the general operation of the ERH system, work performed during the reporting period and anticipated upcoming work. The reports will also provide updates on the following:

- Weekly average power input into the treatment volume
- Energy applied to the treatment volume during the reporting period
- Daily treatment volume average temperatures graphs (Site and individual TMP data)
- Total condensate generation, recycled, and or disposed

- System optimization performed
- Recommended confirmatory sampling schedule
- Mass removal estimates

8.2. Final Report

A final report will be issued in electronic format that documents all activities (including electrode installation, system operation & maintenance, and decommissioning activities), analytical data, Site operations data, schedule deviations, waste disposal, manifests, and other pertinent project information.

Appendix A

Design Package

ELECTRICAL RESISTANCE HEATING DESIGN PACKAGE

PRELIMINARY

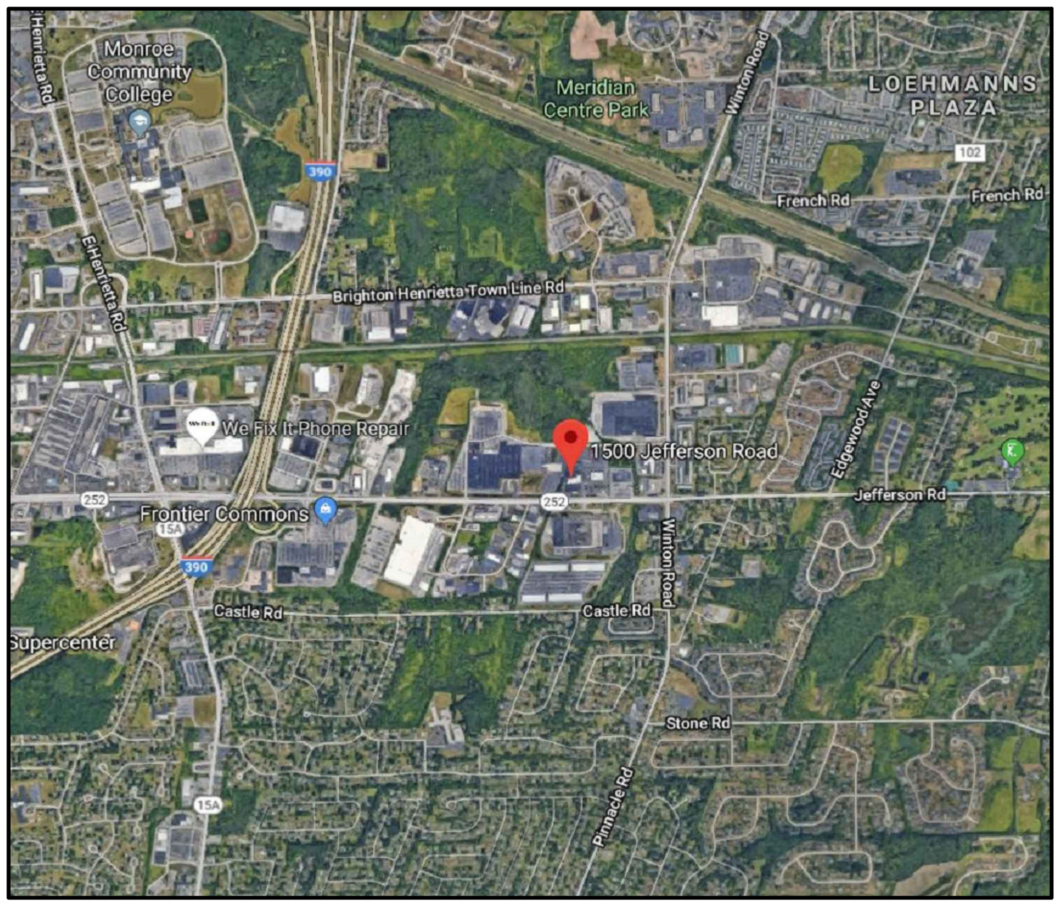
Not Approved for Construction

ELDRE CORPORATION
1500 JEFFERSON ROAD
HENRIETTA, NEW YORK 14623

Prepared by:

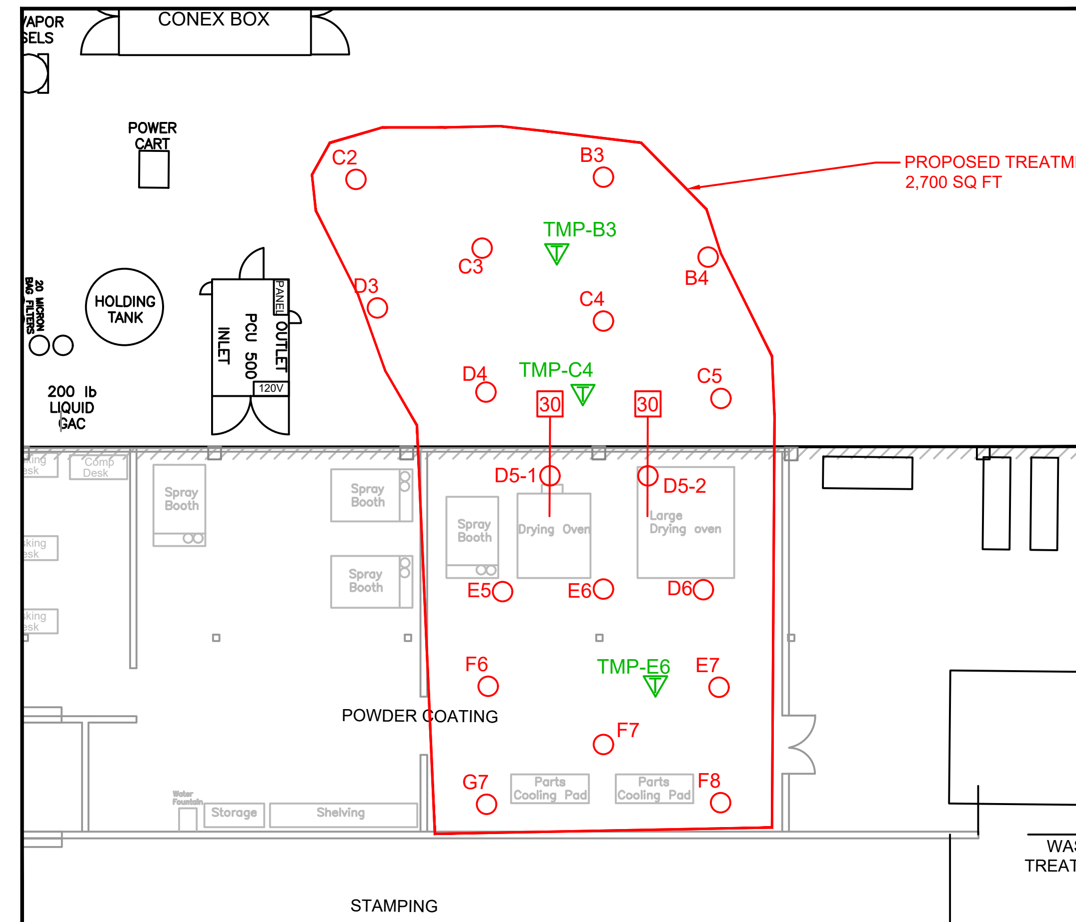
TRS Accelerating Value

AUGUST 2019



SITE LOCATION MAP

SHEET INDEX	
DRAWING NUMBER	TITLE AND DESCRIPTION
Y-1	SITE PLAN WITH SOIL SAMPLE RESULTS
Y-2	SITE PLAN WITH GROUNDWATER SAMPLE RESULTS
Y-3	SITE PLAN WITH ELECTRODE LAYOUT
Y-4	VAPOR RECOVERY PIPING
Y-5	HYDRAULIC CONTROL WELL PIPING
Y-6	EQUIPMENT PIPING PLAN
Y-7	SECURITY PLAN
M-1	EXTERIOR VERTICAL ELECTRODE DETAIL
M-2	INTERIOR VERTICAL ELECTRODE DETAIL
M-3	EXTERIOR ANGLED ELECTRODE DETAIL
M-4	EXTERIOR TEMPERATURE MONITORING POINT DETAIL
M-5	INTERIOR TEMPERATURE MONITORING POINT DETAIL
M-6	EXTERIOR HYDRAULIC CONTROL WELL DETAIL
M-7	INTERIOR HYDRAULIC CONTROL WELL DETAIL
M-8	TRENCH DETAILS
M-9	FENCE DETAIL
M-10	MONITORING WELL HEAD DETAIL



SITE PLAN

ELECTRICAL RESISTANCE HEATING DESIGN PACKAGE

PRELIMINARY

Not Approved for Construction

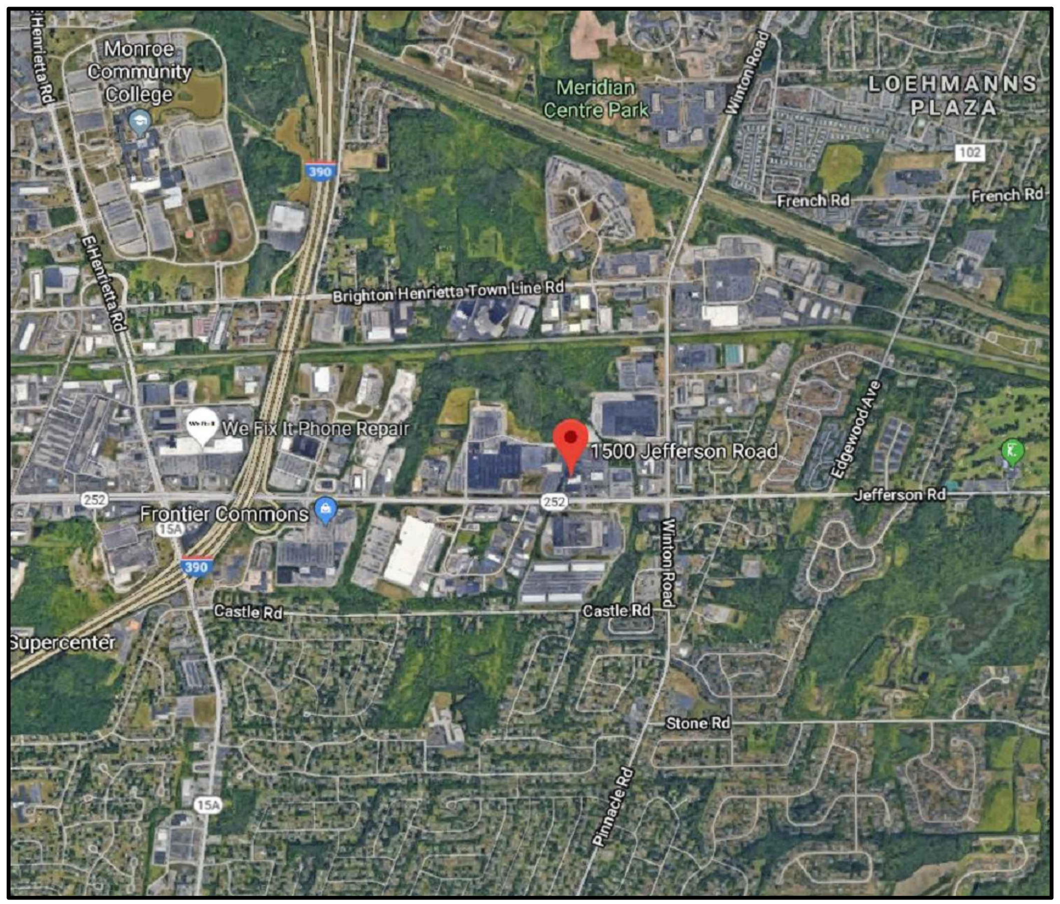
ELDRE CORPORATION
1500 JEFFERSON ROAD
HENRIETTA, NEW YORK 14623

Prepared by:

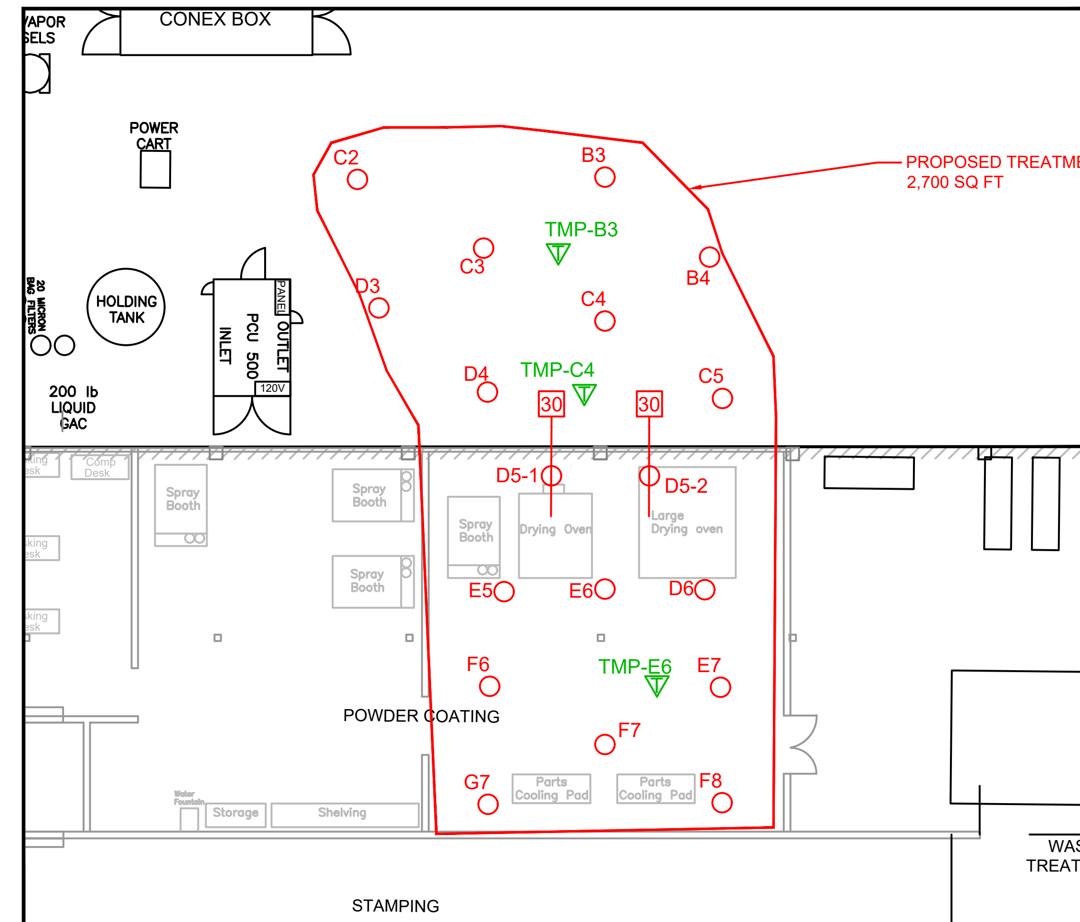
TRS Accelerating Value

AUGUST 2019

SHEET INDEX	
DRAWING NUMBER	TITLE AND DESCRIPTION
P-1	PROCESS FLOW DIAGRAM
P-2	PROCESS FLOW MASS BALANCE
E-1	ELECTRICAL ONE-LINE DIAGRAM LEGEND
E-2	ELECTRICAL ONE-LINE DIAGRAM REQUIREMENTS
E-3	ELECTRICAL ONE-LINE DIAGRAM
E-4	ELECTRICAL ONE-LINE DIAGRAM



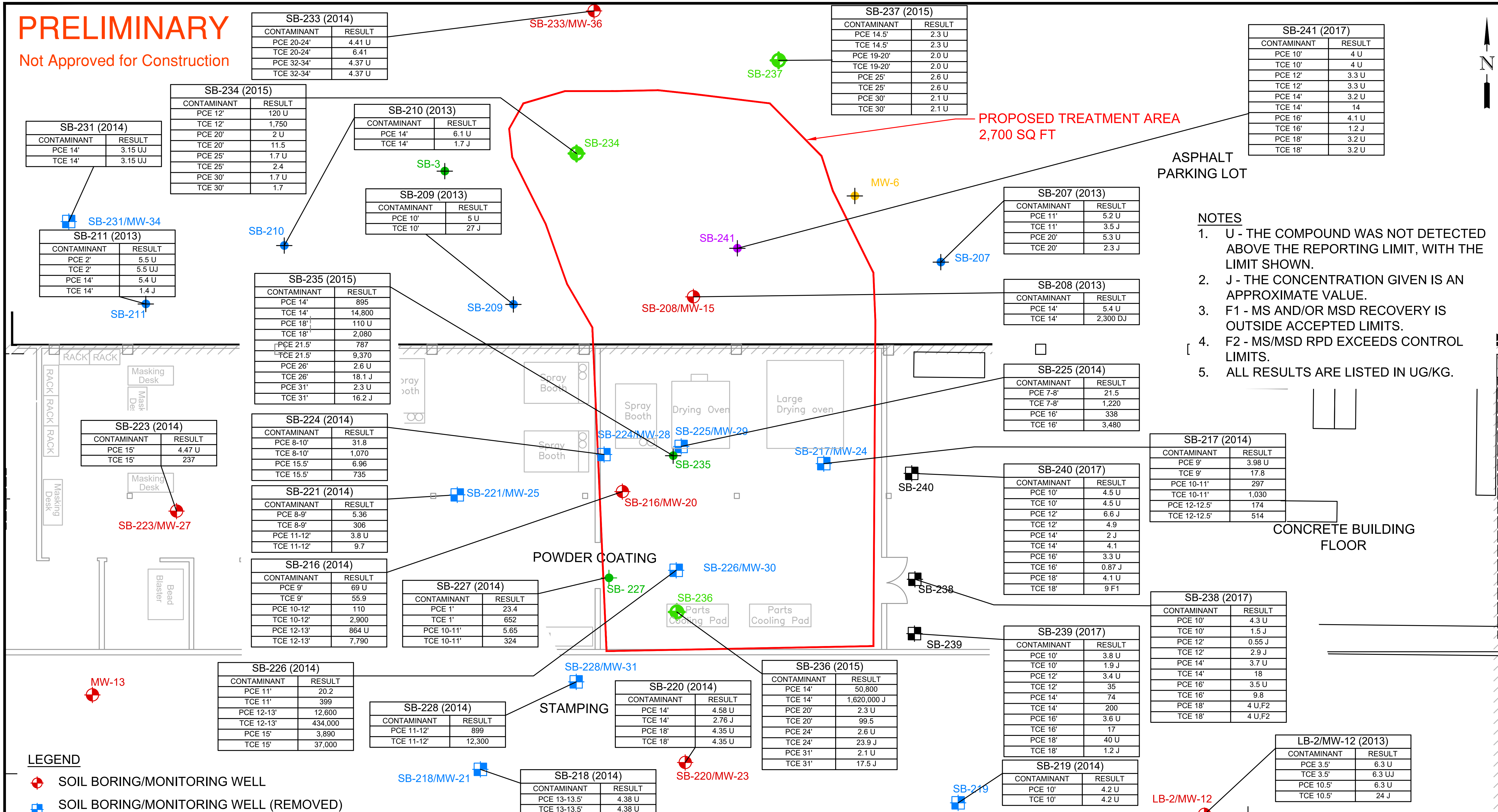
SITE LOCATION MAP



SITE PLAN

PRELIMINARY

Not Approved for Construction



SB-233 (2014)

CONTAMINANT	RESULT
PCE 20-24'	4.41 U
TCE 20-24'	6.41
PCE 32-34'	4.37 U
TCE 32-34'	4.37 U

SB-234 (2015)

CONTAMINANT	RESULT
PCE 12'	120 U
TCE 12'	1,750
PCE 20'	2 U
TCE 20'	11.5
PCE 25'	1.7 U
TCE 25'	2.4
PCE 30'	1.7 U
TCE 30'	1.7

SB-231 (2014)

CONTAMINANT	RESULT
PCE 14'	3.15 UJ
TCE 14'	3.15 UJ

SB-210 (2013)

CONTAMINANT	RESULT
PCE 14'	6.1 U
TCE 14'	1.7 J

SB-209 (2013)

CONTAMINANT	RESULT
PCE 10'	5 U
TCE 10'	27 J

SB-237 (2015)

CONTAMINANT	RESULT
PCE 14.5'	2.3 U
TCE 14.5'	2.3 U
PCE 19-20'	2.0 U
TCE 19-20'	2.0 U
PCE 25'	2.6 U
TCE 25'	2.6 U
PCE 30'	2.1 U
TCE 30'	2.1 U

SB-241 (2017)

CONTAMINANT	RESULT
PCE 10'	4 U
TCE 10'	4 U
PCE 12'	3.3 U
TCE 12'	3.3 U
PCE 14'	3.2 U
TCE 14'	14
PCE 16'	4.1 U
TCE 16'	1.2 J
PCE 18'	3.2 U
TCE 18'	3.2 U

SB-211 (2013)

CONTAMINANT	RESULT
PCE 2'	5.5 U
TCE 2'	5.5 UJ
PCE 14'	5.4 U
TCE 14'	1.4 J

SB-235 (2015)

CONTAMINANT	RESULT
PCE 14'	895
TCE 14'	14,800
PCE 18'	110 U
TCE 18'	2,080
PCE 21.5'	787
TCE 21.5'	9,370
PCE 26'	2.6 U
TCE 26'	18.1 J
PCE 31'	2.3 U
TCE 31'	16.2 J

SB-207 (2013)

CONTAMINANT	RESULT
PCE 11'	5.2 U
TCE 11'	3.5 J
PCE 20'	5.3 U
TCE 20'	2.3 J

SB-208 (2013)

CONTAMINANT	RESULT
PCE 14'	5.4 U
TCE 14'	2,300 DJ

NOTES

1. U - THE COMPOUND WAS NOT DETECTED ABOVE THE REPORTING LIMIT, WITH THE LIMIT SHOWN.
2. J - THE CONCENTRATION GIVEN IS AN APPROXIMATE VALUE.
3. F1 - MS AND/OR MSD RECOVERY IS OUTSIDE ACCEPTED LIMITS.
4. F2 - MS/MSD RPD EXCEEDS CONTROL LIMITS.
5. ALL RESULTS ARE LISTED IN UG/KG.

SB-225 (2014)

CONTAMINANT	RESULT
PCE 7-8'	21.5
TCE 7-8'	1,220
PCE 16'	338
TCE 16'	3,480

SB-223 (2014)

CONTAMINANT	RESULT
PCE 15'	4.47 U
TCE 15'	237

SB-224 (2014)

CONTAMINANT	RESULT
PCE 8-10'	31.8
TCE 8-10'	1,070
PCE 15.5'	6.96
TCE 15.5'	735

SB-217 (2014)

CONTAMINANT	RESULT
PCE 9'	3.98 U
TCE 9'	17.8
PCE 10-11'	297
TCE 10-11'	1,030
PCE 12-12.5'	174
TCE 12-12.5'	514

SB-221 (2014)

CONTAMINANT	RESULT
PCE 8-9'	5.36
TCE 8-9'	306
PCE 11-12'	3.8 U
TCE 11-12'	9.7

SB-240 (2017)

CONTAMINANT	RESULT
PCE 10'	4.5 U
TCE 10'	4.5 U
PCE 12'	6.6 J
TCE 12'	4.9
PCE 14'	2 J
TCE 14'	4.1
PCE 16'	3.3 U
TCE 16'	0.87 J
PCE 18'	4.1 U
TCE 18'	9 F1

SB-216 (2014)

CONTAMINANT	RESULT
PCE 9'	69 U
TCE 9'	55.9
PCE 10-12'	110
TCE 10-12'	2,900
PCE 12-13'	864 U
TCE 12-13'	7,790

SB-227 (2014)

CONTAMINANT	RESULT
PCE 1'	23.4
TCE 1'	652
PCE 10-11'	5.65
TCE 10-11'	324

SB-238 (2017)

CONTAMINANT	RESULT
PCE 10'	4.3 U
TCE 10'	1.5 J
PCE 12'	0.55 J
TCE 12'	2.9 J
PCE 14'	3.7 U
TCE 14'	18
PCE 16'	3.5 U
TCE 16'	9.8
PCE 18'	4 U,F2
TCE 18'	4 U,F2

SB-239 (2017)

CONTAMINANT	RESULT
PCE 10'	3.8 U
TCE 10'	1.9 J
PCE 12'	3.4 U
TCE 12'	35
PCE 14'	74
TCE 14'	200
PCE 16'	3.6 U
TCE 16'	17
PCE 18'	40 U
TCE 18'	1.2 J

SB-226 (2014)

CONTAMINANT	RESULT
PCE 11'	20.2
TCE 11'	399
PCE 12-13'	12,600
TCE 12-13'	434,000
PCE 15'	3,890
TCE 15'	37,000

SB-236 (2015)

CONTAMINANT	RESULT
PCE 14'	50,800
TCE 14'	1,620,000 J
PCE 20'	2.3 U
TCE 20'	99.5
PCE 24'	2.6 U
TCE 24'	23.9 J
PCE 31'	2.1 U
TCE 31'	17.5 J

SB-220 (2014)

CONTAMINANT	RESULT
PCE 14'	4.58 U
TCE 14'	2.76 J
PCE 18'	4.35 U
TCE 18'	4.35 U

SB-228 (2014)

CONTAMINANT	RESULT
PCE 11-12'	899
TCE 11-12'	12,300

SB-218 (2014)

CONTAMINANT	RESULT
PCE 13-13.5'	4.38 U
TCE 13-13.5'	4.38 U

SB-219 (2014)

CONTAMINANT	RESULT
PCE 10'	4.2 U
TCE 10'	4.2 U

LB-2/MW-12 (2013)

CONTAMINANT	RESULT
PCE 3.5'	6.3 U
TCE 3.5'	6.3 UJ
PCE 10.5'	6.3 U
TCE 10.5'	24 J

LEGEND

- SOIL BORING/MONITORING WELL
- SOIL BORING/MONITORING WELL (REMOVED)
- PRE-BCP MONITORING WELL
- DELINEATION SOIL BORING
- RAA INVESTIGATION SOIL BORING
- PRE-BCP SOIL BORING
- PILOT TEST BASELINE BORING
- RI SOIL BORING

TRS
Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA
DRAWN BY: A. PEABODY
CHECKED BY: M. NANISTA
PROJECT MANAGER: TRS PERSONNEL
QSAT REVIEW: xx/xx/xx

SITE: ELDRE CORPORATION
LOCATION: HENRIETTA, NEW YORK
CLIENT: LABELLA ASSOCIATES

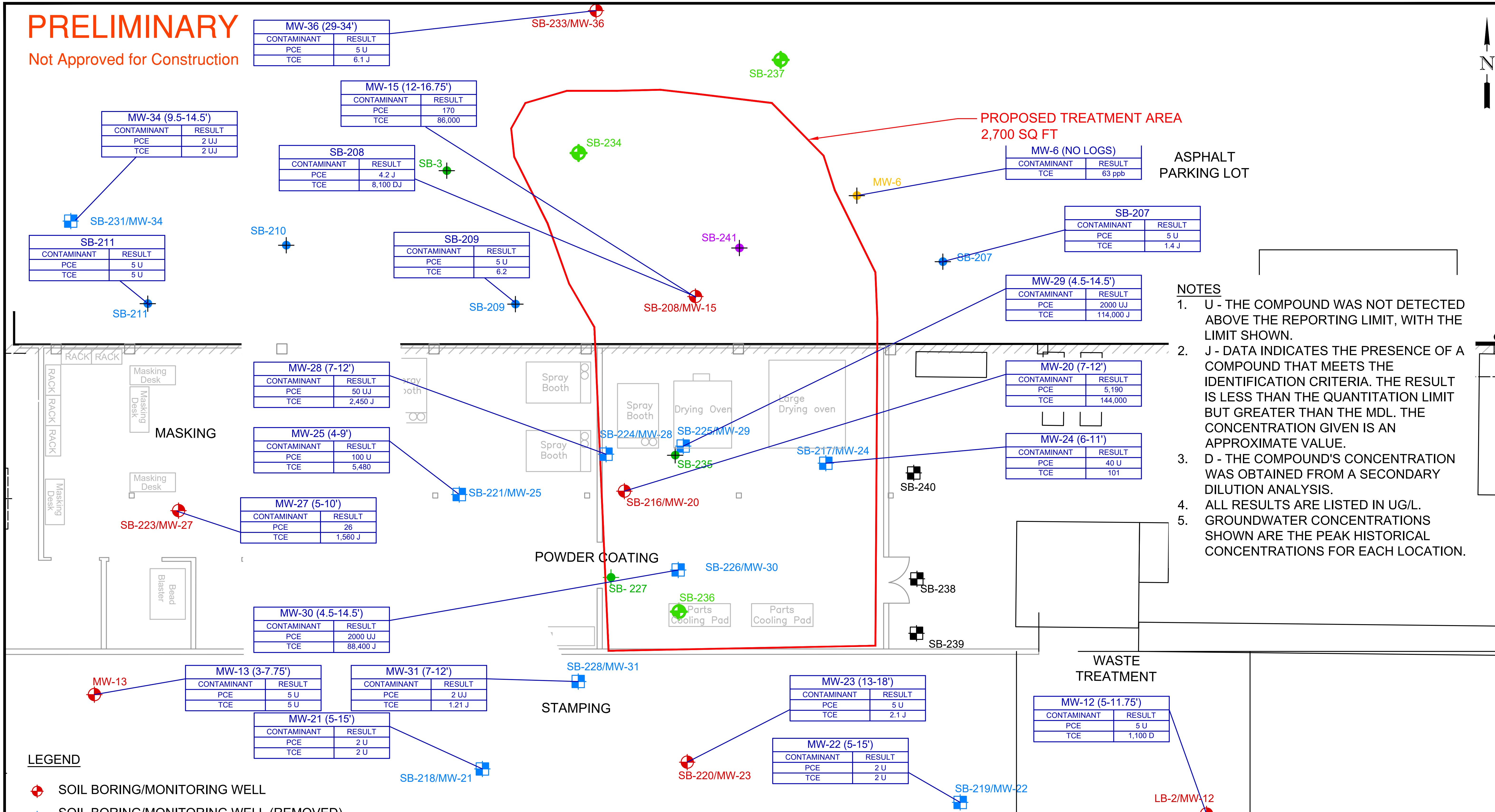
SITE PLAN WITH SOIL SAMPLE RESULTS

APPROVED FOR CONSTRUCTION
BY
DATE

DATE: 2019.JUL.25
PROJECT: NY.ELD.1828
SHEET: Y-1

PRELIMINARY

Not Approved for Construction



MW-36 (29-34')

CONTAMINANT	RESULT
PCE	5 U
TCE	6.1 J

MW-15 (12-16.75')

CONTAMINANT	RESULT
PCE	170
TCE	86,000

MW-34 (9.5-14.5')

CONTAMINANT	RESULT
PCE	2 UJ
TCE	2 UJ

SB-208

CONTAMINANT	RESULT
PCE	4.2 J
TCE	8,100 DJ

MW-6 (NO LOGS)

CONTAMINANT	RESULT
TCE	63 ppb

SB-207

CONTAMINANT	RESULT
PCE	5 U
TCE	1.4 J

SB-211

CONTAMINANT	RESULT
PCE	5 U
TCE	5 U

SB-209

CONTAMINANT	RESULT
PCE	5 U
TCE	6.2

MW-29 (4.5-14.5')

CONTAMINANT	RESULT
PCE	2000 UJ
TCE	114,000 J

MW-28 (7-12')

CONTAMINANT	RESULT
PCE	50 UJ
TCE	2,450 J

MW-20 (7-12')

CONTAMINANT	RESULT
PCE	5,190
TCE	144,000

MW-25 (4-9')

CONTAMINANT	RESULT
PCE	100 U
TCE	5,480

MW-24 (6-11')

CONTAMINANT	RESULT
PCE	40 U
TCE	101

MW-27 (5-10')

CONTAMINANT	RESULT
PCE	26
TCE	1,560 J

MW-30 (4.5-14.5')

CONTAMINANT	RESULT
PCE	2000 UJ
TCE	88,400 J

MW-13 (3-7.75')

CONTAMINANT	RESULT
PCE	5 U
TCE	5 U

MW-31 (7-12')

CONTAMINANT	RESULT
PCE	2 UJ
TCE	1.21 J

MW-23 (13-18')

CONTAMINANT	RESULT
PCE	5 U
TCE	2.1 J

MW-12 (5-11.75')

CONTAMINANT	RESULT
PCE	5 U
TCE	1,100 D

MW-21 (5-15')

CONTAMINANT	RESULT
PCE	2 U
TCE	2 U

MW-22 (5-15')

CONTAMINANT	RESULT
PCE	2 U
TCE	2 U

NOTES

1. U - THE COMPOUND WAS NOT DETECTED ABOVE THE REPORTING LIMIT, WITH THE LIMIT SHOWN.
2. J - DATA INDICATES THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA. THE RESULT IS LESS THAN THE QUANTITATION LIMIT BUT GREATER THAN THE MDL. THE CONCENTRATION GIVEN IS AN APPROXIMATE VALUE.
3. D - THE COMPOUND'S CONCENTRATION WAS OBTAINED FROM A SECONDARY DILUTION ANALYSIS.
4. ALL RESULTS ARE LISTED IN UG/L.
5. GROUNDWATER CONCENTRATIONS SHOWN ARE THE PEAK HISTORICAL CONCENTRATIONS FOR EACH LOCATION.

LEGEND

- SOIL BORING/MONITORING WELL
- SOIL BORING/MONITORING WELL (REMOVED)
- PRE-BCP MONITORING WELL
- DELINEATION SOIL BORING
- RAA INVESTIGATION SOIL BORING
- PRE-BCP SOIL BORING
- PILOT TEST BASELINE BORING
- RI SOIL BORING

REMEDIAL GOAL: 500 μg/L TCE

TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	M. NANISTA
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

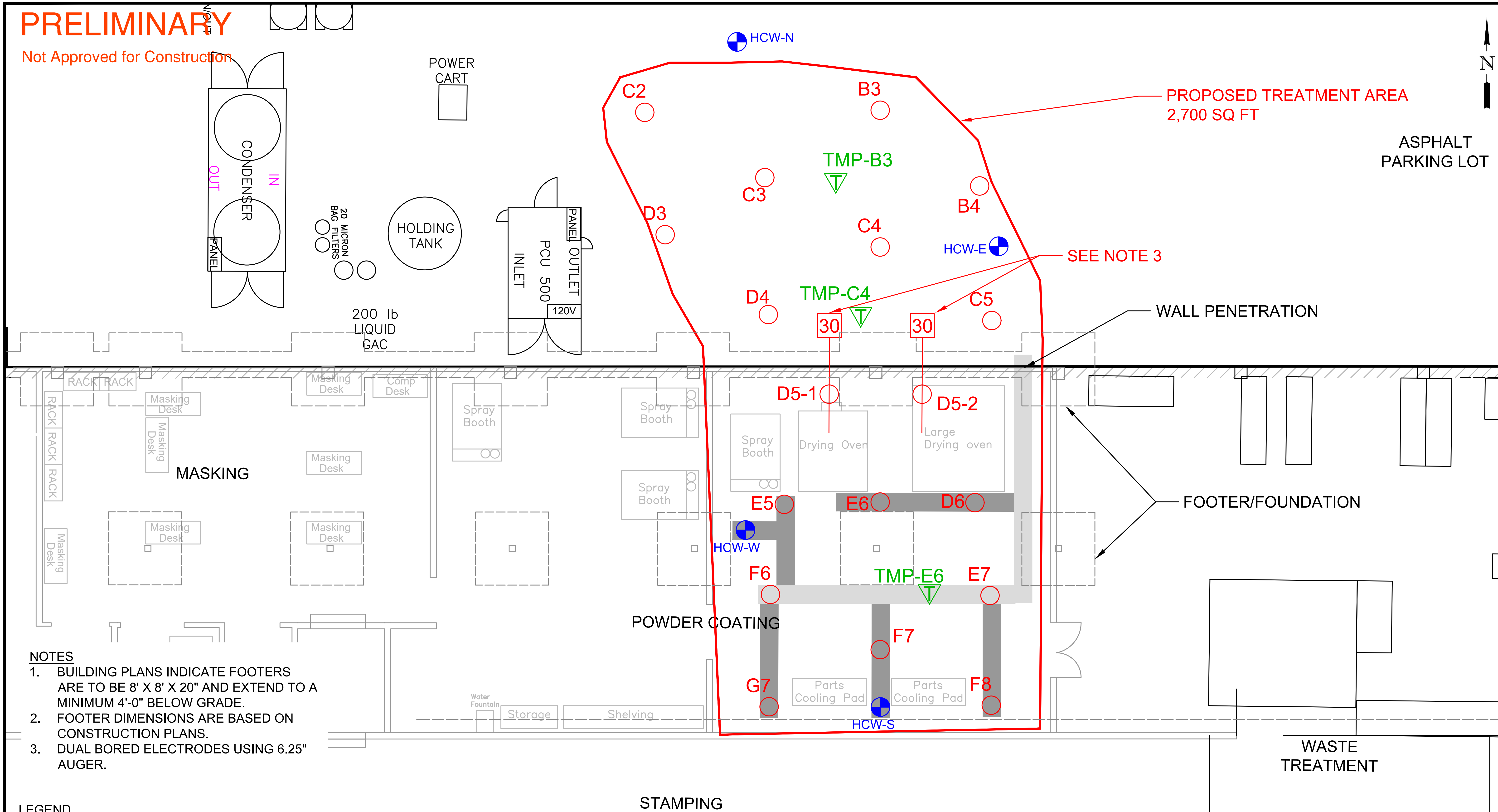
SITE PLAN
WITH GROUNDWATER SAMPLE RESULTS

APPROVED FOR CONSTRUCTION

BY ____________

DATE ____________

DATE	2019.JUL.25
PROJECT	NY.ELD.1828
SHEET	Y-2



NOTES

1. BUILDING PLANS INDICATE FOOTERS ARE TO BE 8' X 8' X 20" AND EXTEND TO A MINIMUM 4'-0" BELOW GRADE.
2. FOOTER DIMENSIONS ARE BASED ON CONSTRUCTION PLANS.
3. DUAL BORED ELECTRODES USING 6.25" AUGER.

LEGEND

- ELECTRODE (QTY. 16)
- ANGLED ELECTRODE WITH DRILLING ANGLE (QTY. 2)
- TEMPERATURE MONITORING POINT (QTY. 3)
- HYDRAULIC CONTROL WELL(QTY. 4)
- 24" WIDE TRENCH
- 12" WIDE TRENCH

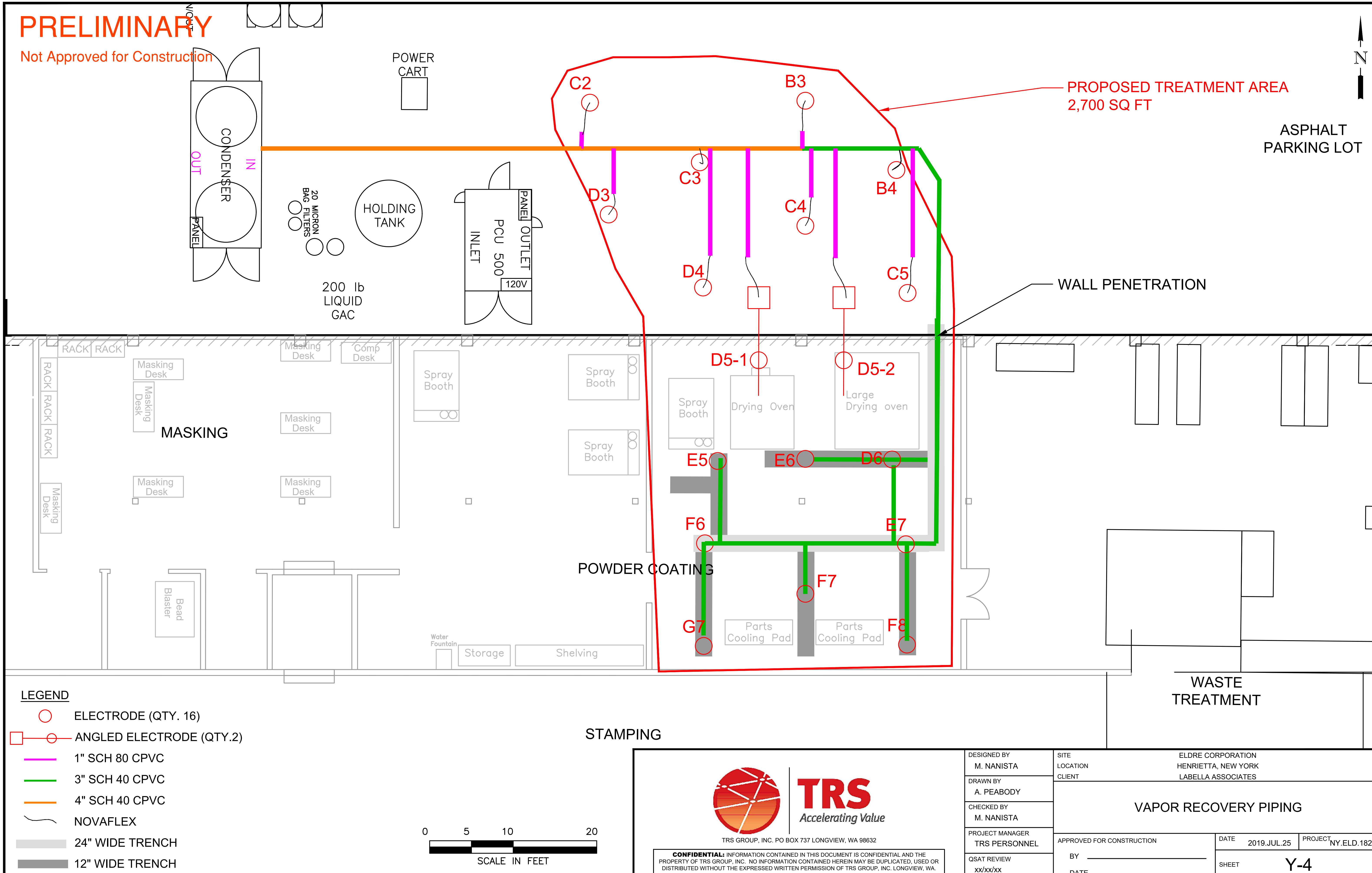
0 5 10 20
SCALE IN FEET

TRS
Accelerating Value
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	M. NANISTA
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

SITE PLAN WITH ELECTRODE LAYOUT

APPROVED FOR CONSTRUCTION	
BY	
DATE	
DATE	2019.JUL.25
PROJECT	NY.ELD.1828
SHEET	Y-3


PRELIMINARY
Not Approved for Construction
POWER CART
CONDENSER
OUT
IN
PANEL
20 MICRON BAG FILTERS
HOLDING TANK
200 lb LIQUID GAC
PCU 500
INLET
OUTLET
PANEL
120V
C2
B3
C3
D3
C4
B4
D4
C5
PROPOSED TREATMENT AREA
2,700 SQ FT
N
ASPHALT PARKING LOT
WALL PENETRATION
D5-1
D5-2
RACK
Masking Desk
Comp Desk
Spray Booth
Drying Oven
Large Drying oven
MASKING
E5
E6
D6
F6
E7
F7
G7
F8
POWDER COATING
Bead Blaster
Water Fountain
Storage
Shelving
Parts Cooling Pad
WASTE TREATMENT
STAMPING
LEGEND
ELECTRODE (QTY. 16)
ANGLED ELECTRODE (QTY.2)
1" SCH 80 CPVC
3" SCH 40 CPVC
4" SCH 40 CPVC
NOVAFLEX
24" WIDE TRENCH
12" WIDE TRENCH
0 5 10 20
SCALE IN FEET
TRS
Accelerating Value
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632
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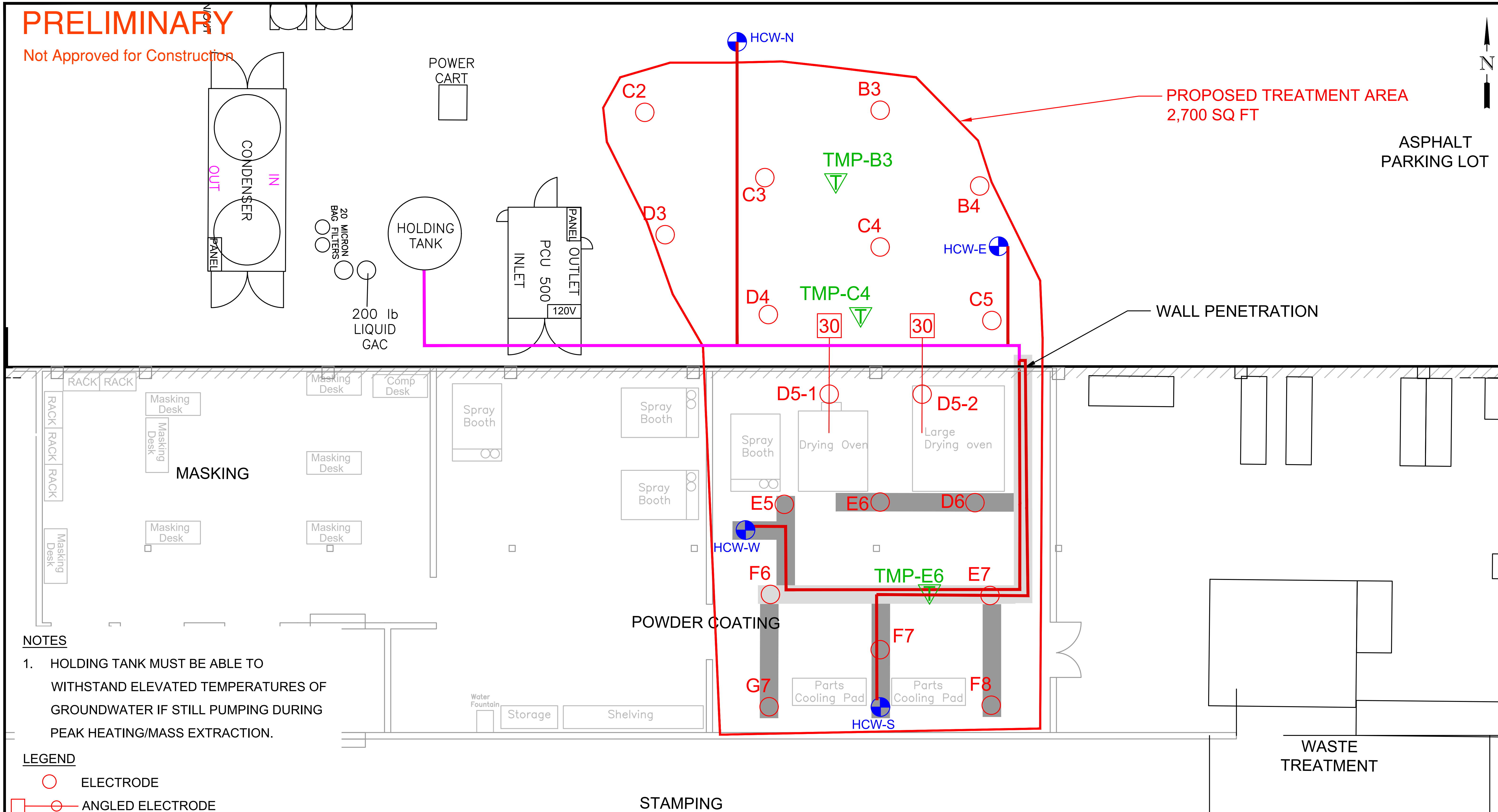
DESIGNED BY M. NANISTA
DRAWN BY A. PEABODY
CHECKED BY M. NANISTA
PROJECT MANAGER TRS PERSONNEL
QSAT REVIEW xx/xx/xx
SITE ELDRE CORPORATION
LOCATION HENRIETTA, NEW YORK
CLIENT LABELLA ASSOCIATES
VAPOR RECOVERY PIPING
APPROVED FOR CONSTRUCTION
BY
DATE
DATE 2019.JUL.25
PROJECT NY.ELD.1828
SHEET Y-4

PRELIMINARY

Not Approved for Construction



NOTES

1. HOLDING TANK MUST BE ABLE TO WITHSTAND ELEVATED TEMPERATURES OF GROUNDWATER IF STILL PUMPING DURING PEAK HEATING/MASS EXTRACTION.

LEGEND

- ELECTRODE
- ANGLED ELECTRODE
- TEMPERATURE MONITORING POINT
- HYDRAULIC CONTROL WELL
- 24" WIDE TRENCH
- 12" WIDE TRENCH
- 1/2" CPVC
- 1" CPVC

0 5 10 20

SCALE IN FEET

TRS

Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

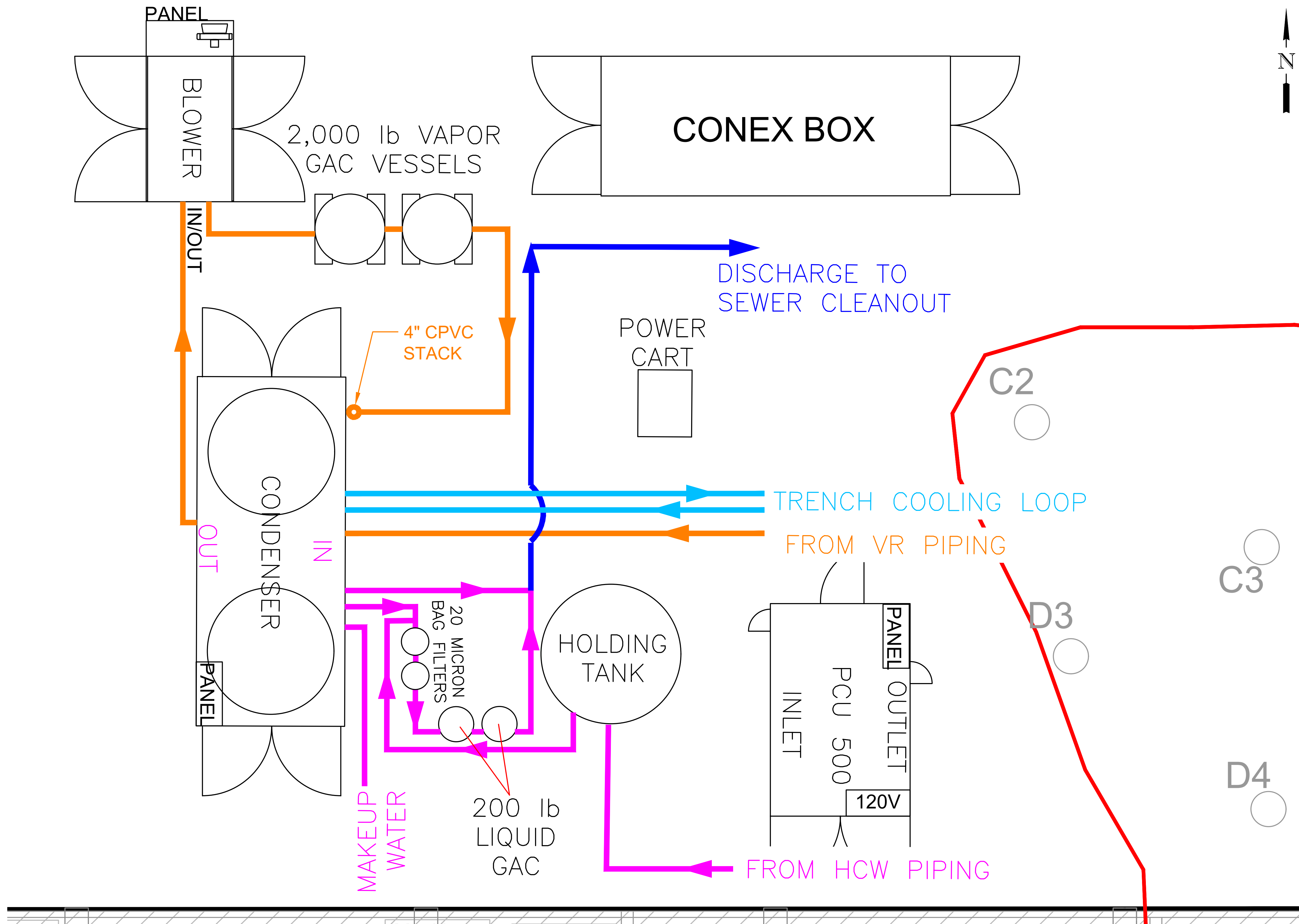
DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	M. NANISTA
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

HYDRAULIC CONTROL WELL PIPING

APPROVED FOR CONSTRUCTION	
BY	
DATE	
DATE	2019.JUL.25
PROJECT	NY.ELD.1828
SHEET	Y-5

PRELIMINARY

Not Approved for Construction



LEGEND

○	ELECTRODE
(light blue line)	1" PEX
(red line)	1/2" CPVC
(magenta line)	1" CPVC
(blue line)	2" CPVC
(orange line)	4" CPVC

0 3 6 12

SCALE IN FEET

TRS

Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA

DRAWN BY: A. PEABODY

CHECKED BY: M. NANISTA

PROJECT MANAGER: TRS PERSONNEL

QSAT REVIEW: xx/xx/xx

SITE: ELDRE CORPORATION

LOCATION: HENRIETTA, NEW YORK

CLIENT: LABELLA ASSOCIATES

EQUIPMENT PIPING PLAN

APPROVED FOR CONSTRUCTION

BY ____________

DATE ____________

DATE: 2019.JUL.25

PROJECT: NY.ELD.1828

SHEET: Y-6

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TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

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DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	M. NANISTA
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

SECURITY PLAN

APPROVED FOR CONSTRUCTION

BY ____________________

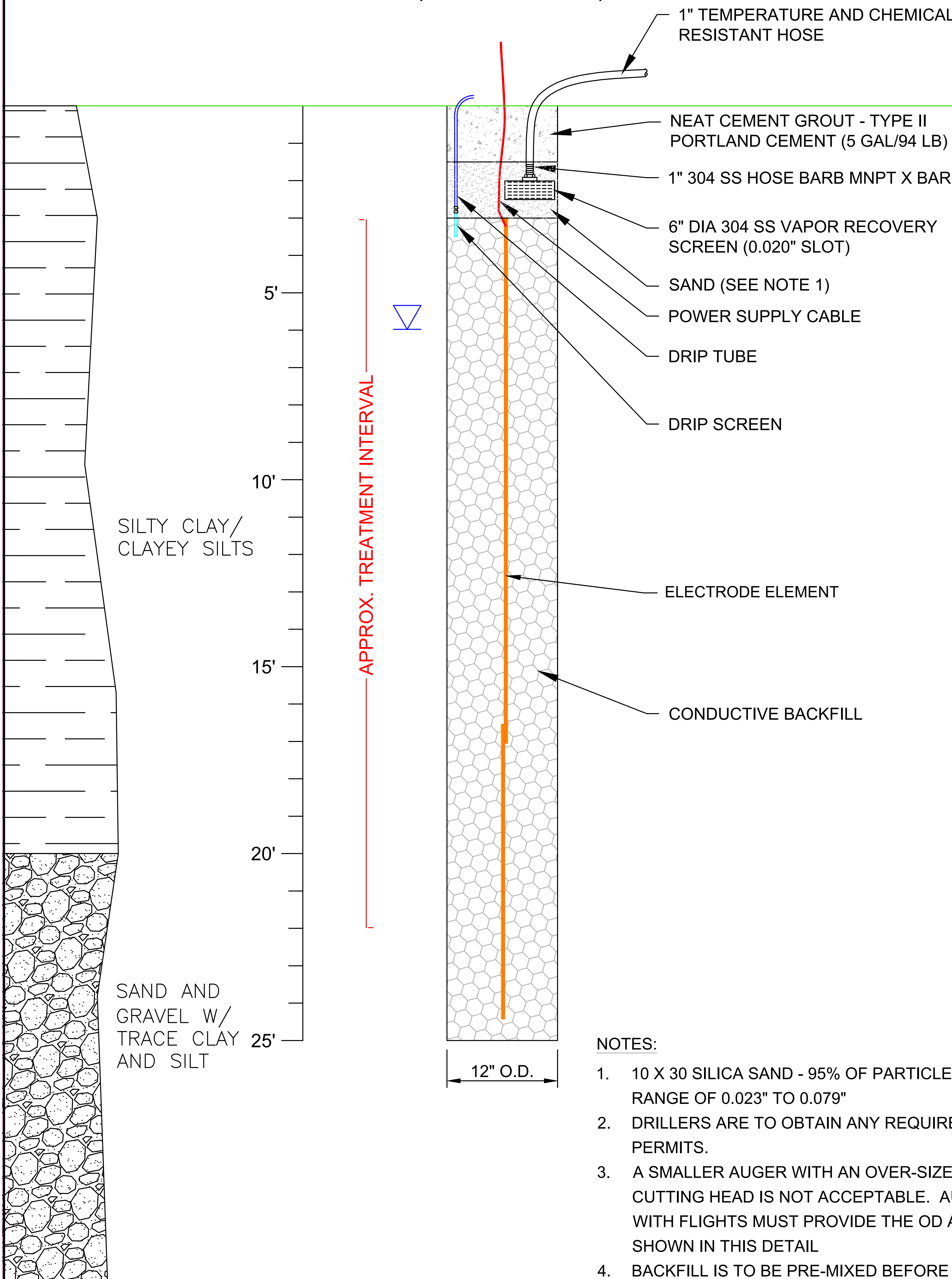
DATE ____________________

DATE	2019.JUL.25
PROJECT	NY.ELD.1828
SHEET	Y-7

PRELIMINARY

Not Approved for Construction

EXTERIOR VERTICAL ELECTRODE DETAIL (TYPICAL OF 8)



NOTES:

1. 10 X 30 SILICA SAND - 95% OF PARTICLES IN THE RANGE OF 0.023" TO 0.079"
2. DRILLERS ARE TO OBTAIN ANY REQUIRED WELL PERMITS.
3. A SMALLER AUGER WITH AN OVER-SIZED CUTTING HEAD IS NOT ACCEPTABLE. AUGERS WITH FLIGHTS MUST PROVIDE THE OD AS SHOWN IN THIS DETAIL
4. BACKFILL IS TO BE PRE-MIXED BEFORE EMPLACEMENT.

TRS Accelerating Value

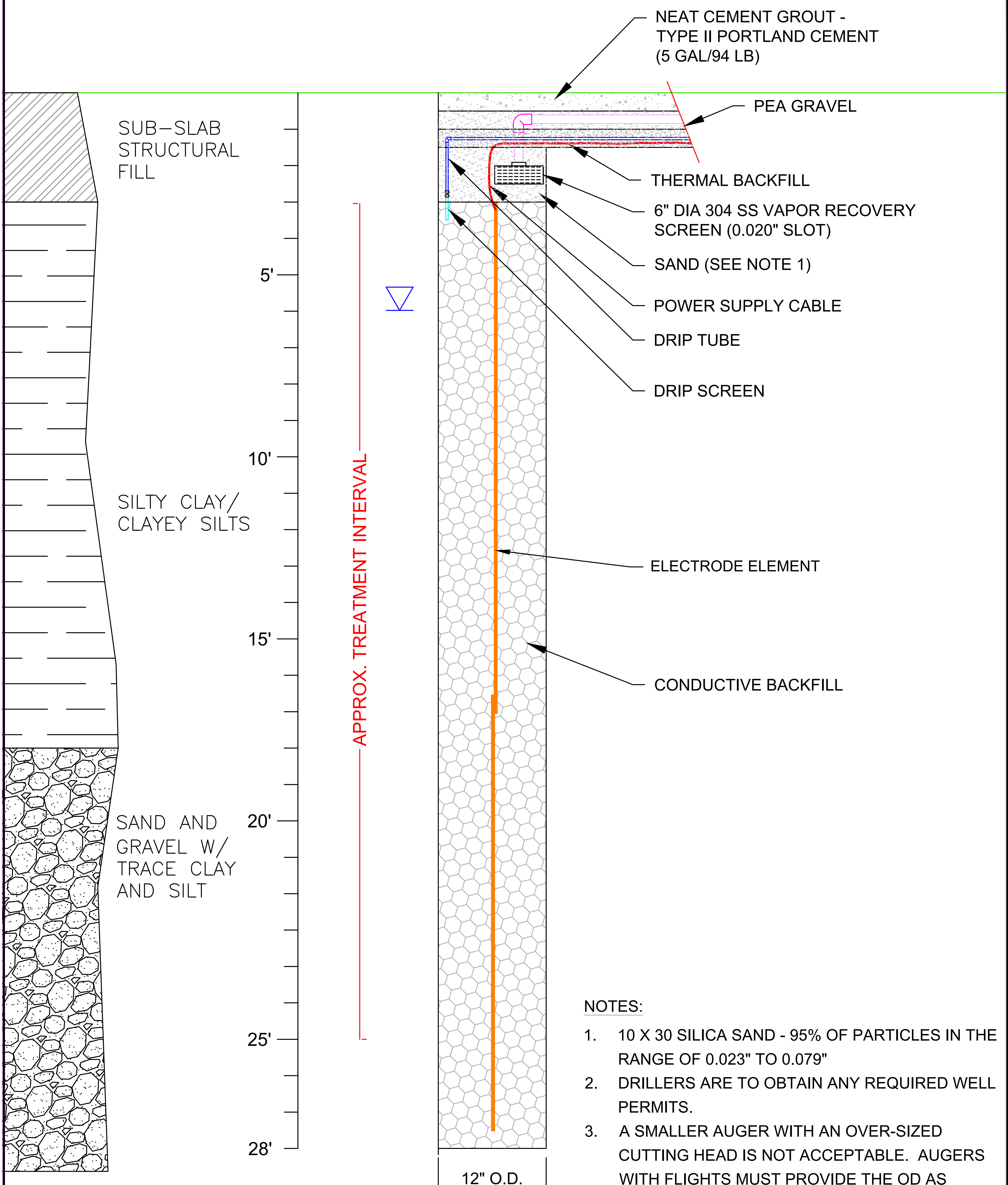
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA	SITE: ELDRE CORPORATION		
DRAWN BY: A. PEABODY	LOCATION: HENRIETTA, NEW YORK		
CHECKED BY: PENDING APPROVAL	CLIENT: LABELLA ASSOCIATES		
PROJECT MANAGER: TRS PERSONNEL	EXTERIOR VERTICAL ELECTRODE DETAIL		
QSAT REVIEW: xx/xx/xx	APPROVED FOR CONSTRUCTION BY ______ DATE ______	DATE: 2019.JUL.17	PROJECT: NY.ELD.1828
		SHEET: M-1	

PRELIMINARY

Not Approved for Construction

INTERIOR VERTICAL ELECTRODE DETAIL
(TYPICAL OF 8)



NOTES:

1. 10 X 30 SILICA SAND - 95% OF PARTICLES IN THE RANGE OF 0.023" TO 0.079"
2. DRILLERS ARE TO OBTAIN ANY REQUIRED WELL PERMITS.
3. A SMALLER AUGER WITH AN OVER-SIZED CUTTING HEAD IS NOT ACCEPTABLE. AUGERS WITH FLIGHTS MUST PROVIDE THE OD AS SHOWN IN THIS DETAIL
4. BACKFILL IS TO BE PRE-MIXED BEFORE EMPLACEMENT.

TRS Accelerating Value

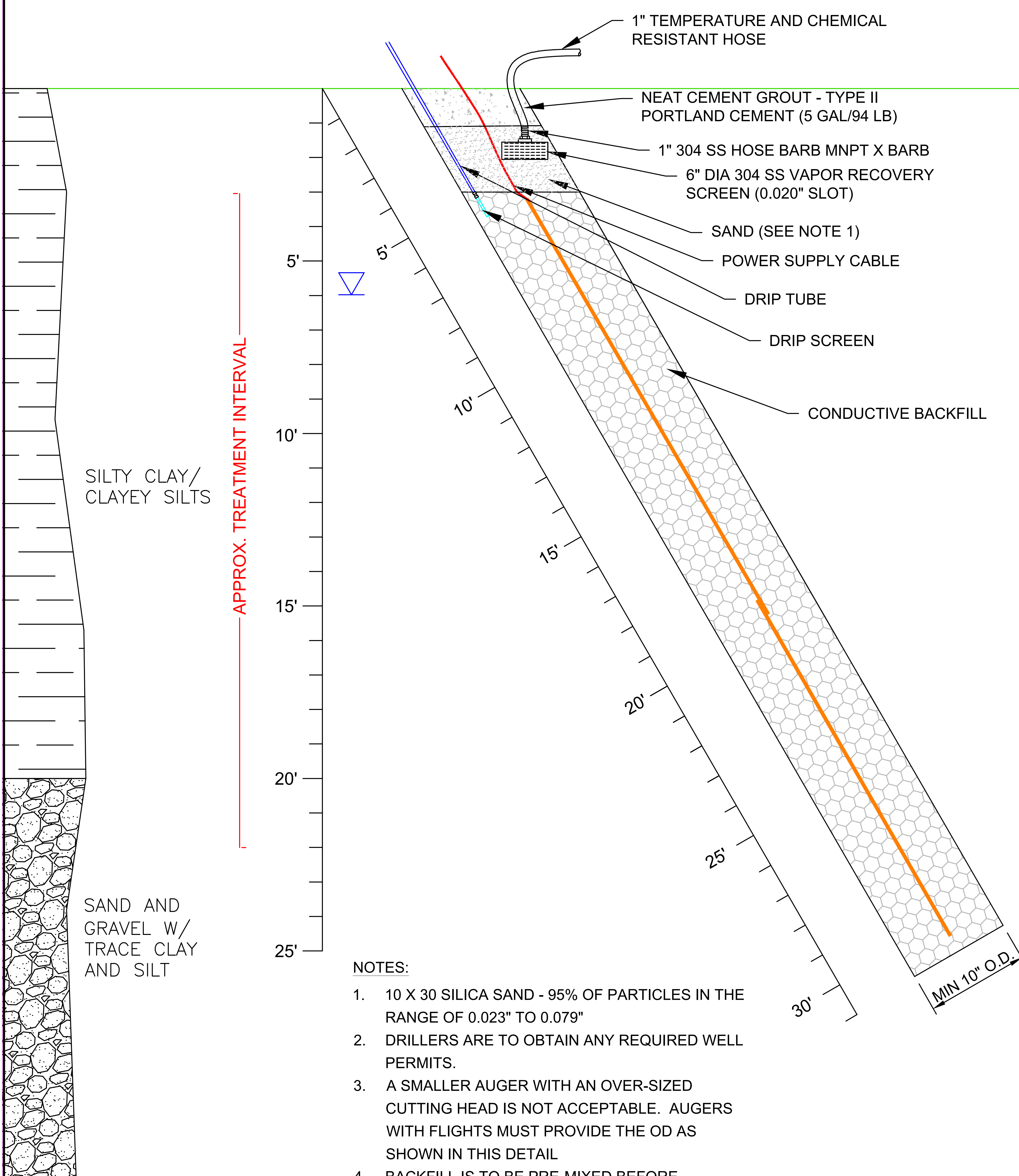
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA	SITE: ELDRE CORPORATION		
	LOCATION: HENRIETTA, NEW YORK		
	CLIENT: LABELLA ASSOCIATES		
DRAWN BY: A. PEABODY	INTERIOR VERTICAL ELECTRODE DETAIL		
CHECKED BY: PENDING APPROVAL			
PROJECT MANAGER: TRS PERSONNEL	APPROVED FOR CONSTRUCTION	DATE: 2019.JUL.17	PROJECT: NY.ELD.1828
QSAT REVIEW: xx/xx/xx	BY ______ DATE ______	SHEET: M-2	

PRELIMINARY

Not Approved for Construction

EXTERIOR ANGLED ELECTRODE DETAIL (TYPICAL OF 2)



NOTES:

1. 10 X 30 SILICA SAND - 95% OF PARTICLES IN THE RANGE OF 0.023" TO 0.079"
2. DRILLERS ARE TO OBTAIN ANY REQUIRED WELL PERMITS.
3. A SMALLER AUGER WITH AN OVER-SIZED CUTTING HEAD IS NOT ACCEPTABLE. AUGERS WITH FLIGHTS MUST PROVIDE THE OD AS SHOWN IN THIS DETAIL
4. BACKFILL IS TO BE PRE-MIXED BEFORE EMPLACEMENT.
5. DRILLING ANGLE IS 30 DEGREES.
6. DRILLED WITH 6.25" AUGER.

TRS Accelerating Value

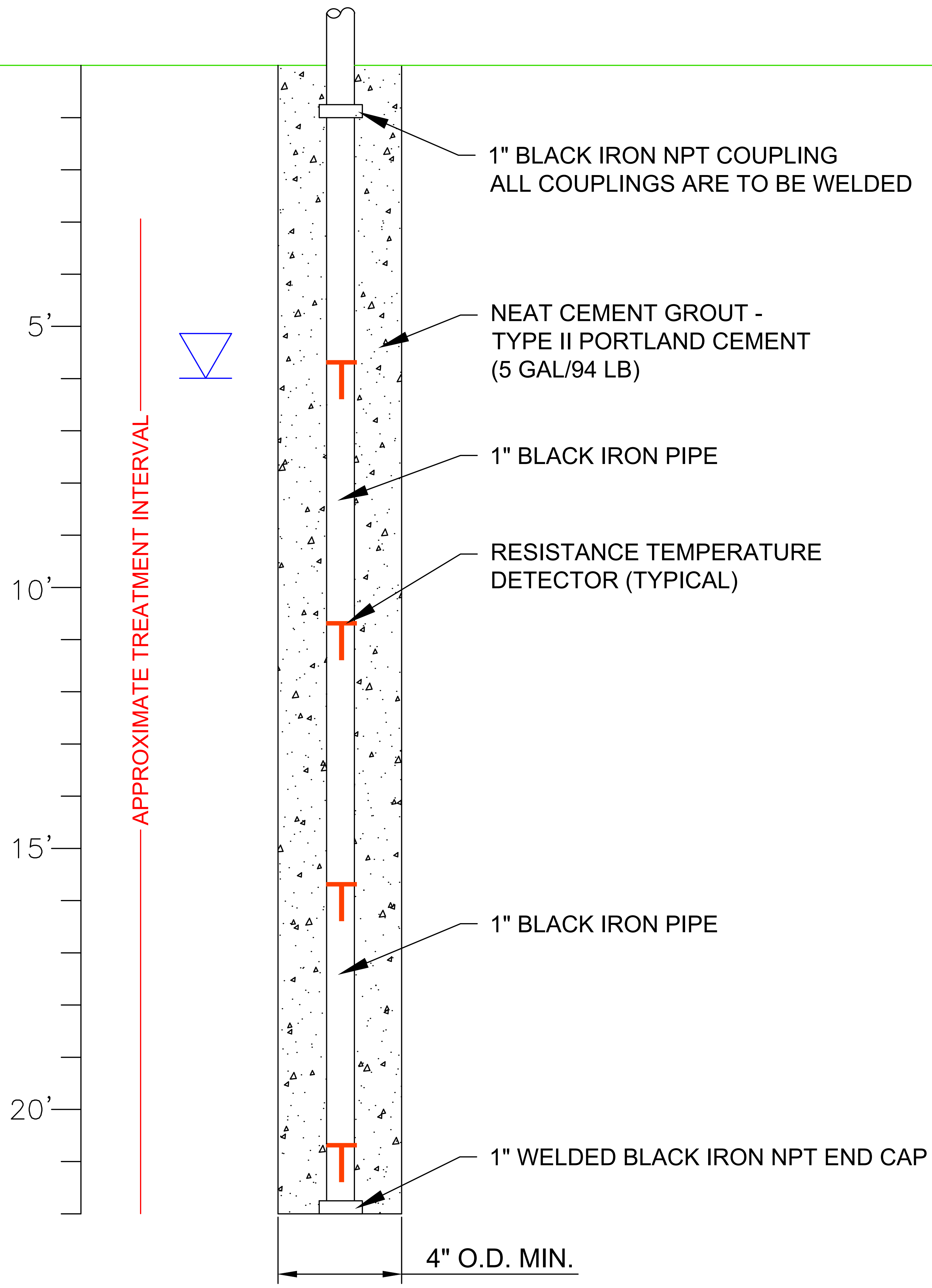
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	PENDING APPROVAL
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES
TITLE	EXTERIOR ANGLED ELECTRODE DETAIL
APPROVED FOR CONSTRUCTION	BY ______ DATE ______
DATE	2019.JUL.17
PROJECT	NY.ELD.1828
SHEET	M-3

EXTERIOR TEMPERATURE MONITORING POINT DETAIL (TYPICAL OF 2)

PRELIMINARY

Not Approved for Construction



TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	PENDING APPROVAL
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

EXTERIOR
TEMPERATURE MONITORING POINT DETAIL

APPROVED FOR CONSTRUCTION

BY ____________

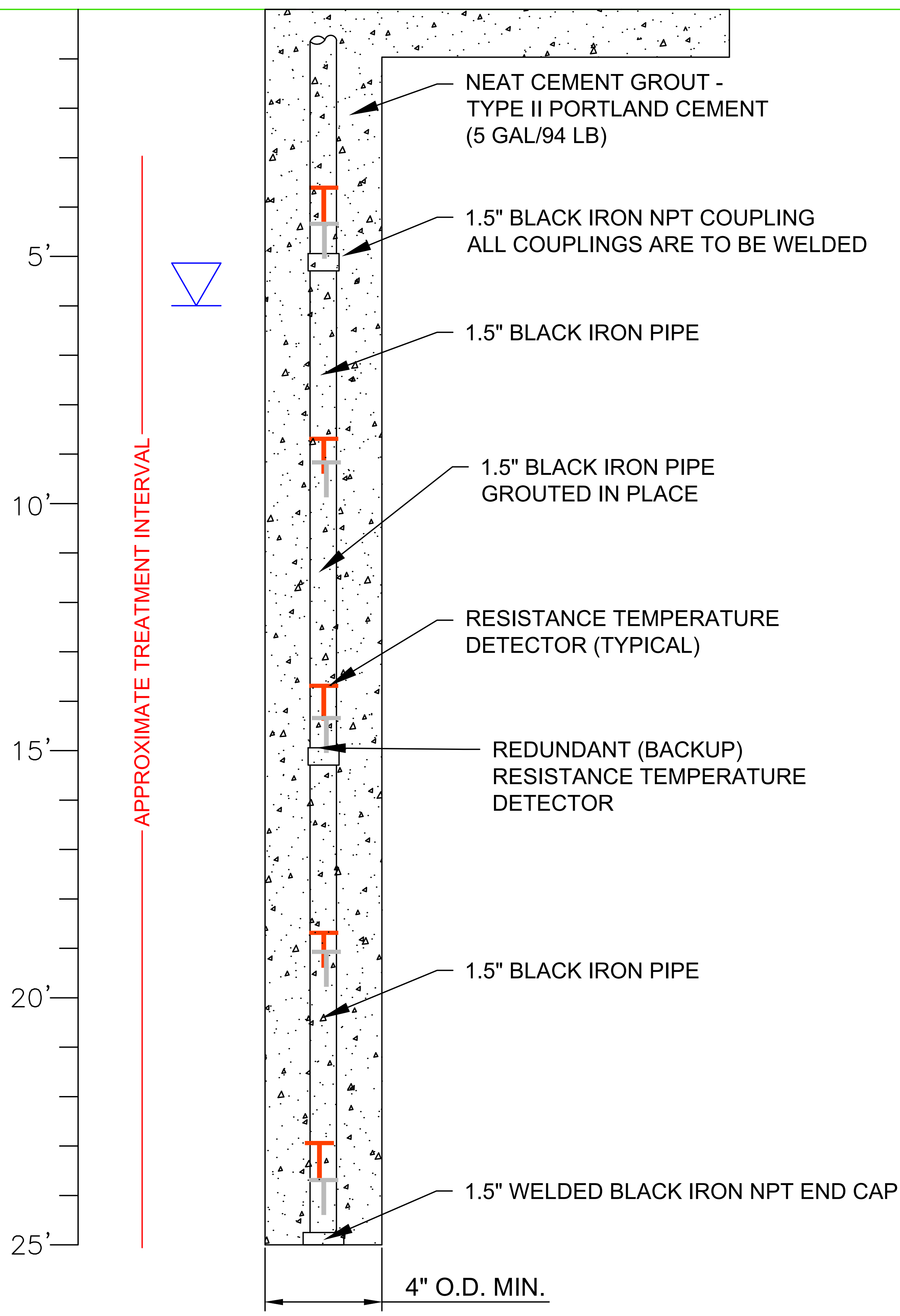
DATE ____________

DATE	2019.JUL.17
PROJECT	NY.ELD.1828
SHEET	M-4

PRELIMINARY

Not Approved for Construction

INTERIOR TEMPERATURE MONITORING POINT DETAIL
(TYPICAL OF 1)



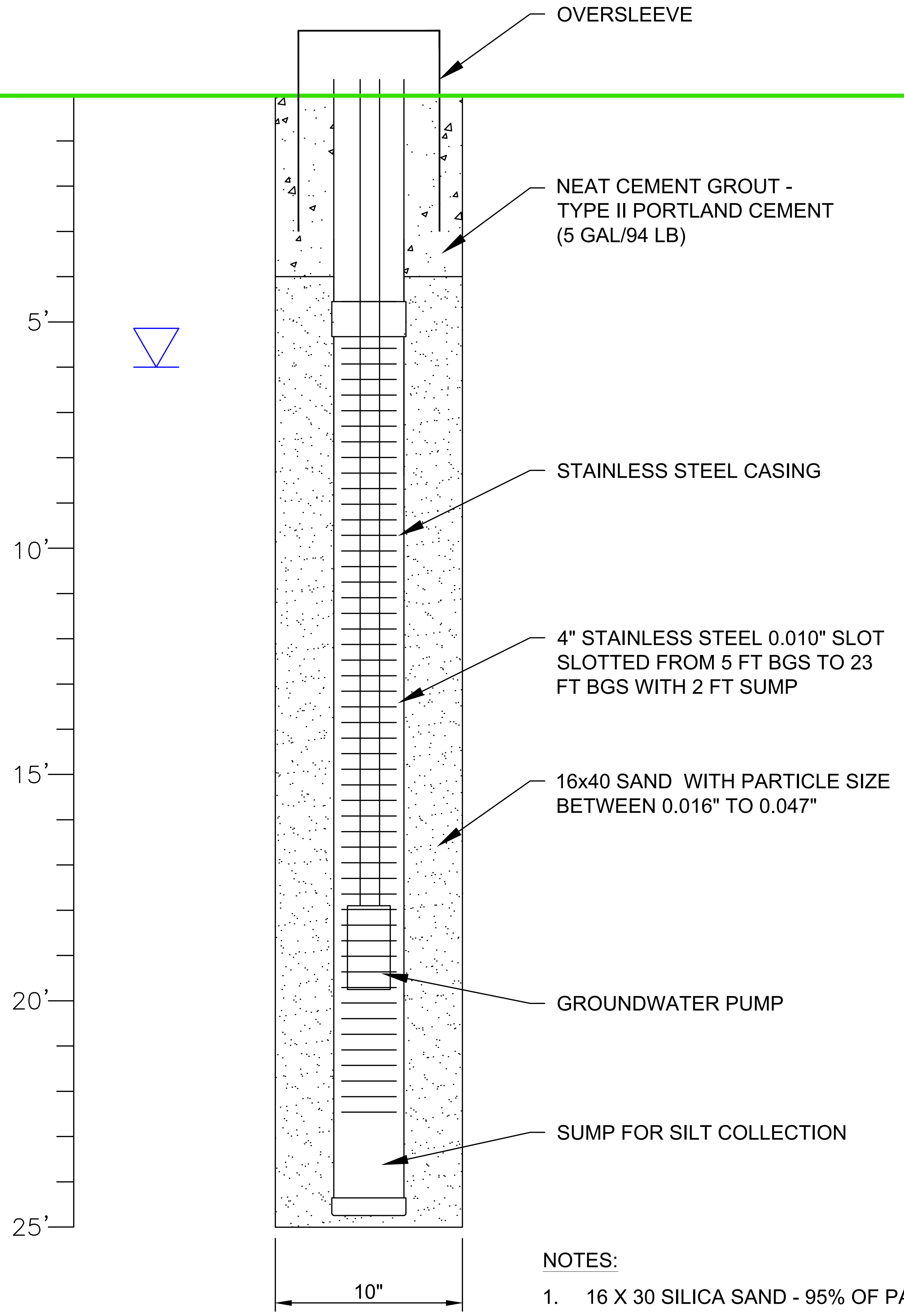
TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA	SITE: ELDRE CORPORATION		
	LOCATION: HENRIETTA, NEW YORK		
	CLIENT: LABELLA ASSOCIATES		
DRAWN BY: A. PEABODY	INTERIOR TEMPERATURE MONITORING POINT DETAIL		
CHECKED BY: PENDING APPROVAL			
PROJECT MANAGER: TRS PERSONNEL	APPROVED FOR CONSTRUCTION	DATE: 2019.JUL.17	PROJECT: NY.ELD.1828
QSAT REVIEW: xx/xx/xx	BY ______ DATE ______	SHEET: M-5	

PRELIMINARY
Not Approved for Construction

EXTERIOR HYDRAULIC CONTROL WELL DETAIL (TYPICAL OF 2)



NOTES:

1. 16 X 30 SILICA SAND - 95% OF PARTICLES IN THE RANGE OF 0.016" TO 0.047".
2. DRILLERS ARE TO OBTAIN ANY REQUIRED WELL PERMITS.
3. A SMALLER AUGER WITH AN OVER-SIZED CUTTING HEAD IS NOT ACCEPTABLE. AUGERS WITH FLIGHTS MUST PROVIDE THE OD AS SHOWN IN THIS DETAIL.

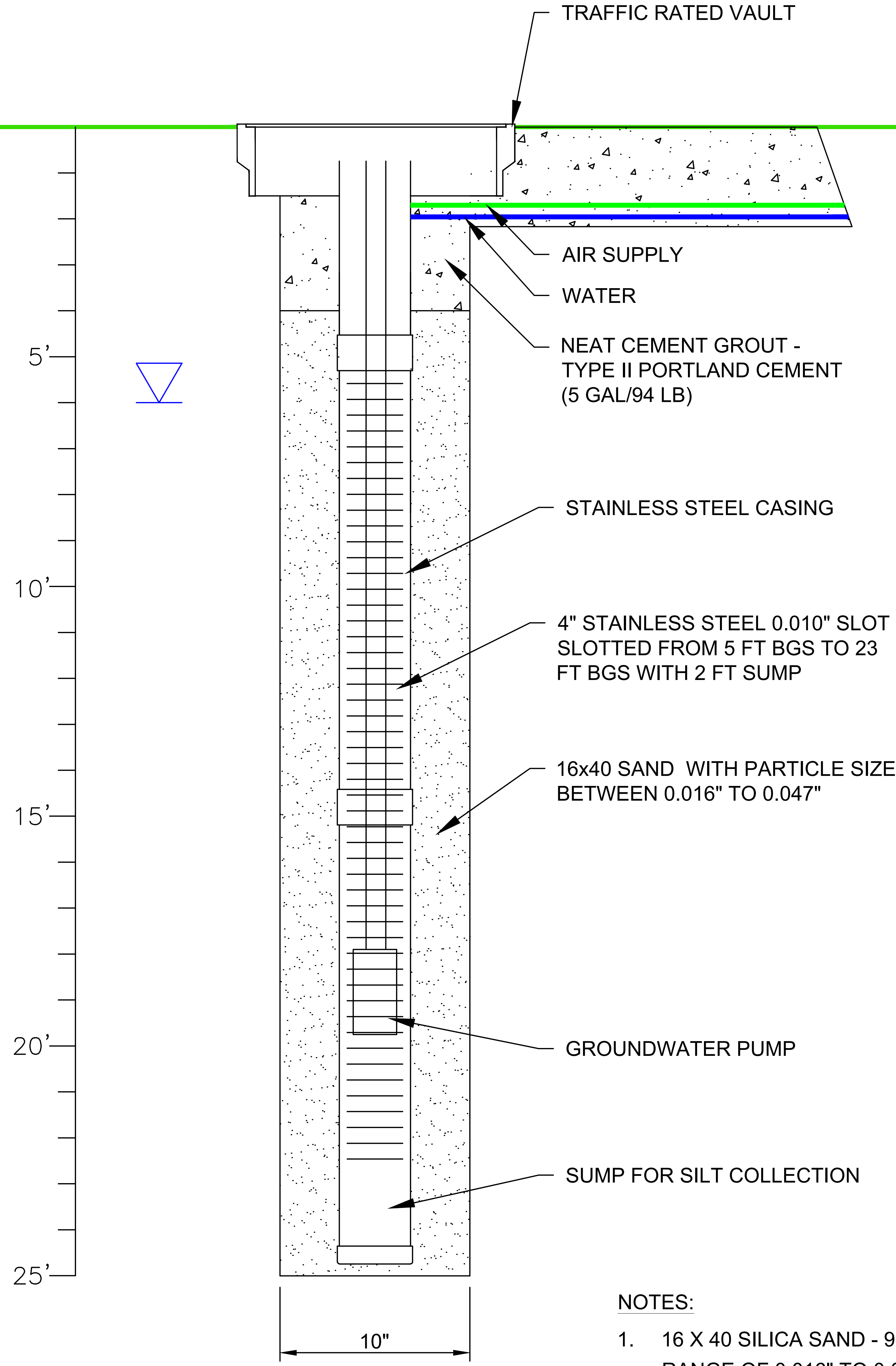
TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY M. NANISTA	SITE ELDRE CORPORATION		
DRAWN BY A. PEABODY	LOCATION HENRIETTA, NEW YORK		
CHECKED BY PENDING APPROVAL	CLIENT LABELLA ASSOCIATES		
PROJECT MANAGER TRS PERSONNEL	EXTERIOR HYDRAULIC CONTROL WELL DETAIL		
QSAT REVIEW xx/xx/xx	APPROVED FOR CONSTRUCTION BY ____ DATE ____	DATE 2019.JUL.17	PROJECT NY.ELD.1828
		SHEET M-6	

PRELIMINARY
Not Approved for Construction

INTERIOR HYDRAULIC CONTROL WELL DETAIL (TYPICAL OF 2)



NOTES:

1. 16 X 40 SILICA SAND - 95% OF PARTICLES IN THE RANGE OF 0.016" TO 0.047".
2. DRILLERS ARE TO OBTAIN ANY REQUIRED WELL PERMITS.
3. ALL BACKFILL MATERIALS EMPLACED BELOW THE WATER TABLE MUST BE TREMMIED IN.
4. A SMALLER AUGER WITH AN OVER-SIZED CUTTING HEAD IS NOT ACCEPTABLE. AUGERS WITH FLIGHTS MUST PROVIDE THE OD AS SHOWN IN THIS DETAIL.

TRS Accelerating Value

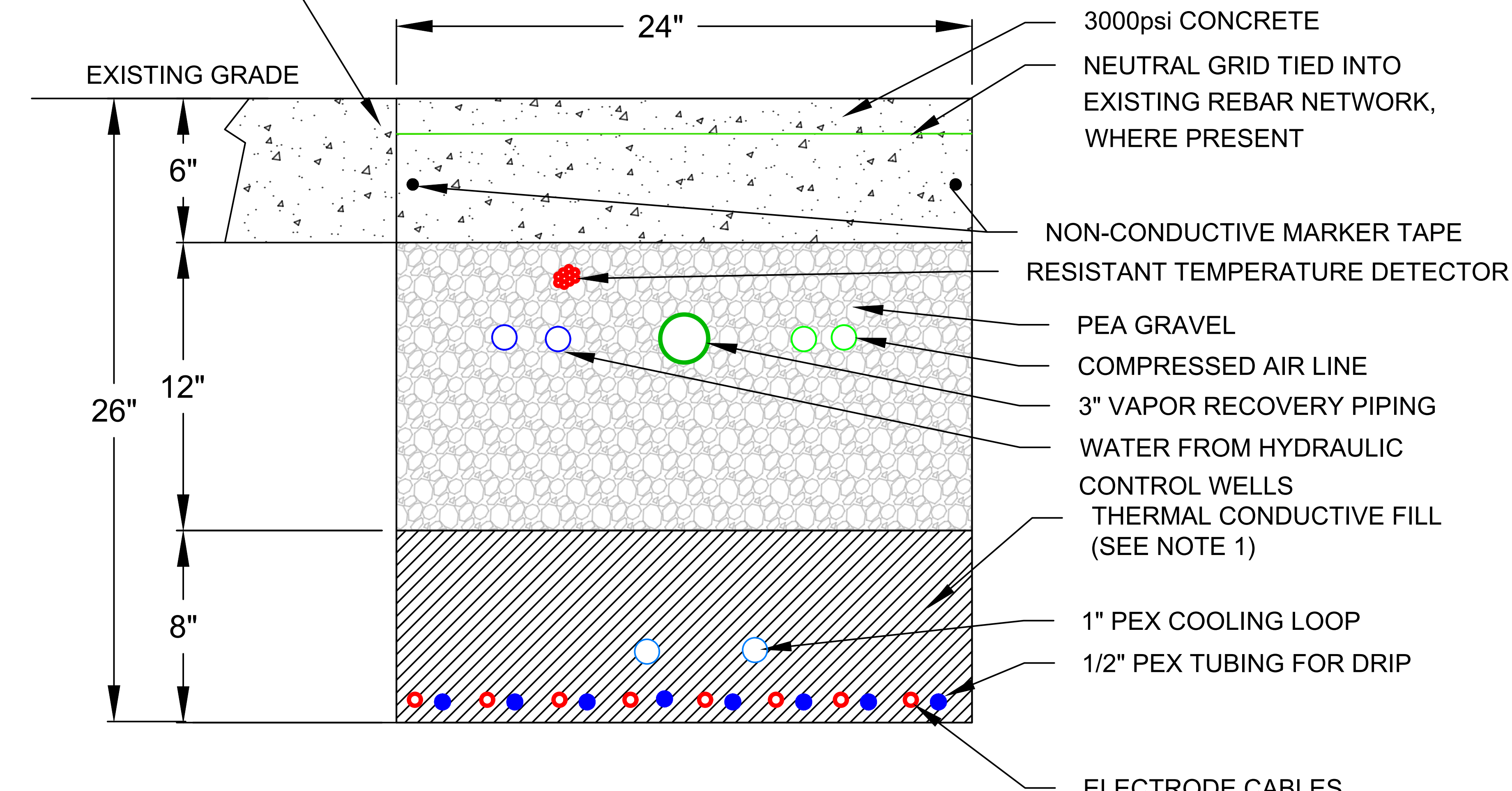
TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY M. NANISTA	SITE ELDRE CORPORATION		
	LOCATION HENRIETTA, NEW YORK		
	CLIENT LABELLA ASSOCIATES		
DRAWN BY A. PEABODY	INTERIOR HYDRAULIC CONTROL WELL DETAIL		
CHECKED BY PENDING APPROVAL			
PROJECT MANAGER TRS PERSONNEL	APPROVED FOR CONSTRUCTION	DATE 2019.JUL.17	PROJECT NY.ELD.1828
QSAT REVIEW xx/xx/xx	BY ______ DATE ______	SHEET M-7	

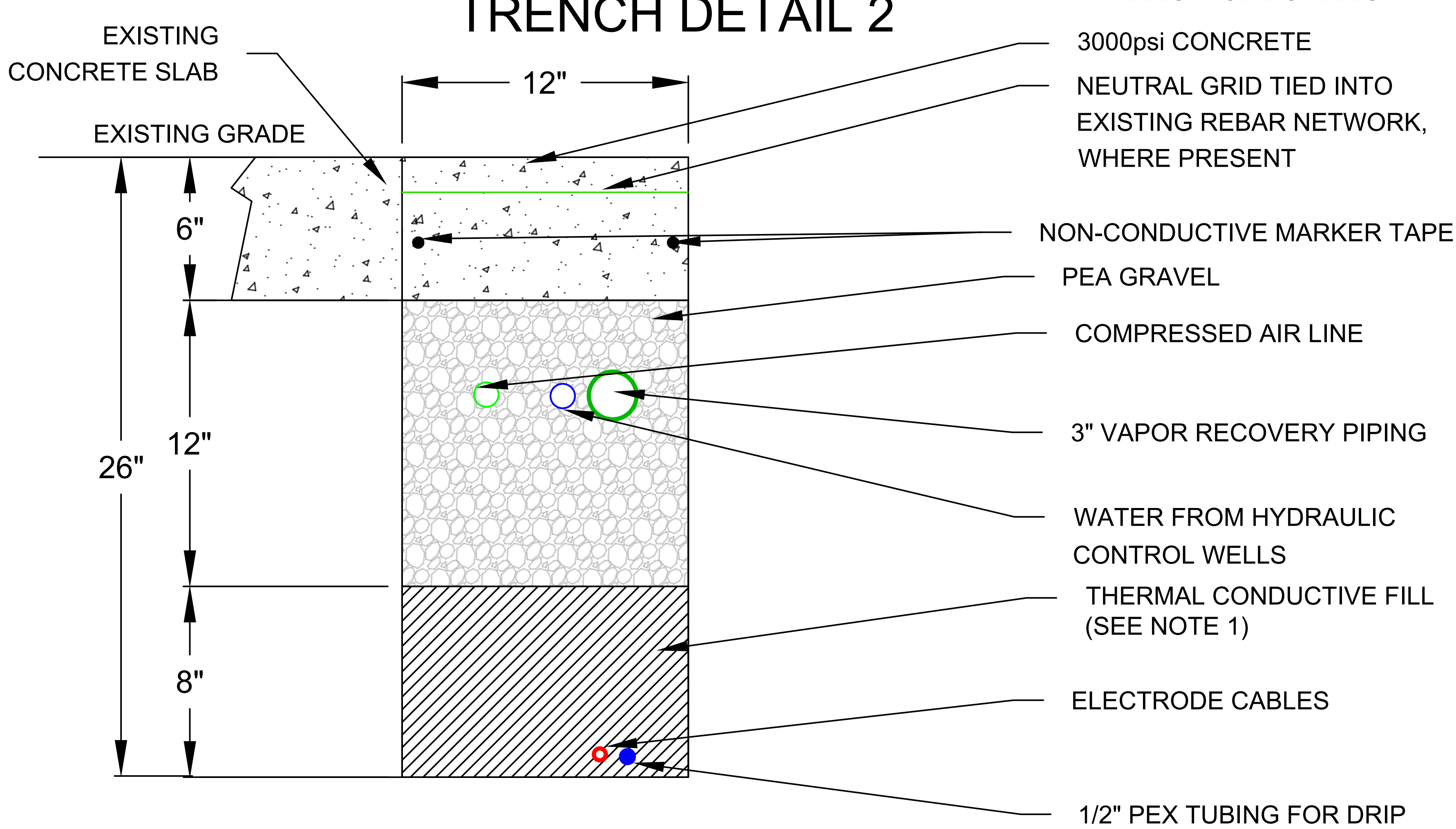
PRELIMINARY

Not Approved for Construction

TRENCH DETAIL 1



TRENCH DETAIL 2



NOTES:

1. THERMAL CONDUCTIVE BACKFILL WILL CONSIST OF (ON A PER CUBIC YARD BASIS): 50 LBS OF ASTM C-150 TYPE II/V CEMENT, 250 LBS OF ASTM C-618 CLASS F (OR C) FLYASH, 2,500 LBS OF SAND AND 35 GALLONS OF WATER TO PRODUCE A PRODUCT WITH DENSITY IN THE RANGE OF 112 TO 116 LB/FT3 WITH TA 6 O 8 INCH SLUMP. ENGINEER MAY CHANGE SPECIFICATIONS BASED ON LOCAL AVAILABILITY OF MATERIALS.

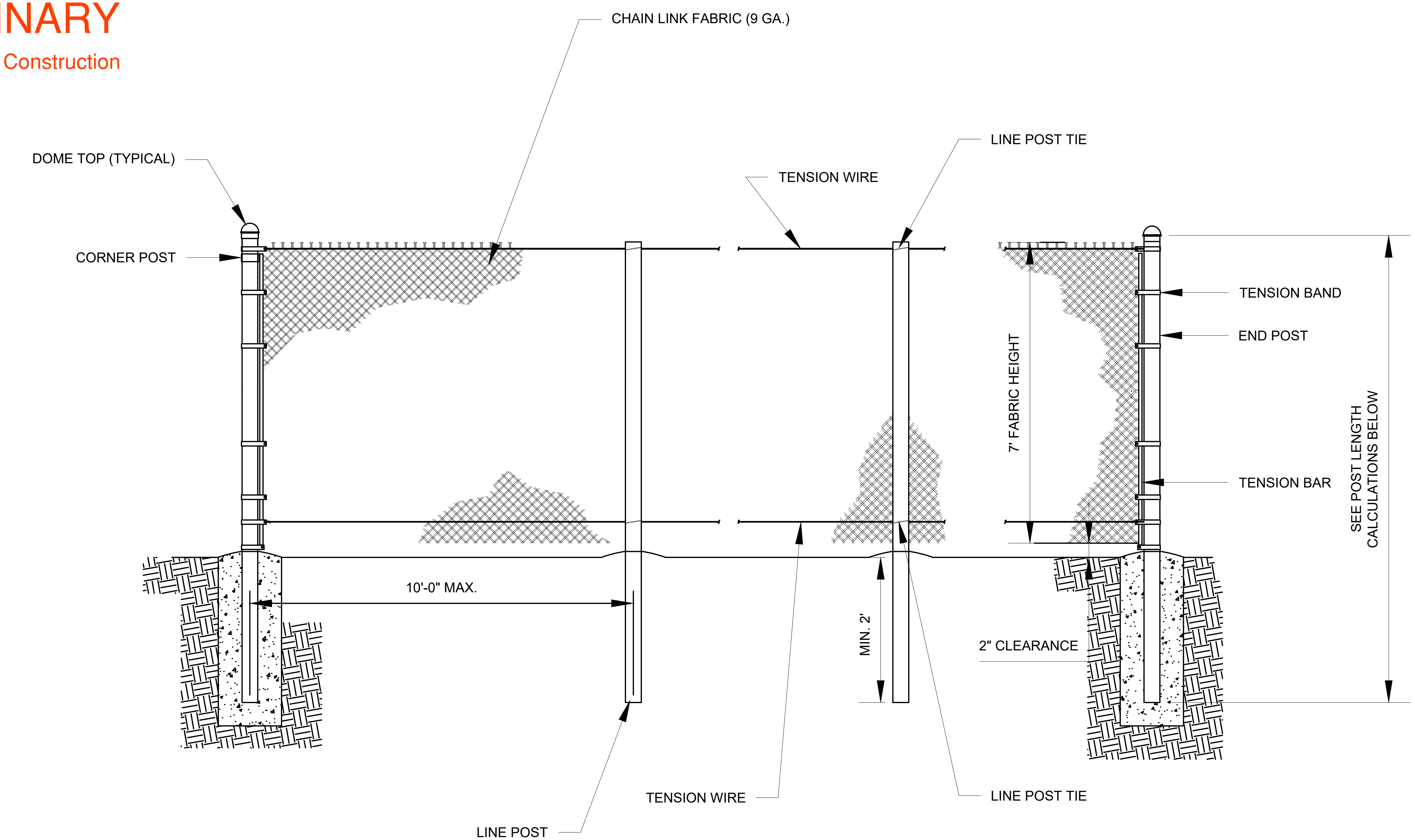
TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY: M. NANISTA	SITE: ELDRE CORPORATION		
DRAWN BY: A. PEABODY	LOCATION: HENRIETTA, NEW YORK		
CHECKED BY: PENDING APPROVAL	CLIENT: LABELLA ASSOCIATES		
PROJECT MANAGER: TRS PERSONNEL	TRENCH DETAIL		
QSAT REVIEW: xx/xx/xx	APPROVED FOR CONSTRUCTION BY ___ DATE ___	DATE: 2019.JUL.17	PROJECT: NY.ELD.1828
		SHEET	M-8

PRELIMINARY

Not Approved for Construction



NOTES:

1. THIS DETAIL DOES NOT INCLUDE PRIVACY DETAILS.
2. SITE FENCING WILL INCLUDE PRIVACY SLATS OR WINDSCREEN.
3. LINE, CORNER AND END POSTS CAN BE CUT TO THE DESIRED LENGTH/HEIGHT.
4. ANY GATES MUST BE BONDED TOGETHER WITH #1/0 WIRE.
5. OLD AND NEW SECTIONS OF FENCE SHOULD BE BONDED TOGETHER WITH #1/0 WIRE.
6. ALL FENCING WITHIN 75 FT OF AN ELECTRODE MUST BE VINYL-CLAD.
7. CORNER AND GATE POSTS MUST BE ANCHORED IN CONCRETE, ALL OTHER POSTS CAN BE DIRECTLY DRIVEN

POST LENGTH CALCULATIONS FOR STANDARD DESIGN/NORMAL CONDITIONS:

1. POSTS = FABRIC HEIGHT + 2'-8" = 9'--8"

TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA
DRAWN BY	A. PEABODY
CHECKED BY	M. NANISTA
PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

FENCE DETAIL

APPROVED FOR CONSTRUCTION	
BY	
DATE	
DATE	2019.JUL.22
PROJECT	NY.ELD.1828
SHEET	M-9

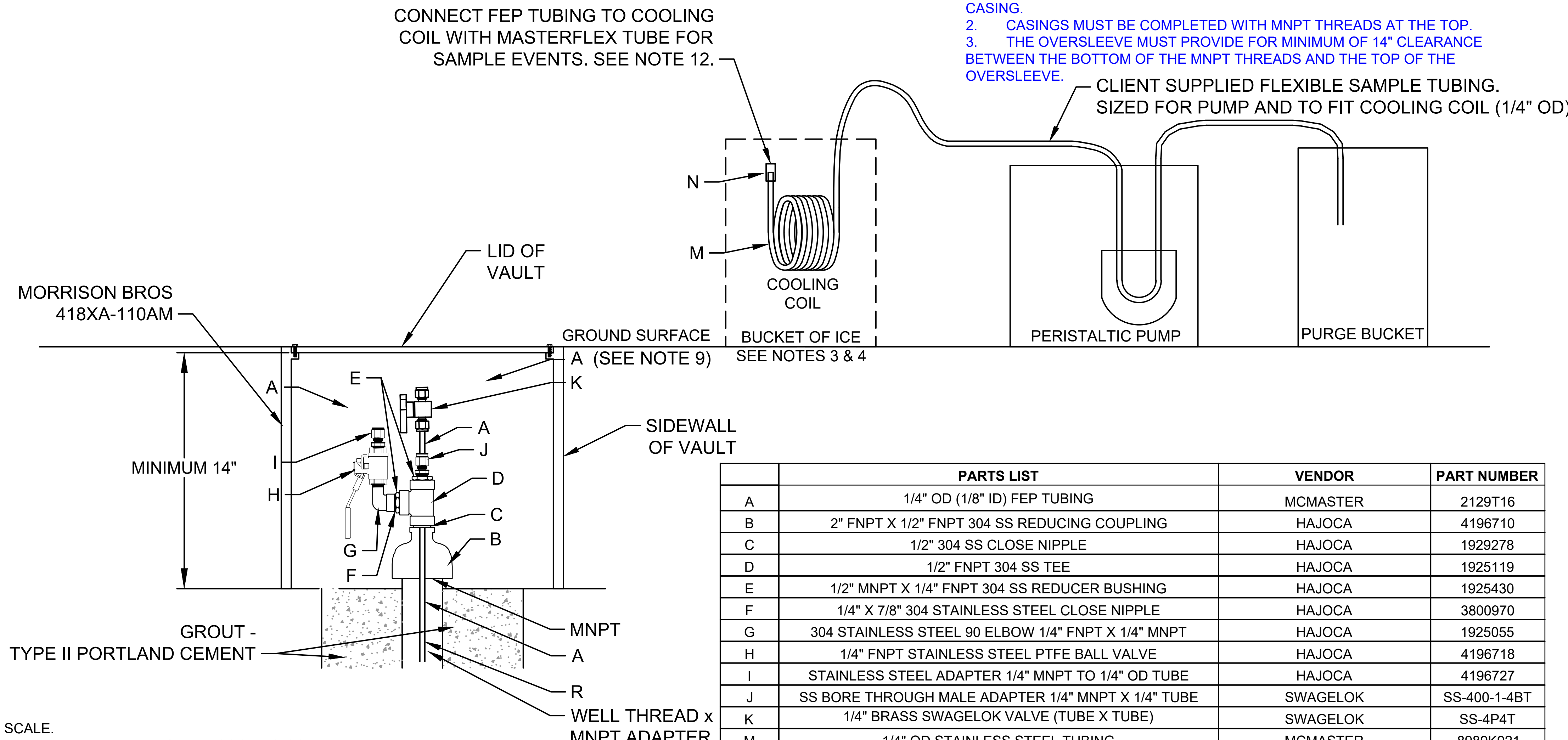
PRELIMINARY

Not Approved for Construction

INTERIOR MONITORING WELL HEAD DETAIL

CRITICAL CONSTRUCTION NOTES

1. MONITORING WELL CASINGS MUST BE CENTERED IN THE BOREHOLE. VAULTS AND/OR OVERSLEEVES SHOULD BE CENTERED AROUND THE CASING.
2. CASINGS MUST BE COMPLETED WITH MNPT THREADS AT THE TOP.
3. THE OVERSLEEVE MUST PROVIDE FOR MINIMUM OF 14" CLEARANCE BETWEEN THE BOTTOM OF THE MNPT THREADS AND THE TOP OF THE OVERSLEEVE.



	PARTS LIST	VENDOR	PART NUMBER
A	1/4" OD (1/8" ID) FEP TUBING	MCMASTER	2129T16
B	2" FNPT X 1/2" FNPT 304 SS REDUCING COUPLING	HAJOCA	4196710
C	1/2" 304 SS CLOSE NIPPLE	HAJOCA	1929278
D	1/2" FNPT 304 SS TEE	HAJOCA	1925119
E	1/2" MNPT X 1/4" FNPT 304 SS REDUCER BUSHING	HAJOCA	1925430
F	1/4" X 7/8" 304 STAINLESS STEEL CLOSE NIPPLE	HAJOCA	3800970
G	304 STAINLESS STEEL 90 ELBOW 1/4" FNPT X 1/4" MNPT	HAJOCA	1925055
H	1/4" FNPT STAINLESS STEEL PTFE BALL VALVE	HAJOCA	4196718
I	STAINLESS STEEL ADAPTER 1/4" MNPT TO 1/4" OD TUBE	HAJOCA	4196727
J	SS BORE THROUGH MALE ADAPTER 1/4" MNPT X 1/4" TUBE	SWAGELOK	SS-400-1-4BT
K	1/4" BRASS SWAGELOK VALVE (TUBE X TUBE)	SWAGELOK	SS-4P4T
M	1/4" OD STAINLESS STEEL TUBING	MCMASTER	8989K921
N	4.8 MM ID MASTERFLEX TUBING	MASTERFLEX/ COLE PARMER	HV-96410-15
	1/2" MEDIUM DENSITY PTFE (TEFLON) TAPE (NOT SHOWN)	GRAINGER	4X227

ALL PARTS ARE AS LISTED OR ENGINEERING APPROVED EQUIVALENTS.

NOTES

1. DRAWING IS NOT TO SCALE.
2. EACH MONITORING WELL WILL HAVE A DEDICATED COOLING COIL.
3. TRS WILL SUPPLY THE CUSTOM WELL HEAD COMPONENTS AND ALL CONNECTIONS THROUGH THE COOLING COIL.
4. OTHERS WILL PROVIDE THE PERISTALTIC PUMP, BUCKETS, ICE, CONNECTIONS AND TUBING BEYOND THE COOLING COIL.
5. THE CUSTOM WELL HEAD AND ABOVE GRADE COMPONENTS SUPPLIED BY TRS WILL BE REMOVED AT THE END OF THE REMEDIATION. THEY WILL REMAIN THE PROPERTY OF TRS.
6. A "HIGH VOLTAGE" HAZARD STICKER SHOULD BE PLACED ON THE SECURED VAULT LID.
7. LENGTH OF TUBE SHOULD BE SUFFICIENT SO THAT TUBE DOES NOT KINK WHEN COIL IS PLACED IN THE ICE BUCKET.
8. ANY EXPOSED METAL VAULT COMPONENTS INCLUDING THE LID SHOULD BE COATED IN A NON-CONDUCTIVE PAINT PRIOR TO STARTUP OF SYSTEM.
9. THE FEP TUBING UP TO THE MASTERFLEX TUBE (PART N) SHOULD BE CAREFULLY COILED AND STORED INSIDE THE VAULT. TAKE CARE TO PREVENT KINKING AND DAMAGE WHEN STORING BETWEEN SAMPLE EVENTS.
10. WELLS SHOULD BE CENTERED IN THE BOREHOLE AND VAULT.
11. THE END OF THE SAMPLING TUBE SHOULD BE PLACED 3/4 OF THE WAY DOWN THE SCREENED INTERVAL.
12. MASTERFLEX TUBE LENGTH SHOULD BE MINIMIZED, A MAXIMUM OF 2" OF MASTERFLEX SHOULD BE USED.
13. TEFLON TAPE IS TO BE USED FOR ALL THREADED CONNECTIONS.
15. FOR INSTALLATION, COMPLETE CONSTRUCTION OF PARTS D AND UP FIRST. THEN THREAD C INTO B AND INSTALL ON THE MONITORING WELL CASING USING A STRAIGHT LENGTH OF PIPE. ONCE C AND B ARE INSTALLED, ADD THE REMAINING HEAD ASSEMBLY (PARTS D AND UP).

TRS Accelerating Value

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DRAWN BY: A. PEABODY
CHECKED BY: M. NANISTA
PROJECT MANAGER: TRS PERSONNEL
QSAT REVIEW: xx/xx/xx

SITE: ELDRE CORPORATION
LOCATION: HENRIETTA, NEW YORK
CLIENT: LABELLA ASSOCIATES

MONITORING WELL HEAD DETAIL

APPROVED FOR CONSTRUCTION
BY
DATE

DATE: 2019.JUL.22
PROJECT: NY.ELD.1828
SHEET: M-10

PRELIMINARY

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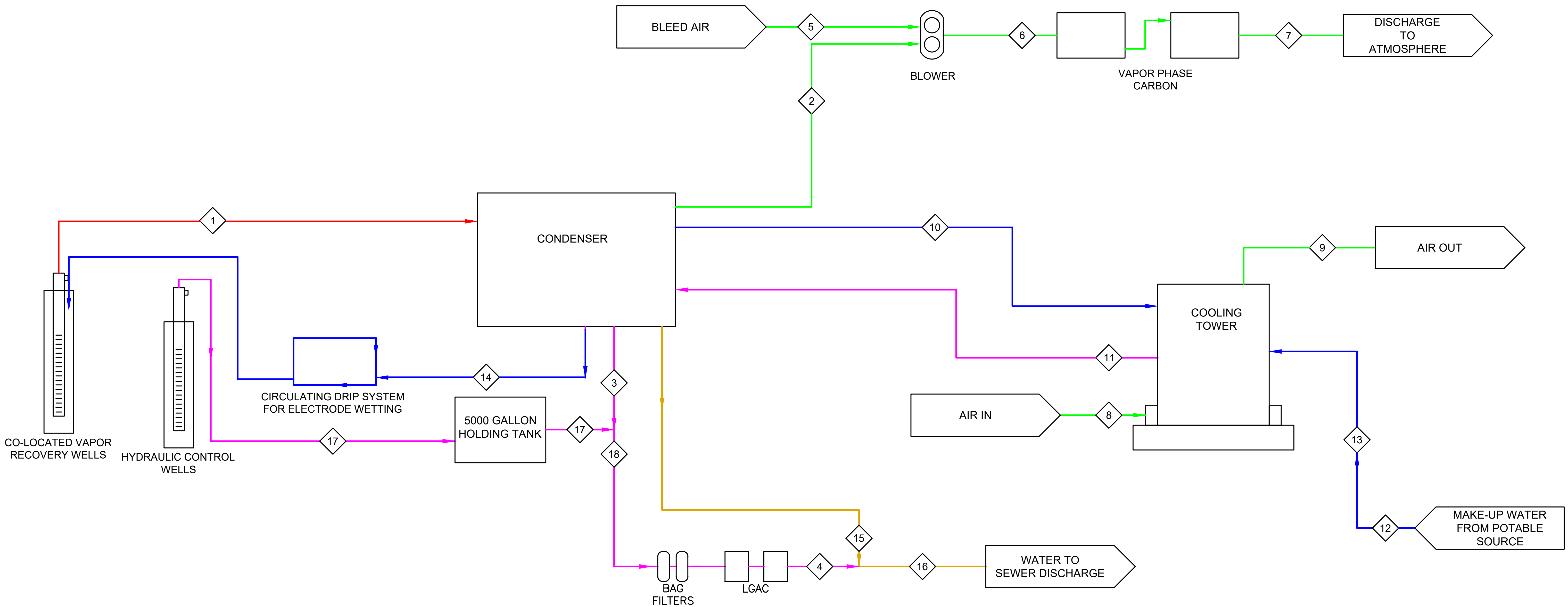

P&ID LINE COLORS

- SOFTENED/POTABLE/CLEAN WATER
- PROCESS WATER
- AIR
- AIR/STEAM MIX
- BLOWDOWN

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SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

PROCESS FLOW DIAGRAM

APPROVED FOR CONSTRUCTION

BY

DATE

DATE	2019.JUL.16
PROJECT	NY.ELD.1828
SHEET	P-1

PRELIMINARY

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Process Stream	Location	Air		Water Vapor		Water		CVOCs		Temperature		Pressure
Description	#	(lb/min)	(scfm)	(lb/min)	(scfm)	(lb/min)	(gpm)	(lb/min)	(ppm)	°C	°F	(Δ from barometric)
Extracted air and steam from vapor recovery system	1	15	200	2.7	58	0.10	0.012	0.00	34.18	63	145	4" Hg Vac
Discharge air from condenser after steam removal	2	15	200	0.4	9	0	0	0.00	42.29	30	86	7" Hg Vac
Condensate discharge from condenser	3	0	0	0	0	2	0.3	0.00	0.58	30	86	30 psig
Treated water from LGAC	4	0	0	0	0	36	4.3	0.00	0.26	30	86	30 psig
Bleed air to rotary lobe blower	5	4	50	0.01	0	0	0	0	0	2	35	N/A
Discharge air from rotary lobe blower	6	19	250	0.42	9	0	0	0.00	34.09	60	140	1 psig
Discharge from carbon vessels	7	19	250	0.42	9	0	0	0	0.34	35	95	N/A
Cooling air into cooling tower	8	2250	30,000	6.69	142	0	0	0	0	2	35	N/A
Air exhaust from cooling tower	9	2250	30,000	10	220	0	0	0	0	3	37	N/A
Recirculation water from condenser to cooling tower	10	0	0	0	0	4993	599	0	0	3	37	10 psig
Recirculation from cooling tower to condenser	11	0	0	0	0	4998	600	0	0	0	32	10 psig
Make-up water from potable source	12	0	0	0	0	10	1.24	0	0	20	68	15 psig
Water for cooling tower	13	0	0	0	0	9	1.0	0	0	20	68	50 psig
Drip water to electrodes	14	0	0	0	0	1.67	0.2	0	0	20	68	10 psig
Cooling tower blowdown	15	0	0	0	0	5.00	0.6	0	0	0	32	10 psig
Total system water discharge	16	0	0	0	0	40.73	4.9	0	0	20	68	10 psig
Water from hydraulic control wells	17	0	0	0	0	33.32	4.0	0	6	90	194	30 psig
Water to LGAC for treatment	18	0	0	0	0	35.73	4.3	0	5	86	187	30 psig

NOTES

1. LOCATION INDICATED IN THIS TABLE CORRESPOND TO THE LOCATION NUMBERS PROVIDED ON SHEET P-2.

TRS Accelerating Value

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PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

PROCESS FLOW MASS BALANCE

APPROVED FOR CONSTRUCTION

BY

DATE

DATE	2019.JUL.16
PROJECT	NY.ELD.1828
SHEET	P-2

PRELIMINARY

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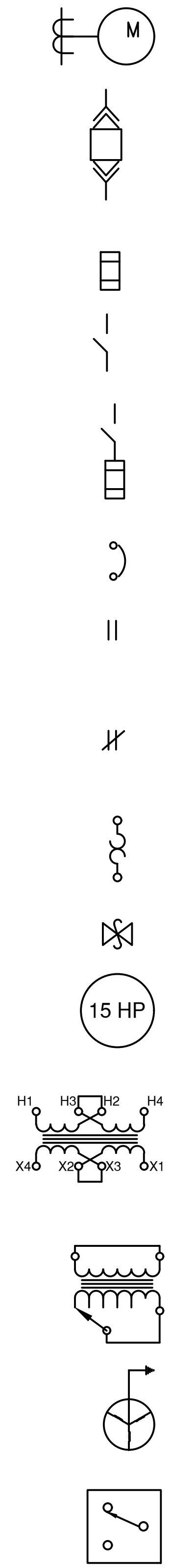
SYMBOLS



- UTILITY METERING
- MEDIUM VOLTAGE DRAW OUT CIRCUIT BREAKER
- FUSE
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- CIRCUIT BREAKER
- N.O. CONTACT
  A NORMALLY OPEN (N.O.) CONTACT IS OPEN WHEN IT, OR THE DEVICE OPERATING IT, IS IN A DE-ENERGIZED
- N.C. CONTACT
  A NORMALLY CLOSED (N.C.) CONTACT IS CLOSED WHEN IT, OR THE DEVICE OPERATING IT, IS IN A DE-ENERGIZED STATE OR RELAXED STATE.
- THERMAL OVERLOAD
- ANTI-SIPHON VALVE
- PUMP/MOTOR
- TRANSFORMER
- VARIABLE OUTPUT 3 PHASE TRANSFORMER
- GENERATOR
- AUTOMATIC TRANSFER SWITCH

ABBREVIATIONS

A	AMPERES
ATS	AUTOMATIC TRANSFER SWITCH
FLA	FULL LOAD AMPS
HP	HORSEPOWER
KW	KILOWATT
KVA	KILOVOLT-AMPERES
KV	KILO-VOLTS
N.O.	NORMALLY OPEN
OL	OVERLOAD
P	POLE
PH, Ø	PHASE
SRGAC	STEAM REGENERATED GAS ACTIVATED CARBON
VAC	VOLTAGE ALTERNATING CURRENT
VFD	VARIABLE FREQUENCY DRIVE
V	VOLT
W	WATTS, WIRE

NOTE: THIS IS AN ALL INCLUSIVE LEGEND SHEET. NOT ALL SYMBOLS/ABBREVIATIONS WILL APPEAR ON EACH SHEET.

TRS Accelerating Value

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PROJECT MANAGER	TRS PERSONNEL
QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

ELECTRICAL ONE-LINE DIAGRAM LEGEND

APPROVED FOR CONSTRUCTION

BY

DATE

DATE	2019.JUL.08
PROJECT	NY.ELD.1828
SHEET	E-1

PRELIMINARY

Not Approved for Construction

GENERAL NOTES

1. PERFORM INSTALLATION IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) AND THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA). EQUIPMENT SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL).
2. PROVIDE AND MAINTAIN A CLEAR WORKING SPACE ABOUT ELECTRIC EQUIPMENT IN ACCORDANCE WITH NEC ARTICLES 110.26 AND 110.34.
3. PROVIDE CIRCUIT BREAKERS WITH UL LISTED INTERRUPTING RATING (RMS SYMMETRICAL AMPERES) GREATER THAN THE AVAILABLE FAULT CURRENT SHOWN IN THE SHORT CIRCUIT REPORT.
4. PROVIDE PADLOCKING PROVISIONS FOR EACH TWO AND THREE POLE CIRCUIT BREAKERS.
5. USE #12AWG OR LARGER CONDUCTORS FOR POWER WIRING.
6. USE #14AWG OR LARGER CONDUCTORS FOR CONTROL WIRING UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS.
7. LIMIT USE OF ELECTRICAL METALLIC TUBING (EMT) AND SCHEDULE 40 PVC CONDUIT TO AREAS WHERE IT WILL NOT BE SUBJECT TO PHYSICAL DAMAGE.
8. USE LIQUID TIGHT FLEXIBLE METAL CONDUIT FOR FLEXIBLE CONNECTIONS TO EQUIPMENT OUTDOORS.
9. USE INTERMEDIATE METALLIC CONDUIT (IMT) OR RIGID GALVANIZED STEEL CONDUIT (RGS) OR SCHEDULE 80 PVC CONDUIT FOR WORK EMBEDDED IN CONCRETE OR EXPOSED TO PHYSICAL DAMAGE. THESE CONDUIT TYPES MAY BE USED IN ALL APPLICATIONS WHERE SCHEDULE 40 PVC OR EMT WOULD BE APPROPRIATE, AT THE DISCRETION OF THE DESIGN ENGINEER.
10. USE THE FOLLOWING CONDUCTOR COLOR CODES.

	240/120V	208Y/120V	480Y/277V	MED VOLTAGE	ELECTRODE CABLES
PHASE A	BLACK	BLACK	BROWN	RED	RED W/ELECTRODE MARKER
PHASE B	RED	RED	ORANGE	YELLOW	YELLOW W/ELECTRODE MARKER
PHASE C		BLUE	YELLOW	BLUE	BLUE W/ELECTRODE MARKER
NEUTRAL	WHITE	WHITE	GRAY		
EQUIP, GND	GREEN/BARE	GREEN/BARE	GREEN/BARE	GREEN/BARE	

ISOLATED GROUND SHALL BE GREEN WITH YELLOW TRACER.

11. USE ONLY COPPER CONDUCTORS.
12. POWER CONDUCTORS 10AWG AND SMALLER SHALL BE SOLID . POWER CONDUCTORS 8AWG AND LARGER SHALL BE STRANDED
13. FOR NON-ELECTRODE CIRCUITS, PROVIDE TYPE THHN/THWN WIRE INSULATION. XHHW INSULATION MAY BE USED FOR 1AWG AND LARGER. TYPE W AND DLO CABLE MAY BE USED FOR CIRCUITS WHICH REQUIRE FLEXIBILITY. CONDUCTORS THAT REQUIRE FLEXIBILITY ARE PERMITTED TO BE STRANDED REGARDLESS OF CONDUCTOR SIZE. USE OF WIRE FERRULES ON UN-LUGGED FLEXIBLE CABLE IS REQUIRED. SOW CABLE IS PERMITTED FOR SKID POWER FEEDERS.
14. ARRANGE CONNECTIONS FOR SINGLE PHASE CIRCUITS TO ACHIEVE THREE PHASE LOAD BALANCE WITHIN 10% OF THE AVERAGE PHASE LOAD CURRENT FOR SCR POWERED LOADS.
15. ARRANGE CONNECTIONS FOR SINGLE PHASE CIRCUITS TO ACHIEVE THREE PHASE LOAD BALANCE WITHIN 20% OF THE AVERAGE PHASE LOAD CURRENT FOR NON-SCR POWERED LOADS.
16. INSTALL OUTDOOR EQUIPMENT TO BE WEATHERPROOF AND TO EXCLUDE BIRDS AND RODENTS WITH A MAXIMUM ½" DIAMETER UNPROTECTED OPENINGS IN ENCLOSURES.
17. TEST CONDUCTORS FOR CONTINUITY AND FREEDOM FROM SHORTS AND UNINTENTIONAL GROUNDS.
18. ELECTRICAL MATERIALS AND CONSTRUCTION SHALL CONFORM TO TRS GROUP INC STANDARD CONSTRUCTION SPECIFICATIONS WHERE APPLICABLE.
19. IF A CONFLICT ARISES BETWEEN THE FIELD CONDITIONS AND THESE GENERAL ELECTRICAL REQUIREMENTS, STOP WORK AND CONTACT THE PROJECT ENGINEER.
20. TIE-INS TO EXISTING POWER SYSTEMS WILL BE PERFORMED BY OTHERS, WORKING UNDER THE DIRECTION OF A LOCALLY LICENSED ENGINEER OR UTILITY AUTHORITY. SEE TRS ELECTRICAL CONTRACTING SPECIFICATION FOR ADDITIONAL REQUIREMENTS IF PERFORMED BY TRS SUBCONTRACTOR.

TRS Accelerating Value

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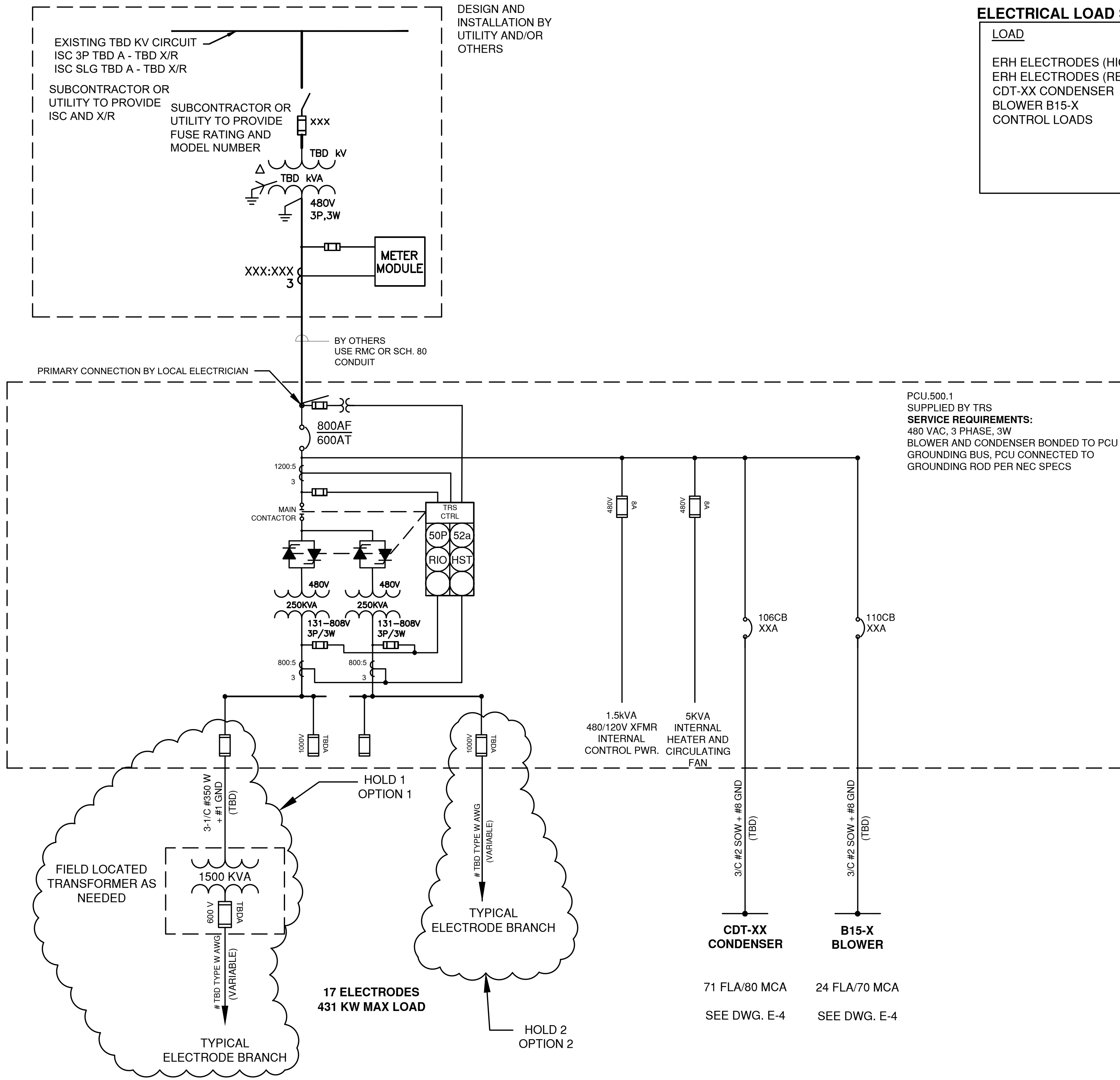
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

ELECTRICAL ONE-LINE REQUIREMENTS

APPROVED FOR CONSTRUCTION	
BY	
DATE	
DATE	2019.JUL.08
PROJECT	NY.ELD.1828
SHEET	E-2

PRELIMINARY

Not Approved for Construction



ELECTRICAL LOAD SUMMARY

LOAD	NUMBER		CONNECTED LOAD		LOAD FACTOR		DESIGN LOAD
ERH ELECTRODES (HIGH TRIAD)	3	X	24.3 KVA	X	1.25	=	91.1 KVA
ERH ELECTRODES (REMAINDER)	15	X	24.3 KVA	X	1.00	=	340.2 KVA
CDT-XX CONDENSER	1	X	60 KVA	X	1.00	=	60 KVA
BLOWER B15-X	1	X	20 KVA	X	1.00	=	20 KVA
CONTROL LOADS	1	X	25 KVA	X	1.00	=	25 KVA
					TOTAL PEAK ELECTRODE LOAD	**=**	**431 KVA**
					TOTAL DESIGN LOAD	**=**	**536 KVA**

NOTES

1. GROUND CABLE SIZES ARE MINIMUMS
2. LIMIT AVERAGE ELECTRODE POWER TO 40.4 KVA PER ELECTRODE

DRAWING HOLDS

1. ENGINEERING HOLD PENDING OPTION SELECTION AND TRANSFORMER SELECTION.
2. ENGINEERING HOLD PENDING OPTION SELECTION.

TRS Accelerating Value

TRS GROUP, INC. PO BOX 737 LONGVIEW, WA 98632

DESIGNED BY	M. NANISTA	SITE	ELDRE CORPORATION
DRAWN BY	A. PEABODY	LOCATION	HENRIETTA, NEW YORK
CHECKED BY	PENDING APPROVAL	CLIENT	LABELLA ASSOCIATES
PROJECT MANAGER	TRS PERSONNEL		ELECTRICAL ONE-LINE DIAGRAM
QSAT REVIEW	xx/xx/xx	APPROVED FOR CONSTRUCTION	
		BY	
		DATE	
DATE	2019.JUL.08	PROJECT	NY.ELD.1828
SHEET	E-3		

PRELIMINARY

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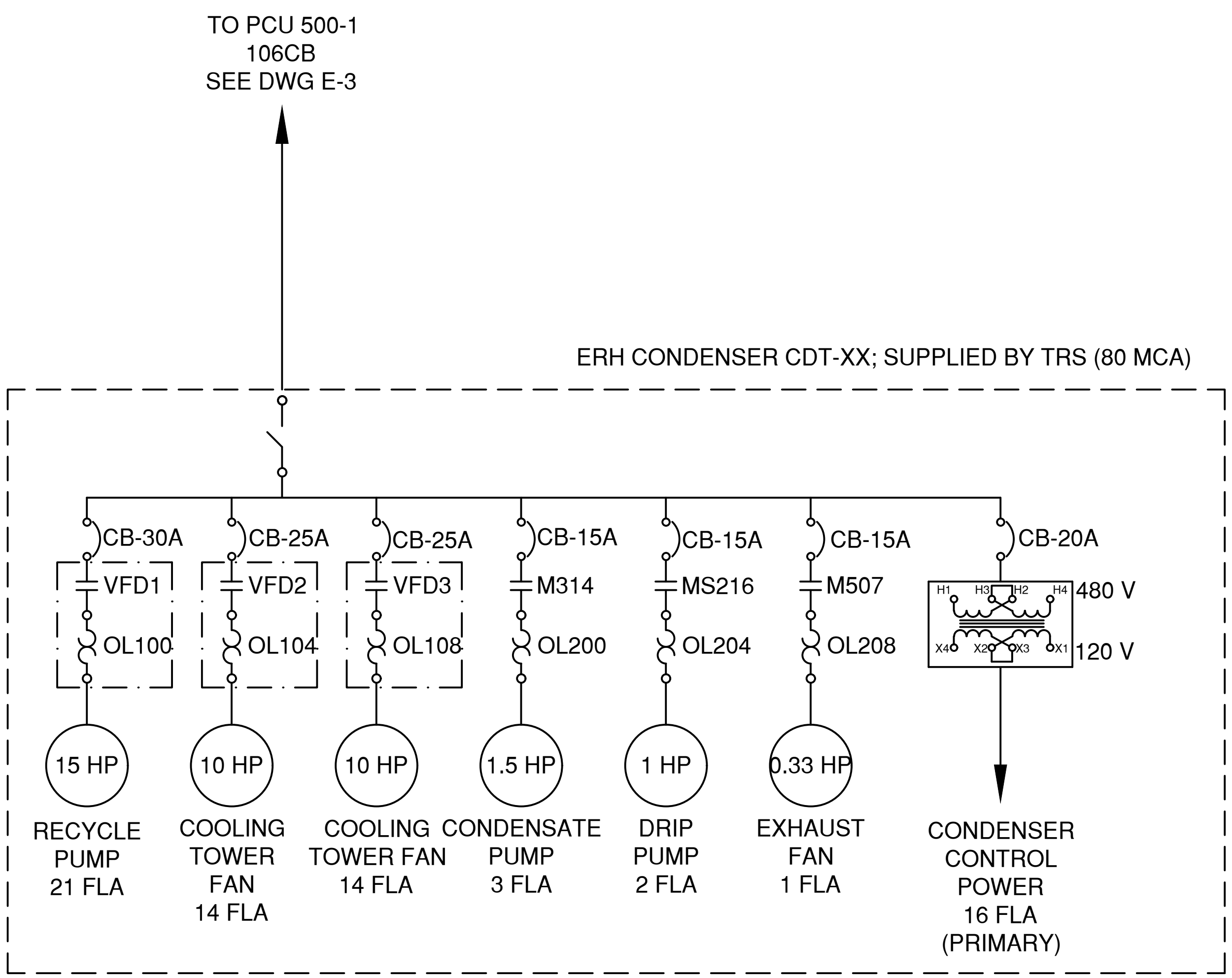

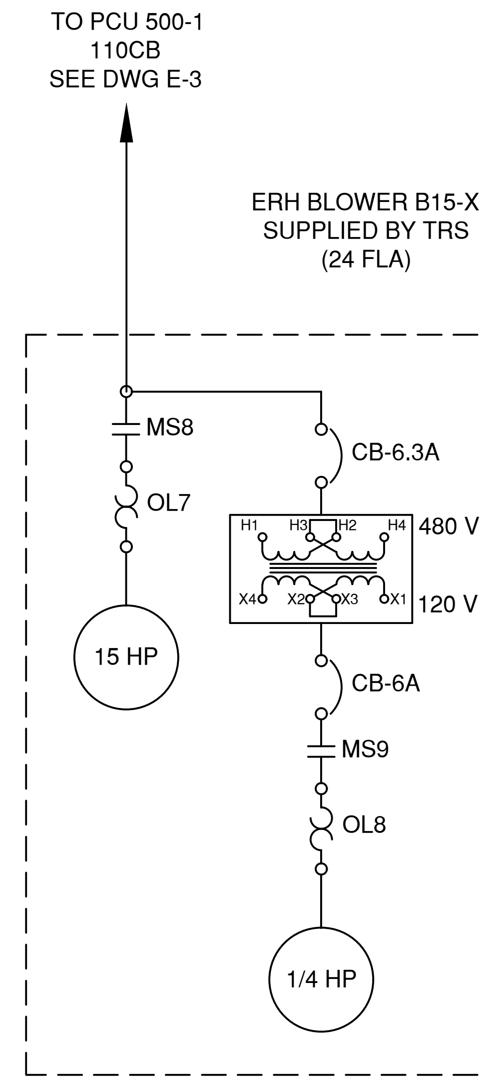

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QSAT REVIEW	xx/xx/xx
SITE	ELDRE CORPORATION
LOCATION	HENRIETTA, NEW YORK
CLIENT	LABELLA ASSOCIATES

ELECTRICAL ONE-LINE DIAGRAM

APPROVED FOR CONSTRUCTION

BY ____________________

DATE ____________________

DATE	2019.JUL.08
PROJECT	NY.ELD.1828
SHEET	E-4

Appendix B

Standard Operating Procedures

TRS Accelerating Value	STANDARD OPERATING PROCEDURE	PROCEDURE No: 3.1

Procedure Title: # Hot Groundwater Sampling

Author:	TRS Team	Issue Date:	4/22/08

Revisions:

Date	Initials	Revision Description	Revision #
04-14-09		Update Format, include pictures	2
06-27-09	LS	Add Scope, responsibilities, training, definitions, Recordkeeping, and new procedures	3
06-25-10	LS	Update Drawings	4
07-27-12	LS	Review and update SOP; changes to pump usage	5
12/15/14	TP	Annual Review, MW access caution	6
12/4/17	GK	Annual review; procedure updates	7

Reviewed and Approved by (initial and date):

SOP/ Revision #	Health & Safety		Operations	
Original	4/22/08		4/22/08	
REV 2	4/14/09		4/14/09	
REV 3	6/27/09		6/27/09	
REV 4	6/25/10		6/25/10	
REV 5	7/27/12		7/27/12	
REV 6	1/21/16		1/21/16	
REV 7	[signature]	12/4/17	[signature]	12/4/17

1.0 PURPOSE

This standard operating procedure (SOP) provides uniform procedures for the safe collection of representative groundwater samples during or after the application of electrical resistance heating (ERH) or other *in situ* thermal technologies (ISTT). This procedure specifically addresses sampling of groundwater that has been heated during the thermal remediation process.

2.0 SCOPE

This SOP provides the relevant information and steps for the collection of groundwater samples during or after the application of ERH using modified low-flow sampling procedures. This SOP draws information primarily from the United States Environmental Protection Agency's (USEPA's) groundwater issue paper, Low-Flow (minimal drawdown) Ground-Water Sampling Procedure (Puls and Barcelona, 1996). Modifications to the EPA methodology have been made to accommodate groundwater temperatures that have been elevated from the application of ERH. Only personnel trained to the minimum requirements outlined in **Section 7.0** of this SOP are authorized to collect hot groundwater samples at TRS ERH project sites.

The USEPA guidance document recommends continual monitoring of water levels during the purge and sample process to ensure that minimal drawdown is occurring (Puls and Barcelona, 1996). Due to the safety hazards associated with opening groundwater monitoring wells where heated groundwater is present at ERH project sites, groundwater level measurements (depth to groundwater) will not be collected as part of hot groundwater sampling activities. If the TRS project site has been constructed with pressure transducers to monitor groundwater gradients, readings from the transducers will be monitored as feasible to minimize groundwater drawdown. If previous sampling records or hydrogeologic data is available, this information shall be used to develop target flow rates for the groundwater sampling effort.

These procedures assume that dedicated sample tubing and pumping systems for each monitoring well have been established prior to application of electrical energy to the subsurface.

Caution - Access to groundwater monitoring wells during a TRS ERH or ISTT application is prohibited without TRS management approval. If intrusive work is required to complete the sampling efforts, or minimally accessing (removing) a well cap, an additional activity hazard analysis (AHA) must be created specific to the site and activity and reviewed and approved by the TRS project manager (PM), TRS Health and Safety Officer (HSO), and, the TRS authorized employee approving the Startup Checklist (SUCL).

Samples collected using this SOP are generally used for optimizing system performance. Samples collected using this procedure may also be used for regulatory compliance and/or site closure.

TRS Group, Inc. (TRS) personnel shall use this procedure in conjunction with site-specific Health and Safety Plans (HASP), sample analysis plans, and permit requirements. These are standard (i.e., typically applicable) operating procedures that may be varied or changed as required, dependent on-site conditions, equipment limitations, permit requirements, or limitations imposed by the procedure. The ultimate procedures, including any deviations from this SOP, shall be documented on the groundwater sampling form.

Groundwater sampling typically is performed while the power application to the treatment area is shut off and locked out by a competent person in accordance with TRS SOP 1.1 Lockout/Tagout (LOTO; TRS 2009). The decision regarding the application of energy to the subsurface during groundwater sampling will be determined on a case-by-case basis dependent on specific site conditions and engineering controls. Refer to the site-specific Health and Safety Plan (HASP) and consult with the PM and Site Health and Safety Officer (SHSO) for site-specific requirements and restrictions.

3.0 DEFINITIONS

Authorized employee

Any designated employee who locks out or tags out equipment in order to perform servicing or maintenance. This person must have completed the mandatory LOTO training described in SOP 1.1 LOTO to be qualified as an authorized worker. Only an authorized worker installs and removes his or her own lock and tag as required by this program.

Competent Person

Any designated employee who has been trained in proper procedures for hot groundwater sampling at thermal remediation sites. This person must have completed the mandatory training outlined in **Section 7.0** to be qualified as a competent person.

ERH – Electrical Resistance Heating

ERH is a process whereby soils and groundwater are heated by passing an electrical current through the subsurface volume to be remediated.

Bladder Pump

Submersible pump with external control unit used for pumping fluids at greater depths. The bladder pump consists of an internal flexible bladder that is positioned within a rigid pump body constructed of stainless steel. The inner bladder is equipped with one-way inlet and outlet valves and passively fills with water when the pump is at depth by virtue of hydrostatic pressure. Following the fill cycle, compressed air from a cylinder or compressor at the wellhead is delivered to the pump through tubing and is used to compress the bladder. The applied pressure then causes the flexible bladder to compress and closes the bottom check valve, forcing water from the bladder into the discharge tubing. During a vent cycle, the pressure is released from the drive tubing. The bladder returns to its initial state as water re-enters the pump, while the top check valve prevents water already in the discharge tubing from falling back into the bladder. The pumping sequence consists of repeated fill/compress cycles, using a pneumatic controller positioned at the wellhead.

LOTO

Lockout/Tagout. The practice of using a tag for visibility and awareness in conjunction with placement of a keyed device ("lock") on an energy isolating device, in accordance with TRS SOP 1.1, Lockout/Tagout to prevent the unwanted activation of mechanical or electrical equipment. Lockout ensures the equipment being controlled cannot be operated until the lock is removed.

Low-Flow Purging

A USEPA approved purge-and-sample method used to minimize stress on the formation (minimal drawdown) which results in less mixing of stagnant casing water with formation water. Additional advantages of using low-flow purging methods include the following:

- Samples are more representative of actual contaminant loading.
- Disturbance at the sampling point is minimal which minimizes sampling artifacts.
- Less operator variability occurs between sampling events.
- Decreased amount of investigation-derived waste (IDW) is produced.
- Need for filtration is reduced.
- Sample consistency is increased.

Flow-rates during low-flow purging/sampling are site-specific, based on hydrology, but are generally in the order of 0.1 to 0.5 L/min. Proper screen location, screen length, well construction and well development techniques may impact the effectiveness of low-flow purging. (Puls and Barcelona, 1996)

Multi-probe and Flow-Through Cell

The flow through cell allows for in-line sampling of water quality parameters with the Multi-probe to determine stabilization for water sampling. At a minimum, groundwater quality parameters include pH, conductivity, temperature, dissolved oxygen (DO), and turbidity. Examples of multi-probes used for collecting water quality parameters include the Horiba U-22 and YSI 556 (shown below).

Peristaltic Pump

A positive displacement pump used for pumping fluids. Generally, flexible tubing is fitted inside a circular pump casing. A rotor with a number of "rollers", "shoes", or "wipers" attached to the external circumference compresses the flexible tube. As the rotor turns, the part of tube under compression closes thus forcing the fluid to move through the tube.

SHSO

Site Health and Safety Officer

Trip Blank

The purpose of trip blanks it to identify any potential contamination of samples during sample handling and shipment. These blanks are prepared in the laboratory by filling a volatile organic analysis (VOA) bottle with distilled/deionized water. Trip blanks shall accompany shipment of empty bottles to the site and shipment of samples back to the laboratory.

VOA Vials

EPA recommended glass sample containers used to collect liquid samples for laboratory analysis. VOA vials have a nominal volume of 40 milliliters (mL) and are manufactured of clear or amber borosilicate glass. Depending on type of analysis being conducted, the VOA vials may contain small amounts of preservative when shipped from the laboratory. When collecting samples in VOA vials, fill the vial completely full (ensure that a meniscus has formed at the top of the vial before securing the cap) and check that there are no air bubbles in the closed sample. If there is a preservative present, use caution to not overfill the vial.

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4.0 EQUIPMENT LIST

The required equipment for groundwater sampling may differ from this SOP based on the requirements set by the local regulatory oversight agency. Typically, the required equipment will be as follows:

1) Groundwater Sampling Field Form and indelible pen;
2) Safety Glasses with side shields. Additional option: full face-shield (wear over safety glasses);
3) Cotton Gloves with Latex over-gloves. Cotton gloves should be worn to protect against water having high temperatures (wear under outer latex gloves);
4) Site-specific personal protective equipment (PPE) requirements. Refer to site-specific HASP;
5) Pump and operating components;
    a) Peristaltic pump utilized when the depth to water is 20 feet below ground surface (ft bgs) or less. Dedicated tubing shall be installed prior to ERH application;
    b) Dedicated bladder pump with compressed air for depth to groundwater greater than 20 feet. Dedicated pumps shall be installed prior to ERH application;
6) Tubing (installed prior to ERH application)
    a) Stainless steel and Silicone tubing (Masterflex®) for use with the peristaltic pump. Silicone tubing should be used only above the ground surface at the pump head in order to minimize potential for degradation by contaminants. The silicone tubing is then connected to the previously installed stainless steel tubing;
    b) Dedicated bladder pumps and tubing if using a bladder pump. Reminder: bladder pumps should have been installed prior to the start of ERH operations;
    c) Caution – Once ERH heating begins; wellhead access is prohibited without prior TRS management approval. See **Section 2.0** for details regarding the administrative process for monitoring well wellhead removal;
7) Cooler with ice;
8) 10-ft length of ¼-inch stainless steel or copper tubing;
9) One-ft length of four-inch diameter pipe;
10) Tray or container for ice bath;
11) Field water quality measuring equipment w/flow-through cell or similar device for monitoring groundwater parameters (pH, conductivity, ORP, temperature, DO, etc.) and calibration standards;
12) Turbidity meter;
13) Buckets for purge water;
14) Sample containers (with preservative as required by the laboratory analytical method), labels, and chain-of-custody forms (as required by the laboratory for the analysis). Pre-printed labels are generally available from the laboratory if requested in advance;
15) Scissors or tubing cutter (for cutting tubing lengths);
16) Packaging material and shipping labels;
17) LOTO equipment as described in TRS SOP 1.1.

5.0 HOT GROUNDWATER SAMPLING PROCEDURES

Groundwater purging is generally accepted as a required component of groundwater sampling in order to remove non-representative water from the well casing (Puls and Barcelona, 1996). Low-flow purging (or micro-purging) and sampling techniques will be used to minimize the impact on groundwater chemistry and collect representative samples. This technique also reduces the amount of investigation-derived waste (IDW) produced from a well.

Generally, low-flow purging is considered to have been accomplished once the water quality parameters monitored have stabilized to within a 10 percent margin of error. The key to successful micro-purging is minimize draw-down in the monitoring well (less than 0.33 feet). Due to the need for sealed monitoring wells during the thermal remediation process, special care should be administered in regards to purge flow rates. Purge flow rates are preferred to be between 0.1 and 0.5 liters per minute (L/min) whenever possible, but rates up to 1.0 L/min are acceptable if hydrogeological conditions dictate.

5.1 Safety Considerations

There are certain hazards associated with ERH during the remediation of soil and groundwater. These hazards include possible contact with hazardous voltage, steam, hot water, or hazardous chemicals. Exposure to these hazards can be mitigated through engineering controls and strict adherence to documented procedures and safety protocols, such as the following restrictions:

- For sample integrity, ground water sampling is performed while the ERH power control unit (PCU) is off-line. The ERH PCU output must be off and LOTO applied.
- Extreme temperatures and steam may be encountered when collecting groundwater samples; the use of the proper personal protective equipment (PPE) is mandatory and caution is advised.
- Dedicated tubing and pumping systems shall be established prior to application of electrical energy to the subsurface.
- The ERH PCU system will be turned off for a *minimum of 12 hours* prior to the sampling event and LOTO applied during groundwater sampling activities. This is for both increased safety and sample quality.
- Refer to the site-specific Sampling and Analysis Plans (SAPs) and HASP for site-specific requirements and restrictions.
- High temperatures, hot water, and steam may be encountered when collecting groundwater samples; the use of the proper PPE is mandatory and caution is advised.
- Personnel shall be trained on hazards and engineering controls associated with hot groundwater and potentially pressurized wells prior to sampling. Potential hazards include steam, hot groundwater, hot mud/soil, heated sampling equipment. Personnel should also be familiar with general site hazards identified in the site-specific HASP.

Refer to the site-specific Sampling and Analysis Plans (SAPs) and HASP for site-specific requirements and restrictions.

Caution: Exposure to hot groundwater and steam possible

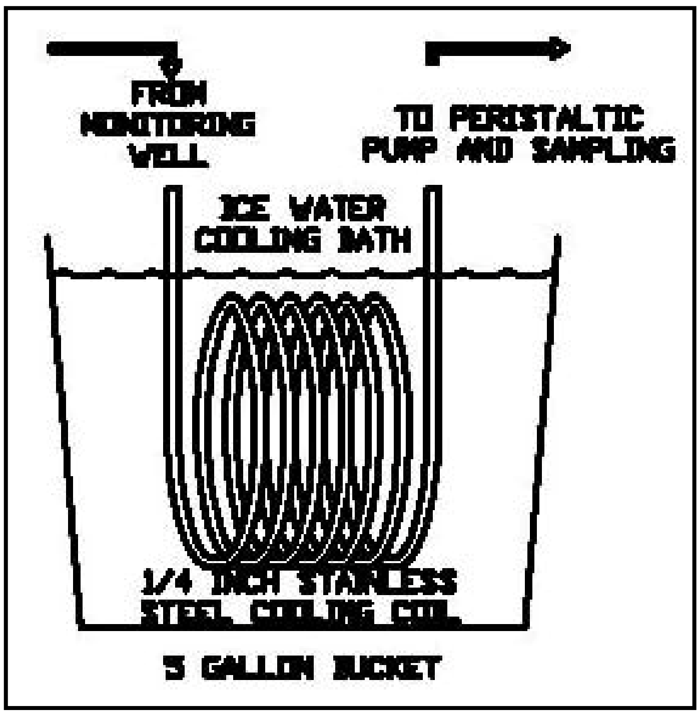
The removal of water and from a groundwater monitoring well can change the temperature/pressure conditions existing in the well by reducing the hydrostatic head in the well allowing hot water and steam to flash within the monitoring well casing. Improper sealing of the monitoring well wellhead may produce steam or hot groundwater leaks at the connection point.

5.2 Ice Bath Construction

Groundwater heated through the thermal remediation process presents both a potential safety hazard and a potential concern for collecting representative samples. If a boiling or near-boiling liquid is collected in a volatile organic analysis (VOA) vial, the formation of air bubbles as the sample cools within the VOA vial renders the sample non-representative. Additionally, hot liquids collected in the VOA vial may result in failure of the VOA septum.

The ice bath is designed to cool the groundwater prior to sample collection while limiting the impact on groundwater chemistry and contaminant concentrations. Cooling the groundwater prior to sample collection allows for both the safe handling of highly elevated water temperatures and prevents the formation of volatile organic compound (VOC) bubbles in the VOA vial after sample collection.

Prior to initial sampling, a cooling coil shall be constructed by wrapping a 10-ft length of ¼-inch stainless steel tubing 6 full turns around a 4-inch diameter pipe. The ends of the tubing shall be fashioned such that both ends of the tubing extend upward, as shown in the figure below.



5.3 Pumps

Peristaltic pumps are used for purging and sampling wells that have a depth to water of 20-ft bgs or less. During the construction of the ERH system, a dedicated ¼-inch stainless steel sample tube will be set within the well and a ¼-inch stainless steel sample valve will be installed in the surface well cap for sampling with a peristaltic pump. Prior to commencing any ERH operations, the well caps will be inspected for proper construction and installation and the well cap should not be removed during ERH operations and/or sampling. Installation of the sample valve is mandatory in order to prevent steam from escaping from the well during ERH application.

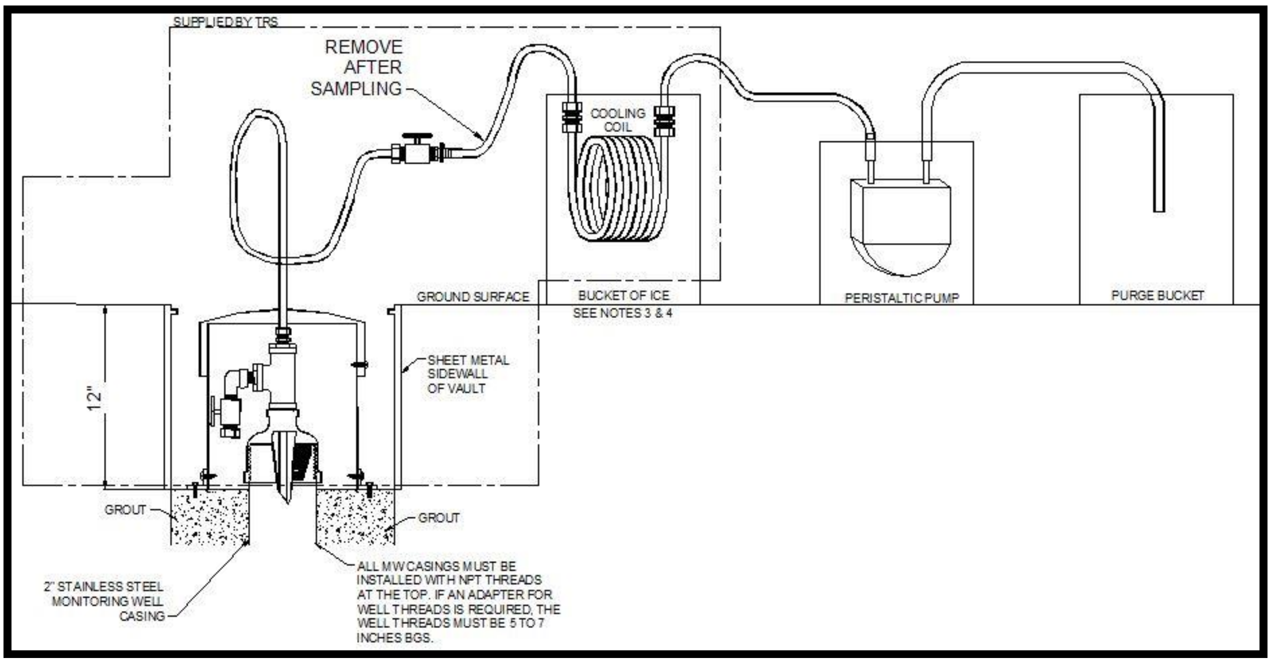
Pneumatically operated bladder pumps will be used for purging and sampling wells that with depth to water greater than 20 feet. The well head completion will be modified to allow for two tubes to pass independently through the sealed well head assembly. One tube will be used to deliver compressed air to the pump and the other tube will be used for sample recovery.

Either dedicated bladder pumps with Teflon® tubing or dedicated stainless steel tubing for use with a peristaltic pump will be installed prior to initiating heating of the ERH treatment volume. The use of pre-installed, dedicated sample equipment will reduce the risk of exposure to steam, hot water, or contaminants, since the well head will not have to be opened.

Refer to the site-specific work plan or client directives on specific placement/depth of the sample tubing intake or dedicated pump in monitoring wells.

5.4 Well Head Construction

The TRS wellhead construction contains mandatory features that support the safe and representative collection of groundwater samples on a heated ERH site. The detailed features of the Groundwater Monitoring Well are shown below.



This well head design provides the ability to collect groundwater samples from a screened monitoring well without needing to open the well head increasing exposure to steam and hot water. Once heating has commenced, entry to the wellhead is prohibited without TRS senior management approval (see **Section 2.0**).

5.5 Sample Collection Approach

For GW sampling, TRS typically extend stainless steel tubing into the water table connected to a stainless steel specialty wellhead and collect the groundwater samples by peristaltic pump. The groundwater partially flashes during recovery but the cooling coil re-condenses it so there is no VOC loss since heated GW contains almost zero dissolved gases. Sampling personnel have to be careful to make sure the tube extends fully into the water table to avoid collecting steam and air from inside the well casing. If steam and air are recovered from above the water table, rather than collecting groundwater, it causes the contaminant concentrations in the samples to be much higher than what is actually in the groundwater (opposite of what you would instinctively think). This occurs because there is mostly steam and very little air in the well casing and VOCs volatilize at a higher proportion in the steam. When the steam is condensed, it shows much higher concentrations than are typically in the groundwater. For example, 1 part per million (ppm) trichloroethene (TCE) in groundwater will boil to create steam that contains about 0.6 milligrams (mg) of TCE per liter of steam, but that one liter of steam condenses to only 0.6 mL of water so when that steam is condensed it can make it appear like the groundwater contains 1,000 mg/L of TCE rather than 1 mg/L. As long as the stainless steel tube is submersed in the groundwater, the data are very comparable to that of water collected by submersible pump.

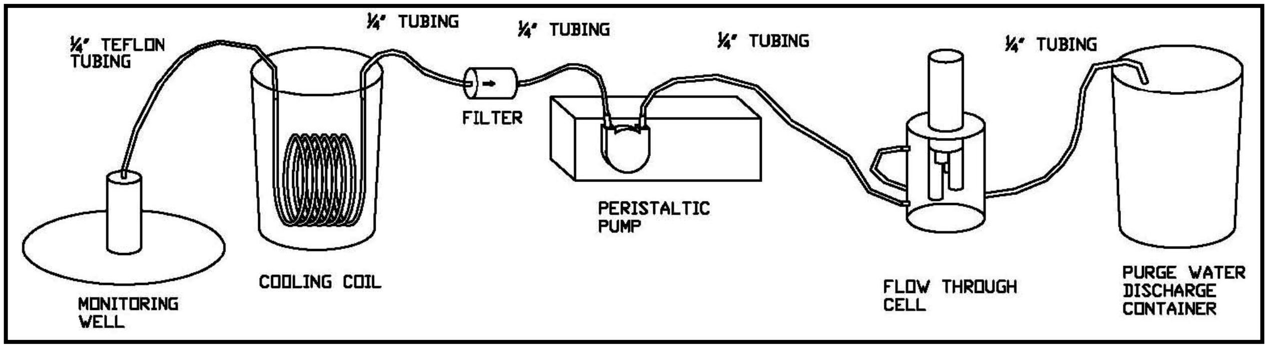
5.6 Groundwater Sampling

The TRS project team must coordinate, in advance, with all applicable parties to schedule an interruption to the ERH application. The PM and SHSO shall determine a site-specific interruption period. Sampling shall be completed in order from the wells having the lowest anticipated concentrations of contaminants of concern (COC) to wells having the highest anticipated COC concentrations (usually from exterior wells to boundary control wells to wells located within the source area).

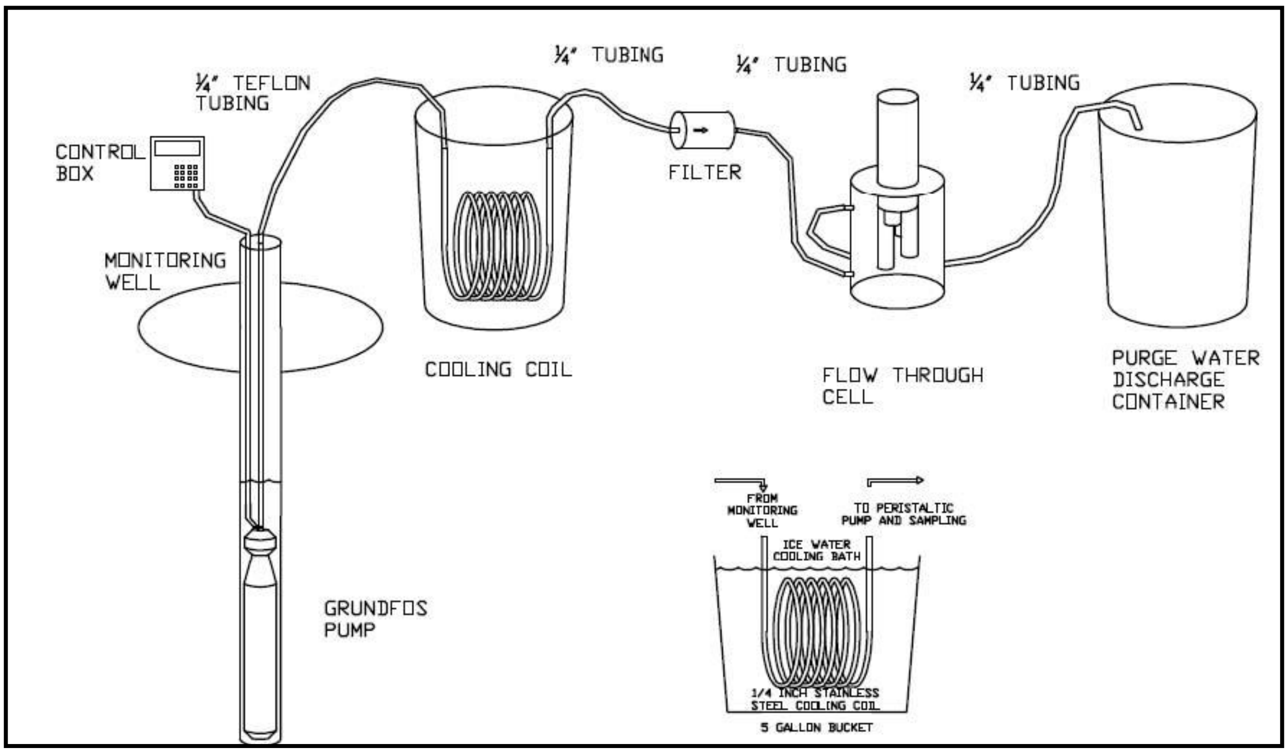
The groundwater sampling procedure is as follows:

1) Calibrate probes used to monitor water quality parameters according to the manufacturer’s instructions (as necessary). Calibration frequencies should adhere to the manufacturer’s recommendations. Document all calibrations done to the probes used. Documentation should include: date, time, calibration solutions used, solution expiration dates, solution lot numbers, calibration results, outliers, and any illuminating comments.
2) Cease ERH application to the treatment volume and perform LOTO procedures on the ERH PCU as required by site-specific protocols. ERH application will be stopped at least 12 hours prior to sampling. Note: LOTO application shall only be completed by personnel who have been trained and certified by TRS in accordance with SOP 1.1.
3) Connect ¼-inch sample tubing from the valve on the well to the cooling coil and place the coil in a bucket or cooler with ice to form the ice bath as described in **Section 5.2**.
4) Connect the pump to the cooling coil. For wells with a depth to water less than 25 feet, connect the cooling coil and peristaltic pump to the monitoring wellhead. For wells having a depth to water greater than 25 ft bgs, connect pump controls to the previously deployed bladder pump and connect the cooling coil and compressed air source. An in-line filter is only required for specific analyses (typically for dissolved metals analyses). Please confirm with laboratory for specific sample requirements.
5) Connect the cooling coil discharge tubing to a flow-through cell with the calibrated meter probes/sensors securely held in the flow-through cell.
6) Connect tubing from the discharge of the flow-through cell to the purge water collection bucket.

PUMPING SET-UP WITH PERISTALTIC PUMP



PUMPING SET-UP WITH SUBMERSIBLE PUMP



7) Begin purging the well at a low flow rate. Target pumping rates should generally be in the order of 0.1 to 0.5 liters per minute (L/min) to ensure stabilization of parameters and reduce mixing of formation water with stagnant well casing water. (Puls and Barcelona, 1996). Depending on site parameters and pumping method used, maintaining a steady low-flow rate may require pumping up to a rate of 1 L/min. Adjustments to the pumping rate are best made within the first 15 minutes of purging to minimize purging time.
8) The pumping rate is recorded on purge data sheets every 3 to 5 minutes during purging. Any adjustments to the pumping rate are recorded. At the initiation of well purging and after recording pumping rates, water quality parameters are measured and recorded with a multi-parameter water quality meter equipped with a flow-through cell. The measured water quality parameters are temperature, turbidity, specific conductance, pH, DO, and oxygen reduction

potential (ORP or Redox). Pumping shall continue until the water quality parameters have stabilized (refer to **Section 5.4.1**).

9) After all water quality parameters have stabilized (refer to **Section 5.4.1**) sampling may begin. If all parameters have stabilized, but turbidity remains above 10 Nephelometric Turbidity Units (NTUs), decrease the pump rate and continue monitoring. If the pump rate cannot be reduced and turbidity remains above 10 NTUs, the information will be recorded and sampling initiated. For low yield wells, contact TRS Engineering group for evaluation and instructions for sampling.
10) Disconnect the tubing from the inlet side of the flow-through cell. The tubing from the pump outlet will be used to fill the groundwater sample bottles. Samples for VOCs shall be collected first followed by semi-volatile organic compounds (SVOCs). All other parameters should be collected in order from most volatile to least.
11) Groundwater samples including quality control (QC) samples are labeled and preserved per the site-specific Sampling and Analysis Plan (SAP).
12) All pertinent information will be documented in the sample log book and on the chain-of-custody forms including: date, time of sample, sample identification, analysis being completed, and any other information deemed relevant to the sample results. The following additional information shall be documented in the sample logbook: time at beginning and end of monitoring well purging, flow rate and any changes during the monitoring well purge, equipment used for monitoring well purge, and water quality parameter readings used to determine sample time.
13) Package and ship samples with a laboratory supplied trip blank to the off-site laboratory for analysis.
14) used for groundwater sampling effort shall be decontaminated according to manufacturer recommendations. Dispose of decontamination liquids and purge water in accordance with site-specific documents.

5.6.1 Water Quality Parameters

Readings are recorded on the purge data sheets every 3 to 5 minutes. Field parameters are monitored until stabilization occurs. Unless local regulatory requirements differ, readings are generally considered stable when three consecutive readings are within the following criteria:

- Specific conductance readings within 3 percent
- Redox potential within 10mV
- pH within +/-0.1 standards units
- Turbidity and DO readings within 10 percent

5.6.2 Pump Assisted Grab Sample

If during the ERH process, groundwater levels have dropped and conditions do not allow for a representative sample to be collected (i.e., pumping activities draw down groundwater level below the sampling tube inlet), the following procedures will be used to sample the well and allow for recharge. Please note that this procedure should not be followed if subsurface temperatures are indicative of steam generation occurring within the ERH treatment volume.

Pump Assisted Grab Sample Procedure:

1) A column of water is drawn in the cooling coil tubing with the pump.
2) The well sample valve and the peristaltic pump inlet valve are closed and the pump shut off.

3) The cooling coil is disconnected from the well sample valve.
4) The cooling coil is carefully removed from the ice bath.
5) The pump inlet valve is opened.
6) The sample is decanted into the sample vials from the pump end of the tubing via gravity flow.

The process is repeated until the sample volume is collected. Any other sample fractions (cations, anions) are sampled from the well end of the cooling coil tubing. It is important to note sampling with this procedure may not provide sample results representative of the formation. In addition, field notes/datasheets should explicitly detail all activities and actions when using this procedure.

6.0 RESPONSIBIITIES

Technical Group Leader	• Develop and implement SOPs. • Periodically review and update procedures based on project feedback.
TRS Health & Safety Officer	• Provide training and maintain training documentation. • Assist SHSO with modifying SOP to meet site-specific HASP and SAP requirements. • Work with PM to develop AHA for any intrusive work required to complete groundwater sampling efforts.
Project Manager	• Review procedures in conjunction with site-specific SAP requirements and scope of work (SOW). Coordinate changes to procedures as necessary. • Schedule and coordinate sampling effort. Ensure adequate supplies are available. • Work with HSO to develop AHA for any intrusive work required to complete groundwater sampling efforts.
Site Health & Safety officer	• Conduct orientations for subcontractors and employees. • Coordinate training needs with TRS HSO. • Review procedures in conjunction with site-specific HASP. Coordinate changes to procedures as necessary to maintain safe working procedures.
Sampling Personnel	• Complete training to the level of competent person prior to initiating sampling activities. • Follow procedures and document information related to groundwater sampling effort as identified in this SOP, including and deviations from the SOP.

7.0 TRAINING

Training in SOPs is provided upon initial assignment and annually thereafter. Practical training is provided on a project-specific basis. Additional retraining is provided if there is a change in procedures or if inadequacies are observed in the individual’s application of procedures.

Competent persons in hot groundwater sampling are determined by the project PM and SHSO and must, at a minimum, complete the following requirements:

- Read this SOP (SOP 3.1) and understand the general process and the specific requirements of this SOP.
- Sign the training acknowledgement form.
- Obtain on-site instruction by a knowledgeable person on the task-specific hazards associated with hot groundwater sampling and the methods used to control these hazards.
- Obtain on-site instruction by a knowledgeable person on important technical components of the hot groundwater sampling program to ensure the collection of representative samples.

8.0 RECORD KEEPING

These are standard (i.e., typically applicable) procedures which may be varied or changed as required, dependent on-site conditions, equipment limitations, permit requirements or limitations imposed by the procedure. The ultimate procedures used during any sampling event, including any deviations from these procedures, shall be documented in the sample logbook. AHA's developed for any intrusive work conducted in conjunction with this SOP shall be maintained with the groundwater sample logbook.

Calibrations of water quality meters used to measure water quality readings shall be completed according to the manufacturer's recommendations. Calibration results shall be maintained in a written log kept at the site throughout the operational phase of the project.

At a minimum, the following information shall be maintained in the sample logbook related to well purging and groundwater sample collection:

1) Date;
2) Sample/purge location identification;
3) Type of pump used for well purge;
4) Duration of well purge;
5) Sample time;
6) Flow rate (including changes throughout purge);
7) Meter(s) used for collection of water quality parameters and calibration documentation;
8) Water quality parameter readings;
9) Volume of purge water collected prior to sampling;
10) Sample identifications and analysis to be performed;
11) Chain-of-custody number;
12) Shipping information;
13) Procedures used for equipment decontamination;
14) Deviations from this SOP, and;
15) Any other information deemed relevant to the sample results.

Copies of chain-of-custody forms and shipping documentation shall be maintained and kept with the sample log book.

9.0 REFERENCES

Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedure, EPA/540/S-95/504.

Yeskis, Douglas and Zavala, Bernard, 2002, Ground Water Sampling Guidelines for Superfund and RCRA Project Managers, EPA/542-S-02-001.

Vail, Jonathon, France, Danny, and Lewis, Bobby, 2013, SESD Operating Procedure Groundwater Sampling, EPA Region 4/SESDPROC-301-R3.

SOP 3.1 Hot Groundwater Sampling

Training Acknowledgment

All personnel that receive training on this procedure will review and sign the acknowledgement form contained in this section.

I have been trained by TRS Group, Inc. (TRS) to perform non-intrusive hot groundwater sampling at ERH project sites. By signing this document, trainee acknowledges that SOP 3.1 Hot Groundwater Sampling has been read and the contents of the document are understood. Trainee has received hands-on training from a competent person who is authorized to use and instruct others on sampling procedures at TRS project sites.

Date	Trainee (print)	Trainee (Sign)	Trainer

	STANDARD OPERATING PROCEDURE	PROCEDURE No: 3.2

Procedure Title:

HOT SOIL SAMPLING

Author:	TRS Team	**Issue Date:**	4/22/08

Revisions:

Date	Initials	Revision Description	Revision #
01-04-10	LS	Add Scope, responsibilities, training, definitions, recordkeeping	1
5-6-14	TP	Added caution concerning hot water, steam expulsion	2
2-22-16	TP	Review, revised power off requirement	3
12-4-17	GK	Removed Geoprobe® Dual-Tube Sampler reference and revised determination for use of Teflon liners.	4

Reviewed and Approved by (initial and date)**:**

SOP/ Revision #	Health & Safety		Operations	
Original	4/22/08		4/22/08	
REV 1	1/4/10		1/4/10	
REV 2	5/6/14		5/6/14	
REV 3	2/24/16		2/22/16	
REV 4	[signature]	12/4/17	[signature]	12/6/17

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a procedure for the safe collection of representative soil samples during, or after, the application of Electrical Resistance Heating (ERH) or other *in situ* thermal treatment (ISTT) technologies. This procedure specifically addresses sampling of soil that has been heated during the ERH process.

2.0 SCOPE

This SOP serves as a guideline for the collection of soil samples during, or after, the application of ERH. To minimize the risk due to electrical hazards, lockout/tagout (LOTO) procedures must be applied to the ERH power control unit (PCU) throughout the duration of the soil sampling effort. Only authorized persons trained in procedures and requirements described in SOP 1.1 are permitted to conduct LOTO on TRS equipment. Samples collected using this SOP are generally used for evaluating treatment effectiveness, and/or confirming treatment goals have been met.

TRS Group, Inc. (TRS) personnel shall use this procedure in conjunction with site-specific sample analysis plans and permit requirements. These are standard (i.e., typically applicable) operating procedures, which may be varied or changed as required, dependent on site conditions, equipment limitations, permit requirements, or limitations imposed by the procedure. The ultimate procedures, including any deviations from this SOP, shall be documented in the soil sampling form.

3.0 DEFINITIONS

Authorized Employee

Any designated employee who locks out or tags out equipment to perform servicing or maintenance. This person must have completed the mandatory LOTO training described in SOP 1.1 LOTO to be qualified as an authorized worker. Only an authorized worker installs and removes his or her own lock and tag as required by this program.

Competent Person

Any designated employee who has been trained in proper procedures for the application of energy to the subsurface at ERH sites. This person must have completed the mandatory training outlined in **Section 7.0** to be qualified as a competent person.

ERH – Electrical Resistance Heating

ERH is a process whereby soils and groundwater are heated by passing an electrical current through the subsurface volume to be remediated.

LOTO – Lockout/Tagout

The practice of using a tag for visibility and awareness in conjunction with placement of a keyed device ("lock") on an energy isolating device, in accordance with SOP 1.1, to prevent the unwanted activation of mechanical or electrical equipment. Lockout ensures the equipment being controlled cannot be operated until the lock is removed.

4.0 EQUIPMENT LIST

1) Soil Sampling Field Form and pen (recommend indelible).
2) Drill rig and related equipment. Soil sampling is best achieved using a direct push drill rig such as a Geoprobe®.

3) Ice bath for soil samples. An example is a cooler filled with ice. The cooler (or container) must be equipped with an opening at the bottom to allow water from melting ice to drain.

4) Standard cooking thermometer. Calibrated to both zero (0) degrees Celsius (°C) and 100°C (an infrared thermometer can be substituted when sampling denser soils or bedrock. Keep in mind the sample tube will likely be a few degrees cooler than the internal temperature of the sample).
5) LOTO equipment as described in TRS SOP 1.1.
6) Sample containers, labels, and chain-of-custody forms (as required by the laboratory for the analysis).
7) Safety Glasses with side shields. Additional option: full face-shield (wear over safety glasses).
8) Hearing protection adequate for sampling equipment decibel level. Refer to site-specific Health and Safety Plan (HASP).
9) Latex or nitrile gloves. Additional option: cotton or leather outer gloves (wear over inner latex gloves).
10) Site-specific personal protective equipment (PPE) requirements. Refer to site-specific HASP.
11) Packaging material, chain-of-custody seals, and shipping labels.

5.0 HOT SOIL SAMPLING PROCEDURES

A soil-sampling event begins with the shutdown and application of LOTO to the PCU. This is done to prevent any electrical hazards between the steel drill string and sampling personnel. The vapor recovery system should continue to operate to maintain capture of steam in the subsurface, rather than allowing it to exit through the sample borehole. Interim and final soil sampling is best achieved using a direct push drill rig such as a Geoprobe®. As the probe casing is extracted from the subsurface, it should be considered to be very hot, and handled with proper precaution and personal protective equipment.

Choose a sample sleeve compatible with the conditions being encountered. For example, if the sample location temperature is elevated above 100°C, then a stainless steel sleeve will be a better choice than a Teflon sleeve as the Teflon sleeve will become soft and deform at elevated temperatures. Consult engineering for the appropriate sleeve. Teflon sleeves are only recommended for sampling when expected subsurface temperatures will be at or below 70°C.

Note: sample sleeves can be custom fabricated if supplier inventories are inadequate. Please contact equipment@thermalrs.com if additional resources are needed to procure sampling sleeves.

5.1 Safety Considerations

There are certain hazards associated with ERH during the remediation of soil and groundwater. These hazards include possible contact with hazardous voltage, steam, hot water, hot soil, other hot surfaces, and/or hazardous chemicals. Exposure to these hazards can be mitigated through engineering controls and strict adherence to documented procedures and safety protocols such as the following restrictions:

- The ERH PCU system must be turned off and LOTO applied during soil sampling activities. Only trained and authorized TRS personnel are allowed to perform LOTO of ERH equipment.
- High temperatures, hot water, and steam may be encountered when collecting subsurface soil samples; the use of the proper PPE is mandatory and caution is advised.
- Contaminant vapors may be present at the borehole during sampling.
- Personnel shall be trained on hazards and engineering controls associated with drilling before beginning sampling operations. Potential hazards include rotating equipment, overhead loads, and slips trips and falls.

Refer to the site-specific Sampling and Analysis Plan (SAP) and HASP for site-specific requirements and restrictions.

Caution: Exposure to hot groundwater and steam possible

The removal of water and soil from the sample borehole can change the temperature/pressure equilibrium conditions existing within the borehole prior to drilling and sampling by reducing the hydrostatic head in the borehole, allowing hot water and steam to eject from the borehole. Review the site conditions prior to commencing drilling or boring. If sampling soil beneath the groundwater surface level elevation, always remove the boring equipment and samples slowly from the boring to allow the borehole conditions to safely re-equilibrate.

Stop and complete the attached Site Sampling Evaluation Checklist before proceeding with this procedure.

5.2 Hot Soil Sampling Procedures

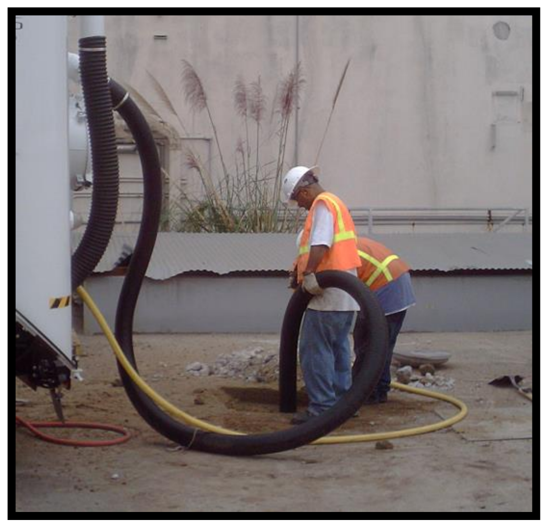
Whenever possible, sampling shall be completed in order from sample locations having the lowest anticipated concentrations of contaminants of concern (COC) to locations having the highest anticipated COC concentrations (i.e.; outside treatment area, treatment area boundary, locations within the source area). The steps outlined below must be followed for iterative, interim, and/or final hot soil sampling.

Contact the TRS Project Manager (PM) the day prior to sampling to coordinate a shutdown. A shutdown period of 4 hours is preferred prior to soil sampling.

1) An authorized person shall apply LOTO to the ERH PCU by site-specific instructions. Note: Only personnel who have been trained and certified by TRS in LOTO procedures can complete this procedure.

2) Position drill rig in the area to be sampled and perform a visual check for any safety concerns. Potential concerns include: high voltage lines, uneven terrain, underground utilities, and egress limitations with rig placement.


3) Hand auger or air knife the first five (5) feet of the boring to clear the location for potential buried utilities.

4) Advance the push sampler to the depth required and collect samples. If subsurface temperatures are expected to be greater than 70°C, the sample sleeves used must be made of brass or stainless steel. Sample sleeves made of acrylic or other materials can melt and bias sample results.


5) The sample sleeves must be capped immediately and placed into the ice bath to begin the cool-down process. Water from melting ice must be allowed to drain, as the sample sleeves should not be submerged at any time.


6) The sample sleeves should be cooled until the soil nears ambient temperature (approximately 20°C or 70 degrees Fahrenheit [°F]). A standard cooking thermometer can be inserted through the end cap for temperature monitoring. The sample sleeve may be opened and sampled once near-ambient temperatures have been reached. Soil samples, including quality control (QC) samples, are collected, labeled, preserved, and shipped per the site-specific SAP.
7) Plugging/sealing of the soil borehole will be in accordance with Federal, State, and/or Local regulatory and client requirements.
8) Soil cuttings not consumed in the sampling process will be disposed of according to Federal, State, and/or Local regulatory and client requirements.

6.0 RESPONSIBILITIES

Role	Responsibility
VP Operations	• Develop and implement SOPs • Periodically review and update procedures based on project feedback • Provide training and maintain training documentation
TRS HSO	• Assist VP Operations with providing training and maintaining training documentation. • Assist Site Health and Safety Officer (SHSO) with modifying SOP to meet site-specific HASP requirements.
PM	• Review procedures in conjunction with site-specific sample requirements and scope of work (SOW). Coordinate changes to procedures as necessary. • Schedule and coordinate sampling effort. Ensure adequate supplies are available.
SHSO	• Conduct orientations for subcontractors and employees

Role	Responsibility
	• Coordinate training needs with TRS HSO • Review procedures in conjunction with site-specific HASP. Coordinate changes to procedures as necessary to maintain safe working procedures.
Sampling Personnel	• Complete training to the level of competent person prior to initiating sampling activities. • Follow procedures and document information related to soil sampling effort as identified in this SOP, including and deviations from the SOP.

7.0 TRAINING

Training in SOPs is provided upon initial assignment and annually thereafter. Additional retraining is provided if there is a change in procedures or if inadequacies are observed in the individual's application of procedures. Subcontractors must train their own employees. LOTO training requirements for personnel are outlined in SOP 1.1.

8.0 RECORD KEEPING

These are standard (i.e., typically applicable) procedures, which may be varied or changed as required dependent on site conditions, equipment limitations, permit requirements, or limitations imposed by the procedure. The ultimate procedures used during any sampling event, including any deviations from these procedures, shall be documented in the sample logbook.

At a minimum, the following information shall be maintained in the sample logbook related to hot soil sampling at ERH project sites:

- Date;
- Sample identification and corresponding location;
- Sample time;
- Sample identifications and analysis to be performed;
- Chain-of-custody number;
- Shipping information;
- Deviations from this SOP; and
- Any other information deemed relevant to the sample results.

Copies of chain-of-custody forms and shipping documentation shall be maintained and kept with the sample logbook.

9.0 REFERENCES

TRS Group, Inc., 2013. SOP 1.1, Lockout/Tagout (LOTO), Most Recent Version.

US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, Most Recent Version (Method 5035)

SOP 3.2 Hot Soil Sampling
Training Acknowledgment

All personnel that receive training on this procedure will review and sign the acknowledgement form contained in this section.

I have been trained by TRS Group, Inc. (TRS) to perform hot soil sampling at TRS ERH project sites. By signing this document, trainee acknowledges that SOP 3.2 Hot Soil Sampling has been read and the contents of the document are understood. Trainee has received hands-on training from a competent person who is authorized to use and instruct others on sampling procedures at TRS project sites.

Date	Trainee (print)	Trainee (Sign)	Trainer

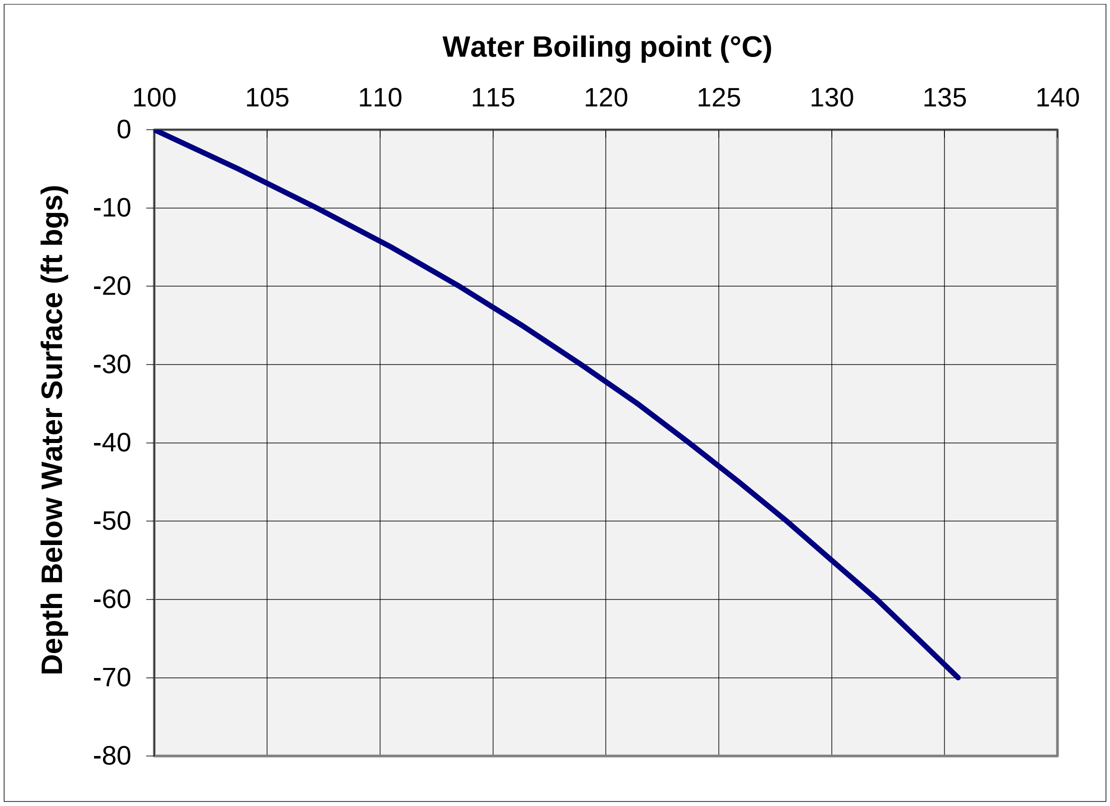
Site Sampling Evaluation Checklist

Project #: _________________

Date: _____________________

Subsurface Conditions

1) Are soil samples being recovered from beneath the groundwater surface?
2) What is the depth to groundwater at the time of sampling?
3) How deep below the groundwater surface elevation are we sampling?
4) What are the current temperatures at or near each boring location?
5) Are there confining layers on site? Clay or silt over saturated zone sand for example.
6) Use the figure below to determine where the sites actual temperatures fit on the boiling point curve.



7) Actual temperature for each depth elevation that is higher in value than the temperatures represented by this curve suggest a temperature value greater than the hydrostatic boiling point of water.

APPENDIX 2

TRS Emergency Response Plan

TRS Group, Inc.

Site-Specific Emergency Response Plan:

Former Shareholder Eldre Corp.
1500 Jefferson Road
Rochester, New York

July 2019

TRS Group, Inc.
Accelerating Value

P.O. Box 737
Longview, WA 98632
www.thermalrs.com

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Abbreviations and Acronyms

CVOC	chlorinated volatile organic compound
E-stop	emergency stop
Eldre	Former shareholder of Eldre Corp
EMT	emergency medical technician
ERH	electrical resistance heating
ERP	Emergency Response Plan
FEMA	Federal Emergency Management Agency
HASP	Health and Safety Plan
PM	Project Manager
PPE	personal protective equipment
SHSO	Site Health and Safety Officer
SPM	Senior Project Manager
SQM	Safety & Quality Manager
TRS	TRS Group, Inc.
WEA	Wireless Emergency Alerts

1.0 PURPOSE

TRS Group, Inc. (TRS) has prepared this Emergency Response Plan (ERP) as part of the site-specific Health and Safety Plan (HASP), dated July 2019, for the Mersen Corporation facility located in Rochester, New York (the Site). The purpose of this ERP is to establish an organizational structure and procedures for response to major emergencies. It assigns the roles and responsibilities for the implementation of plans during an emergency should they occur at the Site. As this ERP is part of the site-specific HASP, all Site personnel will review this ERP, understand their role(s) and responsibilities, and understand the procedures herein. All Site personnel will acknowledgement of their review of this ERP by signing the HASP acknowledgement form in **Appendix A** of the site-specific HASP.

2.0 PROJECT & SITE DESCRIPTION

TRS Group, Inc. (TRS) has entered into a contract with the former shareholder of Eldre, Inc. (Eldre) for the remediation of chlorinated volatile organic compounds (CVOCs) in the subsurface at the Site. TRS will employ electrical resistance heating (ERH) technology to remediate CVOCs in soil and groundwater in the designated ERH treatment area and volume. See **FIGURE 1** for general layout of the Site.

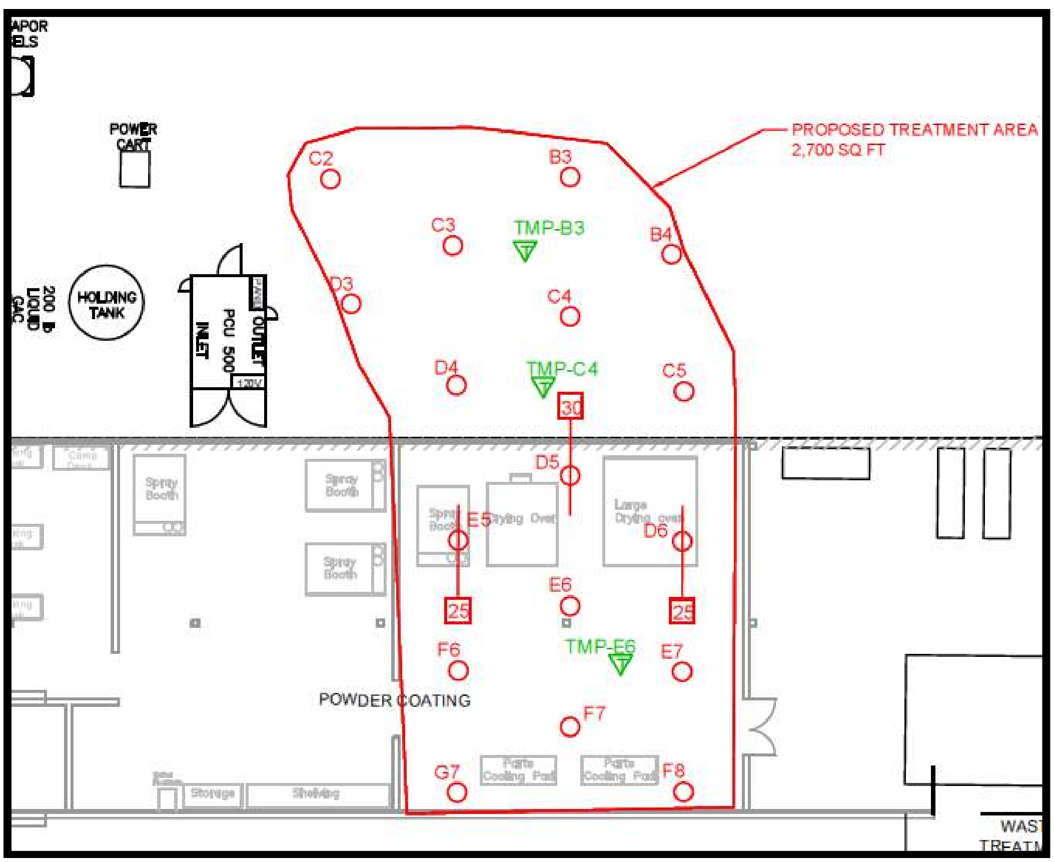

Figure 1. ERH Site Plan

3.0 ROLES AND RESPONSIBILITIES

The TRS project team will generally consist of senior Project Manager (SPM), a Project Manager (PM), a site Health and Safety Officer (SHSO), support/technical staff, and TRS management support staff including the TRS Safety and Quality Manager (SQM). The following provides a description of the roles and responsibilities of TRS staff during emergency situations that may occur at the Site:

- **TRS SPM** – the SPM will serve as a point of contact to relay information to TRS executive and other management staff; will direct response actions as necessary through the PM, SHSO, and other TRS staff on-site; and will provide information regarding emergency response to the TRS client, property owner(s), and other applicable non-TRS Site contacts.
- **TRS PM** – when on-site, the TRS PM will serve as the emergency response Scene Commander; will coordinate with the TRS SHSO regarding emergency response actions and contacting appropriate authorities; will communicate Site emergency response information to the TRS SPM, will carry out emergency response actions in accordance with this ERP; and coordinate with the TRS SHSO and SQM regarding post-response review, investigation, and reporting.
- **TRS SHSO** – when on-site, the SHSO will serve as the emergency response Scene Commander in the absence of the TRS PM; will assume all the responsibilities of the TRS PM listed above; communicate with the TRS PM regarding status of emergency response actions; and coordinate with the TRS PM and SQM regarding post-response review, investigation, and reporting.
- **TRS SQM** – will prepare the ERP in accordance with local, state, and federal requirements; will consult TRS project staff regarding Site-specific emergency response actions required by the TRS client, property owner(s), and other applicable project groups or agencies; will assist TRS on-site staff with emergency response actions as needed; assist with communication of emergency response actions internally and externally as needed, and direct post-incident reviews and investigations and associated follow-up and reporting.

3.1. Emergency Response Chain of Command

The following provides the TRS staff succession for chain-of-command and emergency response Scene Commander during emergency response situations. TRS will assume the lead in any emergency response situation involving the ERH system. The ERH system is defined as the area enclosed by chain link fence that includes the equipment compound and outside components of the electrode installation. TRS will follow the Mersen emergency response plan, if available for all situations that involve incident within the building. TRS will lend support to the Mersen incident commander with regards to request involving the ERH system during an internal incident. TRS chain of is as follows:

1. TRS PM – if present on-site, the TRS PM will assume the role of emergency response Scene Commander.
2. TRS SHSO – if the TRS PM is not on-site at the time that an emergency response takes place, he/she will assume the role of Scene Commander.
3. TRS Support Staff – if the TRS PM and SHSO are not on-site at the time of emergency response, the senior TRS employee (most tenured) on-site will assume the role of Scene Commander and fulfill all the responsibilities of the TRS PM as listed above.

4. In the case that no TRS staff are on-site at the time of emergency response, at the time of notification, the TRS PM will coordinate with on-site personnel to ensure Site safety with regards to TRS operations and equipment; as needed, the TRS PM will remotely shut-down TRS equipment as needed to ensure Site safety; and communicate emergency response status to appropriate TRS staff, client contacts, property owner(s), and other Site-related agencies or personnel.

4.0 SITE-SPECIFIC EMERGENCY RESPONSE PROCEDURES

The following provides a summary of specific response procedures to be followed in the case of a Site emergency. Note that there may be additional response procedures based on Site conditions or other factors that may be present at the time of the emergency and it is extremely important for the Scene Commander to communicate with and follow the instructions of local authorities and other officials or agencies that may also be involved with the emergency response. Site emergencies may include, but not be limited to, the following:

- Fire
- Unplanned release to the environment
- Incident involving personal injury and/or damage to equipment or property
- Vandalism, theft, and/or unauthorized Site entry
- Severe weather-related emergencies (i.e., severe rain storm, blizzard, electrical storm, tornado)
- Natural disaster (i.e., earthquake, flood)
- Unplanned loss of power
- Acts of violence (i.e., personal attacks/mugging, car-jacking, active shooter situations, hostage situations)

4.1. Site Muster Points

In the event of an emergency situation at the Site, a warning horn (air horn, car horn, or equivalent) will be sounded by the Scene Commander using three blasts of the horn. Upon hearing the emergency warning horn, all Site personnel will stop work and immediately retreat to the primary muster point at the Site. The primary muster point for the Site is outside of the Eldre Facility. Personnel will muster outside of the ERH equipment compound in the parking lot to the north of the facility. In the case that it is not safe to go to the primary muster point, Site staff will retreat to the secondary muster point, located at the front of the property (south side) by Jefferson Road. Upon arrival at the muster point, Site staff will report in to the Scene Commander. It is the responsibility of the Scene Commander to account for all staff on-site and, to the best of their ability, ensure that staff safely retreat to the muster point. In the case that any Site staff is not accounted for during the emergency, the Scene Commander must notify emergency response personnel of any staff that may still be on-site and their last known location.

4.2. Fire Emergencies

In the event of a fire at the Site, the Scene Commander on-site will immediately sound the emergency warning and call 9-1-1 to notify the local emergency response system of the fire and provide specific information as requested by the 911 dispatcher (i.e., Site location, number of people on-site, location and nature of fire). The Scene Commander will complete the following (in order as numbered):

1. Sound Site emergency warning (air horn, car horn) using three blasts.
2. Call 9-1-1 as noted above.
3. Depress the ERH Emergency Stop (E-Stop) button if safe to do so.
4. Account for personnel on-site and move them to a safe location and/or the established Site muster point and assist any personnel in danger (only if it is safe to do so).
5. Only if it safe to do so and if the fire is small and contained, the Scene Commander can coordinate fire-fighting efforts using appropriate fire extinguishers on-site. All fire-fighting activities should follow the "Three A's":
    a. <u>A</u>ctivate alarms/9-1-1;
    b. <u>A</u>ssist personnel in danger (if safe to do so); and
    c. <u>A</u>ttempt to fight the fire (only if safe to do so).
6. Call and notify the appropriate TRS and other project related staff as defined in the "ERP Call Tree" in **Figure 2**.
7. Carry out the instructions of any emergency response personnel that may be on-site (Fire Department, Police, Emergency Medical).

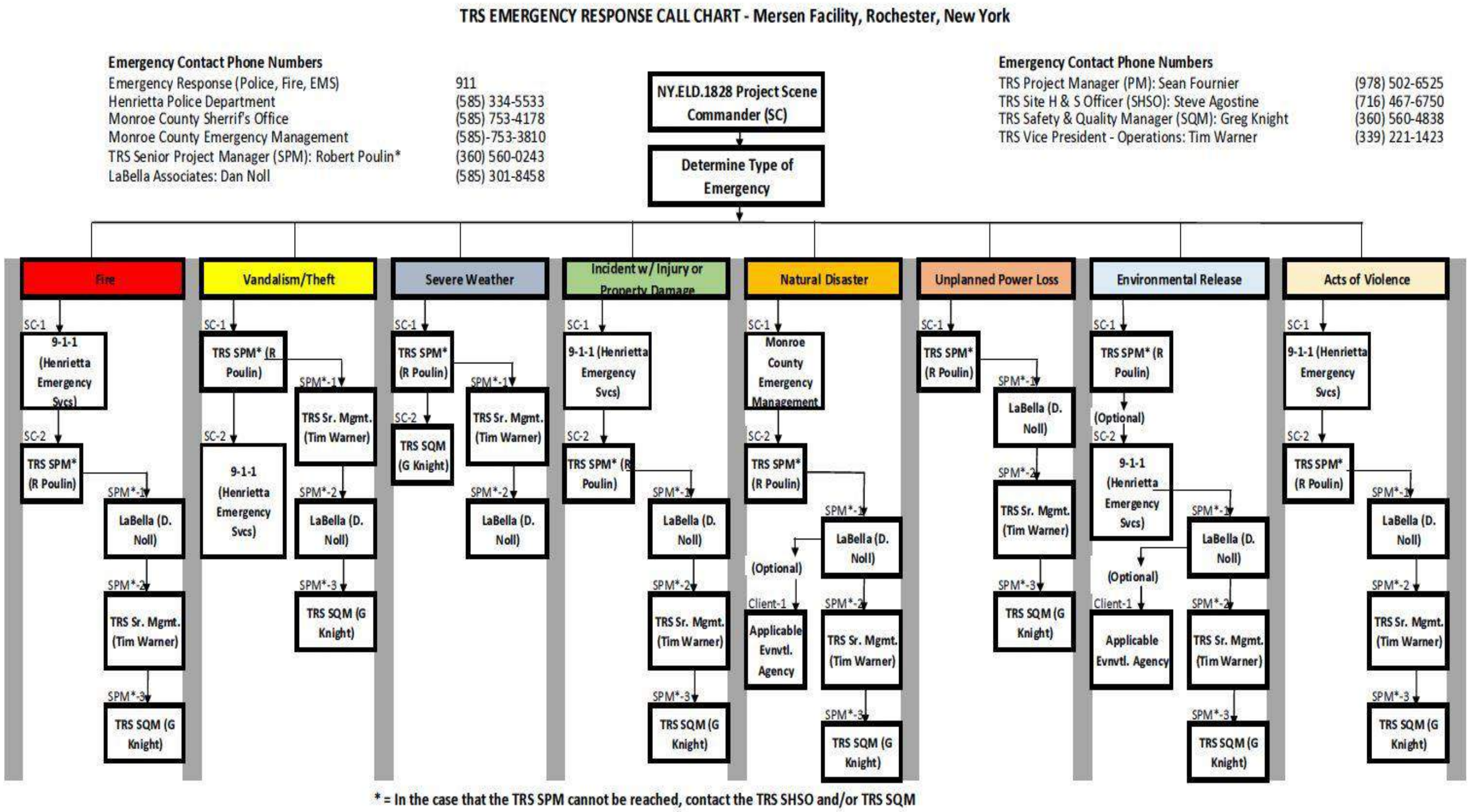

Figure 2. TRS Emergency Response Call Tree

4.3. Unplanned Environmental Release

In the event of an unplanned release of potentially hazardous materials to the environment, the Scene Commander will follow the procedures below (in order as numbered):

1. Identify the source of the release and determine if it safe to attempt to stop and contain the release. If it is not safe to deal with the release, proceed to **Step 9** of this section.
2. Confirm that all on-site staff are accounted for and address any personal injury situation as needed (see **Section 4.3**)
3. If it is safe to respond to the release, coordinate a team for response, develop a response plan, don appropriate personal protective equipment (PPE), and carry out the response plan. <u>Note: this plan should be only to stop the source of the release and prevent further release of materials to the environment.</u>
4. Once the release is contained, contact the appropriate TRS and other project-related staff to notify them of the release and Site status. Follow contact instructions provided in the ERP Call Tree (**Figure 2**).
5. Conduct an assessment of the release to include:
    a. Identify the material and quantity or volume released to the environment.
    b. Determine environmental receptor of the release such as soil, groundwater, surface water, air, local storm sewer or other subsurface conduits, or any combination of receptors.
    c. Determine what additional efforts are needed to contain and mitigate the release.
    d. Collect any other pertinent information associate with the release such as personal injury, equipment damage or failure, property damage, or public exposure potential.
6. Contact appropriate TRS and other project related staff with a status update based on the Site assessment noted above.
7. Coordinate with TRS SPM and other appropriate project staff (client, environmental consultant) to determine if the release exceeds the applicable reportable quantity. If so, coordinate notifying the appropriate authorities and/or agencies.
8. Coordinate with the TRS SPM and appropriate project staff and local agencies (as required) to develop plans for further release response and/or Site assessment.
9. In the case that the Scene Commander determines it is not safe to respond to the release, contact 9-1-1. Follow the instructions of the 9-1-1 dispatcher and any emergency response personnel that arrive on-site. After contacting the emergency response system, contact the appropriate TRS and other project staff regarding the release.

4.4. Personal Injury, Medical Emergency, Equipment Damage, and Property Damage Events

Upon notification of any personal injury or medical emergency situation, the Scene Commander will carry out the following procedure (in order as numbered):

1. Assess the injured person and determine if emergency medical response is needed. If emergency medical response is needed, call 9-1-1 immediately and follow the instructions of the 911 dispatcher. If emergency medical response is not needed proceed to **Step 5** of this section.

2. Provide and/or coordinate first aid if it is safe and those providing care are trained and qualified to do so. Collect information on the victim's status and vital signs and provide to emergency medical technicians (EMT).
3. Notify the appropriate TRS and other project related staff of the incident per the ERP Call Tree (**Figure 2**).
4. Upon the arrival of EMTs, provide victim information as requested and follow instructions provided by EMTs.
5. If the injury is minor and emergency medical response is not needed, provide and/or coordinate first aid if it is safe and those providing care are trained and qualified to do so.
6. Notify the appropriate TRS and other project related staff of the incident per the ERP Call Tree (**Figure 2**).
7. Monitor the victim's condition, provide further treatment if needed, and assess to determine if professional medical attention is needed.
8. Update appropriate TRS and project related staff as needed.

In the case an incident occurs where there is damage to any property or Site equipment, the Scene Commander should conduct the following (in order as numbered):

1. Asses the incident to determine if the scene is safe. Terminate power to TRS equipment as needed to ensure scene safety.
2. Notify the appropriate TRS and other project related staff of the incident per the ERP Call Tree (**Figure 2**).
3. Coordinate with the TRS SPM to develop a plan to further assess equipment/property damage.
4. Power should only be restored to TRS equipment following approval from the SPM and/or appropriate TRS equipment management staff (i.e., Tom Powell, Eric Maki, Tony Strati)

4.5. Vandalism, Theft, and Unauthorized Site Entry

It is not uncommon at TRS sites for vandalism to occur due to the nature of the equipment and materials stored at sites. Vandalism and theft are usually accompanied with entry to sites by unauthorized persons. In the case of notification of unauthorized entry to the Site, the Scene Commander should conduct the following (in order as numbered):

1. Confirm, via remote access that the power to the electrodes has been shut down. If not, remotely shut down power to the electrodes.
2. Notify TRS SPM (and PM as needed) of unauthorized access and develop plan to ensure Site safety. Implement that plan accordingly.
3. Review TRS remote camera and/or motion sensor video to identify if unauthorized persons or police are on-site. If it cannot be confirmed that the Site is clear, notify the local police of the unauthorized entry and request that the Site be inspected by the police.
4. Once the Site is confirmed clear, consult with the SPM and coordinate re-energizing TRS equipment.
5. Notify the appropriate TRS and other project related staff of the incident per the ERP Call Tree (**Figure 2**).

In the case that it is determined that property vandalism and/or related damage to TRS equipment has occurred, the Scene Commander should conduct the following (in order as numbered):

1. Notify TRS SPM (and PM as needed) of unauthorized access and develop plan to ensure Site safety if needed.
2. Contact the local police department regarding the vandalism/property damage. Follow the instructions of police dispatch and other local authorities.
3. Notify the appropriate TRS and other project related staff of the incident per the ERP Call Tree (**Figure 2**).
4. Develop a plan for continued operations with the SPM. If it is necessary to re-energize the electrodes or other TRS equipment, prior approval from the SPM is required.

4.6. Severe Weather

The Site is located in an area of the country that can experience severe weather events. These severe weather events could include, but not be limited to, tornados, severe rain/electrical storms, and blizzards. On a daily basis, the TRS Site Supervisor or SHSO will review weather forecasts for the possibility of severe weather. It is recommended to utilize appropriate smart phone applications that provide real-time notification of severe weather events. If there is a potential for severe weather, the SHSO or Site Supervisor will work with TRS project management to develop and implement a plan to ensure the safety of Site personnel and to minimize potential damage to ERH equipment. That plan should include, but not be limited to, the following:

- Identification of Scene Commander to implement the severe weather plan, Site staffing, and associated task assignments for Site staff;
- Schedule for planned ERH equipment shut-down;
- Schedule for evacuation of Site personnel;
- Site clean-up and preparation of equipment (i.e., securing equipment doors, securing loose equipment and materials, tie-down of equipment as needed, covering of materials);
- Communication system for “all clear” and return to the Site;
- Communication to TRS management (SPM and SQM at a minimum) regarding severe weather conditions, plan to ensure safety of Site personnel, Site activities, and associated schedule; and
- Communication to client and/or property owner regarding severe weather conditions, plan to ensure safety of Site personnel, Site activities, and associated schedule.

It is recommended that the SHSO and PM activate the Wireless Emergency Alerts (WEA) system options on their mobile devices. This can be enabled in the mobile device’s settings or by dialing “##2627##” (without the quotation marks). This is a national system that can provide local weather and AMBER alerts. The WEA system will provide emergency warnings via phone and SMS text for several types of local emergencies including severe weather events and tornado watch conditions. If your mobile device is not wireless emergency alert-enabled, you can use multiple weather mobile device applications that can provide this service (typically for no charge). Weather Channel, Weather Underground, and Weather Bug are popular and free applications.

4.7. Natural Disasters

The Site is located in an area of the country where natural disasters might occur. Potential natural disaster could include, but not be limited to, severe thunderstorms and lightning, tornadoes, wild fires, or flood events. In the case of a tornado at or near to the Site, all on-site personnel should follow the tornado safety procedures developed by the Homeland Department of Security and Federal Emergency Management Agency (FEMA):

<u>If you are in a building:</u>

- Locate the strongest area of the building (interior room on the lowest level) or get to the basement. Avoid corners of the room.
- Do not run outside.
- Stay away from windows, doors, and outside walls.
- Use your arms to protect your head and neck. Use blankets and/or furniture to provide additional shielding.

<u>If you are outside:</u>

- Do not get under an overpass or bridge, you are safer in a low, flat location.
- Cover your body with a coat or blanket.
- Watch out for flying debris.
- Do <u>NOT</u> try to outrun a tornado in your vehicle.

Immediately following a tornado, the Scene Commander should conduct the following (in order as numbered):

1. Sound the Site emergency warning signal (three blasts from air horn/car horn).
2. Account for all on-site personnel and move all personnel to a safe location, the safe location may be the Site muster point or other location as deemed appropriate by the Scene Commander.
3. Terminate power to the electrodes by depressing the nearest E-Stop (if safe to do so) or remotely as needed.
4. Assess all Site personnel to determine if there are any injuries or other medical emergencies, in the case of any medical emergency follow the procedures presented in **Section 4.4** of this ERP.
5. Contact the Sparta Emergency Information Line (information in the ERP Call Tree – **Figure 2**) as needed to obtain information on proper emergency response actions or other procedures required or recommended by the agency.
6. Notify the appropriate TRS and other project related staff of the emergency situation per the ERP Call Tree (**Figure 2**).
7. Develop a plan to assess any damage to equipment or property and to return the Site to operation if possible. Plans for assessment and returning Site to operation should be communicated to the client, property owner, and other appropriate project contacts.

In the case of a pending flood event, the PM and/or SHSO should consult with the SPM to develop a plan to include, but not be limited to, the following:

- Identification of Scene Commander to implement the severe weather plan, Site staffing, and associated task assignments for Site staff.

- Schedule for planned ERH equipment shut-down,
- Schedule for evacuation of Site personnel.
- Site clean-up and preparation of equipment (i.e., securing equipment doors, securing loose equipment and materials, tie-down of equipment as needed, covering of materials).
- Communication system for "all clear" and return to the Site.
- Communication to TRS management (SPM and SQM at a minimum) regarding severe weather conditions, plan to ensure safety of Site personnel, Site activities, and associated schedule.
- Communication to client and/or property owner regarding severe weather conditions, plan to ensure safety of Site personnel, Site activities, and associated schedule.

4.8. Unplanned or Unexpected Power Loss

Unexpected loss of power may occur at any TRS site. Loss of power could be caused by severe weather, natural disaster events, failure of local power grid equipment, or other unexpected events. The Scene Commander should adhere to the following procedure (in order as numbered) in the case of unexpected loss of primary power at the Site:

1. Sound warning signal (three blasts from car horn/air horn).
2. Account for on-site staff at muster point(s) and assess staff for any personal injury or conditions requiring medical attention.
3. If safe to do so, turn all TRS equipment to the "OFF" position to prevent uncontrolled/unattended restart of the equipment.
4. Contact SPM and other applicable project management personnel and advise of the current status of the Site and develop a plan for restart of ERH equipment.
5. Contact client, property owner, and/or other applicable project contacts and advise of Site condition and plan for restart.
6. Contact the local power agency for information regarding the nature of the loss of power and any information regarding the restoration of power. Communicate any information from the local power agency to TRS project management. The local power agency for the Site is:

   Rochester Gas & Electric

   800-743-1701

4.9. Acts of Violence

Unfortunately, it is not uncommon in public buildings, private business, and other locations for acts of violence to occur. These acts of violence can include personal attacks, car-jacking, armed robbery, hostage situations, and even mass shooting events. All Site personnel are encouraged to place their personal safety and the safety of others on-site as the top priorities in any act of violence situation. There is no circumstance or situation where anyone's personal safety is of less importance that any equipment, materials, or anything materials or property associated with the Site. In the case of any act of violence, all staff should contact 9-1-1 for emergency services as soon as it is safe to do so and follow all instructions from police and/or other emergency response personnel.

In the case of personal attacks, muggings, armed robbery, car-jackings, and other similar violent acts, the Scene Commander is advised conduct the following (in order as numbered):

1. Ensure the safety of the person(s) that was attacked, provide first aid as needed, and contact 9-1-1, follow the instructions of the emergency response dispatcher.
2. Ensure the safety of all other on-site personal; situations differ on if it will be safer to gather at a muster point or shelter in place until an all clear is sounded.
3. Notify the appropriate TRS and other project related staff of the incident.
4. Work with local authorities, emergency responders, and other pertinent Site personnel to provide all information needed to aid in any investigations.
5. Develop a plan with the TRS SPM, PM, and other pertinent personnel (local authorities, property owner, client) to return to normal work at the Site.

In the event that there is a hostage situation, mass shooting, or similar situation, the Scene Commander should attempt the following (in order as numbered):

1. Ensure the safety of Site personnel and if it is safe to do so, sound the warning signal (three blasts from car horn/air horn).
2. If safe to do so, the Scene Commander should use an E-Stop or remotely shut off power to the electrodes at the Site.
3. Staff should be instructed to report to the muster point if it is safe to do so or shelter in place in a safe location.
4. The Scene Commander and other Site staff (if not gathered with the Scene Commander at a muster point) should dial 9-1-1 and follow the instructions of the emergency response dispatcher and other emergency response personnel.
5. Specific recommendations for actions during an active shooter, hostage, or other similar situation are presented in the TRS 2016 training presentation titled "Responding to Emergencies at TRS Sites" (link below).

TRS Server/Training-Health & Safety Portal/H&S Documents/TRS HAZWOPER Refreshers/2016/TRS Site Emergency Response

It is highly recommended that the SHSO, or their designee, review the TRS Site Emergency Response presentation with all staff during Site health and safety orientations and during the course of the project (tailgate meeting topic). Also at the link provided above, information from the United States Department of Homeland Security on acts of violence and emergency response can be found and may be useful to help provide additional training to Site personnel.

5.0 POST-INCIDENT FOLLOW-UP AND REVIEW

The TRS SQM will decide the nature and extent of all Site incident follow-up(s). At a minimum, the Scene Commander will prepare an incident report through the TRS server within 24 hours following the incident.

The TRS SQM, depending on the nature of the Site emergency may elect to conduct additional investigation efforts. Where additional investigation is deemed appropriate, the TRS SQM may conduct the following:

- Develop investigation and review teams and select such personnel that may include other personnel other than TRS staff that were involved in the event;

- Conduct an on-site investigation;
- Schedule review sessions with TRS management and project management;
- Complete additional reports as needed for the client, property owner, and/or other persons or agencies at their request;
- Provide recommendations for further actions to be taken as needed; and
- Report findings to TRS management and communicate within TRS regarding the incident, lessons learned, and any further action items associated with the event.

APPENDIX 3

TRS Health and Safety Plan

Health and Safety Plan
Electrical Resistance Heating

THE FORMER SHAREHOLDERS OF ELDRE CORPORATION
1500 Jefferson Road
Rochester, New York

Issued: July 2019

Title	Signature	Date
Greg Knight TRS Group, Inc. TRS Safety & Quality Manager		
Robert Poulin TRS Group, Inc. Senior Project Manager		

TRS Group, Inc.
Accelerating Value

Safe. Fast. Certain.
Guaranteed.
An Employee Owned Company

P.O. Box 737
Longview, WA 98632
www.thermalrs.com

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Appendix B – Standard Operating Procedure Listing

Appendix C – Respiratory Training and Fit Testing Procedures

Appendix D – Chemical Inventory Listing

Appendix E – Site-Specific Emergency Response Plan

Appendix F - Site-Specific Arc Flash and Short Circuit Assessment (to be added following power connection to TRS ERH equipment)

Abbreviations and Acronyms

AED	automatic electronic defibrillator
AHA	activity hazard analysis
ANSI	American National Standards Institute
APR	air purifying respirator
ASTM	American Society for Testing and Materials
BBS	Behavior Based Safety
cis-1,2-DCE	cis-1,2-dichlorethene
CF	correction factor
CFR	Code of Federal Regulations
CO_2	carbon dioxide
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
CSP	Corporate Safety Program
CVOC	chlorinated volatile organic compound
^oC	degrees Celsius
dB	decibel
DOT	(United States) Department of Transportation
Eldre	Eldre Corporation
ERH	electrical resistance heating
ERP	Emergency Response Plan
E-Stop	emergency stop
eV	electron volt
EZ	exclusion zone
ft^2	square feet
ft bgs	feet below ground surface
ft/day	feet per day
^oF	degrees Fahrenheit
GAC	granular activated carbon
GFCI	ground fault circuit interrupter
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations
HEPA	high efficiency particulate air
Hi-Vis	high visibility
HVAC	heating, venting, and air conditioning
IDLH	immediately dangerous to life and health
IE	ionization energy
ISTR	*in situ* thermal remediation

kV	kilovolt
LaBella	LaBella Associates
lb	pound (US weight measure)
LGAC	liquid-phase granular activated carbon
LOTO	Lockout/Tagout
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
mph	miles per hour
N/A	not applicable
NAPL	non-aqueous phase liquid
NFPA	National Fire Protection Association
NR	not reported
OEL	occupational exposure limit
OSHA	(United States) Occupational Safety and Health Administration
OV	organic vapor
PCU	power control unit
PEL	permissible exposure limit
PID	photoionization detector
PM	Project Manager
ppm	parts per million
PPE	personal protection equipment
PVC	polyvinyl chloride
RZ	restricted zone
SBO	safe behavior observation
SDS	safety data sheet
SHSO	Site Health and Safety Officer
SOP	standard operating procedure
SPM	Senior Project Manager
SQM	Safety & Quality Manager
SUCL	Start-Up Checklist
SZ	support zone
TCE	trichloroethylene
TMP	temperature monitoring point
TRS	TRS Group, Inc.
TWA	time weighted average
UV	ultra-violet
VAC	volts alternating current

VC	vinyl chloride
VGAC	vapor-phase granular activated carbon
VOC	volatile organic compounds
VP	Vice President
VR	vapor recovery
yd^3	cubic yards

HEALTH AND SAFETY PLAN SUMMARY

Project Information:

Client: LaBella Associates, Inc.

Client Address: 300 State Street, Suite 201, Rochester, New York, 14614

Project Location: 1500 Jefferson Road, Rochester, New York, 14623

Project Objectives: Thermal remediation via electrical resistance heating (ERH) of chlorinated volatile organic compounds (CVOCs) in soil and groundwater. The primary contaminant of concern (COC) is trichlorethylene (TCE). Secondary COCs are TCE's degradation products, such as cis 1,2-dichloroethene (1,2-DCE), vinyl chloride (VC). The primary remediation goal for the project will be the reduction of the contaminant of concern to 500 micrograms per liter (µg/l) in groundwater.

The ERH project will be considered complete when the remediation goal has been met and is confirmed via laboratory analyses or the input design energy milestone of 610,000 kilowatt hours (kWh) has been achieved, whichever comes first.

The ERH treatment area is approximately 2,700 square feet (ft^2) and extending from three feet below ground surface (ft bgs) to 25 ft bgs. The ERH treatment volume is approximately 2,000 cubic yards (yd^3). The ERH remediation project will employ a total of 17 ERH electrodes to complete the remediation (see **Figure 3** for Site details).

Health and Safety Plan Preparation:

Prepared by: Greg Knight, TRS Safety & Quality Manager (SQM)

Reviewer/Approver: Robert Poulin, TRS Senior Project Manager (SPM)

Project Personnel:

LaBella Associates Primary Contact: Dan Noll	**Phone:** (585) 301-8458
TRS Senior Project Manager: Robert Poulin	**Phone:** (360) 560-0243
TRS Project Manager: Sean Fournier	**Phone:** (978) 502-6525
TRS Site Health & Safety Officer: Steve Agostine	**Phone:** (716) 467-6750

Nearest Local Hospital:

Highland Hospital
1000 South Avenue
Rochester, NY 14620
585-341-6880
Hours: Emergency care available 24 hours, seven days a week

Distance: 5.1 miles, Drive Time: Approximately 15 minutes

Directions from Site (See **Figure 1**):

1. Continue to NY-252 W– 0.3 miles
2. Turn **RIGHT** onto NY-252 W– 0.5 miles
3. Turn **RIGHT** onto the Interstate 390 N ramp to Rochester– 0.5 miles
4. Merge onto I-390 N – 1.0 miles
5. Keep **LEFT** to stay on I-390 N, follow signs for Airport/Greece– 0.9 miles
6. Take exit 16B for Route 15A N/E Henrietta Rd toward Rochester – 0.2 miles
7. Merge onto NY-15A N/E Henrietta Road – 0.5 miles
8. Slight **RIGHT** onto South Avenue – 1.4 miles
9. Turn **RIGHT** onto Bellevue Drive – 112 feet
10. Turn **LEFT** – 174 feet
11. Turn **RIGHT** – destination is on the right – 135 feet

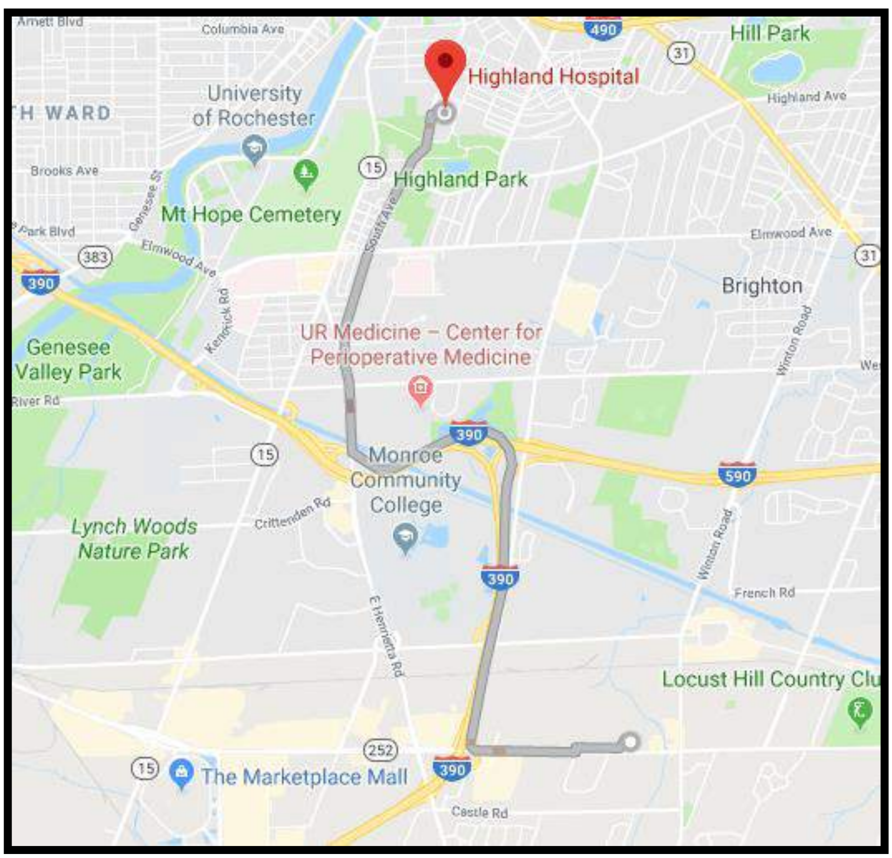


Figure 1. Directions to Highland Hospital – Rochester, NY

Nearest Occupational Medical Center

UR Medicine Urgent Care - Henrietta
1300 Jefferson Avenue, Suite 100
Rochester, NY 14623
585-413-1800
Hours: 9:00 AM to 9:00 PM, Daily, 9:00 AM to 5:00 PM on Holidays

Distance: 1.1 miles, Drive Time: Approximately 5 minutes

Directions from site (See **Figure 2**):

1. Head south out of Site – 0.3 miles
2. Turn **LEFT** towards NY-252 E – 135 feet
3. Turn **RIGHT** onto NY-252 E – 407 feet
4. Turn **RIGHT** – 121 feet
5. Turn **LEFT**, destination will be on the right – 56 feet

Figure 2. Directions to UR Medicine Urgent Care – 1500 Jefferson Road

TRS Group Accelerating Value

EMERGENCY PHONE NUMBERS

Paramedic: 911 **Fire Dept.:** 911 **Police Dept.:** 911

Emergency/Contingency Plans: Call 911 and then administer first aid if it is safe to do so and responders are properly trained and certified in first aid and cardiopulmonary resuscitation (CPR).

Site Control Measures: Only authorized personnel are permitted inside established exclusion zones (EZs), contaminant reduction zones (CRZs) and support zones (SZs). During operations, only authorized personnel are permitted in the ERH restricted zone and only qualified persons are allowed within the ERH EZ as defined by TRS access requirements.

15 Minute Eyewash: Required during use of corrosive materials (i.e., vapor recovery pipe assembly), otherwise optional

Eye Wash Bottles: Required (minimum of six 32-ounce bottles)

Fire Extinguishers: Required (see **Section 13.0** for details) – one A-B-C per 3,000 ft^2

First Aid Kit: Required (see **Section 13.0** for details)

Blood borne Pathogen Kit: Required

Emergency Shower: Not Required

Personal Decontamination Procedures: Thoroughly wash hands before eating. Use proper level of personal protective equipment (PPE) as noted in this HASP. **The minimum PPE level for the project is Level D.**

Table 1. Hazard Inventory

Summary of Chemical Hazards	
Primary Expected Compounds:	Soil: Chlorinated volatile organic compounds (CVOCs) with primarily trichloroethylene (TCE) and other minor contaminants of concern (COCs).
Source	CVOC contamination at the Site is associated with previous activities at the property.
Pathways	Inhalation, skin absorption, ingestion, skin and/or eye contact
Concentrations	The maximum concentrations detected TCE in groundwater within the ERH treatment volume at the Site is 144,000 micrograms per liter (µg/l).
Health Hazards (TCE)	**Signs & Symptoms:** Irritation to eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen] **Target Organs:** Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Summary of Physical Hazards					
Y	Heat	Y	Slip, Trip, Falls	Y	Shallow Excavations/Trenching
Y	Cold	Y	Electrical Hazards	Y	Moving Equipment
Y	Wet	Y	Underground Hazards (utilities)	N	Confined Space
Y	Noise	Y	Overhead Hazards (utilities, hoisting)	Y	Hydraulic Equipment
Y	Lifting	P	Acids and Bases	Y	Rotating Equipment
P	Steam	Y	Sharp and/or abrasive items	Y	Handheld Power Tools

Notes: Y = Yes, N = No, P = Possible, A = As Needed, R = Required, N = Not Required, HEPA = High Efficiency Particulate Air, PVC = Polyvinyl Chloride

Table 1. Hazard Inventory (continued)

<table>
<tr><th colspan="6">Summary PPE Requirements (See Section 4.0 for details regarding PPE requirements)</th></tr>
<tr><td>A</td><td>Hard Hat – Required while heavy equipment is in use and/or overhead hazards exist</td><td>R</td><td>Safety Eye gear</td><td colspan="2">Glasses meeting ANSI Z87.1-2010 standards</td></tr>
<tr><td>R</td><td>Safety Boots or shoes</td><td>A</td><td>Respirator (w/ P100 OV cartridges)</td><td>Half Face (A)</td><td>Full Face (A)</td></tr>
<tr><td>A</td><td>High-Visibility vest or equivalent (ANSI Type 2) – Required during using of all heavy equipment including forklifts and man-lifts</td><td>A</td><td>Filter Type</td><td>Organic Vapor (A)</td><td>HEPA (A) (P100 particulate filter)</td></tr>
<tr><td>A</td><td>Hearing Protection</td><td>R</td><td>Gloves</td><td>Work (R)</td><td>Nitrile (A)</td></tr>
<tr><td>A</td><td>Tyvek Coveralls</td><td>A</td><td>Gloves</td><td>Neoprene (A)</td><td>PVC (A)</td></tr>
<tr><td>N</td><td>5-Min. Escape Respirator</td><td>A</td><td>Gloves</td><td colspan="2">Cut Resistant (A)</td></tr>
<tr><th colspan="6">Summary of H&S Monitoring Equipment Requirements</th></tr>
<tr><td colspan="2">Organic Vapor</td><td colspan="3">Photoionization detector (PID) with 11.7 electron volt (eV) lamp</td><td>R</td></tr>
<tr><td colspan="2">Organic Vapor</td><td colspan="3">Analyzer (flame ionization detector; FID)</td><td>N</td></tr>
<tr><td colspan="2">Oxygen Meter</td><td colspan="3">Exclusion Zone Air Monitoring</td><td>A</td></tr>
<tr><td colspan="2">Combustible Gas Meter</td><td colspan="3">Exclusion Zone Air Monitoring</td><td>A</td></tr>
<tr><td colspan="2">Passive Dosimeter</td><td colspan="3"></td><td>N</td></tr>
<tr><td colspan="2">Hydrogen Sulfide (H2S) Meter</td><td colspan="3"></td><td>N</td></tr>
<tr><td colspan="2">Dust Meter</td><td colspan="3">Breathing Zone Air Monitoring (intrusive activities)</td><td>A</td></tr>
<tr><td colspan="2">Other Meters</td><td colspan="3"></td><td>N</td></tr>
</table>

Notes: Y = Yes, N = No, P = Possible, A = As Needed, R = Required, N = Not Required, HEPA = High Efficiency Particulate Air, PVC = Polyvinyl Chloride

1.0 INTRODUCTION

TRS Group, Inc. (TRS) has entered into a contract with the former shareholders of Eldre corporation Inc. (Eldre) for the remediation of chlorinated volatile organic compounds (CVOCs) within the designated treatment volume at the facility located at 1500 Jefferson Road, Rochester, New York (the Site). LaBella Associates (LaBella) is coordinating the remedial investigation with specified tasks and providing oversight of TRS' work at the Site. TRS will employ electrical resistance heating (ERH) technology to remediate CVOCs in soil and groundwater within the ERH treatment volume. The ERH treatment area is approximately 2,700 square feet (ft^2) in area. Depth of treatment begins at a depth of three feet below ground surface (ft bgs) and extends to 25 ft bgs. The corresponding ERH treatment volume calculates to 2,000 cubic yards (yd^3). See **Figure 3** for details of the Site.

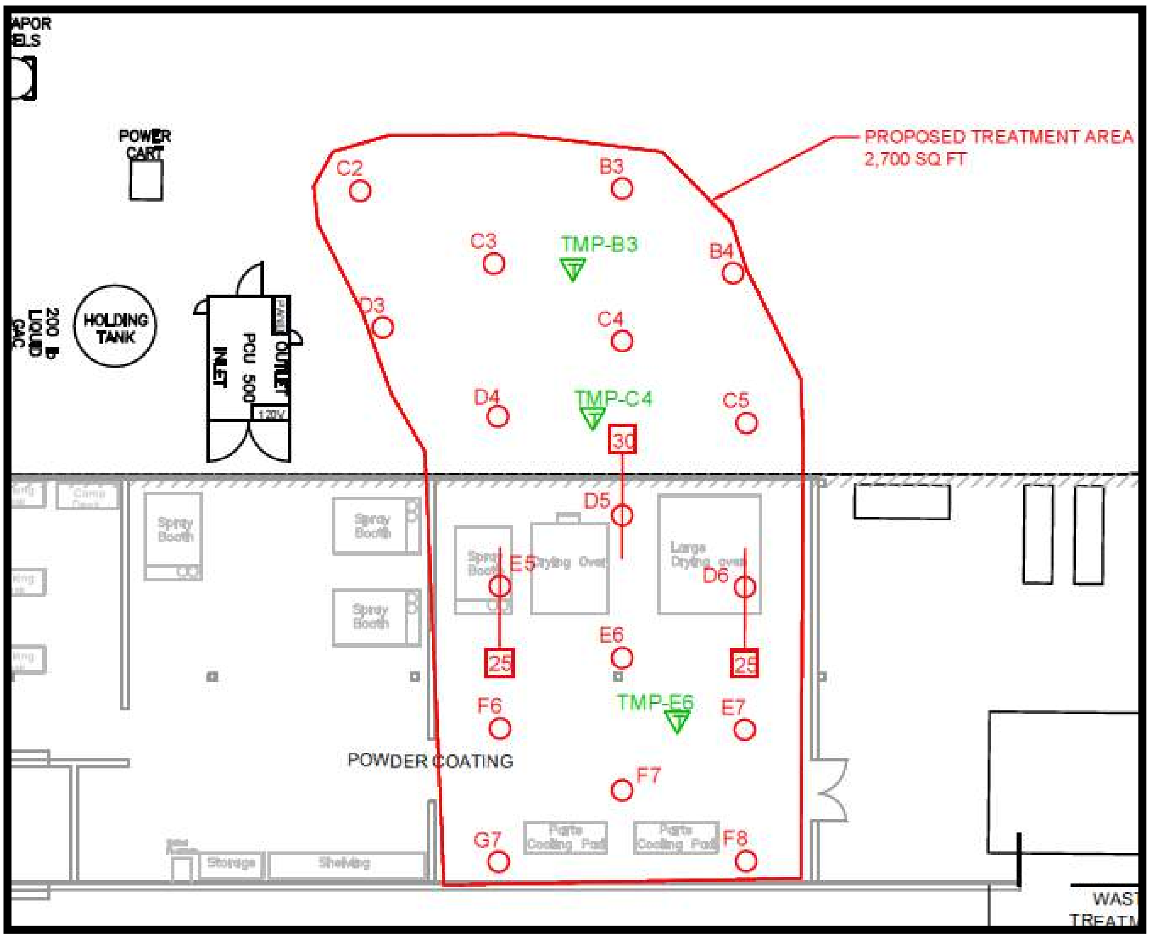


Figure 3. 1500 Jefferson Road - ERH Site Plan

The TRS Corporate Safety Program (CSP) describes policies and procedures to be followed to create a safe and healthy work environment. The CSP is supported by this Health and Safety Plan (HASP) which is a site-specific document that describes the process for identifying the physical and health hazards that could harm workers, procedures to prevent accidents, and steps to take when incidents occur.

Tasks covered by this HASP includes all work related to the installation, operation, and demobilization of an ERH remediation system at the Site. Work to be performed under the scope of this HASP includes; installation of electrodes and temperature monitoring points, assembly of vapor recovery (VR) system piping, placement and installation of remediation system components, operation of the ERH remediation system, and deconstruction/demobilization of ERH related equipment. Activities associated with this project involve drilling oversight for the installation of an electrode array; VR system construction; and the installation, operation, and demobilization of an ERH process/treatment facility. TRS will also perform workplace health and safety monitoring as needed during the project.

If significant changes occur in Site activities associated with the ERH remediation work, the HASP will be modified to reflect changes. All staff associated with Site operations will be notified following changes to the HASP. On-site workers, including subcontractors and Site visitors, will comply with this HASP and any revisions made to the plan. A copy of the HASP will be maintained by the Site Health and Safety Officer (SHSO) and kept readily available at the Site for reference by all Site workers.

TRS recognizes that potential hazards are inherent with ERH related work. TRS expects that all work related to the application of ERH will be conducted in a safe and healthful manner by all staff on Site. All project participants are responsible for conducting work in accordance with applicable federal, state, and local regulations. In addition, all work performed will be completed in accordance with the CSP, applicable TRS Standard Operating Procedures (SOP) and TRS Best Practices. Where there is concern that implementation of work could compromise the safety or health of an individual, personnel noting such conditions are obligated to stop work and immediately notify the on-site TRS Project Manager (PM) or SHSO. All TRS project personnel, TRS subcontractors, and LaBella personnel are authorized to immediately stop work for any ERH related task or operation that poses unreasonable risk to human health, the environment, or property.

Table 2. Summary of Project Information

Project Name	Former Shareholders Eldre Corporation – Rochester, NY
TRS Project Number	NY.ELD.1828
Site Location/ Description	The ERH remediation will be conducted to reduce the concentrations of CVOCs in soil and groundwater at the Site. ERH remediation will occur from ranges between 3 ft bgs to 25 ft bgs. The total volume of the ERH treatment area is approximately 2,000 yd^3. The ERH design consists of 17 electrodes with co-located VR wells.
Current Status of Site	The Mersen Corporation facility is still an active installation. It is currently used for manufacturing activities.
Suspected Chemical Hazards	The primary contaminant of concern (COC) is TCE detected in the soil and groundwater. Other contaminants have also been detected in soil and groundwater at the Site (see **Table 3**).

Known Physical Hazards	ERH Site Hazards: Electricity, steam, heated water, contact with COCs and other site contaminants, vehicles, heavy machinery, hydraulic systems, hoisting/rigging, rotating engines, pressurized lines, power tools, pinch-points, chemicals, extreme weather, lifting, working at height, slip/trip/fall, and physical stress/fatigue
Field Activities	Site preparation and equipment mobilization, subsurface electrode and temperature monitoring point (TMP) installations (drilling oversight), VR piping installation, ERH remediation facility construction, ERH system operations, process monitoring and sampling, equipment deconstruction/demobilization, and waste management/disposal.

2.0 SITE INFORMATION

The Site is located within the interior and the exterior of the Mersen Corporation (Mersen) facility at 1500 Jefferson Road in Rochester, New York. The Site is currently active and is being used for manufacturing activities. The remedial approach for the project involves the application of ERH for remediation of the designated treatment volume soil to volatilize and remove the contaminants of concern (COCs).

Based on the data provided by LaBella, the treatment area for the application of ERH is approximately 2,700 ft^2 with treatment depth from 3 ft bgs to 25 ft bgs. The total targeted volume of soils within the treatment areas is approximately 2,000 yd^3.

2.1. Geology and Hydrogeology

According to information provided by LaBella, the treatment volume under the building consists of a sub-slab structural fill (gravel with some sand) to approximately 8 to 9 ft bgs. Native soils, generally silty clay and clayey silt with lesser amounts of sand and/or gravel are encountered below the structural fill.

The treatment volume outside of the building footprint consists of a sand and gravel fill layer that varies in thickness from approximately 1 foot to 4 foot thick. Underlying this fill material is a native soil that is generally silty clay and clayey silt with lesser amounts of sand and/or gravel. This native fill extends to at least 20 ft bgs. Most borings terminated at 20 ft bgs, but when logged deeper, a sand and gravel layer with lesser amounts of silt and clay was reported from approximately 20 ft bgs to 34 ft bgs, where refusal was encountered due to apparent bedrock.

Groundwater in the treatment volume may range from 3 to 9 feet below ground surface; but is typically at 5 to 7 ft bgs.

2.2. Contaminant Source Area

Previous studies conducted by others at the Site indicate that the primary source of CVOCs is associated with the former activities at the Site. The details regarding known Site COCs are presented in **Table 3**.

2.3. Scope of Work

ERH is an *in-situ* process whereby soils and groundwater are heated by passing an electrical current through the subsurface volume to be remediated. During ERH, the subsurface is heated just enough to cause soil moisture and groundwater to boil and volatile organic compounds (VOCs) to convert to vapors. The steam produced from this process acts as a carrier gas to sweep the contaminant vapors to recovery wells where they are subsequently removed from the subsurface for surface treatment.

The primary remediation objective for this project is to reduce groundwater concentrations of TCE to the following criteria:

- 500 micrograms per liter (µg/l) in groundwater

TCE is the controlling contaminant and the Site remedial goals have been modeled as a greater than 99 percent reduction of TCE in groundwater from pre-ERH concentrations to be confirmed via groundwater samples and the subsequent CVOC analyses. Remediation will be complete when the concentrations of the Site COC in groundwater meet, or are below, the noted remedial goals or the input energy milestone is achieved, whichever occurs first. Due to the nature of ERH, additional remediation of other CVOCs and VOCs, if present, is also likely to occur.

Before work begins at the Site, TRS evaluated and identified potential hazards during all phases of work at the Site and developed this HASP to establish specific control measures to mitigate Site hazards. Site hazards and hazards resulting from construction, system operations, and demobilization activities are controlled using one or more of the control measures listed below:

- Eliminate the hazard
- Mitigate the hazard through engineering/design
- Guard the hazard
- Utilize warning or alarm device to control the hazard
- Obtain specialized training and follow specific procedures
- Establish exclusion zones (EZs) to isolate hazards
- Minimize risk associated with the hazard using personal protective equipment (PPE)

2.4. Subsurface and Overhead Utilities

The ERH remediation area is in the interior and exterior of the Mersen facility. There are overhead restrictions to be aware of during installation of the ERH system and subsurface components. Besides the structural limitations in height and drop ceiling infrastructure, multiple utilities are present running overhead and on the facility’s walls. Existing overhead, above grade, and below grade utilities include:

- Electrical
- Natural gas
- Compressed Air
- Heating, Venting, and Air Conditioning (HVAC)
- Overhead lighting fixtures

A sanitary sewer lateral runs north to south in the facility through the oven room where electrode installations will occur. This sewer line ties into a sewer line in the parking lot. The sewer line in the parking lot runs on a northeast and southwest axis (approximately). The sewer line in the parking lot will not impact ERH component subsurface installation.

Note: *Extreme caution should be exercised while performing intrusive activities (drilling, trenching, and excavation) in areas of known or suspected subsurface utilities. Site-specific work plans that identify utility-related hazards and hazard mitigation should be developed and reviewed prior to these activities. Special attention to "day-light" utilities should be considered for drilling activities associated with electrodes and temperature monitoring points (TMPs) in the vicinity of subsurface utilities.*

Based on the type and size of features present, the TRS PM and Project Engineer will determine the need for any changes to the proposed locations of the subsurface ERH components to ensure safe construction and maintain appropriate operational distances. The minimum offset for an ERH subsurface component from an existing subsurface feature is two feet. In the case that drilling, or excavation is planned for any location less than five-feet from any marked active utility, the location will be cleared using hand-tools or similar non-destructive equipment (air knife, vacuum-excavation, or equivalent) to a depth of at least 5 ft bgs. Whenever possible, subsurface utilities within five feet of drilling or excavation locations should be excavated by non-destructive means to expose the physical utility (day-lighted) to confirm the actual location, depth, and linear run of that utility.

In general, buried electric power lines, communications lines, and other utility services could exist within a few feet below ground surface. Digging into an underground electric line can cause power outages and personal injury from shock or electrocution. These underground facilities are not always located out in public areas. A subsurface utility survey and locations of subsurface utilities will be verified by a TRS-hired professional locating company prior to any intrusive activities. It is important to identify all buried utilities in and adjacent to the ERH treatment area so that proper measures can be designed into the system to mitigate the potential for preferential pathways of subsurface vapors and/or electrical current during ERH application and/or damage to existing subsurface structures.

2.5. Potential Chemical Hazards

Potential chemical hazards that may be encountered during Site work include exposure to uncharacterized waste concentrated in soil, surface water, groundwater, remnant fluids in utility lines, and air. Soil and groundwater at TRS ERH remediation sites are commonly impacted with CVOCs. Soil and groundwater may also contain petroleum hydrocarbons and other VOCs. The amount of chlorinated solvents found in soil and groundwater will be dependent upon the soil type, groundwater flow, weathering of the source area contaminants, and other factors. As CVOC/VOC contaminated soil and water are disturbed and exposed to the air, contaminant vapors may evaporate from the soil and/or water and present an airborne hazard. The higher the ambient temperature, the greater the amount of vapor that may evaporate from soil and water.

CVOCs may enter the body through contact with skin and eyes, through ingestion, and through inhalation of vapors from volatized compounds. Most CVOCs are generally colorless liquid with odors varying from sweet, fruity, to chloroform-like (see **Table 3** for details regarding characteristics of Site COCs).

Intrusive activities such as concrete coring and cutting, drilling, and trenching have the potential to create airborne chemical hazards at the Site. Workers may need to don respiratory protection PPE during intrusive activities if dust or contaminant conditions warrant an upgrade in PPE. Respiratory protection PPE (air purifying respirator [APR] or particulate mask) should include P-100 filters. A negative pressure half-face or full-face APR with P-100 filter cartridges is recommended to provide increased respiratory protection over disposable particulate masks while conducting intrusive activities. See **Section 5.0** for details regarding airborne hazard monitoring.

NOTE: Odor should not be used as an indicator of the airborne hazard present as the nose can become desensitized to odors, and in some cases the solvent odor is not perceptible until airborne concentrations have already become hazardous. **Table 3** contains a list of CVOCs and VOCs historically observed at the Site, along with ionization potential of the compound, reported maximum Site concentrations (soil and groundwater), the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL), and additional characteristics. **Section 5.0** details the Site-specific air monitoring program including air monitoring action levels for worker protection specific to this project.

2.6. Non-Chemical Airborne Hazards

Non-chemical airborne hazards that are present at an ERH site generally are limited to dust generated from: concrete/asphalt cutting, drilling activities, excavation activities, conductive fill placement (electrode construction), placement of well sand, and filling/extracting granular activated carbon (GAC) vessels. Site workers including TRS staff, LaBella staff, and all subcontractors are recommended to don respiratory protection PPE during activities presenting non-chemical airborne hazards (dusts). Respiratory protection PPE (APR or particulate mask) should include P-100 filters. A negative pressure half-face or full-face APR with P-100 filter cartridges is recommended to provide increased respiratory protection over disposable particulate masks when non-chemical airborne hazards are present. See **Section 5.0** for details regarding non-chemical airborne hazard monitoring.

2.7. Potential Physical and Biological Hazards

Potential physical hazards associated with work activities at the Site include electricity, steam, heated water and COC vapors, pressured lines, lines under vacuum, vehicles, rotating equipment, machinery, pinch-points, lifting, drum handling, power tools, slips/trips/falls, work at height, heat/cold stress, physical stress/fatigue, dust, and noise. Refer to the applicable section of this HASP and applicable TRS SOPs and TRS Activity Hazard Analyses (AHAs) for additional information on the hazards associated with a task and associated hazard mitigation.

Small animals and rodents may be encountered on-site. Other potential biological hazards include poisonous insects (spiders, ticks), snakes, and plants (poison ivy). Precautions should be taken to avoid direct contact with animals, insects, or plants. If a bite, sting, or abnormal skin condition should occur, appropriate first aid and/or medical attention should be administered immediately. All cuts received on-site should be treated immediately.

All persons who will be assigned to work at the Site who may be highly allergic to any plants, insects (stings, etc.), food, and susceptible to adverse reactions from such (i.e., anaphylaxis), will notify the SHSO and/or Site Supervisor prior to working on-site. This includes notification to the SHSO or Site Supervisor of any emergency medications or specific emergency response actions that may be needed for that person.

All staff working on-site should take precautions to limit exposure to the sun. Site workers are encouraged to wear long sleeves, hats with visors or full brims, and safety sunglasses to minimize the potential from overexposure to ultra-violet (UV) radiation from the sun. In addition, Site workers should use appropriate sunscreen to protect exposed skin from UV damage. TRS will provide appropriate sunscreen products at the Site. If a Site worker experiences skin conditions associated with over exposure to the sun, they should be removed from direct UV exposure and appropriate first aid and/or medical attention should be administered immediately.

Table 3. Site-Specific Chemical Hazards

	Trichloroethene (TCE) (CAS #79-01-6)	cis-1,2-Dichloroethene (cis-1,1-DCE) (CAS# 156-59-2)	Vinyl Chloride (CAS #75-02-4)
Maximum Reported Concentration	144,000 µg/l	14 µg/l	72 µg/l
Permissible Exposure Limits (TWA)	100 ppm (ceiling at 300 ppm)	200 ppm	5 ppm
Short- Term Exposure Limit	100 ppm (ACGIH)	NR	1 ppm
IDLH	1,000 ppm	1,000 ppm	NR
IE	9.45 eV	9.65 eV	9.99 eV
PID CF (11.7 eV) *	0.43	0.8	0.6
Boiling Point	189°F (89°C)	140°F (60°C)	7°F (-13°C)
Physical Properties	Clear colorless liquid; ethereal (chloroform-like odor)	Clear colorless liquid with an ether-like odor.	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.
Route of Entry	inhalation, ingestion, skin and/or eye contact	Inhalation, ingestion, skin or eye contact/ absorption	Inhalation, skin and/or eye contact (liquid)
Symptoms	Irritation to eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting dermatitis, cardiac arrhythmias, paresthesia; liver damage; [potential occupational carcinogen]	Irritation to eyes, respiratory system; central nervous system, depression	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]
Target Organs	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Eyes, respiratory system, central nervous system	Liver, central nervous system, blood, respiratory system, lymphatic system

Notes: * = PID Correction Factor (CF) (ref.: RAE Systems Technical Note TN-106); TWA = time weighted average; IDLH = immediately dangerous to life and health; IE = Ionization Energy, NR = not reported, N/A = not applicable, ppm = parts per million, eV = electron volts

2.8. ERH System Operational Hazards

2.8.1. Electrical Voltage

Dangerous voltages will be present in the subsurface of the ERH treatment volume during heating operations. Start-up and initial unattended operations of the ERH power control units (PCUs) are performed only when the ERH Start-Up Checklist (SUCL) has been completed and approved by an authorized TRS person in accordance with TRS internal SOP 1.2, Application of Electrical Power to ERH Sites. A compendium of applicable TRS SOPs will be maintained in a binder at the Site by the SHSO and a list of TRS SOPs is provided in **Appendix B**.

In the ERH treatment area, the regions containing subsurface electrodes is a restricted zone (RZ). During start-up, a reduced voltage will be applied to the electrodes. Specially trained TRS personnel will carefully survey and log the surfaces of the electrode field for step-and-touch electrical potential measurements in accordance with TRS internal SOP 1.3, Voltage Surveys. The measured step-and-touch voltage potentials will be compared to TRS' safety policy limit.

The TRS electrical safety policy limit for exposed voltage is:

- **Public Zone:** 5-Volt Step-and-Touch, 10-Volt Extension Cord Survey
- **TRS Restricted Zone:** 10-Volt Step-and-Touch, 30-Volt Extension Cord Survey
- **TRS Controlled 30-Volt Zone:** 30-Volt Step-and-Touch, 30-Volt Extension Cord Survey (This zone requires TRS upper management approval for implementation)
- **Exclusion Zone:** No entry allowed with ERH electrical energy applied to the subsurface. Exclusion zones are not common and only exist when all other means have been exhausted to correct voltage potential have been exhausted. Exclusions zones would be fenced off and delineated with appropriate signs.

This safety limit provides a margin of safety beyond the OSHA limit of 50 volts alternating current (VAC). In general, the step-and-touch voltages increase in proportion to the electrode voltage (a doubling of the applied electrode voltages will tend to double all the step-and-touch voltages). If some surface-voltage potentials are marginal, personnel can mitigate areas of elevated voltage by implementing the following engineering controls:

- Connect the subject voltage location to an electrically neutral location
- Electrically insulate/isolate the subject voltage location so that personnel cannot contact the subject voltage location
- Create and ERH EZ to isolate a specific area of concern and prevent ANY personnel from entering the area

The above engineering controls are the preferred correction methods for mitigating surface voltage potentials.

During start-up of the ERH system, the voltage applied to the electrodes will be slowly increased. During this voltage ramp-up, the step-and-touch voltage surveys are completed repeatedly in accordance with TRS' SOPs 1.2 and 1.3. Special attention will be directed toward conductive fixtures and other materials (conduits, posts, panels, etc.) that may encounter Site personnel. Special attention will also be paid to potentially conductive objects within 50 feet of any of the treatment area.

2.8.2. Arc Flash Hazards

The ERH equipment to be used at the Site poses arc flash hazards based on the electrical energy associated with the electrical supply side to the equipment and/or the electrical output of the equipment. An arc flash hazard is defined by the National Fire Protection Association (NFPA) 70E guidelines as, "a dangerous condition associated with the possible release of energy caused by an electric arc".

Arc flash events are usually the result of an electrical short circuit. The hazards associated with an arc flash include extremely high temperatures, electrical shock, and injury from pressure waves resulting from the arc flash. Injuries associated with arc flash exposure can be severe (burns, eye injuries, shock, physical injuries) and commonly cause fatalities. Extreme caution should be used when working on electrical equipment that present arc flash hazards. All TRS equipment at the Site that present arc flash hazards will be labeled in accordance with NFPA 70E.

TRS has prepared a Site-specific Arc Flash and Short Circuit Assessment (see **Appendix F**) that provides details regarding the specific arc flash hazards for TRS equipment at the Site. This report is completed based on analyses of actual electrical hazards at the Site and which requires installation of primary electrical power to the PCU and ancillary ERH equipment. As such, this HASP will be amended to include the Arc Flash and Short Circuit Assessment when it is completed by TRS engineering personnel. All Site staff are to review **Appendix F** as part of the Site-specific HASP review and sign the HASP Acknowledgement Form in **Appendix A**.

Note: Only competent persons trained and certified in NFPA 70E are permitted to perform electrical work on TRS equipment.

2.8.3. High Temperatures

The application of ERH will increase subsurface soil and water temperatures and increase the temperature of electrode and VR system components. Typically, the electrodes do not get any hotter than the boiling point of the contaminant/water mix at depth. Electrodes will be installed using engineering controls to protect the operators from both hazardous voltages and high temperatures during ERH operation. Following ERH shutdown, it may take several days or weeks for the electrodes to cool below a safe handling temperature of 60 degrees Celsius (°C) or 140 degrees Fahrenheit (°F). Severe burns may result from contact with these components without the use of proper PPE; however, there are no planned activities that would require touching the electrodes while they are hot. Gloves providing protection from burns will be required to handle groundwater monitoring well caps, valves, and soil sampling equipment during this period (see TRS SOP 3.2 for hot soil sampling). It is recommended that temperatures of any surface to be touched be first checked with a remote thermometer such as an infrared temperature monitor. Care should be taken regarding these temperatures for several weeks following shutdown of the ERH system.

2.8.4. Steam

Steam will be generated in the subsurface during operation of the ERH system and will be present throughout the remediation volume. In addition, steam may be present in the VR piping running from the VR recovery points in the vicinity of the remediation area to the ERH condenser, and within the ERH condenser.

Steam below the water table will have a positive pressure equal to the hydrostatic pressure at that depth. The subsurface will remain very hot immediately after an ERH shutdown and steam generation can occur spontaneously if the hydrostatic head pressure is changed while groundwater is at the hydrostatic head boiling point. This might occur during groundwater sampling, dewatering activities, and/or soil sampling and related drilling activities.

Extreme caution must be taken to avoid exposing personnel to any source of steam. Any plans to access VR wells, or other equipment with exposure to the subsurface must first be approved by the TRS PM, the TRS SQM, and the start-up approving TRS employee, as addressed in TRS SOP 3.1 for hot groundwater sampling. Any activity where there is the potential for exposure to hot groundwater and/or steam will be first documented in a Site and task-specific AHA that will define task steps and processes, associated hazards, PPE, and mitigation requirements for each hazard. It is recommended to contact the TRS SQM prior to accessing any subsurface location that has the potential to expose workers to heated soil, heated groundwater, steam, and/or volatilized contaminants. The TRS SQM will assist in the development of any Site-specific AHAs for these activities.

2.8.5. Vapor Treatment

Vapor treatment during the ERH remediation will be accomplished by adsorption using vapor-phase GAC (VGAC). Contaminant vapors are routed through vessels containing VGAC. The vapor treatment system will be comprised of two 2,000-pound VGAC vessels, plumbed in series, with a primary vessel and a secondary vessel.

At no time will TRS personnel enter the VGAC vessels for servicing or other activity. Entrance into a VGAC vessel is a permit-required confined space entry. Should a vessel need repair or maintenance, the carbon vendor will provide the personnel, materials, and equipment to make the repair or replace the unit.

Opening of the access ports or the influent/effluent connections poses a hazard risk to exposure to contaminant vapors. Caution will be emphasized when making connection changes or opening the access ports for visual inspection(s).

2.8.6. Activity Hazards Analysis

Each TRS AHA defines each major work task, associated activities, associated hazards, and mitigation efforts for those hazards. Copies of applicable TRS AHAs will be maintained in a binder at the Site by the SHSO. Each AHA identifies the work tasks, the specific hazards anticipated, and the control measures to be implemented to reduce, mitigate, or control each hazard to an acceptable level. A major feature of work is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew arrives on-site to begin a new segment of the project. Each AHA that is reviewed should be updated as operations, procedures, Site conditions, and equipment are altered during the project. Updated AHAs will be maintained on file at the Site. Staff should notify the SHSO or TRS SQM of any changes that significantly improve AHAs and overall safety associated with a task.

AHAs should be reviewed prior to performing a task with all staff that will be involved in that task. AHAs are commonly reviewed during daily tailgate meetings or pre-task safety meetings conducted at the Site. During these AHA reviews staff involved in the activity are encouraged to discuss Site-specific conditions and edit or “dirty-up” the AHA to provide the best mitigation of hazards as possible.

3.0 PERSONAL SAFETY, HAZARD CONTROL, INJURY, AND INCIDENT PREVENTION

Personal injury and incident prevention are of the upmost importance to TRS. Incident prevention, injury prevention, and personal safety will be maintained at the Site through strict adherence to the following policies and safe work practice measures.

3.1. Site Rules

All TRS personnel, TRS subcontractors, or others participating in on-site ERH activities with TRS must adhere to the instructions contained in this HASP. All Site personnel must review this HASP, understand the information and requirements herein, and acknowledge their understanding of this HASP by signing the HASP Training Documentation form provided in **Attachment A**.

All Site workers are required to attend training on restricted zones and exclusions zones at the Site and will document their training by signing the Restricted Zone Acknowledgement form in **Appendix A**. TRS Site personnel will conduct this Site entry training as needed for all workers coming to the Site. No person shall enter any restricted zone or exclusion zone without this training. Guests and visitors may enter the Site only when escorted by TRS Site personnel.

Contact with contaminated or suspected contaminated surfaces and materials should be avoided. Whenever possible, walking through puddles or discolored surfaces, kneeling on the ground, leaning, sitting, or placing equipment on drums, containers, exposed soil, or the ground should be avoided.

Medicine, alcohol, and illegal drugs can increase the effects from exposure to toxic chemicals. Personnel should not take prescribed drugs where the potential for adsorption, inhalation, or ingestion of toxic substances may exist, unless specifically approved by a qualified physician. The possession and intake of illegal drugs while on-site is prohibited. It is strictly prohibited to be under the influence of or use illegal drugs or alcoholic beverages while on-site, while operating machinery on-site, or operating a TRS company vehicle at any time.

3.1.1. General Housekeeping

Work zones will be kept clean and waste and debris will be removed daily. Any used PPE (gloves, Tyvek®, respirator cartridges, etc.) that have potentially encountered any non-aqueous phase liquid (NAPL) or other Site contaminants will be stored in a drum and properly labeled prior to disposal. Tools and materials will not be strewn about in a manner that may cause tripping or other hazards. Tools and materials will be collected and returned to their storage area following the completion of tasks. Stored materials will be placed and stacked in a manner that is stable and secured against sliding or collapse. All slip/trip/fall hazards will be eliminated wherever possible. Where slip/trip/fall hazards cannot be eliminated, the hazard will be guarded, and warning signs posted in the vicinity of the hazard.

3.1.2. Lone Worker Policy

There may be occasions were TRS staff may be working alone at the Site. Conditions that might require a long worker to be present at the Mersen facility would include response to system alarms after hours or during the weekends. TRS access would be limited to the ERH system compound located within the fence area surrounding the outside treatment area. TRS will not be working alone within the Mersen facility and will coordinate all activities within the Mersen facility with the appropriate contact. Having a lone worker at a TRS site presents elevated hazards and should only occur when necessary. When any TRS staff is working alone at the Site, the following procedures will be followed:

1. The PM and the lone worker will also establish a mutually beneficial procedure for *in situ* thermal remediation (ISTR) system responses that occur outside of normal working hours. If the lone worker is required to respond to a system upset or shutdown during normally non-waking hours, the PM and lone worker will establish the best method(s) of notification. For example, after 10 PM, the lone worker would provide just text notifications of arrival and departure from the site. The PM, in this scenario, would need to confirm receipt of the texts and be on “standby” to ensure the lone worker does not request technical assistance and confirm the lone worker leaves the Site. A lone worker responding to system upsets outside of normal working hours must ensure they have the security system FOB in their possession before investigating system upsets or shutdowns.

2. During normal working hours, and once on-site, the lone worker will contact and check in with the TRS PM, or their designee. The check-in will be made prior to commencing any field activities/tasks. At this time, the lone worker and the TRS PM will establish the day’s check-in schedule for periodic updates of the lone worker’s status. These check-ins can be verbal or written electronic message (e-mail or text) in nature. If planned tasks include activities with an elevated safety risk (e.g.; working at heights), additional check-ins will be made prior to and upon completion of higher-risk tasks. Activities with an elevated safety risk require the donning of PPE beyond the standard Level D field work clothing of steel-toed boots, hard hats, safety glasses, nitrile and/or leather gloves, and high-visibility outer garment(s). Examples of non-standard PPE include, air-purifying respirators, arc flash PPE, fall arrest/protection devices, splash protective clothing w/face shields, etc.

3. The security system at the site includes three (3) FOBs for arming/disarming the security system. These FOBs are also equipped with the ability to request emergency services assistance (this function is also available on the security system control keypad). If the lone worker experiences an injury or perceives imminent danger (e.g., an armed intruder), the lone worker can depress the button with the red star (“panic button”) to request emergency services. Depression of the “panic button” will also cease energy distribution to the ISTR treatment volume. Lone workers will carry one of the security systems FOBs during their work shift(s) to use in a case of emergency. A lone worker responding to system upsets outside of normal working hours must ensure they have the security system FOB in their possession before investigating system upsets or shutdowns.

4. Consistent with the TRS Behavior Based Safety (BBS) program, any employee working alone at the Site will complete and document a daily tailgate meeting, noting that they are working alone. If the tasks or working conditions for a given day change, the lone worker will conduct an additional tailgate meeting or pre-task analysis to identify hazards, proper procedures, and PPE required. The lone worker will notify the PM or their designee of the change in tasks and/or work conditions when they occur.

5. In situations that there are multiple employees on-site, but then conditions or schedules change and dictate a lone worker scenario, the remaining lone worker on-site will contact the PM or their designee and update the PM of the change to the Site employee status. This scenario also applies to travel days when the last person on-site is the remaining employee and responsible for prepping the Site for unattended operations and securing the Site prior

to departure. The previous procedures will be followed for the remainder of the lone worker's shift/assignment.

6. Prior to leaving the Site at the end of the workday, the lone worker will notify the PM or designee of their departure from the Site. Communication can be verbal or via electronic message.

3.1.3. Fire Protection and Prevention

The appropriate number of 20A-80 B and/or C-rated fire extinguishers will be kept on-site during field activities. During operations, one 15-pound (lb) (minimum) carbon dioxide (CO_2) fire extinguisher will be kept on-site near the PCU office entrance. The following are the recommended fire extinguishers and locations for the Site:

- PCU: one 15-lb (minimum) CO_2 extinguisher near each PCU office door (do not store within the PCU office)
- Equipment Compound: one 10-lb (minimum) A-B-C extinguisher near each blower, one 10-lb (minimum) A-B-C extinguisher near each condenser
- Electrode Field(s): one 10-lb A-B-C fire extinguisher per 3,000 ft^2 of area
- Office Trailer/Work Trailer (if applicable): one 5-lb (minimum) A-B-C extinguisher

Note: There may be multiple PCUs and VR equipment at the Site. Additional fire extinguishers may be required based on the final placement of ERH equipment.

3.1.4. General Field Activities

The following list is provided as guidance for general field activities.

- All TRS personnel, TRS subcontractors, or others participating in on-site activities with TRS must be adequately trained and thoroughly briefed on anticipated hazards, protective equipment to be worn, safety practices to be followed, and emergency response and communication procedures.
- At no time during ERH power application shall any person enter an Exclusion Zone
- At no time during ERH power application shall any electrical extension cord be used within the active treatment area.
- Work areas for various construction and operational activities will be established, as needed. Keep non-essential personnel out of the work area.
- A support zone (SZ) will always be maintained.
- All personnel entering work zones must wear the designated PPE for the area.
- Loose-fitting clothing or jewelry, or exposed long hair is prohibited around moving machinery.
- All electrical equipment (power tools, extension cords, etc.) shall conform to Title 29 of the Code of Federal Regulations (CFR) Part 1926.400 (29 CFR 1926.400) Subpart K.
- Be certain that corded electrical equipment and tools use three-wire grounded extension cords.
- All hand and power tools on-site will be maintained and used in accordance with the manufacturer's directions and specifications and visually inspected prior to use.

- Inspect tools and moving equipment to ensure that parts are secured and intact with no evidence of cracks or areas of weakness and that it is operating according to manufacturer's specifications.
- Store tools in clean, secure areas so that they will not be damaged, lost, or stolen.
- At the start of each day, inspect brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, and steering on each piece of heavy equipment. Equipment inspections should be documented using the Heavy Equipment Inspection form provided in **Attachment A**.
- Adhere to procedures defined by applicable TRS SOPs and AHAs.
- Adhere to procedures defined in NFPA 70E regulations for arc flash and voltage protection.

3.1.5. Signs/Labels

Signs and labels will be used to clearly mark containerized waste materials, supplies, etc. Signs will be used to clearly mark dangerous areas, chemical storage areas, restricted areas, and specific work zones. During operations, hot surfaces and high voltage areas will be clearly identified and high voltage/no dig signs will be posted around the perimeter of the ERH Restricted Zone. ERH applicable equipment will have labels for arc flash and voltage hazards in accordance with NFPA 70E. Other Site hazards (such as pressurized steam lines) will be labeled accordingly.

3.1.6. Eating/Drinking/Smoking

Eating, drinking, placement or removal of gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area that has been designated as contaminated, designated Hazardous Waste Operations (HAZWOPER) EZ, within the ERH treatment area, or ERH equipment compound. It is recommended that the TRS SHSO establish a designated smoking/tobacco use area at the Site that is consistent with the client's and the property owner's property use guidelines.

3.1.7. Sanitation

Sanitary facilities will be provided for Site personnel near the ERH equipment compound and/or office trailer. This includes a hand wash sink (or suitable equipment for sanitizing hands) and toilet. Personnel will thoroughly wash/sanitize hands before eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material.

Whenever decontamination procedures for outer garments are in effect, the entire body shall be thoroughly washed as soon as possible after the protective garment is removed.

3.2. Site Control Measures

Due to the nature of the work to be performed and the hazards described in **Section 2.0**, the Site will have strict access control requirements. Access to the outside ERH Treatment area will be restricted to authorized personnel from LaBella, TRS, TRS-approved subcontractors, and visitors approved by the TRS PM or Site Manager and the TRS SHSO. A log of personnel visiting, entering, or working on the Site will be maintained by TRS (the daily tailgate meeting form may serve as a log of Site visitors). All visitors will receive a health and safety briefing by TRS prior to entering the Site.

During the construction phase, LaBella and TRS, will maintain control of the ERH portion of the site. A temporary, chain link security fence will be installed surrounding the exterior ERH treatment area and the ERH equipment compound and will be locked during operations when staff are not on-site.

Unless specifically arranged with LaBella and/or Mersen, work hours during all phases of the ERH project will be restricted between 7:00 a.m. to 6:00 p.m. daily, Monday through Friday, excluding federal holidays. However, TRS personnel may require access to the Site outside of established working hours to respond to system shutdowns or upsets. TRS will coordinate with client regarding Site access during non-work hours.

During the operational phase, no one may enter the restricted zone (ERH equipment compound and ERH treatment area) or sample monitoring wells within the ERH treatment area until they have been trained by TRS and signed the associated Restricted Zone Training Acknowledgement Form (**Appendix A**). Prior to performing work in the restricted zone that could expose personnel to electrical current, trained TRS personnel must lockout/tagout (LOTO) the ERH PCU in accordance with TRS SOP 1.1 Lockout Tagout. Only trained and qualified TRS personnel are permitted to perform LOTO on TRS equipment and will require other affected personnel to participate as required per LOTO protocol.

3.2.1. Traffic Control

The location of the Site is inside and outside of the Mersen facility. Traffic within the facility will be limited to drill rigs and support vehicles. Traffic control will be handled with traffic cones and/or fencing. Traffic pathways will be delineated inside the facility to maintain safety and minimize unnecessary floor wear.

In addition to signage and other marking devices (cones), TRS may use spotters for traffic control for equipment and material deliveries and other similar activities. TRS requires spotters (if available) any time that heavy equipment (forklift, skid-steer, excavation machinery, hoisting equipment, etc.) is in use. Spotters will have no other responsibilities while spotting vehicles/equipment and will be dedicated to observing the activity. Any staff acting as a spotter for traffic control will wear hard hats and high visibility (Hi-Vis) outer garments (vest, shirt, or jacket) meeting American National Standards Institute (ANSI) Class 2/Type R standards. Traffic control measures may include the following:

- Traffic cones or similar temporary warning devices
- Temporary fencing
- Traffic signage (see below)
- Traffic observers and/or flagmen (spotters)

Signage to control traffic and to direct delivery trucks to TRS will include:

- One large sign at the entrance gate to the facility

Depending on Site conditions, traffic flow, ongoing Site work, and/or equipment on-site, the TRS PM may alter traffic control to provide safe working conditions for Site staff and for vehicles driving in the vicinity. Any changes to existing traffic control will be reviewed with all Site staff and documented during the daily tailgate meeting and/or as changes are required. All personnel working in the vicinity of the Site will wear traffic rated Hi-Vis vests (or equivalent outer garment) while traffic control measures are in place. Hi-Vis garments will meet ANSI standard 107-2010 Class 2/Type R requirements.

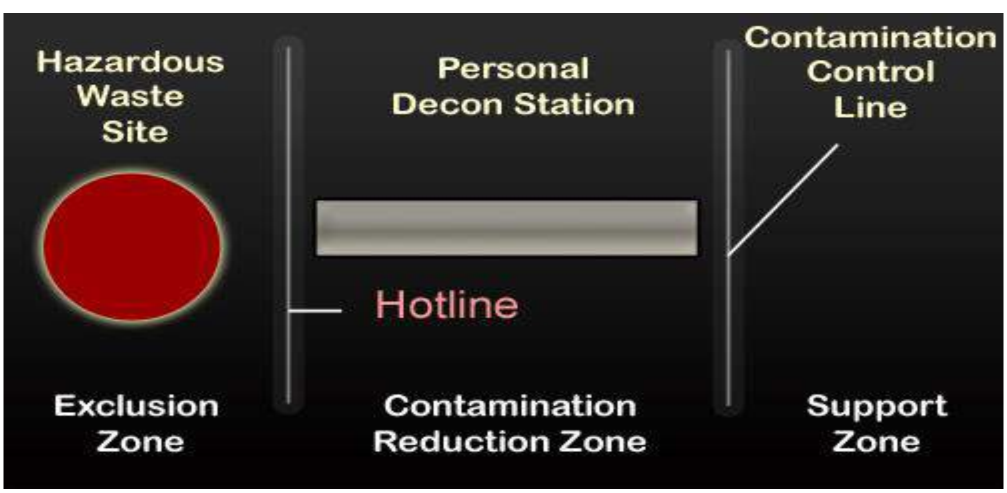
3.2.2. Site Security

Security fencing will be installed around the ERH equipment compound and any above ground infrastructure. The fenced area will inhibit entrance by unauthorized personnel (see **Figure 3** for Site details). Fencing will be located such that step-touch electrical potential measured on the fence does not exceed the applicable voltage limit for that area as defined in TRS SOP 1.3 Voltage Survey. TRS personnel will survey and document voltage at the perimeter of the electrode field restricted zone.

To prevent injury to unauthorized personnel during operations, a motion detection security system and a motion activated video system will be installed within the fenced area covering the ERH electrode field and ERH equipment compounds. As a crucial Site safety component, when any motion alarm is triggered, it will instantly de-energize the electrode field via interlocks with the PCU providing power to the electrode field. This component of the security system will protect an intruder from possible injury associated with electrical shock. If unauthorized entry is detected and the PCU is shut down, TRS personnel will be notified by a security vendor that the system was shut down due to a security breach. If the shutdown was due to a false alarm, the system will be remotely restarted following a visual inspection using the security cameras and/or field personnel. If a true security breach is observed, the local police department will be called to inspect the treatment area to ensure the intruder is gone. Upon confirmation from the local police department, TRS can restart the system via remote connection.

3.2.3. Construction and Sampling Work Zones

Decontamination of personnel, vehicles, and equipment is required prior to leaving the Site. Work zones will be clearly identified for Site personnel and visitors. Work zones during construction and sampling will consist of the following:

- Exclusion Zones (EZ)
- Contamination Reduction Zones (CRZ)
- Support Zone (SZ)
- 

The SZ will be free of contamination or physical hazards. In the SZ, training and PPE requirements will be equal to the lowest levels allowed on the Site. The TRS PM and SHSO will ensure that access to the SZ is regulated at the perimeter fence line.

Exclusion Zones may be established to protect Site personnel and visitors' exposure to chemical and/or electrical hazards at the Site. In the case that an EZ is established at the Site associated with the ERH work, TRS will always maintain sole control of any EZ. Any EZ that is established to prevent exposure to electrical hazards will be off limits to any Site personnel while power is applied to the electrodes. Refer to TRS SOP 1-2, Application of Electrical Power at ERH Sites, for full guidance on EZ access at TRS sites.

The TRS PM and SHSO will ensure that access to the EZs is restricted to properly trained employees who need to enter the zone and who are wearing the proper PPE. It is anticipated that the areas around an active drill rig will be the only established EZs. All EZs will be clearly demarcated using an appropriate combination of caution tape, barriers, and signage.

The CRZs will be established between any EZs and the SZ. Personal decontamination will take place in the CRZ. The TRS PM and SHSO will ensure that all employees, materials, supplies, and equipment leaving an EZ pass through a CRZ and are properly decontaminated. All CRZs will be clearly demarcated using an appropriate combination of caution tape, barriers, and signage.

Other areas of the Site may be demarcated as controlled access areas, but not EZs. These may include haul routes, loading and off-loading areas, storage areas, and portions of the electrode field during ERH system startup. These areas will be clearly demarcated using an appropriate combination of caution tape, barriers, and signage.

3.3. Severe Weather

This area of the country may be subject to severe and sudden changes in weather. Specific weather-related hazards include:

- Thunder and lightning storms
- Tornados
- Flash flooding

The SHSO will monitor the weather on a routine basis using an appropriate smart phone weather application ("Weather Bug" or equivalent weather notification). The SHSO will keep Site personnel informed of weather conditions and plan for shelter and work stoppage dependent upon weather conditions. Details regarding weather related emergency response are provided in the Site-specific Emergency Response Plan (ERP) in **Appendix E**.

3.3.1. Lightning

When data is available, TRS outdoor, on-site work will be suspended when lightning strikes within a 10-mile radius of the Site. If data is unavailable, the 30-second rule should be followed. The 30-second rule is based on the speed of sound, which is roughly 700 miles per hour (mph). At that rate, it takes about five seconds for a sound wave like thunder to travel one mile. If you start counting the number of seconds after a lightning flash, and you keep counting until you hear the thunder, you can then divide by five to get the distance to that flash in miles. Once lightning has moved to within about five or six miles of the Site, there is a high risk for getting struck. The SHSO or their designee, will review forecasted weather and monitor lightning and associated thunder when appropriate at the Site. A smart-phone application capable of providing local lightning strike information (i.e., Weather Bug) is recommended for monitoring these weather conditions. Appropriate action in the case of lightning work stoppage and muster locations will be discussed at the tailgate meeting on days when the weather forecasts indicate possible lightning strikes. See **Section 13.4** for information on Site muster locations and the ERP for emergency response procedures.

A portion of the work will occur within the Mersen facility and will provide shelter from lightning. In the event of outdoor activities, the procedures outlined above will be followed.

3.3.2. Tornadoes

A tornado is a violently rotating column of air extending from the base of a thunderstorm down to the ground and can occur with little or no warning. They can destroy well-made structures, uprooting trees, and hurling objects through the air at high speeds.

The SHSO or their designee will monitor weather while on-site for indications of tornadoes. Appropriate action in the case of a tornado, work stoppage, and muster locations will be discussed at the tailgate meeting on days when the weather forecasts indicate possible severe weather. In the case of a potential tornado, the SHSO or Site manager will sound a warning of three blasts from an air horn or similar device (i.e., car horn) to notify Site personnel to stop work and immediate report to the primary Site muster point. See **Section 13.4** for information on Site muster locations and the ERP for specific emergency response procedures.

3.4. Heat Stress

Heat stress is a major hazard especially for workers wearing protective clothing. Heat-related illnesses range from heat stress to heat exhaustion and heat stroke. Careful training in the use of PPE (including periods of acclimatization), frequent monitoring of personnel wearing protective clothing, judicious scheduling of work and rest periods, and frequent replacement of fluids can protect against this hazard. Areas of shade will be available for all staff on-site and including an air-conditioned work/office trailer at the Site.

When daily average heat index exceeds 85°F, the TRS Site Supervisor or SHSO will develop a heat stress plan for the day. That will plan will include, but not be limited to, periodic rest/rehydration breaks, and monitoring of staff for signs and symptoms of heat stress. Personnel will be monitored by the SHSO for the amount and frequency of liquid intake, frequency of breaks, and the appearance of heat stress symptoms. A person will be assigned to execute the plan and ensure that required breaks are taken and the plan will be reviewed at the daily tailgate meeting.

The symptoms and/or warning signs for the early stages of heat stress include rashes, cramps, discomfort, rapid pulse, drowsiness, and impaired function. Treatment for early stages of heat stress includes rest in a cool setting and fluid intake.

Continued heat stress if untreated, could lead to heat stroke which can cause irreversible damage or even death. The major symptoms of heat stroke include dry - hot skin temperature (the body's natural perspiring mechanism has ceased to function properly), dizziness/disorientation, nausea/vomiting, diminished or loss of motor function, impaired vision, and unconsciousness. Thus, heat stroke requires immediate treatment, which includes:

- Immediately notify the Site Supervisor of the heat stroke victim and contact emergency services (call 9-1-1) and proceed with treating victim.
- Remove victim's protective outer clothing.
- Unless the victim is obviously contaminated, omit or minimize decontamination and begin treatment immediately.
- Immediately cool the victim's body. This should include moving the victim to a cool, shaded area and applying cool, wet towels or ice wrapped in towels (do not apply ice directly to bare skin). Target cooling areas on the body include the head and neck areas, armpits, and crotch (areas where blood flow is near the skin surface).
- Continue to monitor the victim's condition and vital signs every five minutes until emergency medical assistance arrives. Provide a record of the vital signs, observations, and times to the emergency medical personnel.

When Site personnel are in Level D and C PPE, physiological monitoring shall commence when the ambient temperature is above 29.5°C (85°F). This monitoring will be performed by the SHSO (or their designee) and co-workers. The Physiological monitoring shall include:

- Watch for changes skin color, rashes, excessive sweating, or cessation of sweating.
- Ask personnel about rashes, cramps, and discomfort.
- Observe personnel for signs of drowsiness and impaired ability to think or function.
- Measure pulse and the time it takes for a rapid pulse to return to normal once stress has been removed or reduced.
- Monitoring frequency shall increase as the ambient temperature increases or as slow recovery rates are observed. An adequate supply of cool drinking water shall be provided for the workers.

3.5. Cold Stress

Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures or when the wind chill factor is high. Personnel will wear appropriate clothing, have warm shelter readily available, schedule adequate work and rest periods, and will monitor their co-worker's physical ability. Cold weather requirements:

- If wind chill is a factor at the work location, the cooling effect of the wind can be reduced by shielding the work area or providing employees an outer garment to act as a windbreak.
- Extremities, ears, toes, and noses will be protected from extreme cold by protective clothing.
- Employees exposed to wet weather will wear a layer of clothing which is impermeable to water.

Workers will notify the SHSO if they are suffering from illnesses or taking any medication, which interferes with normal body temperature regulation or reduces tolerance to work in cold environments. These workers will be excluded from work in cold (30°F or below).

3.6. Vehicle Safety

Cabs of vehicles will be free of non-essential items and loose items will be secured to prevent movement within the vehicle. Do not allow the rated load capacity of a vehicle to be exceeded.

Heavy equipment will be inspected daily prior to use and documented in the Heavy Equipment Inspection form included in **Appendix A**. Confirm that all appropriate guards are in working condition. These may include rollover protective structures, seat belts, emergency shutoff in case of rollover, and backup warning lights and signals. Equipment operators will report abnormalities such as equipment failure, leaking liquid, unusual odors, etc. to their supervisor(s), the SHSO, or the PM. Blades and buckets will be lowered to the ground and parking brakes set before vehicles are shut off. Wheels of vehicles will be chocked when not in use for extended periods.

During all phases of the ERH project, there will be instances when vehicles will be required to maneuver off clearly marked roads or pathways. While maneuvering vehicles through these areas of the Site, and any areas of limited visibility, a spotter will be implemented to provide the safe mobility of the vehicle through the Site. The spotter should remain visible to the vehicle operator if the vehicle is in motion. If the operator should lose visual contact with the spotter during mobilization of the vehicle, the operator shall stop the motion of the vehicle until visual contact with the spotter is re-established.

A spotter is required any time that heavy equipment (i.e., forklift, skid-steer, excavation machinery, crane) is in operation. When driving any vehicle in reverse, a spotter will be used if one is available on-site. If no spotter is available, drivers should avoid driving in reverse or where vision is limited. If a driver must drive in reverse or in areas of limited vision without a spotter, the driver should exit the vehicle and confirm that a clear driving path is available. Spotters will have no other responsibilities while spotting vehicles/equipment and will be dedicated to observing the activity. Any staff acting as a spotter for traffic control will wear hard hats and Hi-Vis outer garments (vest, shirt, or jacket) meeting ANSI Class 2/Type R standards

Vehicle and equipment operators will operate all vehicles/equipment in accordance with state of New York laws and posted Mersen facility requirements. Operators will not exceed local speed limits.

3.7. Equipment and Machine Guarding

Be certain that equipment has appropriate guards and engineering controls. Belts, gears, shafts, pulleys, sprockets, spindles, flywheels, chains, or other reciprocating, rotating or moving parts of equipment will be guarded if there is a possibility of human contact or when they otherwise create a hazard. TRS and its subcontractors will adhere to other applicable provisions which require backup alarms consistent with OSHA requirements.

3.8. Drilling

Drilling activities to install ERH subsurface equipment falls under the scope of work for TRS. TRS personnel will be on-site during electrode installation activities (drilling). The following list provides guidance to TRS personnel for drilling oversight activities:

- Hard hat, hearing protection, gloves, eye protection, Hi-Vis vest (or equivalent), and safety shoes will be worn by all TRS employees involved in drilling activities, and by employees required to work in the immediate vicinity of drilling activities.
- Based on Site conditions and work activities, specific worker breathing zone air monitoring programs will be established by the SHSO daily. Air monitoring results will be recorded in a log by the SHSO (or their designee) and maintained on-site. See

Section 5.0 for details regarding air monitoring and associated action levels for the Site.

- Depending on worker breathing zone monitoring, workers at drilling locations may be required to wear respirators. All drilling personnel (including oversight personnel) are required to have record of current respirator fit testing (less than one-year old). All drilling personnel and others involved in drilling activities are required to have respirators on-site and readily available during these tasks. If needed, TRS can provide respirators upon request and additional fit testing would be required for any respirators provided.
- Only trained and authorized personnel will operate the drill rig and associated equipment. TRS personnel will not operate drilling equipment or associated support equipment.
- At no time will any personnel be allowed to climb the mast of a drill rig while it is in the upright position without appropriate fall protection and fall protection equipment training.
- The mast will be lowered prior to moving the drill rig.
- Care will be taken to avoid slips/trips while working on uneven, wet, or plastic covered surfaces. To the best extent possible, slip/trip/fall hazards will be mitigated at each drilling location.
- There will be no walking, standing, or crawling under a suspended load.
- All personnel will be trained on the location and function of all "kill-switches" on the drill rig prior to beginning drilling operations; all kill switches will be tested at the start of each shift.
- Site personnel will not approach an operating drill rig without establishing communications with the drill rig operator.
- Clear paths of egress from drilling locations will be maintained at each drilling location during drilling operations.
- When operating drilling equipment in the vicinity of overhead power lines, heavy equipment and personnel will maintain the minimum distances specified by OSHA regulations 29 CFR 1926.1408. The requirements for these minimum distances are provide in **Table 4.**

Table 4. Safe Distance from Overhead Power Lines

Voltage of Power Line (kV)	Minimum Distance to be Maintained from Power Line*
Up to 50kV	10 feet
Over 50kV to 200kV	15feet
Over 200kV to 350kV	20 feet
Over 350kV to 500kV	25 feet
Over 500kV to 750kV	35feet
Over 750kV to 1,000kV	45 feet

Over 1,000kV	Safe working distance will be established by the utility owner/operator or by a qualified engineer experienced in electrical power generation and transmission

Notes: kV=kilovolt; * = OSHA regulations 29 CFR 1926.1408 Table A

3.9. Confined Space Entry

According to CFR 1910.146(b), "Confined space" is defined as a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.)
- Is not designed for continuous employee occupancy

A “permit-required confined space” has the above characteristics, plus one or more of the following characteristics:

- Has the potential to contain a hazardous atmosphere
- Contains a material with the potential to engulf an entrant
- Has an internal configuration that might cause an entrant to become trapped or asphyxiated?
- Contains other recognizable safety or health hazards

The only known potential confined spaces at the Site associated with the ERH equipment is the cooling tower. This is a non-permit confined space. Confined space entry is not anticipated under this contract. If a “permit-required confined space” is identified on-site, then TRS will communicate this requirement to employees, sub-contractors, and visitors using proper signage.

The interior of the condenser container does not meet the requirements of a confined space per applicable OSHA regulations as it is designed for human occupancy. However, a portion of the work area within the condenser container is limited, presents trip and overhead hazards, and may contain hazardous atmospheres. Workers entering the condenser should use caution regarding physical hazards and open the doors of the condenser on both ends for ventilation prior to entry. The doors should be open for a period of five minutes and the breathing zone screened with a photoionization detector (PID) prior to personnel entering the condenser unit.

3.10. Fall Protection

In accordance with OSHA regulations outlined in 29 CFR 1926 Subpart M, each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems. Minimum fall protection is anticipated on this project and will be associated with the installation and demobilization of the condenser/cooling tower units. During condenser/cooling tower assembly/disassembly, personal fall protection equipment (fall harness, lanyards, self-retracting lifelines, etc.) will be worn by staff performing work above 6-feet where other approved fall protection (guardrail systems, etc.) is not present. In addition, should personnel require fall protection for certain, short term activities (e.g., access to crane or drill derricks), only competent, trained personnel shall conduct the work activities. For all activities conducted at a height of 6 feet or greater above the next lower level/platform, each employee will wear a harness and lanyard when appropriate (i.e., when there is a reasonable and stable place to hook the lanyard).

Portable ladders will be used in accordance with 29 CFR 1926.1053(b)(1). When portable ladders are used to access an elevated work area, the ladder shall extend at least three feet above the working surface. In the case that the ladder cannot be extended the required three feet, the ladder will be secured to prevent the accidental movement of the ladder during use. As a rule, fall protection is not required for ladder use to access elevated work areas.

3.11. Hot Work

Hot work includes tasking involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations. Heat shrinking and grinding activities are the only hot work anticipated under typical TRS contracts. Other atypical hot work tasks include thawing of pipework with heaters, soldering, brazing, or sweating copper pipe, applying heat for seized hardware, metal fabrication (cutting or sawing), and welding of metal components.

All activities associated with potential hot work will require completion of the TRS Hot Work Permit and will follow the appropriate safety protocols (i.e., fire extinguisher available nearby). The TRS Hot Work Permit is provided in **Appendix A**.

Prior to any hot work, flammable materials and/or combustible materials will be removed from the work area to a safe distance away from the hot work (minimum distance of 35 feet). Combustible materials include, but are not limited to:

- Construction materials (wood, roofing materials, plastics, insulation, etc.)
- Flammable or combustible liquids or gases (gasoline, paint, propane, etc.)
- Organic material (grass, hay or straw, wood chips, trees, shrubs, etc.)
- Paper products (paper, tissue, cardboard, shipping materials, etc.)
- Fibers and cloths (rags, clothing, furniture, window coverings, etc.)

A fire-watch will be established in accordance with the TRS Hot Work Permit. The fire-watch will continue for a minimum of 30 minutes following the hot work or for a longer duration as described in the TRS Hot Work Permit for the task.

The following conditions require the implementation of a fire-watch

- Work is being done in an area where a fire could develop
- Combustible materials are within 35 feet of the hot work
- Combustible materials are greater than 35 feet away but can be easily ignited by sparks (check SDS or manufacturer’s recommendations)
- There are doorways within 35 feet
- Combustible materials are stored in adjacent spaces

If all the conditions listed above can be eliminated, then the fire-watch can be omitted. The hot work permit still requires completion and signature prior to initiating the work.

3.12. Excavation and Trenching

Trenching and/or excavations where the depth is greater than 4 ft bgs are not expected for this project. In the case that any excavation at the Site does exceed 4 ft bgs, these excavations will be constructed in accordance with the requirements of OSHA Standard 29 CFR 1926.652 for trenching safety. For trenches greater than 4 feet in depth, means of egress shall be installed at distances no greater than 25 feet. For trenches or pits greater than 5 feet in depth, a protective system (benching, sloping, shoring, etc.) shall be constructed and approved by a competent person for excavation safety. All health and safety practices for general construction will be followed including requirements for workspace housecleaning and exposure to falling loads. All excavation spoils will not be piled/stored any closer than three feet from the edge of any excavation.

3.13. Hoisting and Rigging

All hoisting and rigging operations will follow the guidelines set forth in 29 CFR 1926.753, Safety and Health Regulations for Construction, Hoisting and Rigging; OSHA Document 3072 (1996), Sling Safety; OSHA requirements, and applicable state of New York requirements. In accordance with OSHA regulations 29 CFR 1926.1410, minimum distances from energized overhead power lines specific to lifting and hoisting will be maintained. The requirements for these minimum distances are provide in **Table 4.**

A lifting plan will be prepared and reviewed prior to initiating any critical lift. A critical lift is defined as a lift that either exceeds 75 percent of the rated capacity of the crane or derrick or requires the use of more than one crane or derrick. At least three days prior to crane work, hoisting/rigging subcontractors will provide a lift plan and AHAs (or equivalent) to TRS for their work to be performed. The TRS SHSO will determine if a critical lift exists and may also require a lifting plan for other large or unusual loads. AHAs for crane work and lifting and lift plans (if applicable) will be reviewed at a pre-task safety meeting with all personnel involved in hoisting and rigging. TRS staff will oversee all crane work and lifting however, TRS staff will not act as riggers or assist with any lifting or rigging work outside of directing placement of TRS equipment and/or associated lifting activities.

3.14. Material Handling

On-site personnel will observe the following protocols to prevent incidents of hazards and injury related to lifting and moving of equipment and materials on the Site:

- Drums will be pumped prior to moving if the integrity of the drum skin is questionable.
- Personnel will ensure that all container covers, drum lids, bungs, caps, and other sealing devices are in place and properly tightened prior to moving any material container.
- Personnel will be trained in proper lifting and moving techniques and will only move items of reasonable weight and dimension by hand.
- Before moving anything with a forklift, the forklift operator will determine the most appropriate sequence in which the various items should be moved.

3.14.1. Moving/Lifting

Employees performing repetitive motion tasks will take breaks to avoid injury. When lifting objects is necessary, employees will follow safe lifting practices. Bend the knees, keep the back straight, keep the object as close to the body as possible, and lift with the legs. If the object is large or awkward, employees will get help with lifting. Always clear a pathway before moving an object. When possible, use carts, hand trucks, or a push/pull technique to move the object.

3.14.2. Spill Prevention and Containment

TRS and its subcontractors will store, handle, and transfer fluids to prevent the release or spill of oil or other potentially hazardous materials. Materials that are likely to be used in construction equipment include polyvinyl chloride (PVC) glue and primer, gasoline, diesel fuel, hydraulic fluid, and lubricating oils. A chemical inventory list of materials expected to be on-site is provided at **Appendix D** and copies of Safety Data Sheets (SDS) for chemicals on-site will be maintained in a binder at the Site by the SHSO. Materials that are likely to be used or stored on-site during operations include diesel fuel and drums or tanks containing waste material extracted from the subsurface (temporary).

Separated storage areas will be created for the various types of waste and debris (including used PPE) associated with the removal. Signs and labels will be used to clearly mark containerized waste materials, supplies, etc.

Specifications for tanks and containers must meet generally approved standards; including but not limited to suppliers' recommendations and specifications of the United States Department of Transportation (DOT). In meeting these standards, TRS will ensure that tanks and containers maintain their integrity and be of a condition acceptable for storage and transportation. All storage tanks containing liquids will have a secondary containment capable of holding 110 percent of the tank capacity. All flammable materials will be stored in appropriate containers and in a designated flammable materials cabinet.

Secondary containment systems will be placed under the ERH condenser/cooling tower unit(s) and associated liquid-phase granular activated carbon (LGAC) vessels. The secondary containment systems will have the capacity to hold 110 percent of the total fluid volume contained within these units.

An appropriate spill response kit (minimum 25-gallon capacity) will be staged in the immediate vicinity of any ERH equipment secondary containment unit. Any fuel (diesel and gasoline) stored at the Site will be stored in Type 1 containers and in a secondary containment tub (or equivalent) capable of holding 110 percent of the volume of the fuel container(s).

3.14.3. Material Transfer Safety

Volatile liquids and residues shall be removed from storage tanks using explosion-proof or air driven pumps. All pumps and transfer equipment requiring an electrical power source will be properly grounded using Ground Fault Circuit Interrupters (GFCI). Storage and temporary containers will also be grounded during materials transfers.

Transferring liquids and refueling will occur only at approved locations that are at least 100 feet away from any wetlands or surface waters, and 200 feet from any private, municipal, or community water supply. Site personnel will have adequate spill response equipment available at the dispensing or transfer location. Any liquids will be collected in suitable containers and appropriately disposed. Transfer lines will not be left unattended when in use and will either be held or secured in place throughout the transfer process.

Refueling of vehicles will be performed off-site. In addition, only the qualified vendor providing propane tanks (if used) will refuel these tanks on-site.

TRS personnel shall contact the TRS PM and TRS SHSO for non-routine materials handling events. The TRS SHSO will be responsible for developing any task-specific AHA.

3.15. Site Emergency Response

There is always the potential that an emergency could occur. These “emergency situations” include, but are not limited to, the following:

- Fire
- Unplanned loss of power
- Unplanned environmental release
- Extreme/dangerous weather (i.e., tornado, severe electrical storm, blizzard)
- Natural disasters (i.e., earthquake, flood)
- Acts of violence and/or vandalism

In the case of a Site emergency, specific procedures will be followed to ensure the safety of Site personnel, others who may be present at the Site, and/or the general public in vicinity of the Site. An ERP has been prepared for this Site and is presented in **Appendix E**. All Site personnel associated with ERH operations are required to review the Site ERP, be familiar with the Site-specific emergency response procedures, and be able to carry out those procedures in the case of a Site emergency. If any Site personnel feel that they cannot carry out any emergency response procedure, the SHSO and/or PM should be notified so that arrangements can be made to meet the requirements of the Site-specific ERP.

4.0 PPE PROGRAM

Personnel will wear Level D PPE when on-site, which consists of the following:

- Work clothing as dictated by the weather
- Safety (steel-toe or equivalent) shoes or boots
- Safety glasses
- Hard hat (as needed)
- Nitrile (or equivalent) gloves (use when handling or contact may occur with contaminated soils or similar materials)
- Work gloves (as needed)
- Hearing protection (as needed)
- Hi-Vis vest or equivalent (as needed)

Level D PPE provides no respiratory protection and minimal skin protection. Level D PPE should be used when the concentrations of chemicals in the workplace atmosphere contains less than the regulatory limit and work functions preclude the potential for unexpected inhalation of, or other contact with, hazardous levels of any chemical. For Level D PPE, the workplace atmosphere must contain at least 19.5 percent oxygen.

Personnel will be trained on the proper use and limitations of PPE described within this section prior to use on-site. Any personnel using a respirator will be trained in accordance with TRS respiratory training program (**Appendix C**) and have current fit-test documentation (completed within the past year).

4.1. Hearing Protection and Noise Control

The Site-wide hearing conservation program is based upon limiting the exposure of Site personnel and visitors to excess noise. All Site personnel and visitors will be provided with protection against the effects of hazardous noise exposure. Protection will include earplugs, earmuffs, or a combination of both. Site personnel and visitors will be required to use hearing protection whenever sound-pressure levels exceed 85 decibel (dB) steady-state expressed as a time weighted average (TWA). It will be assumed that this sound pressure level is not exceeded if two people can engage in conversation using normal voices within three feet from the noise source.

4.2. Eye Protection

Airborne particulates, flying debris, and chemical exposure can cause injury to eyes. Safety glasses will be worn during all phases of work at the Site. All safety glasses used will meet ANSI Z87.1-2010 standards. When work conditions warrant and as determined by the TRS SHSO, full-face shields, goggles, or chemical goggles may be worn.

4.3. High Visibility Clothing

Hi-Vis outer garments will be required for any activities using heavy equipment including bobcat/skid-steers, excavators, loaders, cranes, forklifts, or similar machinery. Hi-Vis outer garments will consist of, at a minimum, a Hi-Vis vest. Hi-Vis shirts and/or jackets are permissible as long as they are the outermost layer of clothing. Hi-Vis garments should be clean as to promote visibility and meet ANSI requirements for “Performance Class 2/Type R” standards as defined in ANSI standard 107-2015.

4.4. Dermal Protection

Protective clothing, such as Tyvek® suits and nitrile gloves will be worn when dermal exposure to hazards warrants, as determined by the SHSO. Tyvek® suits are not required for the ERH project, but Site personnel may elect to wear them during intrusive, subsurface activities such as drilling. Clothing must be maintained and stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact. Tyvek® suits will not be reused; they will be disposed of at the end of each workday at minimum or whenever necessary. Any PPE that may have encounter NAPL or other site contaminants will be segregated and stored in a sealed container with appropriate labeling prior to disposal.

4.5. Respiratory Protection

The need for respiratory protection is not anticipated during ERH construction, operation, and demobilization. However, due to the nature of ERH, there is always the potential for respiratory hazards. As such, all Site personnel performing tasks with the potential for respiratory hazards will have current respirator fit testing and have respiratory protection available on-site. The SHSO, PM, or Site Manager will review daily tasks planned and provide direction on respiratory PPE required for those tasks during daily tailgate meetings. If respirator use is warranted, half-face or full-face respirators are required for all personnel working at the Site.

Level C PPE provides respiratory protection when atmospheric conditions exceed the action level for airborne contaminants (see **Section 5.0**). Level C PPE should be worn when the types of air contaminants have been identified, concentrations measured, and a respirator filter cartridge is available that can remove the COCs. Level C PPE should not be used if atmospheric concentrations of any chemical exceed immediately dangerous to life and health (IDLH) levels or if the workplace atmosphere contains less than 19.5 percent oxygen (see **Table 3** for IDLH values for expected site COCs). While not anticipated, Level C PPE at the Site will include a half-face or full-face air purified respirator with P100/OV cartridges at a minimum. During drilling and excavation operations, all staff associated with these tasks are required to have on-site an air-purifying respirator and a combination high efficiency particulate air (HEPA) and volatile organic filter cartridges (P100/OV).

Level B and Level A respiratory protection should be used when concentrations of chemicals in the workplace atmosphere are above the regulatory limit. If this situation arises, work will cease until a Site-specific addendum to this HASP is prepared which will include appropriate training and equipment required.

4.5.1. Maintenance and Storage

All respirators will be inspected prior to use. The inspection will include a check of respirator function, tightness of connections, and the condition of the various parts including, the face piece, head straps, valves, connecting tube, and cartridges, canisters, or filters and a check of elastomeric parts for pliability and signs of deterioration.

The respirators will be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an employee will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee will be cleaned and disinfected before being worn by different individuals.
- Respirators maintained for emergency use will be cleaned and disinfected after each use.
- All respirators will be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they will be packed or stored to prevent deformation of the face piece and exhalation valve.

4.6. Construction Safety

Steel-toed shoes/boots or safety shoes/boots conforming to ANSI Z41.1-1991 and American Society for Testing and Materials (ASTM) F 2412-05 and F2413-05 with chemical resistant soles will be worn during all phases of work at the Site. A hard hat will be worn during any phase of Site work when overhead obstructions exist, while acting as a traffic spotter, or during the use of heavy equipment. A Hi-Vis safety vest or an outermost layer of safety/reflective coloring will be worn when heavy equipment is present at the Site, during drilling and excavation operations, during any task where traffic control is in effect, and as Site conditions warrant or as directed by the SHSO (or their designee). Protective work gloves are required for all phases of work at the Site.

5.0 AIR MONITORING PROGRAM

Exposure to airborne contaminants can occur during any phase of an ERH project. Exposure monitoring data from the Site will include real time PID readings from the monitoring of breathing zones, PID readings from ambient air monitoring, PID readings from subsurface samples (during construction, sampling, and demobilization), and analytical data from the analyses of waste materials. All air monitoring results will be recorded on air monitoring logs and records kept on-site (see **Appendix A** for Air Monitoring Log sheet). Depending upon monitoring and analytical results, personal TWA exposure calculations may be performed for VOCs and selected compounds.

Airborne contaminant hazards include, but are not limited to, the list below.

- Chemical and non-chemical (dust) exposure during drilling activities (TMP and electrode installation)
- Chemical and non-chemical (dust) exposure during trenching and excavation activities
- Chemical and non-chemical (dust) exposure during construction activities
- Chemical exposure during ERH operations associated with vapor recovery and treatment
- Chemical and non-chemical (dust) exposure during demobilization activities

Additional chemical hazards commonly found at ERH sites include:

- Chemical solvents and glues used during the construction of vapor recovery piping and electrode drip piping
- Fuel used for generators or other internal combustion powered equipment

5.1. CVOC Air Monitoring

5.1.1. Air Monitoring Equipment

A PID equipped with a 11.7 electron volt (eV) lamp will be kept on-site throughout through all phases of the ERH project. The PID will be calibrated to an isobutylene equivalent according to manufacturer's recommendations. All PID calibrations will be documented on the PID Calibration Form provided in **Appendix A**. The manual will be kept in the storage case with the PID for reference on calibration and use. Experience gained from previous site activities indicates that a personal monitoring program based upon the use of direct-reading field instruments will not put field personnel at a risk of exposure to atmosphere concentrations of chemicals above regulatory limits or of exposure to unexpected contaminants.

The level of personal monitoring during each Site activity will be based upon known Site characteristics, observations of Site conditions, the activity being performed, and any new information/data collected during ERH construction and operations. The following guidelines are provided for as minimum personnel air monitoring requirements during any invasive operations (i.e., drilling, excavation) when TRS personnel are on-site. All PID monitoring results will be recorded on the Air Monitoring Log (**Appendix A**) and records kept on-site.

- Refer to the equipment manual and recent calibration documents to ensure that the monitoring PID is acceptable for use.
- Turn on the equipment. Once stabilized and operating, complete a "bump" test using 100 parts per million (ppm) isobutylene to make sure that the PID is reading properly.

- Establish locations to collect PID readings and expected frequency.
- Monitor the work area for several minutes to determine background level readings.
- Record background readings.
- Ambient Air Monitoring:
- Conducted with a PID prior to and during drilling operations to ensure public safety.

Worker Breathing Zone Monitoring:

- At a minimum, PID readings will be collected every 15 minutes in the worker breathing zone during drilling and/or excavation activities.
- Monitor during all shallow invasive activities, such as drilling, excavation, grading, and trenching.
- Monitoring will begin when the ground surface is broken at a borehole location and continue until drilling of the borehole is completed.
- Monitor in response to any PID readings at the borehole opening which approach or exceed the action levels.
- Monitor in response to any PID readings taken periodically from recent soil cuttings.

5.1.2. Breathing Zone Definitions

Conventionally, the "breathing zone" is defined as the zone within a 10-inch (0.3 meter) radius of a worker's nose and mouth, and it is generally assumed that a contaminant in the breathing zone is homogeneous, and its concentration is equivalent to the concentration inhaled by the worker.

The breathing zone for electrode installation activities (drilling or sheet pile operations) is the area around the rig or downwind from that location at a level with the worker’s nose and mouth. The breathing zone will change to that of the top of the borehole casing (or sheet pile entry into the subsurface), when workers are in the immediate vicinity of the opening performing work such as placing conductive fill.

The breathing zone for trenching operations is any location within the trench, below the top of the trench walls, and adjacent to or above the trench with special consideration given to wind direction.

5.1.3. Other Air Monitoring

During intrusive activities, the SHSO (or designee) may elect to conduct dust monitoring when visible dust is present. If dust monitoring is performed, the PEL of 5 milligrams per cubic meter (mg/m^3) with TWA of 15 minutes is in accordance with 29 CFR 1910.1000. If the dust PEL is exceeded, work will be stopped, and appropriate measures taken (wetting the ground surface/work area) to reduce nuisance dust below the PEL prior to continuing work.

During operations of the ERH system, the vapor stream extracted from the subsurface will be monitored for total VOC concentration using a PID and sampled for off-site laboratory analyses of the concentrations of COCs. Data from these activities will continue to provide guidance as to the possible chemical compound(s) personnel could be exposed to at the Site.

5.2. Worker Exposure Limits

During field activities, the upgrade of respiratory and skin protection requirements from Level D PPE is not anticipated but may be appropriate. The decision to upgrade levels of protection will be made by the SHSO and the TRS PM based on exposure monitoring data collected with a PID and any available analytical data (including waste material profile results). Depending upon monitoring and analytical results, personal TWA exposure calculations may be performed for VOCs and selected compounds.

Use the air monitoring decision tree (**Table 5**) to take appropriate monitoring and personnel protection steps as required.

Table 5. Air Monitoring Decision Tree

PID Readings (ppm)	Guidance	Action	PPE
Background to 1 ppm above background	Continue breathing zone monitoring	Work may continue	**Level D**
Sustained (1 minute) real-time (instantaneous) measurements above background to 1 ppm	Continue breathing zone monitoring. Corrective action will be taken immediately to lower concentrations in the breathing zone through engineering controls or prevent worker exposure using appropriate PPE. Work will temporarily stop work and engineering controls will be implemented to reduce VOC air monitoring readings to below 1 ppm.	Work may continue, evaluate work area for cause of the increased reading. If field PID readings for VOCs cannot be reduced to less than 1 ppm through engineering controls, **STOP WORK** and contact TRS SQM for guidance.	**Level D**
Sustained (1 minute) real-time (instantaneous) measurements of >5 ppm above background	Continue breathing zone monitoring. Corrective action will be taken immediately to lower concentrations in the breathing zone through engineering controls or prevent worker exposure using appropriate PPE. Don half-face or full-face air purifying respirator with organic vapor (OV) cartridge. Combination cartridge with a P-100 particulate filter is recommended. Contact SQM to determine change-out schedule for respirator cartridges.	Work may continue in Level C, evaluate work area for cause of the increased reading.	**Level C**
Sustained (1 minute) real-time (instantaneous) measurements of 5 ppm above background	Continue monitoring with PID. Document the source of the readings. Don full-face air purifying respirator with OV cartridge. Combination cartridge with a P-100 particulate filter is recommended. Contact SQM to determine change-out schedule for respirator cartridges.	Work may continue in Level C	**Level C**

PID Readings (ppm)	Guidance	Action	PPE
Sustained (1 minute) real-time (instantaneous) measurements of 25 ppm above background	Stop intrusive activities immediately. Leave area, apply engineering controls and allow contaminates to dissipate.	STOP WORK	**STOP WORK**

Based on the potential for contaminant exposure at the Site, the recommended air purifying respirator cartridge for this project is organic vapor (OV) with a P-100 particulate filter.

6.0 TRS ERH-SPECIFIC SAFETY PROCEDURES

All TRS personnel, TRS subcontractors, or others participating in on-site activities with TRS must be familiar with standard operating safety procedures and any additional instructions and information contained in this HASP, HASP appendices, and applicable TRS SOPs. Copies of applicable TRS SOPs will be maintained on file at the Site.

6.1. ERH System Operations

ERH system operations will be conducted in accordance with TRS internal SOPs and equipment operating standards. Only trained and qualified TRS personnel will operate TRS ERH equipment.

6.1.1. ERH Start-Up

Dangerous voltages can be present in the subsurface of the ERH field during operations. Only qualified, trained TRS personnel will conduct ERH start-up activities. ERH startup will be in accordance with TRS internal SOPs 1.2 (Application of Electrical Power to ERH Sites) and 1.3 (Voltage Surveys). Startup and initial unattended operations of the ERH PCU are performed only when the Site SUCL has been completed and signed off by authorized TRS operations personnel.

6.1.2. ERH Emergency System Shut Down

During ERH operations, if an emergency condition should arise; all personnel have the authority to depress the emergency stop (E-stop) button on the PCU which will de-energize the electrode field. An E-stop button is located outside of the PCU, immediately adjacent to the control room entrance. Additional E-stop buttons will be installed at the Site and located near the entrance to the equipment compound. The procedure for emergency shutdown is as follows:

- Press the emergency stop button. A “clunk” will be heard as the output contactor (automatic switch) opens.
- Enter the PCU control room, depress the Output Switch, lock it in the depressed position, attach a” Danger/Do Not Operate” tag on the switch, and lock out the output switch key in accordance with TRS SOP 1.1 for LOTO.
- Notify the TRS operator, TRS PM, and/or TRS SHSO of the emergency shutdown at the first available opportunity.

- Once the emergency condition has been rectified and the TRS PM (or their designee) has provided approval to apply power to the electrodes, the PCU can be re-energized in accordance with TRS SOP 1.1 for LOTO. The output control switch should be turned to the “operate” position (normal setting).
- Notify the TRS operator to restart the ERH system.

When the PCU is shut down, the subsurface becomes electrically safe instantly: there is no “residual voltage”.

6.2. ERH Operations Work Zones

Due to the hazards that exist on-site during ERH operations, TRS will establish an ERH restricted zone (RZ). The ERH RZ is an area established to permit access to only authorized personnel who have been properly trained or who are escorted by properly trained personnel and have signed the ERH Restricted Zone Acknowledgement Form.

The ERH RZ will have a clearly defined boundary that restricts access but may consist of movable boundaries (such as temporary chain-link fencing or snow fencing) during operations. Proper signage delineating the area shall be posted.

In the event a hazardous condition exists within the Site that cannot be eliminated or controlled through administrative or engineering control methods, an ERH EZ will be established to prevent access by all personnel while power is applied to the subsurface. TRS will maintain sole control of any EZ established at the Site. The EZ will have a locked access point with immovable boundaries and shall only be entered following the completion of LOTO procedures in accordance with TRS SOP 1-2 for LOTO. Approval by the TRS Vice President (VP) of Operations or TRS SQM is required prior to access an electrical voltage EZ with power applied. Proper signage delineating the area shall be posted. This area has the possibility of exceeding the administrative potential voltage limit during ERH application. EZs at this Site include live electrical panels and transformer compartments. Restricted zones will include the electrode field, equipment compound, and all areas within the fence.

6.3. Lockout/Tagout

Safe work practices will be used to safeguard employees from injury while they are working on or near exposed electrical conductors or circuit paths that are, or can become, energized. The specific safety-related work practice shall be consistent with the nature of and extent of the associated potential energy hazards. Prior to performing work in the restricted zone that could expose personnel to electrical current, trained personnel must lockout and tagout the ERH PCU. Only TRS staff who have been trained in LOTO procedures in accordance with TRS SOP 1.1 Lockout/Tagout may perform LOTO procedures. In addition, TRS staff must sign the SOP 1.1 Training Acknowledgement Form following their training and confirmation of competency by their trainer. All TRS personnel performing LOTO at the Site must have a current certification and training in NFPA 70E.

Unless it can be demonstrated that de-energizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations for specific tasking, exposed energized electrical conductors or circuit paths to which an employee might be exposed will be put into an electrically safe work condition before an employee works on or near them. Workers in the vicinity of exposed and potentially live electrical conductors will follow procedures defined in NFPA 70E to ensure personal safety.

Note: *Only authorized TRS personnel experienced and trained to operate or perform maintenance on the ERH remediation equipment or system support components can conduct the LOTO procedures on TRS equipment as described in TRS SOP 1.1 Lockout/Tagout.*

7.0 DECONTAMINATION

TRS employees and subcontractors shall implement work practices that minimize contact with hazardous substances (e.g., do not walk through areas of obvious contamination; do not directly touch potentially hazardous substances). All TRS' on-site work will be performed in modified Level D PPE. Should changes in Site conditions cause an upgraded level of personal protection, all impacted workers will be informed of the necessary equipment and decontamination requirements.

7.1. Personal Decontamination Procedures

Personnel, clothing, equipment, and samples leaving the contaminated area of a Site must be decontaminated to remove harmful chemicals or infectious organisms that may have adhered to them. While in modified Level D PPE, any disposable PPE, including nitrile gloves and Tyvek® suits will be disposed in a designated and appropriate labeled drum prior to disposal.

Potable water will be provided on-site. Workers will wash hands and face before breaks, lunch, and before leaving the job Site. Water, soap, and clean towels will be provided. Boots and hard hats will be washed with detergent and rinsed with potable water as needed.

If an upgrade to Level C personal equipment occurs, all non-disposable protective equipment will be cleaned in a specified contaminant reduction zone prior to leaving the Site either for reuse or as trash. If needed, respirators will be dismantled, washed, and disinfected after each use or as needed. Disposable Level C PPE (respirator cartridges, clothing, gloves, etc.) will be disposed of in a labeled drum and analyzed prior to disposal.

Personnel will be trained in decontamination procedures to minimize contact with possible contaminants and maximize worker protection. These procedures will be enforced throughout Site operations.

7.2. Vehicle and Equipment Decontamination

A containment berm or decontamination pad will be constructed at a location that the TRS SHSO, TRS PM, and the LaBella and/or Mersen Site representative(s) deem is most adequate to perform decontamination for equipment and tools. Decontamination will be performed on an as-needed basis. It is assumed that all equipment in contact with subsurface contamination will require on-site decontamination. If necessary, equipment and sampling tools will be decontaminated by scrubbing with detergent water using a brush, followed by rinsing with water.

Drilling and excavation equipment will be decontaminated by pressure washer prior to arrival at the Site. TRS will inspect all drilling and excavation equipment arriving at the Site and may require additional decontamination of equipment if deemed necessary prior to using the equipment on-site. Equipment that has touched soil below grade will be decontaminated by pressure washer prior to leaving the Site. The drilling and/or excavation subcontractor will establish a decontamination area with a containment unit to collect water and debris from decontamination. Any decontamination water that collects in the containment area will be pumped to DOT-approved 55-gallon drums for temporary storage prior to disposal. All waste drums will be properly labeled in accordance with applicable local, state, and federal requirements. Decontamination fluids will be handled and contained in accordance with Site-specific waste management plans.

7.3. Decontamination during Medical Emergencies

If emergency lifesaving first aid and/or medical treatment are required, decontamination procedures may be omitted at the professional emergency responder's direction. The appropriate Site personnel and/or professional emergency responder will accompany contaminated victims to the medical facility to advise them on matters involving decontamination. Refer to the "Health and Safety Plan Summary" at the beginning of this document and/or **Section 13.2** for information on local emergency care facilities.

Life-saving care will be instituted immediately without considering decontamination. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual can be wrapped in plastic to help prevent contaminating medical personnel. No attempt need be made to wash or rinse the victim, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause severe injury or loss of life. If it is at all possible, it is best to have a professional emergency responder make the judgment and perform the above-mentioned procedures. For minor medical (non-life threatening) illnesses or injuries, the normal decontamination procedures will be followed.

For inhalation exposure cases, treatment can only be performed by a qualified physician.

If the contaminant is on the skin or in the eyes, rinse/flush the affected area with water for 15 minutes. Portable 15-minute eyewash station containing potable water or eyewash solution will be maintained on-site during activities using or have potential exposure to corrosive materials. At all times, a minimum of six 32-ounce eye-wash bottles will be on-site for emergency use.

8.0 HAZARD ASSESSMENT

The SHSO, or a designee, will prepare a chemical inventory list of chemicals brought to the Site (See **Appendix D**). If new chemicals or hazardous substances are brought onto the Site, employees must inform the SHSO. The SHSO will be responsible for updating the Site chemical inventory as needed and maintaining the SDS compendium for the Site. SDS will be added or removed from the compendium as materials are brought onto or no longer exist at the Site. Any Site personnel potentially exposed to a substance will be advised of information contained in the SDS for that substance.

Each container entering the workplace will be checked for appropriate labeling, if applicable. Container labels will include the following:

- Identity of the hazardous chemical
- Appropriate hazard warning

- Name and address of the chemical manufacturer

Containers which hazardous chemicals are transferred into must be labeled, tagged, or marked with the identity of the hazardous chemical(s) and appropriate hazard warnings. TRS uses routine audits and inspections to evaluate and mitigate site hazards to the extent practical.

8.1. Day 1 Health and Safety Inspection

Prior to the first day of field activities, the TRS PM or SHSO will conduct a "Day 1" health and safety readiness inspection to ensure all the required PPE, first aid kit(s), eye-wash bottle(s)/station, and other essential health and safety items are on-site. If items are shown as incomplete upon inspection, replacement items will be expedited to the Site at a prioritized rate. A copy of the "Day-1 Readiness Health and Safety Checklist" is provided in **Appendix A**.

8.2. SHSO Inspections

General Site safety inspections will be conducted monthly, unannounced, at times selected by the SHSO or his designee to ensure compliance with the HASP. The purpose of these general inspections is to ensure that project health and safety procedures are being implemented in accordance with the HASP and to identify any issues which may require further evaluation, discussion, or actions. The results of these inspections will be documented in writing and submitted to the TRS SQM and discussed at the next Daily Tailgate Health and Safety Meeting.

In addition to the bi-weekly inspection, the SHSO will complete a monthly inspection to review and update all health and safety documentation, including the compendium of SDSs. The monthly compliance inspection will also include and inspection all health and safety equipment and emergency response materials.

8.3. Corporate Health and Safety Audits

Periodic inspections to identify and evaluate workplace hazards shall also be performed by the Corporate SQM or his designee. Inspections may occur:

- When mobilization to a new project site first occurs
- Every other week by the SHSO or his designee
- When new substances, processes, procedures or equipment that present potential new hazards are introduced into the workplace
- When new, previously unidentified hazards are recognized
- When occupational injuries, illnesses, spills, and near misses occur.
- Whenever workplace conditions warrant an inspection

8.4. Hazard Correction

Unsafe or unhealthy work conditions, practices or procedures at TRS work facilities shall be corrected in a timely manner based on the severity of the hazards, and according to the following procedures:

- When observed or discovered.
- When an imminent hazard exists, which cannot be immediately abated without endangering employee(s) and/or property, TRS will remove all exposed workers from

the area except those necessary to correct the existing condition. Workers necessary to correct the hazardous condition shall be provided with the necessary protection.

- All such actions taken and dates they are completed shall be documented on Daily Tailgate Forms or the final incident report.

9.0 MEETINGS AND INSPECTIONS

9.1. Pre-Construction Safety Meeting

The TRS PM or his designee will conduct a pre-construction safety meeting before any work begins at the Site and on the first day of mobilization in the field at the Site of new personnel. Every person working in the field, including TRS employees and subcontractors, must attend a pre-construction safety meeting. Meeting participants will review the HASP and the Site-specific safety concerns. At a minimum, the following topics will be covered in the preconstruction safety meeting:

- Team members and responsibilities, including SHSO
- Location of on-site first aid equipment and spill containment equipment
- Route to local hospital/occupational medical facility and contact information for emergency medical services
- Site security/visitor control
- COCs and signs of exposure
- Physical and biological hazards
- Proper PPE requirements including review of respiratory protection, air monitoring plan, and associated action levels
- Overhead power lines and other overhead hazards
- Areas and tasks requiring fall protection
- Safe operation of vehicles and heavy equipment
- Fire protection, prevention, and location of extinguishers
- Lockout/Tagout requirements
- Permit requirements (e.g. hot work and confined spaces)
- Emergency response procedures (ERP – **Appendix E**) and Site muster point(s)

All personnel will document their understanding of this HASP and the pre-construction safety meeting by signing the HASP Acknowledgement Form included in **Appendix A**.

9.2. Pre-Operations Safety Meeting

Prior to beginning ERH operations at the Site, the TRS PM or his designee will hold a pre-operations safety meeting. At a minimum, the following topics will be covered before personnel are permitted to work within the ERH RZ during the system operational phase of work:

- Proper LOTO requirements to enter the electrode field and a complete review of the TRS SOP 1.1 for LOTO (all personnel will acknowledge SOP training by signing the SOP training acknowledgement form).
- Site protocol with respect to Site-specific restriction zones and exclusion zones.

- Proper PPE requirements including review of respiratory protection, air monitoring plan, and associated action levels.
- Site-specific training regarding potential hazards with ERH equipment. Training should include (but not be limited to) electrical hazards, hot surfaces, pinch points, slip/trip/fall hazards, confined spaces, and contaminants of concern.
- Site-specific and task-specific training regarding Site sampling requirements. Training should include the potential hazards of sampling and review of appropriate TRS SOPs 3.1 and/or 3.2 for hot groundwater and hot soil sampling, respectively.
- Training on locations and function of the E-stops. The E-stop will deactivate PCU and power to electrodes but will not deactivate vapor recovery or treatment equipment.
- On-site training for Emergency Response and the possible scenarios (see ERP **Appendix E**).
- Confirmation that all Site personnel have completed Site-specific reading assignments as outlined by the TRS PM, SHSO, or TRS SQM.

All personnel will document their understanding of topics addressed in the pre-operations safety meeting by signing the ERH Restricted Zone Acknowledgement Form included in **Appendix A**.

9.3. Daily Tailgate Health and Safety Meetings

A daily tailgate meeting will be held each day when personnel are on-site during all phases of the ERH project. The PM, the SHSO, or a delegate of the SHSO will conduct these meetings. All Site personnel will attend. The tailgate meetings will be conducted on-site, prior to the commencement of the daily activities. The agenda of the meeting may vary, but, at a minimum, it will cover the activities planned for the day, including operations which may occur in other areas of the Site that could potentially impact the planned work (e.g., Site equipment or materials deliveries, expected visitors, planned inspections), an overview of the known hazards, and methods to be used to mitigate the hazards. Daily tailgate meetings will include the review of applicable TRS SOPs and AHAs for work to be performed. Any near-miss events or incidents from previous work will be discussed as lessons learned. The SHSO will also discuss any recently completed inspections and inspection findings. The daily tailgate meeting form (**Appendix A**) will be completed and maintained on file at the Site. As needed, the Site Supervisor or SHSO may conduct additional tailgate meetings during a given day if changes in Site conditions, changes in work tasks, or recognition of hazards (near-miss events or incidents) warrant additional review with on-site staff.

9.4. General Site Safety Inspections

General Site safety inspections will be conducted weekly, unannounced, at times selected by the SHSO or his designee to ensure compliance with the HASP. The purpose of these general inspections is to ensure that project health and safety procedures are being implemented in accordance with the project safety plan, and to identify any issues which may require further evaluation, discussion or actions. The results of these inspections will be discussed at the next Daily Tailgate Health and Safety Meeting as discussed in **Section 9.3**.

9.5. Safe Behavior Observations

Safe Behavior Observations (SBOs) are a key component of the TRS BBS program. SBOs will be conducted either by the SHSO or designated TRS personnel, using the form contained in **Appendix A**. The goals of conducting an SBO are to:

- Reinforce safe work practices and behaviors
- Identify and improve at-risk practices and acts
- Improve task procedures, conditions and controls
- Ensure that the necessary tools and supplies are available
- Facilitate collaborative feedback

The SBO evaluations will provide real-time feedback on unsafe actions and conditions on a regular basis to the work crews. Following the observation and feedback session, the SBO form will be returned to the SHSO for evaluation and record keeping. Copies of all SBO forms will also be submitted to the SQM for review. These evaluations will be conducted as Site conditions and activities warrant. SBOs will not be completed when only one person is present on-site.

10.0 ROLES, RESPONSIBILITIES, AND AUTHORITY

TRS has established an organizational structure for providing technical direction and administrative control to accomplish safety and quality-related goals on this project. All project personnel are responsible to make health and safety the top priority on-site each day. The key personnel for the project are identified below:

- Senior Project Manager: Robert Poulin
- TRS Project Manager: Kevin Novello
- TRS Site Safety and Health Officer: Steve Agostine
- TRS Safety & Quality Manager: Greg Knight

Copies of the HASP, appendices, and applicable SOPs will be provided to client staff and subcontractors who will have personnel working on-site. At the time of mobilization to the Site, the SHSO will confirm that they understand the overall safety and health objectives for the project and have been trained and are familiar with the requirements of this HASP. All client staff and subcontractors will document HASP training by signing the HASP Acknowledgement Form (**Appendix A).** The SHSO will have the authority to ensure all personnel on-site follow the health and safety procedures set forth in the HASP and to dismiss any personnel who does not comply with this HASP and/or acts in an unsafe manner.

10.1. Corporate Safety & Quality Manager

The TRS Corporate SQM, Greg Knight, is responsible for developing and implementing the provisions of the TRS CSP. The SQM will support each project team to assist with development of the site-specific HASP for every project.

10.2. Project Manager

The TRS PM has overall responsibility and authority to direct technical, management, and contractual matters for those portions of the project under the supervision of TRS. The PM is required to effectively communicate Site risks and the requirements of the HASP to TRS' employees, TRS' subcontractors, and those on-site personnel being supervised by TRS while they are performing project-related activities. The TRS PM has the following additional responsibilities:

- Promote and maintain that the personal safety of all staff working at the Site is the top priority every day on every task or activity
- Serve as the primary contact with the client or the client's representative
- Establish appropriate health and safety procedures for TRS' on-site activities
- Ensure that project staff are properly trained
- Enforce health and safety requirements, and determine disciplinary actions for violations of the plan
- Ensure that necessary permits for TRS' activities have been obtained prior to starting field work
- Ensure that required field personnel attend health and safety briefings and tailgate meetings
- Review and update the HASP
- Participating in incident investigations
- Stop work in the case of unsafe acts, work practices, or otherwise hazardous Site conditions

10.3. Site Health and Safety Officer

The TRS SHSO is responsible for documenting that the designated procedures of this HASP are implemented in the field by TRS employees, TRS subcontractors, and others participating with TRS in the completion of project tasks under the management of TRS. In some cases, the SHSO role may be filled by the TRS PM.

The TRS SHSO will serve as the on-site point of contact for all health and safety matters related to work being performed or supervised by, TRS. The TRS SHSO will provide technical information regarding health and safety to Site personnel. The TRS SHSO will also oversee Site activities with respect to health and safety issues and will stop work if conditions are determined to be detrimental to Site personnel, equipment/property, or the environment.

The TRS SHSO has the following responsibilities for Site activities under the direction or supervision of TRS:

- Promote and maintain that the personal safety of all staff working at the Site is the top priority every day on every task or activity
- Ensure that all known tasks assigned to TRS, the hazards associated with those tasks, and protective controls required for those tasks have been identified
- Ensure that only personnel qualified in accordance with applicable health and safety requirements can perform field work
- Ensure that only qualified individuals are allowed access to Site locations or operations where potential hazards exist
- Ensure that proper security and control of RZs and EZs at the Site are maintained
- Conduct documented inspections of TRS' work activities

- Stop work and remove personnel from the field if personnel, equipment, property, or the environment are jeopardized by unsafe work activities or otherwise hazardous Site conditions
- Provide Site-specific training to new employees and visitors including required "Right to Know" information (see **Section 8.0** Hazard Communication)
- Conduct and/or participate in daily tailgate health and safety meetings
- Ensure that employees know the location of safety equipment, such as fire extinguishers, eye-wash stations, and first aid kits, and that this equipment is kept current
- Perform scheduled inspections of health and safety equipment including, but not limited to, fire extinguishers, first aid kits, bloodborne pathogen response kits, fall protection equipment, automated external defibrillators (AEDs), eye wash equipment, and emergency shower (if equipped)
- Ensure that proper hazard, right-to-know, and other safety and labor information (local, state, and federal) are posted in a prominent place at the Site
- Ensure that all operations are conducted in a manner to mitigate adverse environmental impacts
- Ensure that work practices promote the TRS BBS program including the performance of SBOs, recognition and correction of unsafe behaviors, and reporting of near-miss and incident events
- Establish and maintain the hazard communications program, including SDS and training materials
- Maintain Site binders for TRS AHAs and SOPs
- Maintain health and safety related record keeping including, but not limited to, daily tailgate meetings, HASP review and acknowledgement, safety related training (SOPs and AHAs), SDS and Site chemical inventory, and any client specific records required
- Maintain health and safety related data records including, but not limited to, PID monitoring logs, dust monitoring logs, and voltage testing
- Evaluate the Site for any hazards not identified in the HASP and initiate safety measures to protect personnel, including appropriate revisions to health and safety documents
- Immediately report near-miss events and incidents in accordance with this HASP and TRS procedures
- Coordinate with off-site emergency responders and medical service organizations to establish required emergency services and verify that emergency phone numbers and addresses are current and accurate

10.4. Field Personnel

Field personnel are responsible for performing work in a safe and healthful manner. They are responsible for abiding by the requirements of the HASP, and for fulfilling and maintaining their individual training and medical surveillance programs. If there are concerns that implementation of work orders or health and safety requirements would unreasonably compromise the safety or health of an individual or the environment, such concerns should be brought to the attention of an immediate supervisor or the SHSO. Field personnel are responsible for the following:

- Perform work to maintain personal safety as the top priority
- Abide by the requirements of this HASP
- Exercise “stop work” if unsafe acts or hazardous Site conditions are recognized that could lead to personal injury, equipment or property damage, or unplanned environmental release(s)
- Take all reasonable precautions to prevent injury to themselves and to their fellow employees
- Being alert to potentially hazardous situations
- Employ safety tools provided such as AHAs, SOPs, and SDSs to mitigate hazards and promote worker safety
- Perform only those tasks for which they have been trained and believe they can do safely, and immediately report any accidents, near misses, and/or unsafe conditions to the SHSO
- Notify the SHSO of any special medical conditions (i.e., allergies, contact lenses, pregnancy, diabetes, etc.) and, if necessary, ensure that all on-site personnel are aware of the condition
- Prevent spillage to the extent possible. If a spill occurs, contain the spillage and clean-up immediately using safe cleanup measures as directed by the SHSO
- Practice good housekeeping always
- Immediately report all injuries, accidents, environmental releases, and near-miss events

10.5. Subcontractors

Subcontractors are responsible for establishing, implementing, and maintaining a health and safety program for their employees. Subcontractors are responsible for performing work activities in a safe and healthful manner in accordance with both the subcontractor’s health and safety program and this HASP. If a subcontractor’s health and safety program conflict or differs from this HASP, the SHSO and PM will review the program components with the subcontractor’s safety representative and develop the best approach to project tasking.

10.6. Stop Work Orders

When any employee observes a condition of “imminent danger”, unsafe work or actions, or hazardous Site conditions, that employee can exercise Stop Work Authority. Imminent danger means a condition or hazard that would reasonably be expected to cause death or serious harm to workers or members of the public, may result in equipment or property damage, or may result in an unplanned environmental release.

Examples of unsafe work conditions can include, but not inclusive to:

- Operation of drill rig too close to overhead power lines
- Air monitoring detection at or above established action levels, OSHA 8-hr TWA, or IDLH limits
- Unsafe operation of heavy equipment
- Failure of workers to wear proper safety equipment, such as required PPE or fall protection equipment

Should an employee exercise Stop Work Authority, the TRS SHSO will be notified immediately. Further, TRS interprets “stop work authority” a step further where every TRS staff, TRS subcontractor, or other personnel working at the Site have a ***“Stop Work Obligation”*** if they recognize any act or condition that could lead to an incident.

11.0 COMMUNICATION

TRS' policy is to maintain open communication between management and staff on all matters pertaining to safety. The following is TRS’ system of communication, designed to facilitate a continuous flow of two-way (management, supervision, and employees) safety and health information in a form that is readily understandable to and between all affected site personnel:

- New worker orientation, including a discussion of Site-specific safety and health policies and procedures
- Site-specific Health and Safety Plans
- TRS CSP
- SOPs
- AHAs
- Workplace-specific safety and health training including Arc Flash training in accordance with NFPA 70E and HAZWOPER training in accordance with 29 CFR Part 1910.120.
- The following on-Site safety meetings are conducted by the TRS PM or his/her designee:
- Pre-construction safety meeting. Before any work begins at the Site and on the first day of mobilization in the field at the Site of new personnel.
- Pre-operations safety meeting. Prior to beginning ERH operations at the site.
- A daily tailgate meeting. Each day when TRS personnel are on-site during all phases of the ERH project.
- TRS has established a Health and Safety Committee to review health and safety procedures, implementation, documentation, and tracking. Ata a minimum, the Health and Safety Committee shall consist of the VP of Operations, the TRS SQM, and an additional staff member. At a minimum, this committee meets every other month to review the status of health and safety across the company, identify areas of improvement, and set goals for the program
- Posted and distributed safety information
- Personnel may report health and safety concerns to their supervisor, the SHSO, or directly to the SQM. Concerns may also be documented in writing on the SHSO status report or monthly checklist
- SBOs
- Follow-through by supervision to ensure effectiveness

It is every TRS employees’ responsibility to work safely in every task they perform. Every TRS employee has personal responsibility to practice BBS principles to improve site and worker safety and share ideas for health and safety programs across the company.

12.0 TRAINING

Due to the nature of the work to be performed on-site, special training will be required based on the activity performed. Training records for all Site personnel will be maintained on-site by the SHSO and available upon request.

12.1. General Hazardous Waste Operations Training

To protect Site personnel from exposure to chemical hazards, it is possible that exclusion zones will be established to contain contaminated materials and will be in place during the duration of each phase of the project. Before Site personnel or visitors may enter an EZ or complete subsurface invasive work activities or perform tasking which has the potential for contact with hazardous materials, they will be required to have successfully completed the following training:

- Initial 40 hours of HAZWOPER training as required under 29 CFR 1910.120
- Eight hours of HAZWOPER refresher training annually as required by 29 CFR 1910.120
- Three days of actual field experience under the direct supervision of a trained, experienced supervisor

Visitors and Site personnel, such as surveyors and electricians, who must enter the Site but will not be entering EZs or performing any subsurface invasive work will not require HAZWOPER training in accordance with 29 CFR 1910.120.

Before a Site worker or visitor may enter an EZ, their employer must provide the SHSO with a certification showing that the worker or visitor has completed their HAZWOPER initial and refresher training. These certifications will be maintained in an on-site file and be available for review.

The SHSO understands TRS' safety and health program and will be trained in TRS' PPE, ERH operations, LOTO procedures, spill containment, hot media sampling procedures, and health hazard monitoring procedures and techniques.

12.2. Site-Specific Training

The information and training employees receive must be tailored to the types of chemical and/or physical hazards and exposures they may encounter at the Site. The training program is designed for both new and experienced employees. Hazard communication training will be provided for employees before and/or immediately when they arrive on-site. Additional training will be provided when a new chemical or hazardous material is brought into the workplace. The following information will be given to employees with a potential for exposure and to all new site workers or whenever TRS becomes aware of a new or previously unrecognized hazard.

- Explanation of the TRS CSP and this Site-specific HASP
- Measures for reporting any unsafe conditions, work practices, injuries and when additional instruction is needed
- Physical hazards at the Site and methods for hazard mitigation
- RZs and EZs at the Site
- Chemicals present at the Site (in use and stored)
- Availability of toilet, handwashing, and drinking water facilities
- Hazardous wastes stored on site and the location of these materials

- Reported soil and groundwater contamination compounds, associated hazards, signs and symptoms of exposure, and hazard mitigation measures
- Physical and health effects of the hazardous chemicals
- Methods and observation techniques used to determine the presence or release of hazardous chemicals
- Methods regarding minimizing or prevention of exposure to these hazardous chemicals using engineering and administrative controls and PPE
- Proper housekeeping, such as keeping stairways and isles clear, work areas neat and orderly, and promptly cleaning up spills
- Prohibiting horseplay, scuffling, or other acts that adversely influence safety
- Prevention of musculoskeletal disorders, including proper lifting techniques.
- Air monitoring action levels associated with Site COCs
- Steps the project team has taken to lessen or prevent exposure to COCs
- Emergency procedures to follow if an individual is exposed to COCs
- Directions to and contact information for local emergency medical services
- Site emergency contact information (see ERP **Appendix E**)
- Site-specific emergency response procedures as defined by the ERP (**Appendix E**)
- How to read labels and review SDS documents to obtain appropriate hazardous information
- Location of SDS files and location of hazardous chemical lists

12.3. Electrical Safety Training

Prior to working on-site during TRS ERH operations, TRS personnel who intend to enter the ERH restricted zone must complete the following electrical safety requirements:

- Read and understand the TRS Electrical Safety Policy
- Read and understand the Site-specific Arc Flash and Short Circuit Assessment (**Appendix F**)
- Read and understand the TRS Working Alone guidance (see **Section 3.1.2**);
- Complete Electrical Safety NFPA 70E Arc Flash Training
- Complete TRS training on LOTO procedures as described in TRS SOP 1.1 Lockout/Tagout, including training on emergency ERH shutdown procedures
- Complete the Site-specific TRS ERH electrical restricted zone training and sign the acknowledgement form included in **Appendix A**

No TRS personnel shall work within medium voltage panels (greater than 600 volts) at any time.

12.4. Crane and Lift Truck Operator Training

Only appropriately trained heavy equipment operators may operate heavy equipment, this includes lift trucks. Specific to tasking anticipated at the Site, only operators trained and certified in accordance with 29 CFR 1926.1427 shall operate a crane. Only personnel trained in accordance with 1910.178 will operate lift trucks. Crane and lift truck operators must present copies of training documentation to the TRS SHSO prior to commencing any lift.

12.5. Respiratory Training

Any personnel using a respirator will be trained and fit tested in accordance with TRS respiratory training program included as **Appendix C** of this document. Current fit-testing will be less than one-year old.

12.6. Competent Person Training

Certain activities or safety procedures at a construction site require design, inspection or supervision by a competent person. The OSHA Construction Standard defines a competent person as someone who:

- can identify existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees
- who has authorization to take prompt corrective measures to eliminate any issue

Unless otherwise noted in the Daily Tailgate Health and Safety Meeting, the SHSO will serve as the Competent/Qualified Person to complete the following health and safety requirements:

- General safety and health
- Safety training
- Fire protection and prevention
- PPE
- Noise exposure
- Gases, vapors, dusts, and mists (air monitoring)
- Hazard communication
- HAZWOPER
- Waste disposal
- General electrical
- LOTO
- Work at heights, fall protection, and ladder safety
- Motor vehicle safety

During the Daily Tailgate Health and Safety Meeting, TRS and on-site subcontractors will identify the Site-specific competent persons required to complete daily tasking. Competent persons are required for the following anticipated Site activities:

- Rigging (TRS staff will not conduct rigging of any equipment)
- Electrical
- Aerial lifts
- Cranes or hoists
- Powered industrial trucks (forklifts)
- Excavations
- First aid and medical
- Signaling

12.7. Other Training

Personnel involved in the transportation of hazardous material will be trained in accordance with 49 CFR 172, Subpart H.

All personnel operating electric and or pneumatic tools will receive training on their use and safe operation.

12.8. Medical Surveillance

The expected duration of the project is estimated to be nine to twelve months. Exclusion zones will be established to contain contaminated materials and to protect Site personnel and visitors from exposure to chemical hazards. It is possible that these zones will be in place during the duration of the project. Personnel working on this project who enter such exclusion zones will be required to participate in a medical monitoring program that meets the requirements of 29 CFR 1910.

12.8.1. Medical Examination Requirements

OSHA suggests that a baseline medical monitoring program contain the components listed below.

- Medical History/Physical
- Audiometry
- Respirometry
- Vision by Machine
- Urinalysis
- Blood Chemistries

The employer of each Site personnel or visitor who enters an EZ will be required to provide the SHSO with a signed letter stating that the employee currently participates in a medical monitoring plan that meets the requirements of 29 CFR 1910 and has passed a respirator fit test within the last 12 months. The employer will also provide the SHSO with a letter or certificate signed by physician or other licensed healthcare professional stating that the employee is physically fit to perform the work duties assigned to him or her and has medical clearance to use a respirator. These documents must be provided to the SHSO and filed for review before the employee will be allowed to enter an EZ.

12.8.2. Exposure Monitoring

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical surveillance examination at, or if necessary, before the conclusion of the project. Such an examination will help determine the medical implications of the exposure. The type of surveillance examination will be determined by the SHSO and TRS SQM based on the exposure. Any person suffering a lost-time injury or illness must have medical approval prior to returning to work on site.

12.8.3. Post-Accident/Incident Testing

In the event of an accident or incident at the Site where there is personal injury and/or property damage in excess of $1,500.00, TRS may require drug and/or alcohol screening for any TRS employee involved. Drug and alcohol testing will be at the discretion of the TRS SQM and will occur as soon as possible following the incident/accident.

13.0 INCIDENT RESPONSE AND FIRST AID

In the event of an accident or emergency, the appropriate response is critical to minimize impact of the event. Proper preparation by maintaining the emergency call list and first aid supplies are vital to providing the appropriate response.

13.1. Personnel Roles, Lines of Authority and Communication System

A list of emergency and Site contacts is contained in **Table 6**. The list of emergency contacts will be kept on-site with the acting SHSO and posted in a prominent location inside the TRS Site office. All staff will carry a working cell phone for emergency situations.

Table 6. Site-Specific Emergency Contact Information

Situation/Title	Response Agency/Name	Telephone Number
Emergency	Fire/Police/Rescue	911
Police (Non-emergency)	Henrietta Police Department	(585) 334-5533
County Sherriff	Monroe County Sherriff's Department	(585) 753-4178
Medical	Highland Hospital	(585) 341-6880
Poison Control	National Poison Control	(800) 222-1222
Chemical Release	National Response Center	(800) 635-7179
LaBella Associates - Primary Contact	Dan Noll	(585) 301-8458
TRS Managing Director	Tim Warner	(617) 489-0535
TRS Corporate SQM	Greg Knight	(360) 560-4838
TRS Senior Project Manager	Robert Poulin	(360) 560-0243
TRS Project Manager	Sean Fournier	(978) 502-6525
TRS SHSO	Steve Agostine	(716) 467-6750

13.2. Hospital Directions

The directions to Community Hospital East are provided in the HASP summary at the beginning of this document, in **Figure 1**, and below.

Nearest Local Hospital:

Highland Hospital
1000 South Avenue
Rochester, NY 14620
585-341-6880
Hours: Emergency care available 24 hours, seven days a week

Distance: 5.1 miles, Drive Time: Approximately 15 minutes

Directions from Site (See **Figure 1**):

1. Continue to NY-252 W– 0.3 miles
2. Turn **RIGHT** onto NY-252 W– 0.5 miles
3. Turn **RIGHT** onto the Interstate 390 N ramp to Rochester– 0.5 miles
4. Merge onto I-390 N – 1.0 miles
5. Keep **LEFT** to stay on I-390 N, follow signs for Airport/Greece– 0.9 miles
6. Take exit 16B for Route 15A N/E Henrietta Rd toward Rochester – 0.2 miles
7. Merge onto NY-15A N/E Henrietta Road – 0.5 miles
8. Slight **RIGHT** onto South Avenue – 1.4 miles
9. Turn **RIGHT** onto Bellevue Drive – 112 feet
10. Turn **LEFT** – 174 feet
11. Turn **RIGHT** – destination is on the right – 135 feet

13.3. Emergency and First Aid Equipment

Maintaining the proper emergency equipment and first aid supplies on-site during construction and operations are essential in preserving employee, sub-contractor, and visitor health and safety.

A list of health and safety equipment to be kept on-site is provided below:

- One AED
- Two 10 lb (minimum) dry chemical A-B-C rated fire extinguishers (equipment compound and site office trailer)
- One 15 lb (minimum) CO_2 fire extinguishers (at entrance to PCU)
- Air horn
- 15-minute eyewash and/or portable eyewash bottles (minimum of six 32 oz. bottles)
- Potable water
- Safety glasses
- Eye goggles
- Face Shields
- Ear plugs
- Tyvek® suits

- Hard hats
- Gloves - Nitrile
- Gloves – Neoprene
- One Spill kit (minimum 25-gallon capacity)

At least one First aid kit stocked in accordance with ANSI Z308.1-2003:

- At least one absorbent compress, 32 sq. in. (no side smaller than 4 in)
- At least 16 adhesive bandages, 1 in. x 3 in.
- One roll of adhesive tape, 5 yd total
- Two or more pairs of medical exam gloves (latex or non-latex)
- At least four sterile pads, 3 in x 3 in
- One triangular bandage, 40 in x 40 in x 56 in
- Additional (but optional) items include:
- Four 2x2 inch bandage compresses
- Two 3x3 inch bandage compresses
- One 4x4 inch bandage compresses
- One eye patch
- One ounce of eye wash
- One chemical cold pack, 4x5 inch
- Two roller bandages, two inches wide
- One roller bandage, three inches wide
- CPR barrier device
- Red biohazard bags
- At least ten packets of antiseptic, 0.5g (0.14 fl oz.) applications
- At least six applications of burn treatments, 0.5 g (0.14 fl. oz.)

13.4. On-Site Emergency Response

Procedures for emergency response are presented in the Site-specific ERP presented in **Appendix E**. As part of project orientation, the SHSO (or designee) will review the ERP with all project staff.

First aid kits and other emergency response equipment including an AED will be located on-site in the equipment compound or TRS office area and maintained by the SHSO. If an injured individual requires attention beyond first aid, the individual will immediately be transported to the nearest emergency medical facility. A map illustrating the route to the nearest hospital (with emergency care services) is shown in **Figure 1** and will be posted in a prominent location on-site. Injuries, regardless of severity, will be reported immediately to the SHSO and TRS SQM. Documentation of the incident will be completed in writing and submitted to the TRS Corporate SQM within 24 hours or as otherwise indicated by the SQM

In the case that Site evacuation is needed, a horn or similar audible warning signal (car horn) will be sounded with three long blasts and repeated as necessary. Upon hearing this signal, Site staff will evacuate to the Site's primary muster point, the parking area by the condenser equipment compound. A secondary muster point for the Site will be in the parking lot by the main entrance to the building.

13.5. Communication System

Specific instructions for emergency response communication are provided in the Site-specific ERP. In the case of any stop work action, near-miss event, incident, Site personnel will contact the SHSO or TRS PM directly or by mobile telephone. The SHSO or PM will then follow the Site-specific emergency response procedures (if needed) and associated notifications per the ERP.

Internal communication will be used for the following:

- Alert project team members to emergencies
- Pass along safety information
- Communicate changes in the work to be accomplished
- Maintain Site control

Pre-arranged hand signals will be used for communication to personnel operating equipment, wearing PPE, respirators, etc. These hand signals will be interpreted as follows:

- Thumbs up - all clear
- Grabbing wrist of personnel – evacuate
- Hands on throat - help and/or choking

Equipment operators (forklift, skid-steer, backhoe, excavator, crane, and other heavy equipment) and their respective spotters will establish hand signals for the operation of and movement of equipment about the Site. Equipment operators and spotters will agree on these hand signals prior to the operation of the equipment.

Off-site sources may need to be contacted to get assistance or to inform officials regarding hazardous conditions that may affect public or environmental safety (See **Table 6** for Emergency Contacts).

14.0 INCIDENT REPORTING, FOLLOW-UP, AND INVESTIGATION

Site personnel and visitors will report all injuries, illnesses, equipment or property damage, spills/release to the environment, and near miss events, no matter how minor, to the SHSO, PM, or SQM as soon as possible when it is safe to do so (near-miss events or incidents can be reposted anonymously without reprisal). To prevent recurrence, every incident and near-miss event must be investigated as soon as possible to find the primary and contributing causes. A near miss event is an unplanned event, which does not result in personal injury, environmental release, or equipment/property damage but, in similar circumstances, likely could. If the conditions permitting the near miss event or "close call" are not eliminated, they will continue to contribute to the potential for future employee injury, equipment/property damage, or environmental release.

The following actions and reporting must be completed following an incident occurring at the Site:

- Immediately secure the situation to prevent further damage, injury, and/or future incidents

- The SHSO will report the incident verbally to the PM and Corporate SQM as soon as it is safe to do so
- Within 24 hours of the incident, the TRS PM will notify the client PM of any injuries, illnesses, spills, or property damage that occurred at the Site
- Within 48 hours of the incident, the TRS PM will confirm that the TRS incident reporting and investigation form has been completed. As most accidents involve unsafe conditions and/or unsafe acts, it is the responsibility of the investigators to uncover the root causes of the incident and develop action items to minimize the possibility of re-occurrence
- Accidents that are recordable per OSHA requirements will be placed on the OSHA 300 logs of the appropriate company within six (6) working days by the TRS Corporate Health and Safety Officer
- Government agencies will be notified as required. For example, if there have been any fatalities, hospitalizations, loss of an eye, or amputations and the TRS SQM will notify OHSA within the required time period
- The corporate SQM will ensure that any new incident that occurred at a TRS project site will be reviewed by employees during division meetings and OSHA refresher courses

15.0 RECORDKEEPING

TRS and its subcontractors must comply with OSHA recordkeeping requirements and standard TRS recordkeeping. The following records and documentation will be maintained onsite by TRS for the duration of the project:

- On-site training documentation (i.e., HASP, Restricted Zone, Right-to-Know)
- Heavy equipment inspections
- Daily tailgate meetings
- Daily construction reports
- Daily operations log
- Air monitoring logs and PID calibration records
- Site chemical inventory and associated SDS binder (reviewed and updated periodically and as needed)
- Posting of right-to-know required information, known Site hazards, emergency response contacts, directions/map to hospital, and other pertinent Site-specific information

The corporate SQM from each company involved in the project will maintain the following documentation for a minimum of three years:

- Documentation of safety and health training for each worker, including the worker's name or other identifier, training dates, type(s) of training, and training providers are recorded.
- Log and Summary of Occupational Injuries and Illness on OSHA Form 300 for annual posting. Relevant cases include:
    - An occupational death
    - An occupational illness

- An occupational injury that involves the following:
  - Medical treatment other than first aid
  - Overnight hospitalization for other than observation
  - Hospitalization of three or more persons involved in an incident
  - Loss of eye
  - Amputation/loss of body part
  - Loss of consciousness
  - Restriction of work or motion
  - Temporary assignment to another job
  - Days away from work other than the day of injury

The Corporate SQM maintains the following documentation for a minimum of one (1) year:

- Site-specific inspections completed by the SQM or his designee.
- Incident investigations. Documentation includes a description of the incident, the investigation, corrective actions, and completion dates for corrective actions.
- SBOs
- Meeting minutes from Corporate Health and safety meetings

APPENDICES

APPENDIX 4

LaBella Health and Safety Plan

Site Health and Safety Plan

Location:

1500 Jefferson Road & 55 Hofstra Road
Town of Henrietta
Monroe County, New York

Prepared For:

Mr. Harvey Erdle
16622 Sweet Bay Drive
Delray Beach, FL 33445
&
Alex Kralles
Mersen USA Rochester-NY, Corp.
1500 Jefferson Road
Rochester, NY 14623

LaBella Project No. 212721.01

August 2019

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SITE HEALTH AND SAFETY PLAN

Project Title:	Eldre Corporation
Project Number:	212721.01
Project Location (Site):	1500 Jefferson Road & 55 Hofstra Road, Henrietta New York
Project Manager:	Dan Noll, PE
Site Safety Supervisor:	To Be Determined
Site Contact:	Alex Kralles, Mersen
Safety Director:	David Engert, CHMM
Proposed Date(s) of Field Activities:	To Be Determined 2019-2020
Site Conditions:	Industrial and commercial property comprising 6.72-acres with active manufacturing. Site slopes from south to north.
Site Environmental Information Provided By:	Phase I ESA and Phase II ESA by LaBella. Draft Remedial Investigation Report by LaBella. Interim Remedial Measures Work Plan for RAOC #1 by LaBella.
Air Monitoring Provided By:	LaBella Associates, DPC
Site Control Provided By:	LaBella Associates, DPC and TRS Group, Inc.

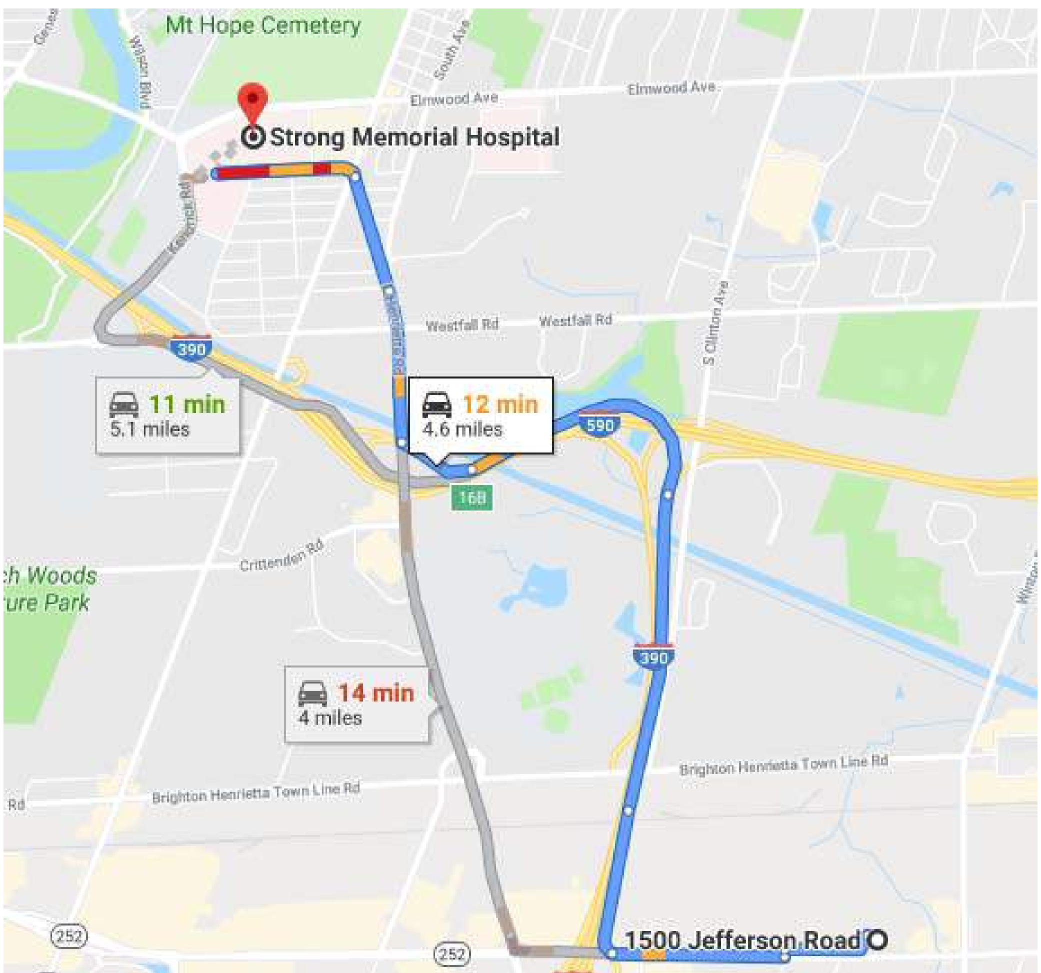
EMERGENCY CONTACTS

	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Strong Memorial Hospital	(585) 275-2100
Poison Control Center:	Finger Lakes Poison Control	716-275-5151
Police (local, state):	Monroe County Sheriff	911
Fire Department:	Henrietta Fire District	911
Site Contact:	Alex Kralles, Mersen	585-784-2501
Agency Contact:	NYSDEC – Charlotte Theobald NYSDOH – Julia Kenney	585-226-5354 518-402-7860
Project Manager:	Dan Noll, PE	585-301-8458
Safety Director	David Engert, CHMM	585-295-6630

MAP AND DIRECTIONS TO THE MEDICAL FACILITY
STRONG MEMORIAL HOSPITAL

Total Est. Time: 12 minutes **Total Est. Distance:** 4.6 miles

1:	Turn right onto Jefferson Road	0.3 miles
2:	Merge onto I-390 N via ramp on the right to Crittenden Blvd	3.9 miles
3:	Slight left onto Crittenden Blvd	0.4 miles
4:	End at Strong Memorial Hospital Rochester, NY 14642	



1.0 Introduction

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during in-situ thermal remediation (ISTR) at 1500 Jefferson Road and 55 Hofstra Road, located in the Town of Henrietta, Monroe County, New York, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C828182 (the Site). This HASP only reflects the policies of LaBella Associates D.P.C. The requirements of this HASP are applicable to LaBella personnel at the work site. It is the responsibility of each sub-consultant and sub-contractor to follow their own company HASP. This document's project specifications should be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel. It is the responsibility of LaBella employees to follow the requirements of this HASP, or HASPs specific to individual activities, and all applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following:

- Thermal treatment system (installation and operation of system by TRS)
    - Collection of samples
    - Oversight during system installation
    - CAMP implementation during subsurface work
    - Periodic Site visits

4.0 Work Area Access and Site Control

LaBella will have primary responsibility for maintaining a safe work area for all activities conducted by LaBella personnel. Such work area controls will consist of:

- Air monitoring.
- Use of Personal Protective Equipment (PPE).

TRS will have primary responsibility for Site control during thermal treatment system installation, operation, and decommissioning. Contractors will be responsible for their own HASP.

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his instructions must be followed.

5.1 Hazards Due to Heavy Machinery and Equipment

Potential Hazard:
Heavy machinery including trucks, drilling rigs, trailers, etc. will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses and steel toe shoes are required.

5.2 Excavation Hazards

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Excavations that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0). Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. Do not proceed closer than 3 feet to an unsupported or non-sloped excavation side wall.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.3 Cuts, Punctures and Other Injuries

Potential Hazard:
In any excavation or construction work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Safety Director is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Safety Director.

5.4 *Injury Due to Exposure of Chemical Hazards*

Potential Hazards:
Contaminants identified in testing locations at the Site include various volatile organic compounds (VOCs), primarily chlorinated VOCs. Volatile organic vapors, chlorinated solvents or other chemicals may be encountered during subsurface activities at the project work site. Inhalation of high concentrations of volatile organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Protective Action:
The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Unauthorized personnel will not be in the vicinity of the work area during subsurface work. Subsurface work will be conducted after normal facility working hours.

Air monitoring will be performed in accordance with the Site-specific CAMP. Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained total volatile organic compound (VOC) readings of 25 ppm is encountered personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0).

5.5 *Injuries Due to Extreme Hot or Cold Weather Conditions*

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

5.6 *Potential High Pressure Equipment Failure*

Potential Hazards:
High pressure pumps may be utilized with associated piping/ tubing. Failure of the equipment and/or materials (e.g., fittings) could result in a high pressure burst of contaminated water and/or vapors.

Protective Action:
Equipment will be checked for defects or wear and any materials/ equipment with suspect conditions will be replaced/ repaired. In addition, LaBella will be aware of the location of such equipment and will observe the work from a safe distance as much as possible. The use of proper PPE will also reduce potential issues should an incident occur.

5.7 *Electrical Hazards*

Potential Hazards:
There is a potential for stray voltage from electricity that is being applied to the thermal treatment system. Possible hazards include electrical injury.

Protective Action:
The thermal treatment area will be secured with fencing and locked during non-working hours. No unauthorized entry into the work area will be allowed. Safety checks will be performed by the thermal remediation vendor. Safety features including access guards, interlocks between system components, over-temperature gauges, and emergency stop switches will be installed.

5.8 *Temperature Hazards*

Potential Hazards:
The ground and any equipment in the ground will be heated up to 100 degrees Celsius. Possible hazards include burn hazards.

Protective Action:
Sampling of subsurface materials will be completed in accordance with the Hot Soil and Groundwater Sampling Standard Operating Procedures included in the Interim Remedial Measures Work Plan. Appropriate heat resistance gloves shall be worn by sampling personnel.

6.0 Work Zones

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. LaBella will not enter the EZ unless deemed necessary to do so. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

Voltage surveys will be conducted to evaluate voltage of different areas within and surrounding the thermal treatment area. The following work zones for the thermal remediation system will be established by TRS.

Public Zone:
5-Volt Step-and-Touch, 10-Volt utility ground Survey

TRS Restricted Zone:
10-Volt Step-and-Touch, 30-Volt utility ground Survey

TRS Controlled 30-Volt Zone:
30-Volt Step-and-Touch, 30-Volt utility ground Survey (This zone requires TRS upper management approval for implementation)

Exclusion Zone:
No entry allowed with ERH electrical power applied to the subsurface

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

8.0 Personal Protective Equipment

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

Refer to the Hot Soil Sampling and Hot Groundwater Sampling Standard Operating Procedures for further safety precautions during sampling within the thermal treatment area.

9.0 Air Monitoring

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Refer to the Site-specific CAMP for air monitoring requirements.

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 Employee Training

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the fieldwork must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

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Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69
Anthracene	0.2	0.2	NA	NA	NA	NA	Faint aromatic	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	0.096	10.07
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07
Ethylbenzene	100	100	NA	1	6.7	2,000	Ether	2.3	8.76
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	5	15	NA	NA	NA	12.98
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56
Metals									
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond	NA	NA
Cadmium	0.2	0.5	NA	NA	NA	NA	NA	NA	NA
Chromium	1	0.5	NA	NA	NA	NA	NA	NA	NA
Lead	0.05	0.15	NA	NA	NA	700	NA	NA	NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless	NA	NA
Selenium	0.2	0.02	NA	NA	NA	Unknown	NA	NA	NA
Other									
Asbestos	0.1 (f/cc)	NA	1.0 (f/cc)	NA	NA	NA	NA	NA	NA

(a) Skin = Skin Absorption
(b) OSHA-PEL Permissible Exposure Limit (flame weighted average, 8-hour): NIOSH Guide, June 1990
(c) ACGIH – 8 hour time weighted average from Threshold Limit Values and Biological Exposure Indices for 2003
(d) Metal compounds in mg/m3
(e) Lower Exposure Limit (%)
(f) Upper Exposure Limit (%)
(g) mmediately Dangerous to Life or Health Level: NIOSH Guide, June 1990

Notes:
1. All values are given in parts per million (PPM) unless otherwise indicated
2. Ca = Possible Human Carcinogen, no IDLH information

APPENDIX 5

Site-Specific Community Air Monitoring Plan

Site-Specific Community Air Monitoring Plan

Location:

1500 Jefferson Road & 55 Hofstra Road
Town of Henrietta
Monroe County, New York

Prepared For:

Mr. Harvey Erdle
16622 Sweet Bay Drive
Delray Beach, FL 33445
&
Alex Kralles
Mersen USA Rochester-NY, Corp.
1500 Jefferson Road
Rochester, NY 14623

LaBella Project No. 212721.01

August 2019

Table of Contents

1. Introduction

This Site-Specific Community Air Monitoring Plan (CAMP) has been prepared by LaBella Associates, P.C. (LaBella) for 1500 Jefferson Road and 55 Hofstra Road, located in the Town of Henrietta, Monroe County, New York, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C828182 ("the Site"). This CAMP addresses potential Volatile Organic Compound (VOC) vapor and particulate emissions that may occur during implementation of the Interim Remedial Measure (IRM) for Remedial Area of Concern (RAOC) #1 which includes work within the northern portion of the 1500 Jefferson Road building and within the parking lot to the north of the 1500 Jefferson Road building.

2. Purpose

Chlorinated volatile organic compounds (CVOCs) have been detected in the subsurface within RAOC #1. The presence of these CVOCs through disturbance of soil and groundwater at the Site can potentially result in nuisance odors or fugitive emissions in the immediate vicinity of the work area.

This CAMP is specific to activities being conducted as part of the IRM for RAOC #1. The CAMP describes the air monitoring activities to be completed in order to provide a measure of protection for any building occupants and downwind receptors including Site occupants and occupants of neighboring properties. This CAMP is not intended to provide action levels for respiratory protection of workers involved with the IRM. Rather, Site workers will be required to develop and follow a Health & Safety Plan (HASP) for implementation of this IRM.

This CAMP is based on the air monitoring specified in the New York State Department of Health (NYSDOH) Generic CAMP (included as Appendix 1A of the Draft DER-10 NYSDEC Technical Guidance for Site Investigation and Remediation dated December 2002). This CAMP also includes more stringent criteria for VOC monitoring during interior subsurface work as an added level of protection for Site occupants.

3. Methodology

This CAMP has been designed for IRM activities at the Site. Subsurface activities will include: drilling for electrode/ vapor recovery well installation, trenching between electrode locations, soil borings and monitoring well installation. Work will be complete on the interior of the 1500 Jefferson Road Building and also the exterior of the building to the north within the parking lot. The CAMP includes the following types of monitoring:

- Upwind/ Background Monitoring (Exterior) – Monitoring (VOC and fugitive dust) to be completed continuously during exterior subsurface work. The background monitoring is used for comparing background readings to downwind readings during subsurface work.
- Downwind Monitoring (Exterior) – Monitoring (VOC and fugitive dust) to be completed continuously during exterior subsurface work. Downwind readings will be compared to background (upwind) readings.
- Work Zone Monitoring (Interior) - Monitoring (VOC, fugitive dust combustible gases, hydrogen sulfide, carbon monoxide, and oxygen) to be completed at the beginning of each day and periodically throughout the day when subsurface IRM activities are being conducted. This work will be completed during interior work to protect workers within the work zone.
- Nearest Potential Receptor Monitoring (Interior) – Monitoring (VOC and fugitive dust) to be completed within the building during interior work to monitor employee work areas near the

work zone.

It should be noted that based on the type of work, various monitoring locations may be moved throughout the day to comply with the appropriate work area and wind direction. In addition to the above, this CAMP also contains a Vapor Emission Response Plan (Section 6). This includes actions to be taken in the event that sustained exceedences of the specified action levels occur.

4. Exterior Work Monitoring

Exterior work will be completed north of the 1500 Jefferson Road Building within the parking lot. As detailed in the IRM Work Plan, security fencing will be installed to prevent unauthorized personnel from entering the work area. Exterior monitoring will include upwind and downwind monitoring for dust and VOCs. Exact locations of air monitoring stations will depend on the wind direction and may change throughout the project or even throughout the day as wind direction changes.

4.1 Upwind/ Background Monitoring

At the beginning of each day when subsurface work is planned, wind direction will be monitored in the work area. Based upon daily wind conditions, a background monitoring location will be established. [*Note: In the event that the wind direction changes, the background monitoring location will be moved to an appropriate upwind location and additional background readings will be collected*.] The background monitoring location will be at least 25 feet from the work area in an upwind location. Subsequent to establishing the initial background measurements (VOC and particulate, see below), background measurements will be collected continuously in 15-minute time weighted average intervals throughout the duration of the subsurface work. Exterior upwind monitoring is consistent with the NYSDOH Generic CAMP. The specific background monitoring is defined below:

<u>Background VOC Monitoring:</u>
A Mini-Rae 3000 photo-ionization detector (PID), or equivalent, capable of continuous time weighted average data logging will be stationed in the background location (i.e., upwind). The PID will be calibrated in accordance with the manufacturer's specifications prior to collecting the background readings. The background readings will be used for comparison to the downwind perimeter monitoring. Upwind readings will be collected and recorded in 15-minute time weighted averages throughout the duration of subsurface work.

<u>Background Fugitive Dust Monitoring:</u>
A DustTrak™ Model 8530 aerosol monitor, or equivalent, capable of continuous time weighted average data logging will be stationed in the background location (i.e., upwind) for measuring particulates. The meter must be capable of measuring matter less than 10 micrometers in size (PM-10). The dust monitor will be calibrated in accordance with the manufacturer's specifications prior to collecting the background readings. The background readings will be used for comparison to the downwind perimeter monitoring. Upwind readings will be collected and recorded in 15-minute time weighted averages throughout the duration of subsurface work.

4.2 Downwind Monitoring

Subsequent to collecting the initial Background Monitoring measurements, continuous monitoring downwind of the work area will be conducted throughout the duration of subsurface work. Use of the parking lot outside of the security fencing will continue and employees may still utilize the employee entrance on the northwest side of the building. The loading dock on the northeast side of the building will also be used. The downwind monitoring location will be directly outside of the security fence, in order to monitor dust and VOCs exiting the work zone and entering the area still accessible to employees. Exterior downwind monitoring is consistent with the NYSDOH Generic CAMP.

Downwind VOC Monitoring:
A PID capable of continuous time weighted average data logging will be stationed in the downwind location. The PID will be calibrated in accordance with the manufacturer's specifications prior to collecting the background readings. Downwind readings will be collected and recorded in 15-minute time weighted averages throughout the duration of subsurface work.

Actions for Elevated VOC Readings

1. In the event that the action level of 5 ppm above background is exceeded for the 15-minute average, then work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200-feet downwind of the work area or half the distance to the nearest potential receptor or residential/ commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down and the Vapor Emission to Sensitive Receptors Response Plan initiated, refer to Section 6.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request. Instantaneous readings, if any, that are used for decision purposes will also be recorded.

Downwind Fugitive Dust Monitoring:
A DustTrak™ Model 8530 aerosol monitor, or equivalent, capable of continuous time weighted average data logging will be stationed in the background location (i.e., upwind) for measuring particulates. The dust meter must be capable of measuring matter less than 10 micrometers in size (PM-10) and be equipped with an audible alarm. The dust meter will be calibrated in accordance with the manufacturer's specifications prior to collecting readings. The dust monitoring will be collected and recorded in 15-minute time weighted averages. The results will be compared to the background monitoring.

Actions for Elevated Particulate Readings

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind) for the 15-minute period or if

airborne dust is observed leaving the work area, then Fugitive Dust Control Techniques must be employed (see below). Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m³ above the upwind level, work must be stopped and the Fugitive Dust Control Techniques identified below will be reevaluated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg /m³ of the upwind level and in preventing visible dust migration.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request.

<u>Fugitive Dust Control Techniques</u>
One or more of the following dust control measures will be implemented in the event that the action levels are exceeded:

- Apply water on exposed soils.
- Wetting equipment.
- Immediately placing any investigation derived waste in drums, roll-offs, and/or covering with plastic sheeting.

5. Interior Work Monitoring

Interior work monitoring will include work zone monitoring and nearest potential receptor monitoring. Although subsurface interior work will be completed during nights and weekends, facility work areas in closest proximity to the work zone (i.e., the oven room) will be considered the nearest potential receptors and will be monitored. This will include the powder coat area directly to the west and the loading dock area directly to the east.

5.1 Work Zone Monitoring

Workers will be responsible for their own HASP. TRS's and LaBella's HASP are included in the IRM Work Plan. Fugitive dust and VOC readings will be collected within the work zone at the start of each work day that subsurface work is planned to occur, and every 60 minutes thereafter. Appropriate personal protective equipment (PPE) will be implemented as needed based on work zone monitoring per the HASP.

A four-gas meter will also be used within the interior work zone to monitor for combustible gases, hydrogen sulfide, carbon monoxide, and oxygen while drilling equipment is in use. Equipment will be filtered or vented outside and fans will be used as needed to direct the equipment exhaust outside. The four-gas meter will have alarms set to alert workers if oxygen is outside of the normal ranges (<20.9%) or combustible gases approach the lower explosive limit (LEL). If alarms sound, equipment will be shut off and workers will leave the work area until the alarm has ceased. Additional ventilation and/or filtration will be implemented prior to resuming work. Interior work will be completed during nights and weekends while there are no regular facility shifts and employees will be prohibited from entering the work zone.

5.2 Nearest Potential Receptor Monitoring

Particulates and VOCs will be continuously monitored at the nearest potential receptor location during all subsurface interior work. Interior work will be conducted on nights and weekends when there are no regular facility work shifts. All interior subsurface work is to be completed within the oven room and employees will be prohibited from entering the oven room during subsurface work. There may be few employees within the building; however, employees will not be in the immediate vicinity of the work area. As a precautionary measure for any employees that may be in the building, work spaces in closest proximity to the oven room will be considered the nearest potential receptors and will be monitored for particulates and VOCs. This will include the powder coat area directly to the west and the loading dock area directly to the east. These areas are separated from the oven room by an interior wall; however, there is a doorway between the oven room and each of these areas.

Additionally, the location of all exhaust vents in the oven room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, will be assessed and the monitoring locations established accordingly. Equipment will be filtered or vented outside and fans will be used as needed to direct the equipment exhaust outside.

A background reading will be collected in the adjacent work areas prior to initiating subsurface work within the building to collect a typical background reading of the building under normal conditions. A PID and DustTrak will be placed in the powder coat area and loading dock area which are adjacent to the work area. It should be noted that these locations are not dependent on wind direction and will be the same throughout the course of the interior work. The PIDs and DustTraks will be calibrated in accordance with the manufacturer's specifications prior to collecting readings. Readings will be collected and recorded in 15-minute time weighted averages throughout the duration of interior subsurface work.

<u>Actions for Elevated VOC Readings</u>

1. In the event that the action level of 1 ppm above background is exceeded in adjacent rooms, then work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 1 ppm over background work activities can resume with continued monitoring.

2. If total organic vapor levels in adjacent rooms persist at levels in excess of 1 ppm over background but less than 10 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level in the adjacent rooms are below 1 ppm over background (background based on the 15-minute average).

3. If the organic vapor level is above 10 ppm above background in adjacent rooms, activities must be shut down and the Vapor Emission to Sensitive Receptors Response Plan initiated, refer to Section 6.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request. Instantaneous readings, if any, that are used for decision purposes will also be recorded.

Actions for Elevated Particulate Readings

1. If the action level of 150 mcg/m³ is exceeded adjacent to the work zone work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m³ or less at the monitoring point.

Fugitive Dust Control Techniques

One or more of the following dust control measures will be implemented in the event that the action levels are exceeded:

- Apply water on exposed soils.
- Wetting equipment.
- Immediately placing any investigation derived waste in drums, roll-offs, and/or covering with plastic sheeting.

Following completion of the subsurface work each day and prior to employees resuming regular work shifts, particular and VOC readings will be recorded adjacent to the work zone to confirm particulate and VOC levels have decreased to background conditions. The following measures will be implemented at the end of each subsurface work day to ensure dust and VOCs are not elevated in indoor air during regular facility shifts.

- Open boreholes and/or trenches will be covered with poly sheeting or metal plates.
- Equipment or tools being stored in the building will be decontaminated and/or removed from the building.
- The sub-slab depressurization system (SSDS) will be inspected to ensure fans are operating properly and there is no damage to depressurization points. If any components are damaged, repairs will be made immediately.

6. Vapor Emission Response Plan

Engineering controls to abate VOC emissions sources will immediately be put into effect if the action levels for VOC monitoring as detailed in previous sections are exceeded. These engineering controls may include:

- Vapor suppression utilizing foam vapor suppressants, polyethylene sheeting, or water.
- Backfill/ cover open boreholes or trenches.
- Covering emission sources with stockpiled materials.

In addition, employees will be prohibited from entering areas adjacent to the work zone while action levels are exceeded and additional areas within the building may be monitored if employees are within the building. Employees will be prohibited from entering any locations with exceedances of action levels until the engineering controls are implemented and VOCs are below action levels. If employees are not within the building, work may continue with continued monitoring per the CAMP. Work zone monitoring will continue as detailed in section 5.1. Workers will follow their own HASP for PPE requirements.

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APPENDIX 6

Quality Control Program

Quality Control Program (QCP)

Location:

Eldre Corporation
1500 Jefferson Road & 55 Hofstra Road
Town of Henrietta
Monroe County, New York

August 2019

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1.0 Introduction

LaBella's Quality Control Program (QCP) is an integral part of its approach to environmental investigations. By maintaining a rigorous QC program, our firm is able to provide accurate and reliable data. This QCP should be followed during implementation of environmental investigation and remediation projects and should serve as a basis for quality control methods to be implemented during field programs. Project-specific requirements may apply.

The QC program contains procedures which allow for the proper collection and evaluation of data and documents that QC procedures have been followed during field investigations. The QC program presents the methodology and measurement procedures used in collecting quality field data. This methodology includes the proper use of equipment, documentation of sample collection, and sample handling procedures.

Procedures used in the firm's QC program are compatible with federal, state, and local regulations, as well as, appropriate professional and technical standards.

This QC program includes the following:

- QC Objectives and Checks
- Field Equipment, Handling, and Calibration
- Sampling and Logging Techniques
- Sample Handling, Packaging, and Shipping
- Laboratory Requirements and Deliverables

It should be noted that project-specific work plans (e.g., Remedial Investigation Work Plans) may have project specific details that will differ from the procedures in this QC program. In such cases, the project-specific work plan should be followed (subsequent to regulatory approval).

The characteristics of major importance for the assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. Application of these characteristics to specific projects is addressed later in this document. The characteristics are defined below.

1.1 Accuracy

Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

1.2 Precision

Precision is the degree of mutual agreement among individual measurements of a given parameter.

1.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

1.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition

Careful choice and use of appropriate methods in the field will ensure that samples are representative. This is relatively easy with water or air samples since these components are homogeneously dispersed. In soil and sediment, contaminants are unlikely to be evenly distributed, and thus it is important for the sampler and analyst to exercise good judgment when removing a sample.

1.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data sets may be inter- or intra- laboratory.

2.0 Measurement of Data Quality

2.1 Accuracy

Accuracy of a particular analysis is measured by assessing its performance with "known" samples. These "knowns" take the form of EPA standard reference materials, or laboratory prepared solutions of target analytes spiked into a pure water or sample matrix. In the case of gas chromatography (GC) or GC/MS (mass spectrometry) analyses, solutions of surrogate compounds are used. These solutions can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination.

In each case the recovery of the analyte is measured as a percentage, correcting for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA supplied known solutions, this recovery is compared to the published data that accompany the solution.

For the firm's prepared solutions, the recovery is compared to EPA-developed data or the firm’s historical data as available. For surrogate compounds, recoveries are compared to EPA CLP acceptable recovery tables.

If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate. The analyst or his supervisor must initiate an investigation of the cause of the problem and take corrective action. This can include recalibration of the instrument, reanalysis of the QC sample, reanalysis of the samples in the batch, or flagging the data as suspect if the problems cannot be resolved. For highly contaminated samples, recovery of the matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

2.2 Precision

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field and transported to the laboratory as distinct samples. Their identity as duplicates is typically not known to the laboratory. For most purposes, precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample). Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantitation of precision is impossible. For EPA CLP analyses, replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD).

- Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix spike duplicate analyses.
- RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non-homogeneity, analysis of check samples, etc. Follow-up action may include sample reanalysis or flagging of the data as suspect if problems cannot be resolved.
- During the data review and validation process, field duplicate RPDs are assessed as a measure of the total variability of both field sampling and laboratory analysis.

2.3 Completeness

Completeness for each parameter is calculated as follows:

- The firm's target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the site managers. In planning the field sample collection, the site manager will plan to collect field duplicates from identified critical areas. This procedure should assure 100% completeness for these areas.

2.4 Representativeness

The characteristic of representativeness is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representativeness of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representative of the site and the specific area. Within the laboratory, precautions are taken to extract from the sample bottle an aliquot representative of the whole sample. This includes premixing the sample and discarding pebbles from soil samples.

2.5 Comparability

Comparability of laboratory tests is ensured by utilizing only New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)- certified laboratories. This certification is the basis for demonstrating proficiency in testing requirements. Using ELAP certified laboratories will result in consistency amongst analytical data within a specific project and across projects.

3.0 Quality Control Targets

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and RPD of duplicates/replicates are included in the QCP, Analytical Procedures. Note that tabulated values are not always attainable. Instances may arise where high sample concentrations, non-homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the firm will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

4.0 Soil Boring Advancement & Monitoring Well Installation Procedures

Soil and groundwater sampling shall be conducted in accordance with NYSDEC Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation dated May 3, 2010 and any Site-specific work plans.

Prior to drilling, all drill sites will be cleared with appropriate utility companies to avoid potential accidents relating to underground utilities. Utility drawings will be reviewed, if available.

4.1 Drilling Equipment and Techniques

<u>Direct Push Geoprobe Advanced Borings:</u>

Soil borings and monitoring wells will be advanced with a Geoprobe direct push sampling system. The use of direct push technology allows for rapid sampling, observation, and characterization of relatively shallow overburden soils. The Geoprobe utilizes a four to five-foot macrocore sampler, with disposable polyethylene sleeves. Soil cores will be retrieved in four or five-foot sections, and can be easily cut from the polyethylene sleeves for observation and sampling. The macrocore sampler will be decontaminated between boring locations using an alconox and water solution.

Prior to initiating drilling activities, the Macrocores, drive rods, and pertinent equipment, will be steam cleaned or washed with an alconox and water solution. This cleaning procedure will also be used between each boring. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used.

Test borings will be advanced with 2-inch (or larger) inside diameter (ID) direct push Macrocore through overburden soils. Drilling fluids, other than potable water will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative.

During the drilling, a properly calibrated photoionization detector (PID) will be used to screen soil cores retrieved from the Macrocores.

Direct Push Geoprobe advanced groundwater-monitoring wells typically utilize minimum 1.25-inch threaded flush joint PVC pipe with 0.010-in. slotted screen or pre-packed well screens. PVC piping used for risers and screens will conform to the requirements of ASTM-D 1785 Schedule 40 pipe.. All materials used to construct the wells will be NSF/ASTM approved. Solvent PVC glue shall not be used at any time in the construction of the wells. The bottom of the screen shall be sealed with a treated cap or plug. No lead shot or lead wool is to be employed in sealing the bottom of the well or for sealant at any point in the well. Stainless steel wells or pre-packed PVC wells may be used if specified in the work plan and approved by the NYSDEC.

Hollow-Stem Auger Advanced Borings:

The drilling and installation of soil borings and monitoring wells will be performed using a rotary drill rig which will have sufficient capacity to perform 4 1/4-inch inside diameter (ID) hollow-stem auger drilling in the overburden, retrieve Macrocore or split-spoon samples, and perform necessary rock coring using NX, NQ, HQ or core barrel size as specified in the project-specific work plan. The borehole may be reamed up to 5 1/2-inch diameter prior to monitoring well installation as cased hole in the bedrock, or may be left as open bedrock hole, with regulatory concurrence. Equipment sizes and diameters may vary based on project-specific criteria. Any investigative derived waste generated during the advancement of soil borings and monitoring well installations will be containerized and characterized for proper disposal.

Prior to initiating drilling activities, the augers, rods, Macrocore, split spoons, and other pertinent equipment will be steam cleaned or washed with an alconox and water solution. This cleaning procedure will also be used between each boring. Steam cleaning activities will be performed in a designated on-site decontamination area. During and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used.
Test borings will be advanced with 4 1/4-inch (ID) hollow stem augers through overburden, and cored with a NX, NQ, HQ or core barrel size as specified in the project-specific work plan sized diamond core barrels in competent rock, driven by truck-, track-, or trailer-mounted drilling equipment. Alternative methods of drilling or equipment may be allowed or requested for project-specific criteria, but must be approved by the NYSDEC. Drilling fluids, other than water from a

NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative.

During the drilling, a (PID) will be used to screen soils retrieved from the split spoons or Macrocores.

Where bedrock wells are required, test borings shall be advanced into rock with NX, NQ, HR (or similar) coring tools. Only water from an approved source shall be used in rock coring. The consultant shall monitor and record the petrology, core recovery, fractures, rate of advance, and water lost or produced in each test boring. The Rock Quality Determination (RQD) value shall be calculated for each 5-foot core. Each core shall be screened with a PID upon extraction. All core samples shall be retained and stored by the consultant in an approved wooden core box for a period of not less than one year.

The method selected may be percussion or rotary drilling. The method and equipment selected must be capable of penetrating the bedrock at each well location to a depth required by the work plan.

Bedrock well installation will involve construction of a rock socket in the weathered bedrock. The socket will be drilled into the top of rock (typically 1-ft. to 5-ft. into the top of rock) at each bedrock well location to allow a permanent steel casing to be grouted securely in place prior to completion of the well. The purpose for this is to provide a seal at the overburden/bedrock interface and into the upper bedrock surface, to prevent the entrance of overburden water into the bedrock. After the grout and casing have set up for a minimum of 12 hours, the remaining bedrock can be NX (or similar) cored through the steel casing to a depth determined by the project-specific work plan.

Bedrock wells will either be open coreholes in the rock or consist of threaded, flush-joint PVC piping. Construction will vary depending on the project and as such, specific construction of the wells will be detailed in the project-specific work plan. Bedrock wells which do utilized PVC piping for risers and screens will conform to the requirements of ASTM-D 1785 Schedule 40 pipe. All materials used to construct the wells will be NSF/ASTM approved.

Screen and riser sections shall be joined by flush-threaded coupling to form watertight unions that retain 100% of the strength of the casing. Solvent PVC glue shall not be used at any time in the construction of the wells. The bottom of the screen shall be sealed with a treated cap or plug. No lead shot or lead wool is to be employed in sealing the bottom of the well or for sealant at any point in the well.

4.1.1 Artificial Sand Pack

When utilized, granular backfill will be chemically and texturally clean, inert, siliceous, and of appropriate grain size for the screen slot size and the host environment The sand pack will be installed using a tremie pipe, when possible (i.e., a tremie pipe may not fit into smaller, 2-in. diameter boreholes). When utilized, the well screen and casing will be installed, and the sand pack placed around the screen and casing to a depth extending at least 2-ft.. A pre-packed well screen may be used if pre-approved by the NYSDEC.

An artificial sand pack will not be utilized in bedrock wells without screens (i.e., open borehole wells).

4.1.2 Bentonite Seal

A minimum 2-ft. thick seal will be placed directly on top of the sand pack, and care will be taken to avoid bridging. In the event that Site geology does not allow for a 2-ft. seal (e.g., only 1-ft. of space remains between the top of the sand pack and ground surface), the remaining space in the annulus will be filled with bentonite.

4.1.3 Grout Mixture

Upon completion of the bentonite seal, the well may be grouted with a non-shrinking cement grout (e.g., Volclay^{R}) mix to be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of Portland cement (ASTM C 150) and water, in the proportion of not more than 7 gallons of clean water per bag of cement (1 cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder may be added.

4.1.4 Surface Protection

At all times during the progress of the work, precautions shall be used to prevent tampering with or the entrance of foreign material into the well. Upon completion of the well, a suitable cap shall be installed to prevent material from entering the well. Where permanent wells are to be installed, the well riser shall be protected by a flush mounted road box set into a concrete pad or locking well cap for stick-up wells. A concrete pad, sloped away from the well, shall be constructed around the flush mount road box or stick-up casing at ground level.

Any well that is to be temporarily removed from service or left incomplete due to delay in construction shall be capped with a watertight cap.

4.2 Surveying

Coordinates and elevations will be established for each monitoring well and sampling location. Elevations to the closest 0.01 foot shall be used for the survey. These elevations shall be referenced to a regional, local, or project-specific datum. The location, identification, coordinates, and elevations of the wells will be plotted on maps with a scale large enough to show their location with reference to other structures at each site.

4.3 Well Development

After completion of the well, but not sooner than 24 hours after grouting is completed, development will be accomplished using pumping, bailing, or surge blocking. No dispersing agents, acids, disinfectants, or other additives will be used during development or introduced into the well at any other time. During development, water will be removed throughout the entire water column by periodically lowering and raising the pump intake (or bailer stopping point).

Development water will be either properly contained and treated as waste until the results of chemical analysis of samples are obtained or discharged on Site as determined by the Site-specific work plans and/or consultation with the NYSDEC representatives on Site.

The development process will continue until removal of a minimum of 110% of the water lost during drilling, three well volumes; whichever is greater, or as specified in the work plan. In the event that limited recharge does not allow for the recovery of all drilling water lost in the well or three (3) well volumes, the well will be allowed to stabilize to conditions deemed representative of groundwater conditions. Stabilization periods will vary by project but will be confirmed with the NYSDEC prior to sampling.

5.0 Geologic Logging and Sampling

At each investigative location, borings will be advanced through overburden using either a drill rig and hollow-stem auger or direct push technology (split spoons or Macrocore). Soils will be evaluated for visual and olfactory evidence of impairment (i.e., staining, odors, and elevated PID readings) by a qualified individual. Sampling devices will be decontaminated according to procedures outlined in the Decontamination section of this document. When utilized, split-spoon samplers will be driven into the soil using a minimum 140-pound safety hammer and allowed to free-fall 30-inches, in accordance with ASTM-D 1586-84 specifications. The number of blows required to drive the sampler each 6-inches of penetration will be recorded. When required, samples will be stored in the appropriate bottleware (refer to Section 10) until analysis or deemed unnecessary.

In the event that maximum design depth of investigation is reached and hydrogeologic conditions are not suitable for well installation, the maximum drilling depth may be revised.

Boulders and bedrock encountered during well installation may be cored by standard diamond-core drilling methods using an NX, NQ, HQ size core barrel or other if specified in the project-specific work plan. All rock cores recovered will be logged by a qualified individual, and stored in labeled wooden core boxes. The cores will be stored by the firm until the project is completed or for at least one year. Drilling logs will be prepared by a qualified individual who will be present during drilling operations. One copy of each field boring and well construction log and groundwater data, will typically be submitted as part of the investigation summary report (e.g., Remedial Investigation Report). The RQD value shall be calculated for each 5-foot section. Information provided in the logs shall include, but not be limited to, the following:

- Date(s), test hole identification, and project identification;
- Name of individual developing the log;
- Name of driller and assistant(s);
- Drill, make and model, auger size;
- Identification of alternative drilling methods used and justification thereof (e.g., rotary drilling with a specific bit type to remove material from within the hollow stem augers);
- Standard penetration test (ASTM D-1586) blow counts;
- Field diagram of each monitoring well installed with the depth to bottom of well/ screen, top of screen, length of riser, depth of steel casing, depths of sand pack, bentonite seal, grout, type of well completion etc.;
- Depth of each change of stratum;
- Identification of the material of which each stratum is composed, according to the USCS system or standard rock nomenclature, as appropriate;

- Depth interval from which each sample was taken, sample identification, and sample time;
- Depth at which hole diameters (bit sizes) change;
- Depth at which groundwater is encountered;
- Drilling fluid and quantity of water lost during drilling;
- Depth or location of any loss of tools or equipment;
- Depths of any fractures, joints, faults, cavities, or weathered zones

6.0 Groundwater Sampling Procedures

The groundwater in all new monitoring wells will be allowed to stabilize for at least 24-hours following development prior to sampling. Water levels will be measured to within 0.01 feet prior to purging and sampling. Sampling of each well will typically be accomplished in one of two ways; active or passive.

<u>Active Sampling:</u>

Active sampling includes bailing or pumping. Purging will be completed prior to active sampling if specified in the project-specific work plan. During purging, the following will be recorded in field books or groundwater sampling logs:

- date
- purge start time
- weather conditions
- presence of NAPL, if any, and approximate thickness
- pump rate
- pH
- dissolved oxygen
- temperature
- conductivity
- redox
- turbidity
- depth of well
- depth to water
- purge end time
- volume of water purged

In general, wells will be purged until the pH, conductivity, temperature, dissolved oxygen, redox, and turbidity of the water being pumped from the well have stabilized with a turbidity goal of 50 NTU (may be lower for metals analysis).

<u>Passive Sampling:</u>

Groundwater samples will be collected via passive methods (i.e., no-purge) according to the following procedures and in the volumes specified in Table 10-1:

Samples will be collected via passive diffusion bag (PDB) samplers. PDB samplers are made of low-density polyethylene plastic tubing (typically 4 mil), filled with laboratory grade (ASTM Type II) deionized water and sealed at both ends.

- Pre-filled PDBs will not be stored for longer than 30 days and will be kept stored at room temperature in a sealed plastic bag until ready to use.
- PDBs filled in the field will be used immediately and not stored for future use.
- PDB samplers will only be used to collect groundwater samples which will be analyzed for VOCs.
- Mesh covers will be utilized for open rock holes as to not puncture the PDB and will be secured to the bag using zip-ties.
- PDB samplers will be deployed by hanging in the well at the depth(s) specified in the project-specific work plan. The PDB samplers will be deployed at least 14 days prior to sampling;
- When transferring water from the PDB to sample containers, care will be taken to avoid agitating the sample, since agitation promotes the loss of volatile constituents;
- Gloves will be changed between collection of each PDB and tools used to open the PDB will be decontaminated with an alconox and potable water solution between each PDB;
- Any volume not used will be treated as investigation derived waste;
- Any observable physical characteristics of the groundwater (e.g., color, sheen, odor, turbidity) at the time of sampling will be recorded; and
- Weather conditions (i.e., air temperature, sky condition, recent heavy rainfall, drought conditions) at the time of sampling will be recorded.

7.0 Soil Vapor Intrusion Sampling Procedures

Soil vapor intrusion (SVI) sampling is to be conducted in accordance with the *NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006 and subsequent updates. Tracer gas testing is to be conducted for sub-slab sampling points to ensure concentrations of the tracer gas are not detected in the sub-slab at greater than 10% of the concentration detected in the atmosphere. An outdoor air sample is to be collected at an upwind direction as a control. A building inventory should be completed to document building construction information and identify products that may be contributing to the levels in indoor air.

8.0 Field Documentation

8.1 Daily Logs/ Field Notebook

Daily logs are necessary to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. Daily logs may be kept in a project-specific notebook labelled with the project name/ number and contact information.

The daily log is the responsibility of the field personnel and will include:

- Name of person making entry;
- Start and end time of work;
- Names of team members on-site;
- Changes in required levels of personnel protection:
  - Level of protection originally used;
  - Changes in protection, if required; and
  - Reasons for changes.
- Air monitoring locations, start and end times, and equipment identification numbers;
- Summary of tasks completed;
- Summary of samples collected including location, matrix, etc.;
- Field observations and remarks;
- Weather conditions, wind direction, etc.;
- Any deviations from the work plan;
- Initials/ signature of person recording the information.

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Corrected errors may require a footnote explaining the correction.

Sample documents, forms, or field notebooks are not to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document. If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the corrected information. The incorrect information should not be obliterated. Any subsequent error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

8.2 Photographs

Photographs will be taken to document the work. Documentation of a photograph is crucial to its validity as a representation of an existing situation. Photographs should be documented with date, location, and description of the photograph.

9.0 Investigation Derived Waste

Purpose:

The purposes of these guidelines are to ensure the proper holding, storage, transportation, and disposal of materials that may contain hazardous wastes. Investigation-derived waste (IDW) included the following:

- Drill cuttings, drilling mud solids;

- Water produced during drilling;
- Well development and purge waters, unused PDB waters;
- Decontamination waters and associated solids;

Procedure:

1. Contain all investigation-derived wastes in Department of Transportation (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.
2. Place different media in separate drums (i.e., do not combine solids and liquids). 3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Label all containers with regard to contents, origin, and date of generation. Use indelible ink for all labeling.
6. Collect samples for waste characterization purposes, use boring/well sample analytical data for characterization.
7. For wastes determined to be hazardous in character, be aware on accumulation time limitations. Coordinate the disposal of these wastes with the Owner and NYSDEC.
8. Dispose of investigation-derived wastes as follows;
    - Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels consistent with background, may be spread on-site (pending NYSDEC approval) or otherwise treated as a non-waste material.
    - Soils, water, and other environmental media in which organic compounds are detected or metals are present above background will be disposed as industrial waste or hazardous waste, as appropriate. Alternate disposition must be consistent with applicable State and Federal laws.
    - Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate disposal as industrial wastes
9. If waste is determined to be listed hazardous waste, it must be handled as hazardous waste as described above, unless a contained-in determination is accepted by the NYSDEC.

10.0 Decontamination Procedures

Sampling methods and equipment have been chosen to minimize decontamination requirements and to prevent the possibility of cross-contamination. Decontamination of equipment will be performed between discrete sampling locations. Equipment used to collect samples between composite sample locations will not require decontamination between collection of samples. All drilling equipment will be decontaminated after the completion of each drilling location. Special attention will be given to the drilling assembly and augers.

Split spoons and other non-disposable equipment will be decontaminated between each sampling location. The sampler will be cleaned prior to each use, by one of the following procedures:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner;

OR

- Initially cleaned of all foreign matter;
- Scrubbed with brushes in alconox solution;
- Triple rinsed; and
- Allowed to air dry.

Other sampling equipment including but not limited to low-flow sampling pumps, surface soil sampling trowel, water level meters, etc. will be decontaminated between sample location using an alconox solution. Consumables including gloves, tubing, bailers, string, etc. will be dedicated to one sample location and will not be reused.

11.0 Sample Containers

The containers required for sampling activities are pre-washed and ordered directly from a laboratory, which has the containers prepared in accordance with USEPA bottle washing procedures. The following tables detail sample volumes, containers, preservation and holding time for typical analytes.

Table 11-1
Groundwater Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Holding Time Until Extraction/ Analysis
VOCs	40-ml glass vial with Teflon-backed septum	Two (2); fill completely, no headspace	Cool to 4° C (ice in cooler), Hydrochloric acid to pH <2	14 days
Semi-volatile Organic Compounds (SVOCs)	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Pesticides	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Polychlorinated biphenyls (PCBs)	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Metals	250-ml HDPE	One (1); fill completely	Cool to 4° C (ice in cooler) Nitric acid to pH <2	180 days (28 for mercury)
Cyanide	1,000-mL HDPE		Cool to 4° C (ice in cooler) Nitric acid to pH <2	14 days

Note:
All sample bottles will be prepared in accordance with USEPA bottle washing procedures.
Consult with laboratory as bottleware may vary by laboratory.
Holding time begins at the time of sample collection.

TABLE 11-2
Soil Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Holding Time Until Extraction/ Analysis
VOCs	4-oz, glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	14 days
VOCs via EPA 5035	40 mL vials with sodium bisulfate, methanol, and/or DI water	Three (3), 5 grams each	Cool to 4° C (ice in cooler)	2 days
SVOCs	4-oz, glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	7/40 days
PCBs	4-oz, glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	7/40 days
Pesticides	4-oz, glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	14/40 days
Metals	4-oz. glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	180 days (28 for mercury)
Cyanide	4-oz, glass jar with Teflon-lined cap	One (1), fill as completely as possible	Cool to 4° C (ice in cooler)	14 days

Note:
All sample bottles will be prepared in accordance with USEPA bottle washing procedures.
Consult with laboratory as bottleware may vary by laboratory.
Holding time begins at the time of sample collection.

Table 11-3
Air Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Holding Time Until Extraction/ Analysis
VOCs	1 – Liter Summa® Canister	One (1) 1-Liter 1.4- Liter for MS/MSD	N/A	14 days

Note:
All sample bottles will be prepared in accordance with USEPA bottle washing procedures.
Consult with laboratory as bottleware may vary by laboratory.
Holding time begins at the time of sample collection.

12.0 Sample Custody and Shipment

12.1 Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container:

AA-BB-CC-DD-EE

AA: This set of initials indicates an abbreviation for the Site from which the sample was collected.
BB This set of initials represents the type of sample (e.g., SB for soil boring and MW for monitoring well)
CC: These initials identify the unique sample location number.
DD: These initials identify the sample start depth (if soil sample)
EE These initials identify the sample end depth (if soil sample)

Each sample will be labeled, chemically preserved (if required) and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out prior to sample collection when possible. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers. The sample label will give the following information:

- Date and time of collection
- Sample identification
- Analysis required
- Project name/number
- Preservation

Sample tags attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample tags are to be placed on the bottles so as not to obscure any QC lot numbers on the bottles; sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the logbook.

For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as "real" samples.

12.2 Chain of Custody

This section describes standard operating procedures for sample identification and chain-of-custody to be utilized for all field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during their collection, transportation, and storage through analysis. All chain-of-custody requirements comply with standard operating procedures indicated in USEPA sample handling protocol.

Sample identification documents must be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks;
- Sample label; and
- Chain-of-custody records.

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

As few persons as possible should handle samples. Sample bottles will be obtained pre-cleaned from the a laboratory. Sample containers should only be opened immediately prior to sample collection. The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules. The sample collector will record sample data in the field notebook and/or field logs.

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints on the chain of custody.

12.3 Transfer of Custody and Shipment

The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain-of-custody record. This record documents sample custody transfer.

Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered on the chain-of-custody.

All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment. The other copies are distributed appropriately to the site manager.

12.4 Custody Seals

Custody seals are preprinted adhesive-backed seals. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before shipment. On receipt at the laboratory, the custodian must check (and certify, by completing the package receipt log and LABMIS entries) that seals on boxes and bottles are intact. Strapping tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

12.5 Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The label should not cover any bottle preparation QC lot numbers.
- All sample bottles are placed in a plastic bag and/or individual bubble wrap sleeves to minimize the potential for cross-contamination and breaking.
- Shipping coolers must be partially filled with packing materials and ice when required, to prevent the bottles from moving during shipment.
- The sample bottles must be placed in the cooler in such a way as to ensure that they do not directly come in contact with other samples. Ice will be added to the cooler to ensure that the samples reach the laboratory at temperatures no greater than 4°C.
- Any remaining space in the cooler should be filled with inert packing material. Under no circumstances should material such as sawdust, sand, etc., be used.
- A chain of custody record must be placed in a plastic bag inside the cooler. Custody seals must be affixed to the sample cooler.

12.6 Sample Shipment

Shipping containers are to be custody-sealed for shipment as appropriate. The container custody seal will consist of tape wrapped around the package and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking the seal. Chain of custody seals shall be placed on the container, signed, and dated prior to taping the container to ensure the chain of custody seals will not be destroyed during shipment. In addition, the coolers must also be labeled and placarded in accordance with DOT regulations if shipping medium and high hazard samples.

Field personnel will make arrangements for transportation of samples to the lab. The lab must be notified as early as possible regarding samples intended for Saturday delivery. The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States DOT in the Code of Federal Regulation, 49 CFR 171 through 177. All samples will be delivered to the laboratory and analyzed within the holding times specified by the analytical method for that particular analyte.

All chain-of-custody requirements must comply with standard operating procedures in the USEPA sample handling protocol.

12.7 Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identification number matches that on the chain-of-custody record and traffic reports, if required. Pertinent information as to shipment, pickup, and courier is entered on the chain of custody or attached forms.

13.0 Deliverables

This section will describe laboratory requirement and procedures to be followed for laboratory analysis. Samples collected in New York State will be analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory. When required, analyses will be conducted in accordance with the most current NYSDEC Analytical Services Protocol (ASP). For example, ASP Category B reports will be completed by the laboratory for samples representing the final delineation of the Remedial Investigation, confirmation samples, samples to determine closure of a system, and correlation samples taken using field testing technologies analyzed by an ELAP-certified laboratory to determine correlation to field results. Data Usability Summary Reports will be completed by a third party for samples requiring ASP Category B format reports. Electronic data deliverables (EDDs) will also be generated by the laboratory in EQUIS format for samples requiring ASP Category B format reports.

NYSDEC DER-10 DUSR requirements are as follows:

a) Background. The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data with the primary objective to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

   1. The development of the DUSR must be carried out by an experienced environmental scientists, such as the project Quality Assurance Officer, who is fully capable of conducting a full data validation. The DUSR is developed from:

      i. A DEC ASP Category B Data Deliverable; or

ii. The *USEPA Contract Laboratory Program National Functional Data Validation Standard Operating Procedures for Data Evaluation and Validation.*

2. The DUSR and the data deliverables package will be reviewed by DER staff. If full third party data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later data on the same data package used for the development of the DUSR.

b) Personnel Requirements. The person preparing the DUSR must be pre-approved by DER. The person must submit their qualifications to DER documenting experience in analysis and data validation. Data validator qualifications are available on DEC's website identified in the table of contents.

c) Preparation of a DUSR. The DUSR is developed by reviewing and evaluating the analytical data package. In order for the DUSR to be acceptable, during the course of this review the following questions applicable to the analysis being reviewed must be answered in the affirmative.

1. Is the data package complete as defined under the requirements for the most current DEC ASP Category B or USEPA CLP data deliverables?
2. Have all holding times been met?
3. Do all the QC data; blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
4. Have all of the data been generated using established and agreed upon analytical protocols?
5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?
6. Have the correct data qualifiers been used and are they consistent with the most current DEC ASP?
7. Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?

d) Documenting the validation process in the DUSR. Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters, including data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed.

14.0 Equipment Calibration

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Section 11 lists the major instruments to be used for sampling and analysis. In addition, brief descriptions of calibration procedures for major field and laboratory instruments follow.

14.1 Photovac/MiniRae Photoionization Detector (PID)

Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers. All calibration procedures will follow the manufacturer recommendations.

14.2 Conductance, Temperature, and pH Tester

Temperature and conductance instruments are factory calibrated. Temperature accuracy can be checked against an NBS certified thermometer prior to field use if necessary. Conductance accuracy may be checked with a solution of known conductance and recalibration can be instituted, if necessary.

14.3 0_2/Explosimeter

The specific meter used at the time of work shall be calibrated in accordance with manufacturer recommendations. The model 260 O_2/ Explosimeter is described below.

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt (V) nickel cadmium battery. The battery is recharged by removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V AC outlet.

The battery can also be recharged using a 12V DC source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours.

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the LEL meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow; remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.
6. Close the flow control valve.

7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease, or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate, or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

14.4 Nephelometer (Turbidity Meter)

LaMotte 2020WE Turbidity Meter is calibrated before each use. The default units are set to NTU and the default calibration curve is formazin. A 0 NTU Standard (Code 1480) is included with the meter. To calibrate, rinse a clean tube three times with the blank. Fill the tube to the fill line with the blank. Insert the tube into the chamber, close the lid, and select “scan blank”.

TABLE 14-4
List of Major Instruments
for Sampling and Analysis

- MSA 360 0_2 /Explosimeter
- Geotech Geopump II AC/DC Peristaltic Pump
- QED MP50 Controller and QED Sample Pro MicroPurge Bladder Pimp
- Horiba U-53 Multi-Parameter Water Quality Meter
- LaMotte 2020WE Turbidity Meter
- EM-31 Geomics Electromagnetic Induction Device
- Mini Rae Photoionization Detectors (3,000, ppbRAE, etc.)

15.0 Internal Quality Control Checks

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of field equipment. Field-based QC will comprise at least 10% of each data set generated and will consist of standards, replicates, spikes, and blanks. Field duplicates and field blanks will be analyzed by the laboratory as samples and will not necessarily be identified to the laboratory as duplicates or blanks. For each matrix, field duplicates will be provided at a rate of one per 10 samples collected or one per shipment, whichever is greater. Field blanks which may consist of trip, routine field, and/or rinsate blanks will be provided at a rate of one per 20 samples collected for each media, or one per shipment, whichever is greater. Frequency of QC data may vary from project to project; refer to the project-specific work plan for QC requirements.

Calculations will be performed for recoveries and standard deviations along with review of retention times, response factors, chromatograms, calibration, tuning, and all other QC information generated. All QC data, including split samples, will be documented in the site logbook and/or appropriate field logs. QC records will be retained and results reported with sample data.

15.1 Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. The following types of blanks may be used: the trip blank, the routine field blank, and the field equipment blank. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination. Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

- Routine Field Blanks or bottle blanks are blank samples prepared in the field to access ambient field conditions. They will be prepared by filling empty sample containers with deionized water and any necessary preservatives. They will be handled like a sample and shipped to the laboratory for analysis.
- Trip Blanks are similar to routine field blanks with the exception that they are not exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. For the RI/FS, one trip blank will be collected with every shipment of water samples for VOC analysis. Each trip blank will be prepared by filling a 40-ml vial with deionized water prior to the sampling trip, transported to the site, handled like a sample, and returned to the laboratory for analysis without being opened in the field. Trip blanks may be provided by the laboratory, shipped with the bottleware, and kept with the sampling containers until analysis.
- Field Equipment Blanks are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

15.2 Duplicates

Duplicate samples are collected to check the consistency of sampling and analysis procedures. The following types of duplicates may be collected.

- Blind duplicate samples consist of a set of two samples collected independently at a sampling location during a single sampling event. Blind duplicates are designed to assess the consistency of the overall sampling and analytical system. Blind duplicate samples should not be distinguishable by the person performing the analysis.

- Matrix Spike and Matrix Spike Duplicates (MS/MSDs) consist of a set of three samples collected independently at a sampling location during a single sampling event. These samples are for laboratory quality control checks.

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APPENDIX 7

Well Construction Details

GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: MW-6

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	*Mersen - Rochester*	DRILLING CO.:	*Parratt Wolfe, Inc.*
SITE LOCATION:	*1500 Jefferson Road, Rochester, NY*	DRILLER:	*Mark Eaves*
JOB NO.:	*11007.01*	RIG TYPE:	*Ingersol-Rand A-300 HSA*
LOGGED BY:	*DLR*	DRILLING METHOD:	*Hollow Stem Auger*
DATE DRILLED:	*10/17/11*	DEVELOPMENT DATE:	*10/17/11*
		LOCATION:	*North or Eldre Building*

NOTES: Sample collected at 5'-7', 10'-12' and 15'-17' below grade for lab analysis

ELEVATION:
GEOLOGIC FORMATION:

DEPTH FEET	CUM. BLOWN YIELD	SAMP. #	LITHOLOGY
0			ASPHALT: Asphalt
			FILL: Brown, damp, loose, Sand and Gravel, FILL
			SILT: Brown, damp, semi-dense, SILT with some Clay; trace fine-grained Sand.
			SILT: Brown, damp, dense, SILT with some Clay; trace fine-grained Sand.
		(5'-7')	CLAY: Brown, damp, dense to semi-dense, CLAY with some Silt; trace fine-grained Sand. [Split-Spoon sample collected at 5'-7'; PID=0.0ppm]
10			SILT: Brown, damp, dense, SILT swith some Clay; trace fine-grained Sand and Gravel.
		(10'-12')	SILT: Brown, dense, wet, SILT with some Clay; trace fine-grained Sand. [Split-Spoon sample collected at 10'-12'; PID=0.0ppm]
		(15'-17')	SAND AND SILT: Brown, semi-loose, wet- saturated, SILT and fine-grained SAND with little Gravel; trace Clay. (Wet at 20') [Split-Spoon sample collected at 15'-17'; PID=0.0ppm]
20			

GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
	0		8" dia. flush-to-grade surface completion: 8' diameter manhole set in 18" diameter circular concrete pad
			2" locking compression cap
			2" dia. PVC riser (0.5'-5')
			8" dia. HSA borehole (0'-20')
	10		Bentonite chip annular seal (1'-4')
			#00N Sand pack (4'-20')
			2" dia. PVC 10-slot screen (5'-20')
	20		

MONITORING WELL INSTALLATION REPORT

LABELLA Associates, P.C.

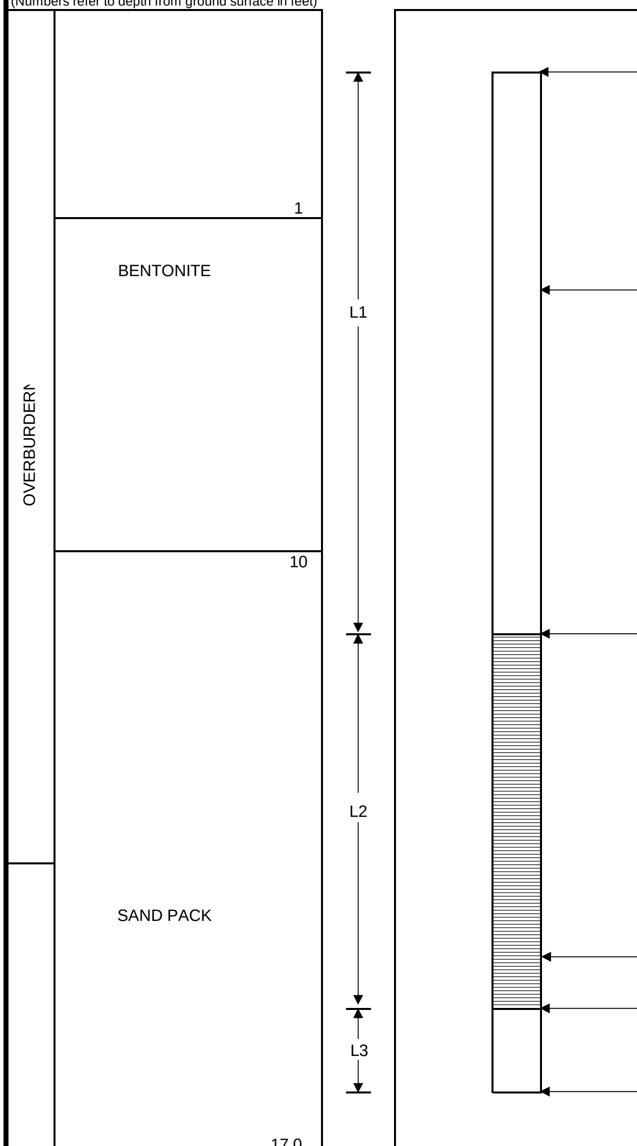
MONITORING WELL ID **MW-15**

Project:	Eldre Corporation	LaBella Project No.:	212721
Well Location:	1500 Jefferson Road	LaBella Representative:	J. Jaskowiak
Client:	Eldre	Date Installed:	8/20/2013
Contractor(s):	Trec	Time:	to
Driller:		Type of Drill Rig:	
Rock Coring Method:	N/A	Auger size and type:	N/A

Ground El.: Asphalt Parking lot | Location: SEE PLAN | Depth to bedrock: N/A

BOREHOLE BACKFILL

(Numbers refer to depth from ground surface in feet)



Elevation/Depth of riser pipe	Asphalt Parking lot	ft.
Type of Riser/Silt Pipe	Schedule 40 PVC	
Inside diameter	2	in.
Outside diameter		in.
Depth of top of Screen	12.0	ft.
Diameter of borehole	4	in.
Type of Screen	0.010 in. Schedule 40 PVC	
Depth of bottom of Screen	16.75	ft.
Depth of bottom of Silt trap	Not Applicable	ft.
Depth of bottom of borehole	17.0	ft.

12 ft. (Riser Length (L1)) + 5 ft. (Length of Screen (L2)) + 0 ft. (Length of Silt trap (L3)) = 17 ft. (Total Length)

NOTES:

MONITORING WELL INSTALLATION REPORT

LaBella Associates, P.C.

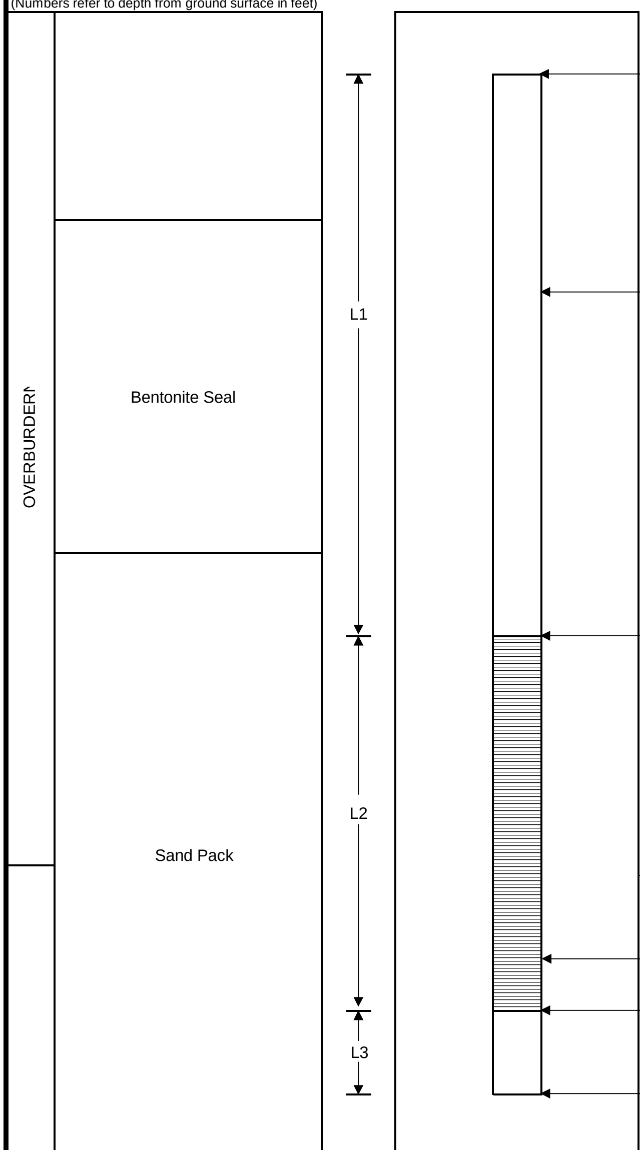
MONITORING WELL ID **MW-20**

Project:	Eldre Corporation	LaBella Project No.:	212721
Well Location:	1500 Jefferson Road	LaBella Representative:	K. Miller
Client:	Eldre	Date Installed:	1/25/2014
Contractor(s):	LaBella Env., LLC	Time:	to
Driller:	N. Wall	Type of Drill Rig:	Geoprobe Systems 54LT
Rock Coring Method:	N/A	Auger size and type:	N/A

Ground El.: Finished Floor (FF) | Location: SEE PLAN | Depth to bedrock: N/A

BOREHOLE BACKFILL

(Numbers refer to depth from ground surface in feet)



Elevation/Depth of riser pipe	2.75" Below FF	
Type of Riser/Silt Pipe	Schedule 40 PVC	
Inside diameter	1	in.
Outside diameter		in.
Depth of top of Screen	7	ft.
Diameter of borehole	2.25	in.
Type of Screen	0.010" slot	
Depth of bottom of Screen	12	ft.
Depth of bottom of Silt trap	Not Applicable	ft.
Depth of bottom of borehole	13	ft.

7 ft. + 5 ft. + ______ = 12 ft.

Riser Length (L1) | Length of Screen (L2) | | Total Length

NOTES:

Well constructed in soil boring SB-216 and was finished w/ flush mt. road box on 1/26/2014.