ELECTRICAL RESISTANCE HEATING MONITORING REPORT

CTS OF ASHEVILLE, INC. SUPERFUND SITE

235 Mills Gap Road
Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
Consent Decree – Civil Action No. 1:16-cv-380

Prepared for:

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Wood Project 6252-16-2012

March 27, 2019

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March 27, 2019

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RE: Electrical Resistance Heating Monitoring Report
CTS of Asheville, Inc. Superfund Site
235 Mills Gap Road, Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
Consent Decree – Civil Action No. 1:16-cv-380
Wood Project 6252-16-2012

Dear Mr. Zeller:

Please find attached the Electrical Resistance Heating Monitoring Report (ERH Monitoring Report) for completion of the ERH Interim Remedial Action at the above-referenced Site. Wood Environment & Infrastructure Solutions, Inc. prepared this ERH Monitoring Report on behalf of CTS Corporation to comply with the Consent Decree for Interim Remedial Design/Remedial Action at the CTS of Asheville, Inc. Superfund Site between the United States of America and CTS Corporation, Mills Gap Road Associates, and Northrop Grumman Systems Corporation (entered on March 7, 2017).

If you have questions regarding this ERH Monitoring Report, please contact us at (828) 252-8130.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.

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LIST OF ACRONYMS

bgs	below ground surface
CD	Consent Decree
CQA/QCP	Construction Quality Assurance/Quality Control Plan
DOC	dissolved organic carbon
ERH	electrical resistance heating
IRA	Interim Remedial Action
LGAC	liquid-phase granular activated carbon
LNAPL	light non-aqueous phase liquid
MDL	method detection limit
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSD	Metropolitan Sewerage District (of Buncombe County)
NAPL	non-aqueous phase liquid
NCDEQ	North Carolina Department of Environmental Quality
O&M	operation and maintenance
OWS	oil-water separator
ppb	parts per billion
PID	photoionization detector
PCU	power control unit
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RA	Remedial Action
RD	Remedial Design
ROD	Record of Decision
RTO	regenerative thermal oxidizer
SDG	sample delivery group
SOW	Statement of Work
SVOC	semivolatile organic compound
TCE	trichloroethene (also, trichloroethylene)

LIST OF ACRONYMS (continued)

TMP	temperature monitoring point
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VR	vapor recovery
WNCRAQA	Western North Carolina Regional Air Quality Agency

1.0 BACKGROUND

This document presents the Electrical Resistance Heating (ERH) Monitoring Report (ERH Monitoring Report) for completion of the ERH Interim Remedial Action (Interim RA) at the CTS of Asheville, Inc. Superfund Site (Site) located at 235 Mills Gap Road in Asheville, Buncombe County, North Carolina (Figure 1). This ERH Monitoring Report has been prepared to comply with Section 4.6(b) of the Statement of Work (SOW) of the Consent Decree for Interim Remedial Design/Remedial Action (CD) at the Site between the United States of America and CTS Corporation, Mills Gap Road Associates, and Northrop Grumman Systems Corporation (Settling Defendants).

1.1 SITE DESCRIPTION

The approximate center of the Site is located at north latitude 35°29'36" and west longitude 82°30'25". The Site formerly contained an approximate 95,000-square foot, single-story brick and metal structure on the southern portion of the Site. The building was demolished in December 2011 and the concrete building pad remains intact. The northeastern portion of the Site contains an asphalt-paved parking area, and asphalt-paved driveways are located parallel to the north (front) of the building pad and southeast (rear) of the building pad. A six-foot high chain-link fence surrounds the Site and a locked gate at the north end of the Site controls access to the Site from Mills Gap Road. The Site is unoccupied. The Site and surrounding area are illustrated on Figure 2.

1.2 BACKGROUND

A non-aqueous phase liquid (NAPL) investigation was conducted at the Site in 2013 and 2014. An approximate one-acre area containing light NAPL (LNAPL) with comingled trichloroethene (TCE) was identified (Wood, 2014). A Focused Feasibility Study was conducted to evaluate potential remedial alternatives for the one-acre LNAPL area. ERH was chosen as the recommended alternative (Wood, 2015a). An additional approximate 0.2-acre area located adjacent and upgradient of the LNAPL area where elevated TCE concentrations had been detected was added to the proposed treatment area (Wood, 2015b). This 1.2-acre area is considered the TCE source area.

The United States Environmental Protection Agency (USEPA) approved ERH as the recommended interim remedial alternative for the TCE source area and memorialized the decision in an Interim Action Record of Decision (ROD) in February 2016. A chronology of events related to implementation of the ROD and the ERH Interim RA is summarized in Table 1.

1.3 REMEDIAL ACTION OBJECTIVE

In addition to TCE, the source area contains LNAPL from weathered fuel oil. In this area, TCE exists in three states: dissolved in groundwater, sorbed to saturated soil, and partitioned in the petroleum LNAPL. A remedial action objective (RAO) of a 95 percent reduction of TCE concentrations was applied to saturated soil, groundwater and LNAPL samples collected in the ERH treatment area.

An Interim Remedial Action Objective Values Technical Memorandum (Interim RAO Tech Memo) was submitted to USEPA on June 1, 2018. The Interim RAO Tech Memo described the procedures that were conducted to collect baseline/pre-remediation samples of saturated soil, groundwater and LNAPL in the treatment area. The average concentrations for each media were presented, as well as the calculated five percent interim RAO TCE values (i.e., 95 percent removal). The pre-remediation and calculated RAO values for the ERH Interim RA are summarized in the following table:

Interim Remedial Action RAOs

Media	Average Pre-Remediation TCE Concentration	RAO TCE Concentration for the ERH Interim RA
Saturated soil	59,496 µg/kg	2,975 µg/kg
Groundwater	16,523 µg/L	826 µg/L
LNAPL	8,080 mg/kg	404 mg/kg
µg/kg – micrograms per kilogram µg/L – micrograms per liter mg/kg – milligrams per kilogram		

The Interim RAO Tech Memo was approved by USEPA on June 4, 2018.

Confirmation/post-remediation sampling was conducted on several successive occasions to determine when the RAO was achieved, and the Interim RA was complete. The confirmation sampling activities and results are described in Section 4.0.

1.4 REMEDIAL DESIGN ELEMENTS

The ERH Final Remedial Design (Final RD) was approved by USEPA on December 18, 2017. The Final RD contained descriptions of the remedial design elements, construction activities, operation and maintenance (O&M) procedures, monitoring activities, and procedures for protecting human health and the environment. The remedial design process and elements are described below. The Final RD was completed by TRS Group, Inc. (TRS), the ERH contractor, with input from Wood and the Settling Defendants.

ERH is a process whereby soil and groundwater are heated by passing an electrical current through the subsurface between electrodes. Resistance to the flow of the electrical current by the subsurface materials (primarily groundwater) induces the heating. A power control unit (PCU), which is a variable transformer system capable of providing multiple simultaneous power outputs at automatically adjustable levels, delivers energy to the electrodes.

The electrodes consist of the electrode element(s) and conductive backfill consisting of graphite and steel shot. The conductive backfill materials essentially increase the surface area of the electrode. The electrode elements are installed within the desired area of heating, in this case, from the water table to top of bedrock. The heat created by resistance to the current is sufficient to generate steam and transfers the volatile contaminants by the process of evaporation. Vacuum blowers at ground surface are connected to vapor recovery (VR) points and create a negative pressure in the treatment area. The steam generated by ERH acts as a carrier gas and transports volatile organic compounds (VOCs) to the VR points. Steam and contaminant vapors are then transported to the ERH treatment compound. The heat generated in the subsurface is monitored by temperature monitoring points (TMPs), which contain multi-level temperature thermocouples at each TMP.

The Final RD indicated a target treatment area of approximately 56,100 square feet and a treatment volume of approximately 47,250 cubic yards. The actual treatment volume was anticipated to change based on the final depths to the water table and drilling refusal depths encountered in the field. The general average subsurface temperature goal was 87 degrees Celsius, which is the boiling point of TCE; however, this value was subject to change depending on the depth within the water column (pressure increases with depth). The design energy density goal was 175 kilowatt-hours per cubic yard, which, with the assumed treatment volume and energy required for the treatment system equipment, resulted in an estimated energy consumption of approximately 8,510,000 kilowatt-hours (kWh). The Final RD included specifications for subsurface heating, vapor extraction, monitoring equipment, and the installation of above-ground vapor and condensate treatment systems.

The Final RD included 229 electrodes co-located with VR wells, 2 vapor-only recovery points, and 18 TMPs. The Final RD included installation of an above-ground vapor treatment system that consisted of the following:

- Two steam condensers with cooling towers;

- Two vacuum blowers;
- A condensate treatment system, including an oil-water separator (OWS), two liquid granular activated carbon (LGAC) units and an air stripper; and
- A regenerative thermal oxidizer (RTO) with an acid gas scrubber.

The Final RD included the use of two PCUs connected to a temporary electrical service. The PCUs incorporate a variable voltage transformer system capable of providing three simultaneous power outputs at automatically adjustable levels of 130 to 860 volts. The Final RD indicated the ERH system would include remote data acquisition software to collect and store data related to subsurface temperatures, power input, voltage, amperage, and treatment system operational parameters.

2.0 CONSTRUCTION ACTIVITIES

The ERH system construction activities were documented in the ERH Remedial Action Report, dated August 7, 2018, and are included herein in accordance with Chapter 2.0 (Remedial Action Completion) of USEPA's "Close Out Procedures for National Priority Sites," dated May 2011.

2.1 WELL ABANDONMENT ACTIVITIES

Prior to initiating installation of subsurface ERH system components, existing PVC piezometers/wells in the treatment area were abandoned. The following wells were abandoned via tremie method using a neat cement grout in accordance with North Carolina Department of Environmental Quality (NCDEQ) regulations:

- Monitoring well MW-3A
- Piezometers PZ-1, PZ-2 and PZ-3
- SVE extraction wells VE-1 through VE-15
- SVE pilot test observation wells OW-1, OW-3 and OW-4 (OW-2 could not be located)

The NCDEQ well abandonment forms for the above piezometers/wells are included in Appendix A.

2.2 SITE PREPARATION ACTIVITIES

Prior to subsurface ERH system component installation activities, the following Site preparation activities were completed:

- Clearing of vegetation around the Site entrance to provide improved ingress/egress visibility from/to Mills Gap Road.
- Installation of signage along Mills Gap Road notifying traffic of the Site entrance.
- Installation of new/additional fencing and gate at the entrance to the Site with a holding area. A Site trailer was installed adjacent to the new fencing in such a way that Site visitors could only enter the restricted-access area through the Site trailer.

- Installation of a gravel drive extending to the northwestern area of the former building pad to allow for heavy equipment and supply unloading on the former building pad.
- Clearing/grubbing in the treatment area to remove vegetation and other surface obstructions.
- Clearing and tree removal in the southern and southeastern portion of the treatment area, as necessary for drill rig access, piping installation, and overhead electrical line installation.

Prior to installation of subsurface ERH components on the adjacent property to the east, a portion of the fence where the treatment area extends off-Site to the east was removed and a temporary fence was installed approximately ten feet to the east. The temporary fence incorporated screens to prevent persons from being able to contact the area on the interior of the fence where electrode components were located.

2.3 SUBSURFACE INSTALLATION ACTIVITIES

Drilling activities were conducted between December 11, 2017 and May 3, 2018. The drilling activities were temporarily suspended at the end of February 2018 to allow for relocation of an overhead electrical line in the eastern and southeastern portion of the treatment area. Drilling activities resumed the week of March 19, 2018.

Vertical electrode borings were advanced at 190 locations. Angled electrode borings were advanced at 37 locations where there are surface obstructions or steep topography and at the eastern property boundary/fence to access the subsurface treatment area on the off-site property to the east. Figure 3 contains a layout of the electrodes and TMPs.

At locations where the treatment interval was thick (i.e., greater than approximately 28 feet) two electrode elements were installed so that the power delivery to the elements could be adjusted over more discrete intervals. In areas where quartz/rock zones were identified (these zones result in a higher electrical resistance), two elements were installed when the treatment interval was greater than approximately 23 feet. A total of 353 electrode elements were installed at the 227 electrode locations.

Two planned electrodes, V2 and W4 located in the southwestern portion of the treatment area, were not installed as the depth to bedrock was approximately one foot below the water table at the time of drilling. Also, during system start-up testing, it was determined that the lower elements at electrodes B12 and J14 were not operating as designed. A replacement J14 electrode, with a shallow and deep element, was installed on June 26, 2018. The deep element at electrode B12 was not replaced, as this electrode was located in the most downgradient edge of the treatment area.

The electrodes, which have co-located VR points and 'drip tubes', were installed using nominal 8.25-inch inside-diameter hollow-stem augers (creating an approximate 12-inch diameter borehole). The borings were advanced to auger refusal. At some locations where auger refusal was shallower than anticipated, roller cone rotary equipment was used in an attempt to advance the boring deeper. In most cases where roller cone rotary equipment was used, it appears that the bedrock was indeed shallower than the surrounding area.

The electrodes extended from the depth of the water table to drilling refusal. The electrode elements consisted of a copper plate connected to a power supply cable. The borehole annulus surrounding the elements was backfilled with graphite and steel shot. Where two elements were installed in a boring, an approximate three-foot layer of sand was placed between the two elements/conductive intervals. A 'drip tube' consisting of slotted copper tubing attached to crosslinked high-density polyethylene piping was placed immediately above the top of the conductive backfill. The drip tubes were installed as a contingency to inject water for maintaining conductivity if determined to be necessary during ERH operation. However, this contingency did not have to be implemented due to stable saturated conditions.

The VR points consisted of a one-inch diameter, three-foot long 0.020-inch slotted stainless-steel screen, which was positioned approximately four feet above the conductive backfill. Course sand was placed to approximately two-feet above the screen, above which an approximate one-foot layer of extra fine sand was placed. The remainder of the borehole above the extra fine sand was backfilled with neat Portland cement.

Two individual VR points were installed in angled borings advanced using nominal 4.25-inch hollow-stem augers (creating an approximate 8-inch diameter borehole) to the eastern off-Site property. Seven additional VR points were installed on September 10 and 11, 2018 to increase efficiency of vapor capture. The VR points were installed in the same manner as the co-located VR points.

The 18 TMPs were installed using nominal 3.25-inch or 4.25-inch hollow-stem augers. The borings were advanced until auger refusal was encountered. A 1.5-inch diameter copper or steel pipe was placed in each boring and the boring annulus was backfilled with neat Portland cement. Temperature thermocouples were placed at five-foot intervals in the TMPs from the water table to approximately one foot above the shallowest adjacent electrode.

During drilling, ambient air monitoring was performed using a calibrated photoionization detector (PID) capable of measuring volatile organics in the parts per billion (ppb) range to monitor ambient air conditions in the areas of the drilling activities and the waste containers. The monitoring indicated air quality remained within protective limits of on-site workers and the adjacent community during the drilling activities.

Wood provided oversight of the drilling activities and managed the waste pickup/disposal/ manifesting (see Section 2.5). TRS provided the design and materials for the electrodes, VR points and TMPs. TRS assembled the electrode elements, VR points, and TMPs, and the drill crews installed the equipment in the boreholes with oversight by Wood and TRS. Copies of log books used to document construction activities are included in Appendix B. Table 2 contains a summary of the electrode construction details.

2.4 MONITORING WELL CONSTRUCTION

Eighteen monitoring wells were installed in the ERH treatment area between February 20 and March 23, 2018. As described in the USEPA-approved ERH Performance Monitoring Well Construction Modifications Technical Memorandum, dated February 20, 2018, two of the proposed monitoring wells were not installed due to the shallower than expected depth to bedrock, and several monitoring well clusters were relocated due to obstructions or the depths of adjacent electrodes. The locations of the eighteen new monitoring wells are shown in Figure 4. The monitoring well construction diagrams and NCDEQ monitoring well construction records are included in Appendix C and monitoring well details are summarized in Table 3.

2.5 WASTE MANAGEMENT ACTIVITIES

During installation of initial electrodes, soil samples were collected from soil cuttings generated at varying depths between 4 and 64 feet below ground surface (bgs). The soil samples were submitted to Pace Analytical Services for analysis of VOCs and semivolatile organic compounds (SVOCs) according to USEPA Methods 8260 and 8270, respectively. Also, soil samples collected from the unsaturated/vadose zone were submitted for analysis of RCRA metals using the Toxicity Leaching Characteristic Procedure and USEPA Methods 6010 and 7470. The analytical reports are included in Appendix D.

The analytical results indicated that soil from the unsaturated zone (from ground surface to 15 to 20 feet bgs) could be managed as non-hazardous waste, while saturated soil was required to be managed as hazardous waste. During the drilling activities, the soil generated was transferred to ‘roll-off’ waste containers equipped with covers. The non-hazardous/unsaturated soil cuttings were segregated from the hazardous/saturated soil cuttings.

Prior to demobilization of drill rigs from the Site, the drill rig and drilling equipment were decontaminated using a pressurized steam cleaner. Water generated from the decontamination activities was containerized in 55-gallon drums. The drums were managed as a hazardous waste. Soil cuttings generated during installation of replacement electrode J14 were containerized in 55-gallon drums. Unsaturated soil cuttings from ground surface to 20 feet were managed as non-hazardous waste and saturated soil cuttings were managed as hazardous waste. Soil cuttings generated during installation of the 7 additional VR points installed above the water table, were containerized in 55-gallon drums and managed as non-hazardous waste.

Waste generated during the drilling activities was transported by A&D Environmental Services, or a subcontractor to them, to the appropriate USEPA-approved disposal facility. Approximately 74 tons of non-hazardous soil were disposed at the Republic Services facility in Enoree, South Carolina. Approximately 2 tons of non-hazardous soil was transferred to the A&D facility located in High Point, North Carolina, and then disposed at Great Oak Landfill in Randleman, North Carolina. Approximately 479 tons of hazardous soil was disposed at the US Ecology facility located in Bellville, Michigan. Approximately 3 tons of hazardous soil and 1,300 gallons of hazardous water were disposed at the Clean Harbors facility in LaPorte, Texas.

Appendix E contains the completed waste manifests generated during the subsurface installation activities.

2.6 WASTEWATER DISCHARGE PERMIT

A permit for the discharge of wastewater from a groundwater remediation system was obtained from Metropolitan Sewerage District of Buncombe County (MSD). Permit Number G-050-18 was issued to CTS Corporation on June 5, 2018. The permit required the following monitoring activities:

- Collection of influent/effluent water samples from the condensate water treatment system on a monthly basis;
- Collection of effluent samples from the acid gas scrubber on a monthly basis;
- Measurement of pH on a monthly basis from the combined discharge; and
- Reporting of total monthly flow.

The permit required analysis of the influent/effluent samples for VOCs and SVOCs according to USEPA Methods 8260 and 8270, respectively. The permit required a contaminant removal efficiency of greater than 95 percent for the condensate treatment system (Note: the removal efficiency is not calculated for estimated concentrations). The permit also required that the total concentration of VOCs or SVOCs detected in the acid gas scrubber effluent be less than 100 micrograms per liter (μg/L), not inclusive of estimated VOC/SVOC concentrations. A revision to the permit was issued on August 31, 2018 and modified the permissible discharge concentration of acetone to 25 milligrams per liter (mg/L) as described in Section 3.3 below.

2.7 UTILITY INSTALLATION

Various public utilities were required for operation of the ERH system. A TRS subcontractor installed natural gas (Public Service of North Carolina), potable water (City of Asheville), and sewer (MSD) lines from utility mains along Mills Gap Road to the ERH system equipment compound. Utilities were inspected by Buncombe County on April 28, 2018.

A Duke Energy subcontractor provided electrical service to the Site, which included the installation of a new power pole. The power drop used a transformer to step down the 22,000-volt service to 12,475 volts for connection to the PCUs.

2.8 SURFACE INSTALLATION AND START-UP ACTIVITIES

Surface installation activities began the week of February 26, 2018 and included construction of the water and vapor treatment systems. Surface installation activities were conducted by TRS, as described in TRS's Construction and Start-up Report, dated July 30, 2018, which was included in the ERH Remedial Action Report, dated August 7, 2018. As-built drawings of the constructed system, which are sealed by the engineer of record, are included in TRS's Final Report, dated March 7, 2019 (Appendix F). The above ground systems included the following:

- 2 PCUs: 4,500 kilowatt (kw) and 2,000 kW;
- 9 step-down transformers;
- 3 steam condensers with cooling towers;
- 3, 40-horsepower VR blowers;
- Regenerative thermal oxidizer with acid gas scrubber (including 200-pound LGAC);
- 2,000-gallon sodium hydroxide tank;
- 18,000-gallon OWS;
- 2 - 1,000-pound LGAC units;
- 15,000-gallon LNAPL storage tank; and
- Security systems.

As described in TRS's Final Report, system start-up began on May 14, 2018. Start-up and shakedown activities included energizing the system components and testing the functionality of equipment and interlocks. Application of energy to the subsurface began on May 29, 2018, at which time step-and-touch voltage surveys were conducted. The system reached continuous full operating power on June 8, 2018.

2.9 DESIGN MODIFICATIONS

The design treatment volume was estimated using historical depth to groundwater and bedrock measurements. The actual treatment volume increased primarily due to the bedrock depth being greater than estimated in the northern portion of the treatment area. Due to the increase in the treatment volume from what was estimated in the Final RD, design modifications to the ERH treatment system were made. The original design included two condenser units and two vacuum blowers. To accommodate the additional treatment volume, an additional condenser/blower package was installed. The original design also included an air stripper to provide additional/polishing treatment of the condensate water. Due to a limitation on the air flow that the RTO could accept, the air stripper was not installed. These modifications did not affect the compliance of the treatment system with applicable requirements.

Other design modifications include:

- Two electrodes, V2 and W4, were not installed, as sufficient treatment thickness was not encountered.
- A replacement electrode J14 was installed. A VR point was not installed in the replacement electrode borehole, as the VR point at the adjacent original electrode was operational.
- At some locations, the treatment interval was less than 10 feet, which is TRS's minimum treatment interval thickness. In such instances, a 10-foot electrode element was installed and extended into the unsaturated/vadose zone soil (Note: the electrode length above the water table was not included in the treatment volume calculations discussed in Section 4.7).
- Seven additional VR points were installed to increase and enhance vacuum recovery.
- A storage tank was mobilized to the Site for the storage of recovered LNAPL pending off-site transport and disposal.
- A 200-pound LGAC unit was installed to provide additional VOC removal from the acid gas scrubber discharge.

2.10 CONSTRUCTION QA/QC

Construction quality assurance/quality control (QA/QC) procedures were implemented as described in the Construction Quality Assurance/Quality Control Plan (CQA/QCP), which was Appendix D of the Final RD. The CQA/QCP described planned and systematic activities that provided confidence that the remedial action construction would satisfy plans, specifications, and related requirements. There were no changes to the project (personnel) organization as presented in the CQA/QCP. The following QA/QC activities were conducted:

- Surveying of electrode locations was conducted by North Carolina-licensed surveyors. Locating of subsurface utilities in the area of the system installation was completed by professional subsurface utility locators.
- Drilling activities were conducted by North Carolina-licensed well contractors.
- Utility construction activities were conducted by North Carolina-licensed contractors in accordance with applicable regulations and inspected by Buncombe County inspectors.
- During construction, phases of the construction were reviewed as related to the design. In general, reviews were conducted after drilling/electrode installation activities, during system surface construction, and at shakedown/initial operation. USEPA participated in the phased inspections.
- Construction deficiencies were identified when a performed work, material, or installation did not meet project plans or specifications. An example was the operation of electrode J14 which did not meet specifications. The corrective action was the replacement of the electrode elements adjacent to the original electrode. Other deficiencies and corrections were noted above in Section 2.9.
- Minor deficiencies identified during the construction were corrected promptly and documented by TRS.

The ERH system was constructed as designed, with exception of items described in Section 2.9. Construction QA/QC related to the system equipment was performed by TRS with oversight by Wood. TRS's Final Report (Appendix F) includes the ERH system as-built documentation/drawings.

3.0 SYSTEM OPERATION AND MONITORING

The following sections describe O&M and monitoring activities that were conducted during operation of the ERH system.

3.1 OPERATION AND MAINTENANCE

TRS was responsible for O&M of the ERH system with oversight by Wood. O&M information is included in TRS's Final Design, Execution Plan, and Operation & Maintenance Plan which was included in Appendix C of the Final RD and in TRS's Final Report (Appendix F). O&M activities generally included the following:

- Measurement of operational parameters, including power input, subsurface temperatures, and condensate production.
- Optimization/reconfiguration of power input to electrodes based on subsurface temperatures.
- Adjustments of system controls to optimize VR pressures and flow.
- Measurement of LNAPL thickness in the OWS and transfer of the LNAPL to the storage tank.
- Inspection and maintenance of equipment based on manufacturer's recommendations.
- Implementation of voltage surveys, including mitigation as required.
- Operation of security equipment.

The ERH system became fully operational on June 8, 2018. Subsurface temperatures began to rise steadily approximately 0.5 to 2 degrees Celsius (^{o}C) per day. The average subsurface temperature prior to heating was 14 ^{o}C and the maximum average temperature achieved was 104 ^{o}C on September 16, 2018. A plot of temperature versus time for the 18 TMPs is included as Appendix C in TRS's Final Report (Appendix F). System operation was suspended from August 7 to 24, 2018 for unscheduled maintenance related to significant LNAPL recovery. A decrease in the subsurface temperatures during this period can be observed in the temperature plot.

In general, the ERH system operated as designed. Historically-high rainfall that occurred between construction of the electrodes and beginning of system operation increased the water table elevation an estimated four to six feet (i.e., the depth to groundwater could not be measured during heating of the subsurface due to safety concerns; the estimate is based on groundwater elevations in the northern area of the Site). The VR points were installed approximately four feet above the top of the electrodes, which was the approximate depth of the water table at the time of installation. Because of the water table rise, some VR point screens likely intercepted the water table which lead to an increased recovery of groundwater and LNAPL by the VR system. Groundwater and LNAPL were processed through the condenser units and routed to the OWS. The OWS contained compartments with weirs that allowed for the underflow of water to the second chamber, with the LNAPL being contained in the first chamber. Due to the amount of LNAPL being recovered during operation, a 15,000-gallon double-walled storage tank was mobilized to the Site in early August 2018. LNAPL was periodically transferred from the OWS to the tank for storage until the LNAPL could be removed for proper disposal (see Section 3.5).

Collection of confirmation saturated soil, groundwater, and LNAPL samples was performed on several successive occasions during the ERH remediation. As portions of the treatment area achieved the RAO, based on 95 percent reduction in total or averaged TCE concentrations, areas of electrodes were de-energized to focus the treatment on areas where the RAO had not yet been achieved. On October 3, 2018, 110 electrodes in the northern and western/southwestern areas were de-energized. On October 22, 2018, 34 additional electrodes in the north-central area were de-energized. On November 10, 2018 the remaining electrodes were de-energized for groundwater sampling that was conducted on November 12, 2018. The results of the November 12, 2018 groundwater sampling indicated that the RAO had been achieved, so the electrodes remained de-energized and the remediation was deemed complete.

The Final RD estimated that 8,250,000 kWh of electricity applied to the subsurface would be required to remediate the treatment volume. A total of 8,842,536 kWh was applied to the treatment volume from June 8 to November 10, 2018. This increase in required electricity was primarily due to the increase in treatment volume and re-establishing temperature loss from the unscheduled maintenance-related downtime in August 2018.

3.2 MONITORING

Samples were collected during operation of the ERH system for system performance monitoring, remediation performance monitoring, and health and environmental-related monitoring, as follows:

- System performance monitoring included the collection air samples for chemical analysis to monitor the performance of the vapor and liquid treatment systems.
- Remediation performance monitoring included collection of samples for chemical analysis to determine whether the RAO has been achieved (described in Section 4.0).
- Health and environmental protection-related monitoring included collection of air samples to monitor ambient conditions at the property boundary.

Data quality procedures were described in the ERH Remedial Action Work Plan Quality Assurance Project Plan (QAPP), dated January 17, 2018.

3.3 WASTEWATER DISCHARGE

Wastewater samples were collected monthly during ERH treatment system operation to evaluate compliance with the MSD wastewater pretreatment permit, as described in Section 2.6. Water/condensate treatment samples were collected upstream of the OWS (monitoring point MP-01) and downstream of the LGAC (monitoring point MP-03). Water samples were also collected from the acid gas scrubber discharge (monitoring point MP-04B). The water samples were submitted for analysis of VOCs and SVOCs according to USEPA Methods 8260 and 8270, respectively. The samples were submitted for a Level II data package, as data validation of the analytical results was not required by MSD. Monthly pH and total flow readings were also recorded.

In general, the removal efficiency of the water/condensate treatment system was greater than the permit limit of 95 percent for the constituents detected. Analytical results of influent/effluent samples collected on July 20, 2018 from the water/condensate treatment system indicated an acetone removal efficiency of 44 percent. Acetone and other ketone compounds are typically generated during heating. When the subsurface is heated, many of the naturally-occurring total organic carbon (TOC) long chain humic acids break apart into smaller compounds with greater water solubility. Heating speeds the conversion of TOC into dissolved organic carbon (DOC). When TOC is broken apart into simpler molecules, most of the DOC consists of unregulated compounds. However, about one percent of the DOC consists of acetone and other ketones, such as 2-butanone and 2-hexanone. Because of the high solubility of ketone compounds, they are not effectively removed via LGAC. MSD was notified of the acetone exceedance and subsequently revised the permit (effective date of August 30, 2018) to indicate a maximum acetone discharge concentration of 25 mg/L. Acetone concentrations did not exceed 25 mg/L in influent/effluent samples for the remainder of ERH system operation.

The results of the October 19 and November 15, 2018 water/condensate influent and effluent samples indicated a 2-butanone removal efficiency of 79 and 80 percent, respectively. MSD was notified of these exceedances. MSD did not require additional sampling or mitigation measures regarding the 2-butanone removal efficiencies.

The acid gas scrubber water effluent results were used to determine if concentrations of total VOCs or SVOCs were less than 100 μg/L. Analytical results of the acid gas scrubber effluent sample collected on July 20, 2018 indicated a total SVOC concentration of 121.4 ug/L. MSD was notified of the exceedance and requested that a second effluent sample be collected. A second effluent sample was collected on July 30, 2018, and the total SVOC concentration was 58.5 μg/L, which was compliant with the permit. The remainder of the acid gas scrubber water discharge samples were compliant with the acetone permit limit and the VOC/SVOC total concentration permit limits.

The pH readings ranged between 6.2 and 8.1 during system operation. Approximately 1,344,134 gallons of treated wastewater were discharged to the MSD system. The wastewater discharge pretreatment permit expired on December 31, 2018.

The analytical reports for the wastewater discharge monitoring are included in Appendix G and the summary tables that were submitted to MSD are included in Appendix H.

3.4 VAPOR DISCHARGE

Although a permit was not required for the air/vapor discharge or perimeter air conditions, air samples were collected to evaluate compliance with Western North Carolina Regional Air Quality Agency (WNCRAQA) regulations.

Influent and effluent vapor samples were collected from the vapor treatment system on a bi-weekly or weekly basis during heating operations (23 sampling events). Influent samples were collected from the vapor piping upstream of the RTO and effluent samples were collected from the discharge stack on the acid gas scrubber. The samples were submitted for analysis of VOCs according to EPA Method TO-15. The samples were submitted for a Level II data package, as data validation of the analytical results was not warranted. The analytical reports for the vapor sampling are included in Appendix I and Table 4 contains a summary of the analytical results.

The influent VOC data was used to calculate the vapor phase TCE/VOC mass extracted from the subsurface. The effluent VOC data were used to calculate the vapor phase TCE/VOC mass being discharged to ambient air to determine if the mass being discharged was in compliance with the WNCRAQA annual maximum discharge of 4,000 pounds of TCE and 10,000 pounds of total VOCs.

Based on the analytical results and operational parameters, approximately 5,645 pounds of TCE and 7,550 pounds of total VOCs (including TCE) were removed from the subsurface in the vapor phase. The TCE treatment rate by the RTO (difference between influent and effluent concentrations) was approximately 97 percent. Based on the TCE treatment rate by the RTO and the subsurface contaminant mass removal estimates, discharge from the system was in compliance with the WNCRAQA regulations.

3.5 LNAPL ACCUMULATION AND DISPOSAL

During operation of the ERH system, LNAPL was extracted via the VR system. The LNAPL accumulated in the OWS and was periodically transferred to a storage tank for temporary accumulation/storage. A biological material also accumulated in the OWS. Samples of the LNAPL and biological material were collected and submitted for the following characterization analyses:

- VOCs according to USEPA Method 8260
- SVOCs according to USEPA Method 8270
- Percent water according to ASTM D4017
- Flashpoint according to USEPA Method 1010A
- Heat of combustion according to ASTM D240-87

The analytical reports for the characterization samples are included in Appendix D. The LNAPL was transferred from the storage tank to a vacuum tanker truck on three occasions for off-site transport. The LNAPL was used in an incineration process as a petroleum fuel. The waste manifests are included in Appendix E. The biological material was removed when the OWS and storage tank were cleaned, as described in Section 5.0. Approximately 14,300 gallons of LNAPL were removed from the subsurface.

3.6 AMBIENT AIR MONITORING

Ambient air was monitored at four locations near the perimeter of the Site (Figure 5). The air monitors consisted of a calibrated PID that measured total VOCs in the ppb range. The PIDs took a reading every minute and uploaded the data to a website via a telemetry system. The readings were remotely observed and downloaded.

The WNCRAQA regulations do not have a short-term/acute limit for total VOCs in ambient air. However, the limit for TCE in ambient air at the property boundary is 59 micrograms per cubic meter (µg/m^3 or 11 ppb) on an annual averaged basis. For this project, the 24-hour average was calculated by the PID and monitored electronically via the website. If the 24-hour average value exceeded 11 ppb, efforts to determine the source of the elevated PID readings were conducted. The air monitoring data was considered screening level data and was not used to determine compliance with a regulation.

The daily total VOC average was calculated and submitted to USEPA in weekly Data Transmittals (see table below). The maximum 24-hour PID reading was 11 ppb at the western PID (AAS-22) on August 29, 2018. This reading was likely due to maintenance activities being conducted at the OWS, which was located approximately 75 feet from AAS-22. The majority of the PID readings, when detected, were less than 1 ppb.

Ambient Air Monitoring Data Transmittals

Sampling Period	Transmittal Date	Sampling Period	Transmittal Date
6/8/18 – 6/17/18	6/26/18	9/3/18 – 9/9/18	9/12/18
6/18/18 – 6/24/18	6/26/18	9/10/18 – 9/16/18	9/19/18
6/25/18 – 7/1/18	7/5/18	9/17/18 – 9/23/18	10/3/18
7/2/18 – 7/8/18	7/10/18	9/24/18 – 9/30/18	10/5/18

Sampling Period	Transmittal Date	Sampling Period	Transmittal Date
7/9/18 – 7/15/18	7/18/18	10/1/18 – 10/7/18	10/19/18
7/16/18 – 7/22/18	7/25/18	10/8/18 – 10/14/18	10/19/18
7/23/18 – 7/29/18	8/2/18	10/15/18 – 10/21/18	10/30/18
7/30/18 – 8/5/18	8/9/18	10/22/18 – 10/28/18	11/8/18
8/6/18 – 8/12/18	8/16/18	10/29/18 – 11/4/18	11/8/18
8/13/18 – 8/19/18	8/23/18	11/5/18 – 11/11/18	11/19/18
8/20/18 – 8/26/18	8/30/18	11/12/18 – 11/16/18	11/28/18
8/27/18 – 9/2/18	9/6/18		

3.7 AMBIENT AIR SAMPLING

Ambient air samples were collected at the four air monitoring stations to determine compliance with the WNCRAQA regulation of an annualized average TCE concentration of 59 µg/m^3 at the property boundary. Baseline ambient air samples were collected prior to operation of the ERH system on June 7, 2018. Ambient air samples were collected every two weeks during initial ERH system operation and collected weekly during peak subsurface heating. Ambient air samples were also collected two weeks after peak heating. Ten ambient air sampling events were conducted, including the baseline sampling event.

Ambient air samples were collected over a 24-hour period and submitted for analysis of VOCs according to EPA Method TO-15. The samples were submitted for a Level IV data package and data validation of the analytical results was performed.

Results of the ambient air sampling events, including the analytical and data validation reports, were submitted to USEPA in Data Transmittals. The minimum and maximum TCE concentrations detected in ambient air samples collected at the property boundary were 0.11 µg/m^3 (estimated) and 15 µg/m^3, respectively. Based on the ambient air sampling results, the vapor discharge from the ERH system was in compliance with the WNCRAQA regulation. The following Data Transmittals were submitted to USEPA:

- ERH Ambient Air Sampling (June 7, 2018), dated July 31, 2018

- ERH Ambient Air Sampling (June 21, 2018), dated August 21, 2018
- ERH Ambient Air Sampling (July 6, 2018), dated August 29, 2018
- ERH Ambient Air Sampling (July 19, 2018), dated August 29, 2018
- ERH Ambient Air Sampling (July 27, 2018), dated September 19, 2018
- ERH Ambient Air Sampling (August 3, 2018), dated October 22, 2018
- ERH Ambient Air Sampling (August 31, 2018), dated November 28, 2018
- ERH Ambient Air Sampling (September 6, 2018), dated November 28, 2018
- ERH Ambient Air Sampling (September 13, 2018), dated November 28, 2018
- ERH Ambient Air Sampling (October 2, 2018), dated December 3, 2018

3.8 USEPA OVERSIGHT ACTIVITIES

The USEPA provided oversight of the ERH system construction and operation activities. The USEPA Remedial Project Manager visited the Site thirteen times during the construction and operation activities, including during the shakedown testing period of the system construction, and at the completion of system construction and initial system operation. USEPA Public Relations personnel also visited the Site six times to conduct meetings with community members and media outlets. USEPA did not collect environmental samples associated with construction or operation of the ERH system.

3.9 SAFETY

Safety procedures contained in the Site Health and Safety Plan were followed during the Interim RA construction and operation activities. There were no Occupational Safety and Health Administration recordable incidents, or releases of material/chemicals to the environment/community which required a response.

4.0 CONFIRMATION SAMPLING ACTIVITIES AND RESULTS

The following sections describe the confirmation sampling activities and results. Table 5 contains a summary of the confirmation samples collected.

4.1 SOIL

Confirmation samples were collected on September 24 and 25, 2018 in accordance with the ERH Remedial Action Work Plan. Soil borings were advanced within two feet of the baseline soil sampling locations and soil samples were collected at approximately the same depth of the baseline soil samples. A soil sample was not collected at the location/depth of baseline soil sample SS-115-41 due to shallow refusal of the drilling equipment. The soil sample locations and results are depicted in Figure 6 and the analytical reports are included in Appendix J.

A summary of the baseline and confirmation soil analytical results is contained in Table 6. TCE concentrations in the confirmation soil samples ranged from non-detect (i.e., not detected above the method detection limit, or MDL) to 17,700 micrograms per kilogram (μg/kg; SS-118-34B). The average soil confirmation TCE concentration was 1,318 μg/kg (Note: where TCE was non-detect, one-half of the MDL concentration was used to calculate the average confirmation soil concentration). Using the average baseline and the average confirmation TCE concentrations in soil, the percent reduction of the TCE concentration in soil is 97.8 percent.

4.2 LNAPL

Samples of LNAPL were collected from monitoring wells MW-12 and MW-14 prior to startup of the ERH system. An attempt to collect confirmation LNAPL samples was made on September 25, 2018 in accordance with the ERH Remedial Action Work Plan. A stainless-steel bailer was lowered into the monitoring wells and the purged water was placed in a glass jar to determine if LNAPL was present. LNAPL was not present in groundwater purged from MW-14. A minor amount of LNAPL was observed in groundwater purged from MW-12, but the amount was not sufficient for sample collection and analysis.

4.3 GROUNDWATER

Groundwater samples were collected on four occasions (September 18 and 19, 2018, October 8, 2018, October 22, 2018, and November 12, 2018). Table 3 contains a summary of monitoring well construction details. The monitoring well locations and groundwater results are depicted in Figure 7 and the analytical reports are included in Appendix K.

Groundwater samples were collected in accordance with the ERH Remedial Action Work Plan with the following deviations. During the baseline groundwater sampling, dedicated Teflon tubing was placed in the monitoring wells with the tubing intake at the approximate depth of the middle of the wetted screened interval. During confirmation groundwater sampling, the depth to groundwater decreased in some monitoring wells and the tubing had to be lowered for purging and collection of a groundwater sample. Also, during purging of some wells, LNAPL was produced. In such cases, groundwater was purged into a glass jar, and the groundwater sample was collected by placing the tubing below the LNAPL in the jar and pumping the sample into the appropriate sample containers. The groundwater sampling field data records are included in Appendix B.

A summary of the baseline and confirmation groundwater analytical results is contained in Table 7. TCE concentrations in the confirmation groundwater samples ranged from 22.6 µg/L (MW-3) to 3,250 µg/L (MW-29). The average groundwater confirmation TCE concentration was 736 µg/L. Using the average baseline and the average confirmation TCE concentrations in groundwater, the percent reduction of the TCE concentration in groundwater is 95.5 percent

4.4 DATA VALIDATION

Data validation was conducted based on procedures in the USEPA Region 4 Data Validation Standard Operating Procedures for Organic Analysis (USEPA, 2016), in conjunction with USEPA Method 8260B, and the ERH Remedial Action Work Plan QAPP. Full validation, including raw data verification and calculation checks, was completed on the laboratory data. The data validation narratives for the soil and groundwater samples are included in Appendix L and M, respectively.

Due to a laboratory error, percent moisture analyses were not completed for soil samples in sample delivery group (SDG) 92400561 and sample results were reported on a wet weight basis (i.e., versus a dry weight basis). Results for soil samples in SDG 92400561 were qualified estimated (J/UJ) and represent low biased results. Using the maximum percent moisture of soil samples in the other SDGs to calculate an adjusted worst-case concentration for the soil samples in SDG 92400561, the percent reduction of TCE concentrations in soil did not change.

Results for TCE in groundwater samples collected from monitoring wells MW-30 (collected October 22, 2018), MW-30A (collected November 12, 2018), and the associated MW-30A field duplicate sample (FD-36), were qualified as estimated (J+) due to matrix spike recoveries greater than the 70-130 percent control limits. The TCE concentrations reported for groundwater MW-30A and FD-36 were used to calculate the average percent TCE concentration reduction. The TCE concentrations are biased high and would not decrease the percent TCE reduction in groundwater if there was not a quality control issue.

4.5 DATA USABILITY SUMMARY

The data set is considered to be 100 percent complete with respect to the collected data. Therefore, the data are usable for completing the objectives set forth in the ERH Remedial Action Work Plan.

4.6 RAO DETERMINATION

The average confirmation soil and groundwater analytical results were compared to the baseline results and the percent TCE reduction was calculated. The percent reduction of TCE in soil is 97.8 percent and the percent reduction of TCE in groundwater is 95.5 percent.

As described in the Interim Remedial Action Objective Determination Technical Memorandum, dated September 13, 2017, if sufficient LNAPL is not present in a monitoring well for confirmation sampling, the TCE concentration will be considered zero for averaging purposes. LNAPL confirmation samples were not collected due to LNAPL not being present in MW-14, and LNAPL not being present in sufficient quantity for sampling in MW-12. Therefore, the percent reduction of TCE in LNAPL is considered 100 percent.

Based on the TCE reductions of greater than 95 percent, the RAO has been achieved for the 1.2-acre source area. Table 8 contains a summary of the percent reductions for the three media.

4.7 TREATMENT VOLUME AND CONTAMINANT MASS REMOVED

The depth to auger refusal was generally less than anticipated in the western and southern portions of the treatment area, and generally greater than anticipated in the central, northern, and eastern portions of the treatment area., Due to two electrodes not being installed because of minimal saturated zone thickness, the treatment area decreased by approximately 490 square feet. The original treatment interval (thickness) was estimated to average 22.7 feet, and the original treatment volume was calculated to be 47,250 cubic yards. Using the actual average constructed treatment interval of 26.2 feet, and an area of 55,610 square feet, the calculated treatment volume was slightly greater than originally anticipated at approximately 53,960 cubic yards.

Based on the analytical results of influent samples (prior to treatment), analytical results of LNAPL, and ERH treatment system operational parameters, approximately 6,041 pounds of TCE were removed from the subsurface, as indicated in the table below.

TCE Removal during ERH Interim RA

Source	TCE Removed (pounds)
Vapor	5,645
Condensate	81
LNAPL	315
Total	**6,041**

Also, approximately 14,300 gallons of LNAPL were removed from the subsurface.

5.0 SYSTEM SHUTDOWN AND DEMOBILIZATION

Subsurface heating operations ceased on November 10, 2018, and the water and vapor treatment equipment ceased operation on November 15, 2018. The aboveground piping and wiring were substantially removed by November 21, 2018. The treatment system equipment was cleaned, and rinse water was transferred to the OWS. The temporary fence installed on the property to the east was reinstalled at the original location on November 28, 2018. Excess sodium hydroxide from the acid gas scrubber, ethylene glycol from the PCUs, and non-hazardous soil cuttings from installation of the additional VR point were removed on December 19, 2018 for transport and disposal. Appendix E contains the completed waste manifests.

The OWS and LNAPL storage tank were pumped out and cleaned on January 3, 2019. The VR points and TMP casings were abandoned in place with grout on January 8 through 10, 2019. Aboveground equipment was removed from the Site by January 18, 2019. A final Site walkover to verify the Site had been returned to pre-remediation conditions was conducted by Wood and TRS personnel on January 24, 2019.

A final waste pickup was conducted on February 27, 2019. The waste included LNAPL, rinse water from cleaning the OWS, and biological material from the OWS. Two of the completed manifests are included in Appendix E. One of the completed manifests has not been received as of the date of this report. When the completed manifest is received, it will be included in a monthly progress report.

6.0 INTERIM REMEDIAL ACTION COMPLETION AND CERTIFICATIONS

The RAO of a 95 percent reduction of TCE concentrations in saturated soil, groundwater, and LNAPL has been achieved based on sampling analysis comparison between pre- and post-Interim Remedial Action conditions. The ERH Interim Remedial Action has been completed in full satisfaction of the requirements of the Consent Decree. The Settling Defendants request that USEPA schedule the Work Completion Inspection required by Section 4.8(a) of the CD SOW and issue a Certification of Remedial Action Completion under Section 4.6(d) of the CD SOW for the ERH Interim Remedial Action.

As required by Section 4.6(b) of the CD SOW, below are the required Certifications by the Settling Defendants' responsible official and the Supervising Contractor.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

For the Settling Defendants:

Andrew Warren

Andrew Warren, CTS Corporation
Deputy General Counsel
Responsible Official

For the Supervising Contractor

Matthew E. Wallace

____

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8.0 REFERENCES

Wood Environment & Infrastructure Solutions, Inc. (Wood), 2014. NAPL Investigation Report, CTS of Asheville, Inc. Superfund Site (May 5, 2014).

Wood, 2015a. Final NAPL Area Focused Feasibility Study Report, CTS of Asheville, Inc. Superfund Site, September 10, 2015.

Wood, 2015b. NAPL Area Focused Feasibility Study Report Addendum, CTS of Asheville, Inc. Superfund Site, November 25, 2015.

Wood, 2018. ERH Remedial Action Report, August 7, 2018.

TABLES

TABLE 1
Chronology of Events Related to ERH Interim Remedial Action
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Date	Event
2/11/2016	Interim Action Record of Decision signed
3/7/2017	Consent Decree entered
4/19/2017	Remedial Design Work Plan submitted to USEPA
5/1/2017	Remedial Design Work Plan approved by USEPA
9/29/2017	ERH Preliminary Remedial Design submitted to USEPA
11/27/2017	ERH Final Remedial Design submitted to USEPA
12/7/2017	USEPA approval to begin ERH installation activities
12/11/2017 - 5/3/2018	Installation of subsurface components (electrodes, temperature monitoring points, monitoring wells)
12/18/2017	ERH Final Remedial Design approved by USEPA
1/17/2018	ERH Remedial Action Work Plan submitted to USEPA
2/16/2018	ERH Remedial Action Work Plan approved by USEPA
2/20/2018	ERH Performance Monitoring Well Construction Modifications Technical Memorandum submitted to USEPA
2/23/2018	USEPA approval of monitoring well construction modifications
2/26/2018	Begin installation of aboveground piping/cabling and connection of treatment equipment
3/5/2018 - 3/12/2018	Collect baseline soil samples
3/6/2018	Conduct the Preconstruction Conference at the Site
3/29/2018 - 4/4/2018	Collect baseline groundwater and LNAPL samples
5/14/2018 - 6/8/2018	Conduct testing of equipment (shakedown period) and Inspection of Constructed Remedy
5/22/2018	Begin continuous ambient air monitoring at the perimeter of the Site
6/1/2018	Interim Remedial Action Objective Values Technical Memorandum submitted to USEPA
6/4/2018	Interim Remedial Action Objective Values Technical Memorandum approved by USEPA
6/5/2018	Permit to Discharge Pretreated Wastewater from Groundwater Recovery issued
6/6/2018 - 6/7/2018	Collect baseline ambient air samples at the perimeter of the Site
6/8/2018	ERH system fully operational
6/11/2018	Collect influent/effluent vapor samples
6/14/2018	Collect influent/effluent vapor samples
6/18/2018	Collect influent/effluent vapor samples
6/20/2018 - 6/21/2018	Collect ambient air samples at the perimeter of the Site
6/21/2018	Collect influent/effluent vapor samples
6/21/2018	Collect aqueous samples from the wastewater treatment systems
6/25/2018	Collect influent/effluent vapor samples
7/2/2018	Collect influent/effluent vapor samples

TABLE 1
Chronology of Events Related to ERH Interim Remedial Action
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Date	Event
7/5/2018 - 7/6/2018	Collect ambient air samples at the perimeter of the Site
7/9/2018	Collect influent/effluent vapor samples
7/17/2018	Collect influent/effluent vapor samples
7/18/2018 - 7/19/2018	Collect ambient air samples at the perimeter of the Site
7/20/2018	Collect aqueous samples from the wastewater treatment systems
7/24/2018	Collect influent/effluent vapor samples
7/26/2018 - 7/27/2018	Collect ambient air samples at the perimeter of the Site
7/30/2018	Collect influent/effluent vapor samples
7/30/2018	Collect aqueous samples from the wastewater treatment systems
8/2/2018 - 8/3/2018	Collect ambient air samples at the perimeter of the Site
8/6/2018	Collect influent/effluent vapor samples
8/7/2018	ERH Remedial Action Report submitted to USEPA
8/7/2018 - 8/24/18	Electrodes de-energized for treatment system maintenance
8/24/2018	Collect influent/effluent vapor samples
8/24/2018	Collect aqueous samples from the wastewater treatment systems
8/28/2018	Collect aqueous samples from the wastewater treatment systems
8/31/2018	A revised version of the Permit to Discharge Pretreated Wastewater from Groundwater Recovery issued
8/30/2018 - 8/31/2018	Collect ambient air samples at the perimeter of the Site
9/4/2018	Collect influent/effluent vapor samples
9/5/2018 - 9/6/2018	Collect ambient air samples at the perimeter of the Site
9/10/2018	Collect influent/effluent vapor samples
9/10/2018 - 9/11/2018	Seven additional vapor recovery points installed
9/12/2018 - 9/13/2018	Collect ambient air samples at the perimeter of the Site
9/17/2018	Collect influent/effluent vapor samples
9/18/2018 - 9/19/2018	Collect confirmation groundwater samples (19 monitoring wells)
9/21/2018	Collect aqueous samples from the wastewater treatment systems
9/24/2018	Collect influent/effluent vapor samples
9/24/2018 - 9/25/2018	Collect confirmation soil samples (38 samples)
10/1/2018	Collect influent/effluent vapor samples
10/1/2018 - 10/2/2018	Collect ambient air samples at the perimeter of the Site
10/2/2018	110 electrodes de-energized
10/8/2018	Collect confirmation groundwater samples (6 monitoring wells)
10/9/2018	Collect influent/effluent vapor samples
10/15/2018	Collect influent/effluent vapor samples
10/19/2018	Collect aqueous samples from the wastewater treatment systems
10/22/2018	Collect confirmation groundwater samples (7 monitoring wells)
10/23/2018	Collect influent/effluent vapor samples

TABLE 1
Chronology of Events Related to ERH Interim Remedial Action
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Date	Event
10/26/2018	35 electrodes de-energized
10/29/2018	Collect influent/effluent vapor samples
10/29/2018	4,880 gallons of LNAPL removed by waste contractor
11/5/2018	Collect influent/effluent vapor samples
11/8/2018	5,050 gallons of LNAPL removed by waste contractor
11/12/2018	Collect influent/effluent vapor samples
11/10/2018	Remaining 82 electrodes de-energized
11/12/2018	Collect confirmation groundwater samples (4 monitoring wells)
11/15/2018	Collect aqueous samples from the wastewater treatment systems
11/15/2018	Vapor/liquid treatment systems turned off
11/16/2018	Ambient air meters turned off and removed
11/15/2018 - 1/24/2019	Demobilization activities
11/27/2018	3,850 gallons of LNAPL removed by waste contractor
2/27/2019	Waste from oil-water separator transported off-site for disposal

Prepared By: SEA 2/18/19
Checked By: GLH 3/12/19

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
B-12	2/1/2018	V	2	24	24	62.5	38.5
B-13	1/31/2018	V	2	24	24	70	46
C-11	2/13/2018	V	2	24	24	59.5	35.5
C-12	2/13/2018	V	2	24	24	62	38
C-13	2/14/2018	V	2	24	24	63	39
C-14	2/15/2018	V	2	24	24	63.5	39.5
D-11	2/12/2018	V	2	24	24	61.5	37.5
D-12	2/8/2018	V	2	24	24	60	36
D-13	2/6/2018	V	2	24	24	60.5	36.5
D-14	2/5/2018	V	2	24	24	62	38
D-15	2/2/2018	V	2	24	24	61	37
E-11	1/18/2018	V	2	24	24	60	36
E-12	1/17/2018	V	2	24	24	60	36
E-13	1/16/2018	V	2	24	24	60	36
E-14	1/16/2018	V	2	24	24	61	37
E-15	1/15/2018	V	2	24	24	60	36
F-11	1/19/2018	V	2	24	24	60	36
F-12	1/22/2018	V	2	24	24	61	37
F-13	1/23/2018	V	2	24	24	60	36
F-14	1/23/2018	V	2	24	24	60	36
F-15	1/24/2018	V	2	24	24	60	36
F-16	1/25/2018	V	2	24	24	65	41
G-11	1/11/2018	V	2	23	23	62	39
G-12	1/10/2018	V	2	23	23	61	38
G-13	12/15/2017	V	2	23	23	54	31
G-14	12/14/2017	V	2	23	23	57	34
G-15	12/13/2017	V	2	19	19	68	49
H-11	1/9/2018	V	2	23	23	68	45
H-12	1/9/2018	V	2	23	23	60	37
H-13	1/5/2018	V	2	23	23	55	32
H-14	1/4/2018	V	2	23	23	60	37
H-15	1/3/2018	V	2	23	23	61	38
J-11	12/13/2017	V	2	19	19	70	51
J-12	12/14/2017	V	2	23	23	70	47
J-13	1/10/2018	V	2	23	23	61	38
J-14	1/9/2018	V	2	23	23	73	50
J-14R	6/26/2018	V	2	23	23	73	50
J-15	1/9/2018	V	2	23	23	63	40
K-10	2/13/2018	V	2	20	20	70	50
K-11	2/14/2018	V	2	21	21	65	44

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
K-12	2/15/2018	V	2	22	22	68	46
K-13	2/19/2018	V	2	22	22	66	44
K-14	2/20/2018	V	2	22	22	59.5	37.5
K-15	2/20/2018	V	2	22	22	65	43
L-4	12/21/2017	V	2	18	17.9	62.5	44.5
L-5	1/11/2018	V	2	18.5	18.5	47	28.5
L-6	12/13/2017	V	2	17	16.4	45	28
L-7	12/14/2017	V	2	20	19.7	50.5	30.5
L-8	12/15/2017	V	2	19	19	51.5	32.5
L-9	1/26/2018	V	2	20	20	55	35
L-10	1/30/2018	V	2	20	20	51	31
L-11	2/2/2018	V	2	21	21	55	34
L-12	2/5/2018	V	2	21	21	57	36
L-13	2/12/2018	V	2	22	22	75	53
L-14	2/8/2018	V	2	21.9	21.9	63	41.1
M-4	12/19/2017	V	2	19	19	46	27
M-5	1/2/2018	V	2	19	19	46	27
M-6	1/15/2018	V	1	19	19	43.5	24.5
M-7	12/15/2017	V	2	18.7	18.7	46.5	27.8
M-8	1/3/2018	V	2	19	19	47	28
M-9	1/4/2018	V	2	19	19	57	38
M-10	1/29/2018	V	2	20	20	56	36
M-11	1/30/2018	V	2	20	20	57	37
M-12	2/6/2018	V	2	21	21	62.5	41.5
M-13	2/9/2018	V	2	21	21	69.5	48.5
M-14	2/6/2018	V	2	21	21	73.5	52.5
P-3	1/22/2018	V	1	18	18	40	22
P-4	2/22/2018	A (12^{o})	1	18	18	40.1	22.1
P-5	1/17/2018	V	2	18	18	41	23
P-6	1/16/2018	V	2	19	19	45	26
P-7	1/16/2018	V	2	19	19	43.5	24.5
P-8	1/5/2018	V	2	19	19	46	27
P-9	1/25/2018	V	2	19	19	49	30
P-10	1/11/2018	V	2	19	19	51	32
P-11	1/29/2018	V	2	20	20	52	32
P-12	1/31/2018	V	2	20	20	58	38
P-13	2/8/2018	V	2	20	20	60.5	40.5
P-14	2/6/2018	V	2	21	21	60.5	39.5
R-3	1/22/2018	V	1	18	18	33	15
R-4	1/23/2018	V	1	18	18	31.5	13.5

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
R-5	1/23/2018	V	1	18	18	31	13
R-6	1/24/2018	V	1	18	18	33	15
R-7	1/24/2018	V	1	18.5	18.5	36	17.5
R-8	1/10/2018	V	2	19	19	45.5	26.5
R-9	1/9/2018	V	2	18.3	18.3	44.5	26.2
R-10	1/9/2018	V	2	18.4	18.4	48	29.6
R-11	1/5/2018	V	2	19	19	49.5	30.5
R-12	1/31/2018	V	2	19	19	51	32
R-13	2/6/2018	V	2	20	20	56.5	36.5
R-14	2/5/2018	V	2	20	20	56	36
S-2	1/30/2018	V	1	17	17	29.5	12.5
S-3	1/29/2018	V	1	17	16	29.5	12.5
S-4	1/26/2018	V	1	18	18	30.5	12.5
S-5	1/26/2018	V	1	18	18	28.5	10.5
S-6	1/25/2018	V	1	18	18	34.5	16.5
S-7	1/25/2018	V	1	18	18	32	14
S-8	1/25/2018	V	1	18	18	33	15
S-9	12/22/2017	V	1	19	19	39	20
S-10	12/14/2017	V	1	19	19	42	23
S-11	12/13/2017	V	2	18	18	46.5	28.5
S-12	12/13/2017	V	2	17	16.2	48	31
S-13	2/1/2018	V	2	19	19	50.5	31.5
S-14	1/31/2018	V	2	20	20	50.5	30.5
S-15	2/21/2018	V	2	20	20	52.5	32.5
S-19	12/13/2018	V	2	19.5	19.5	47	27.5
S-20	2/20/2018	V	2	19.5	19.5	52	32.5
S-21	3/26/2018	V	2	20	20	60	40
S-22	3/27/2018	V	2	25	25	65	40
T-2	12/19/2017	V	1	17	14.6	24.5	7.5
T-3	12/22/2018	V	1	17	13.9	24	7
T-4	2/2/2018	V	1	17	14	28	11
T-5	1/30/2018	V	1	17	15.5	25.5	8.5
T-6	1/19/2018	V	1	18	14	24	6
T-7	1/19/2018	V	1	18	17.8	31	13
T-8	2/1/2018	V	1	18	18	32	14
T-9	1/12/2018	V	1	18	17.8	35.5	17.5
T-10	1/2/2018	V	1	19	19.1	40.5	21.5
T-11	1/3/2018	V	1	19	19	43	24
T-12	1/4/2018	V	1	19	19	41.5	22.5
T-13	2/19/2018	V	2	19	19	46	27

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Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
T-14	1/30/2018	V	2	19	19	47.5	28.5
T-15	2/8/2018	V	2	19	19	46	27
T-16	2/8/2018	V	2	20	20	48	28
T-17	2/16/2018	V	1	20	20	35	15
T-18	2/12/2018	V	2	20	20	48	28
T-19	2/13/2018	V	2	21	21	44	23
T-20	2/20/2018	V	2	20	20	49	29
T-21	3/26/2018	V	2	22	22	53	31
T-22	3/21/2018	V	2	21	21	60	39
T-23	3/28/2018	A (5^o)	2	24	24	60.8	36.8
T-24	4/2/2018	A (19^o)	2	29	29	62.4	33.4
V-3	12/21/2017	A (41^o)	1	17	10.9	18.9	1.9
V-4	1/3/2018	A (45^o)	1	17	10.8	19.1	2.1
V-5	1/17/2018	V	1	17	14	25.5	8.5
V-6	1/18/2018	V	1	17	15	25.5	8.5
V-7	1/18/2018	V	1	18	17	30	12
V-8	1/31/2018	V	1	18	18	30	12
V-9	1/31/2018	V	1	18	18	34	16
V-10	2/2/2018	V	1	18	18	38	20
V-11	1/22/2018	V	1	18	18	41.5	23.5
V-12	2/2/2018	V	1	18	18	40	22
V-13	1/18/2018	V	1	18	17.8	44	26
V-14	1/29/2018	V	2	17	17	49	32
V-15	2/19/2018	V	1	18	18	37	19
V-16	2/16/2018	V	1	19	19	30.5	11.5
V-17	2/16/2018	V	1	20	20	30.5	10.5
V-18	2/19/2018	V	1	20	20	37	17
V-19	2/20/2018	V	1	20	20	45	25
V-20	3/28/2018	V	1	20	20	46	26
V-21	3/28/2018	V	2	22	22	51	29
V-22	3/22/2018	V	2	21	21	58	37
V-23	3/20/2018	A (13^o)	2	21	21	59.4	38.4
V-24	4/3/2018	A (24^o)	2	25	25	60.3	35.3
V-25	3/28/2018	A (34^o)	2	30	30	68.8	38.8
W-5	2/14/2018	A (32^o)	1	17	15.5	23.7	6.7
W-6	1/22/2018	V	1	16	15	25	9
W-7	1/22/2018	V	1	17	15.5	25.5	8.5
W-8	1/22/2018	V	1	17	16.9	27	10
W-9	1/31/2018	V	1	18	18	34	16
W-10	1/30/2018	V	1	18	18	37	19

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
W-11	1/29/2018	V	1	18	17.7	39	21
W-12	1/29/2018	V	1	18	18	43	25
W-13	1/5/2018	V	1	18	18.1	36	18
W-14	1/19/2018	V	1	18	18	40	22
W-15	2/9/2018	V	1	18	18	40.5	22.5
W-16	2/14/2018	V	1	18	18	42.5	24.5
W-17	2/14/2018	V	1	19	19	42	23
W-18	1/24/2018	V	1	19	19	36	17
W-19	1/25/2018	V	1	19	18.7	45	26
W-20	4/2/2018	V	2	21	21	50	29
W-21	3/28/2018	V	2	23	23	54	31
W-22	3/19/2018	V	2	22	22	60	38
W-23	4/18/2018	A (21^{o})	2	25	25	53.2	28.2
W-24	4/4/2018	A (31^{o})	2	25	25	55.7	30.7
W-25	5/2/2018	A (43^{o})	2	30	30	55.7	25.7
W-26	5/2/2018	A (45^{o})	2	30	30	55.2	25.2
X-6	1/11/2018	V	1	16	14.9	27	11
X-7	1/11/2018	V	1	16	15.9	30	14
X-8	1/12/2018	V	1	17	17	33	16
X-9	1/15/2018	V	1	17	17	36	19
X-10	2/5/2018	V	1	17	17	40	23
X-11	2/6/2018	V	1	17	17.2	40	23
X-12	2/6/2018	V	1	18	18	30	12
X-13	2/8/2018	V	1	18	18	39	21
X-14	1/9/2018	V	1	18	17.9	40	22
X-15	2/8/2018	V	1	18	18	39	21
X-16	1/23/2018	V	1	18	17.9	31.5	13.5
X-17	1/24/2018	A (15^{o})	1	18	17.4	33.8	15.8
X-18	1/25/2018	A (23^{o})	1	18	16.7	36.8	18.8
X-19	4/5/2018	V	2	20	20	46	26
X-20	4/3/2018	V	2	23	23	50	27
X-21	4/2/2018	V	2	24	24	56	32
X-22	3/26/2018	A (8^{o})	2	22	22	63.4	41.4
X-23	3/27/2018	A (18^{o})	2	27	25.7	62.8	35.8
X-24	4/12/2018	A (33^{o})	2	28	28	54.5	26.5
X-25	4/17/2018	A (45^{o})	2	27	27	43.8	16.8
X-26	4/17/2018	A (45^{o})	2	31	31	53	22
Y-8	1/16/2018	A (21^{o})	1	16	16	31.7	15.7
Y-9	1/16/2018	A (15^{o})	1	16.5	16.5	26.6	10.1
Y-10	1/23/2018	V	1	17	15	25	8

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
Y-11	1/10/2018	A (11^o)	1	17	17	27	10
Y-12	1/10/2018	A (9^o)	1	17	17	29.1	12.1
Y-13	12/19/2017	A (10^o)	1	17	16.5	34.5	17.5
Y-14	1/4/2018	A (15^o)	1	17	10.3	20.3	3.3
Y-15	1/4/2018	A (24^o)	1	17	9	18.3	1.3
Y-16	1/26/2018	A (23^o)	1	17	15.6	26.7	9.7
Y-17	3/19/2018	V	1	27	27	41.5	14.5
Y-18	3/20/2018	V	1	25	25	41	16
Y-19	4/5/2018	V	1	24	24	46	22
Y-20	4/4/2018	V	1	25	25	50	25
Y-21	4/3/2018	V	1	25	25	55	30
Y-22	3/21/2018	A (15^o)	2	22	22	65.7	43.7
Y-23	3/22/2018	A (28^o)	2	22	19.4	66.2	44.2
Y-24	4/11/2018	A (35^o)	2	26	26	50	24
Y-25	4/11/2018	A (45^o)	1	28	28	40	12
Y-26	4/30/2018	A (45^o)	1	30	30	43.8	13.8
Z-11	2/26/2018	A (17^o)	1	17	14	23.9	6.9
Z-12	2/23/2018	A (20^o)	1	17	14.5	23.5	6.5
Z-13	2/22/2018	A (17^o)	1	25	25	40.2	15.2
Z-14	2/20/2018	A (11^o)	1	30	22	44.7	14.7
Z-15	2/19/2018	V	1	30	22	38.5	8.5
Z-16	2/15/2018	V	1	33	29.5	39.5	6.5
Z-17	2/19/2018	V	1	31.5	31.5	45	13.5
Z-18	3/20/2018	V	1	27	27	40	13
Z-19	4/4/2018	V	1	25	25	45	20
Z-20	4/4/2018	V	1	25	25	50	25
AA-18	3/20/2018	V	1	28	28	40	12
AA-19	4/4/2018	V	1	28	28	44	16

Notes:
1. Depths are the vertical depth from ground surface.
2. V - vertical boring; A - angled boring (the indicated angle is relative to vertical).
3. The treatment thickness is the distance between the assumed water table depth and bottom of the conductive interval.

Prepared By: SEA 7/25/18
Checked By: GLH 7/25/18

TABLE 2
Summary of Electrode Installations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Electrode ID	Date Installed	Vertical or Angled	Number of Elements	Assumed Water Table Depth (feet bgs)	Top of Conductive Interval (feet bgs)	Bottom of Conductive Interval (feet bgs)	Treatment Thickness (feet)
Y-11	1/10/2018	A (11^o)	1	17	17	27	10
Y-12	1/10/2018	A (9^o)	1	17	17	29.1	12.1
Y-13	12/19/2017	A (10^o)	1	17	16.5	34.5	17.5
Y-14	1/4/2018	A (15^o)	1	17	10.3	20.3	3.3
Y-15	1/4/2018	A (24^o)	1	17	9	18.3	1.3
Y-16	1/26/2018	A (23^o)	1	17	15.6	26.7	9.7
Y-17	3/19/2018	V	1	27	27	41.5	14.5
Y-18	3/20/2018	V	1	25	25	41	16
Y-19	4/5/2018	V	1	24	24	46	22
Y-20	4/4/2018	V	1	25	25	50	25
Y-21	4/3/2018	V	1	25	25	55	30
Y-22	3/21/2018	A (15^o)	2	22	22	65.7	43.7
Y-23	3/22/2018	A (28^o)	2	22	19.4	66.2	44.2
Y-24	4/11/2018	A (35^o)	2	26	26	50	24
Y-25	4/11/2018	A (45^o)	1	28	28	40	12
Y-26	4/30/2018	A (45^o)	1	30	30	43.8	13.8
Z-11	2/26/2018	A (17^o)	1	17	14	23.9	6.9
Z-12	2/23/2018	A (20^o)	1	17	14.5	23.5	6.5
Z-13	2/22/2018	A (17^o)	1	25	25	40.2	15.2
Z-14	2/20/2018	A (11^o)	1	30	22	44.7	14.7
Z-15	2/19/2018	V	1	30	22	38.5	8.5
Z-16	2/15/2018	V	1	33	29.5	39.5	6.5
Z-17	2/19/2018	V	1	31.5	31.5	45	13.5
Z-18	3/20/2018	V	1	27	27	40	13
Z-19	4/4/2018	V	1	25	25	45	20
Z-20	4/4/2018	V	1	25	25	50	25
AA-18	3/20/2018	V	1	28	28	40	12
AA-19	4/4/2018	V	1	28	28	44	16

Notes:
1. Depths are the vertical depth from ground surface.
2. V - vertical boring; A - angled boring (the indicated angle is relative to vertical).
3. The treatment thickness is the distance between the assumed water table depth and bottom of the conductive interval.

Prepared By: SEA 7/25/18
Checked By: GLH 7/25/18

TABLE 3
Monitoring Well Construction Details
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Monitoring Well	Installation Date	Well Depth (bgs)	Screened Interval (bgs)	Ground Surface Elevation	Depth to Groundwater 3/28/18 (bgs)*	Groundwater Elevation
MW-2	9/24/2008	28.3	18.3 - 28.0	2,416.5	13.85	2,402.7
MW-3	9/25/2008	36.1	26.1 - 35.8	2,417.2	19.71	2,397.5
MW-23	2/21/2018	34.9	29.8 - 34.6	2,417.3	21.99	2,395.3
MW-23A	2/21/2018	50.2	45.1 - 49.9	2,417.3	21.83	2,395.5
MW-24	2/22/2018	30.5	20.4 - 30.2	2,417.3	19.89	2,397.4
MW-24A	2/22/2018	55.2	50.1 - 54.9	2,417.3	20.03	2,397.3
MW-25	2/21/2018	35.3	30.2 - 35.0	2,417.3	18.20	2,399.1
MW-25A	2/21/2018	49.8	44.7 - 49.5	2,417.3	18.33	2,399.0
MW-26	2/26/2018	30.4	25.3 - 30.1	2,417.3	16.95	2,400.4
MW-26A	2/26/2018	42.8	37.7 - 42.5	2,417.3	17.44	2,399.9
MW-27	2/26/2018	25.7	15.6 - 25.4	2,417.3	15.03	2,402.3
MW-28	2/22/2018	30.7	25.6 - 30.4	2,417.3	17.42	2,399.9
MW-28A	2/22/2018	45.6	40.5 - 45.3	2,417.3	17.47	2,399.8
MW-29	2/20/2018	26.0	15.9 - 25.7	2,417.3	16.34	2,401.0
MW-29A	2/20/2018	35.9	30.8 - 35.6	2,417.3	16.36	2,400.9
MW-30	2/23/2018	25.8	20.7 - 25.5	2,417.3	17.68	2,399.6
MW-30A	2/23/2018	35.5	30.4 - 35.2	2,417.3	17.63	2,399.7
MW-31	3/22/2018	35.5	30.4 - 35.2	2,417.7	33.20	2,384.5
MW-31A	3/22/2018	54.4	49.3 - 54.1	2,417.7	24.98	2,392.7
MW-32	3/23/2018	37.5	27.4 - 37.2	2,426.5	27.43	2,399.1

Notes:

1. Depths are in feet relative to ground surface (bgs).
2. Elevations are approximate and in feet relative to mean sea level.
3. * - The depth to groundwater could not be gauged during ERH remediation activities.

Prepared By: SEA 4/23/18
Checked By: GLH 4/23/18

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	6/11/2018		6/14/2018		6/18/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene	8.7 J		66 J	13	39 J	
Dichlorodifluoromethane						
Chloromethane						
Vinyl chloride						
1,3-Butadiene				4.5 J		
Ethanol	70 J	98		47 J		92
Acetonitrile						
Acrolein		2.3 J		6.0 J		2.7 J
Acetone		23 J		45 J		140
2-Propanol		15 J		2.4 J		4.5 J
1,1-Dichloroethene	9.7 J		190 J	9.2	220	2.2 J
Methylene chloride				1.8 J		
Trichlorotrifluoroethane	12 J		140 J	5.1 J	85 J	
Carbon disulfide	23 J	6.9 J	280 J	16 J	170 J	9.2 J
trans-1,2-Dichloroethene						
1,1-Dichlorethane			45 J	1.4 J		
Vinyl acetate						46 J
2-Butanone		2.4 J		5.6 J		13 J
cis-1,2-Dichloroethene	52		1,300	46	240	3.6 J
Ethyl acetate	30 J	30		27		81
n-Hexane	21 J	1.5 J	250	11	200	3.2 J
Chloroform	12 J	1.2 J	51 J	2.9 J		7.3
Tetrahydrofuran	21 J	4.8 J	160 J	11	67 J	26
1,1,1-Trichloroethane	150	1.3 J	820	28	190	2.3 J
Benzene	10 J	2.0 J	120 J	18	58 J	32
Cyclohexane	27 J	1.8 J	300 J	14	200 J	3.2 J
1,2-Dichloropropane						
Trichloroethene	6,600	100	37,000	1,100	13,000	270
Methyl methacrylate			330 J			
n-Heptane	21 J	1.3 J	510	21	410	8.0
4-Methyl-2-pentanone				1.0 J		
Toluene	8.7 J	5.7	75 J	14	66 J	18
2-Hexanone						
n-Octane	20 J		1,000	58	1,300	41
Tetrachloroethene	6.1 J		54 J	3.1 J		
Ethylbenzene		1.4 J	250	16	390	19
m,p-Xylenes		5.0 J	450	35	720	39
Styrene		1.2 J		2.0 J		1.8 J
o-Xylene	6.8 J	2.5 J	550	37	1,000	56
n-Nonane	22 J	1.8 J	1,300	77	4,100	210
Cumene	29 J	6.2	140 J	86	380	100
alpha-Pinene						
n-Propylbenzene			190 J	12	690	
4-Ethyltoluene			230	17	840	66
1,3,5-Trimethylbenzene	5.6 J		270	20	1,200	90
1,2,4-Trimethylbenzene	5.3 J	1.2 J	780	60	3,500	310
d-Limonene		3.4 J		24		31
1,2,4-Trichlorobenzene						
Naphthalene				7.3	110 J	22

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	**6/21/2018**		**6/25/2018**		**7/2/2018**	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene	49 J			11	1,800	10
Dichlorodifluoromethane					140 J	
Chloromethane						
Vinyl chloride					31 J	
1,3-Butadiene		1.3 J		3.2 J		3.1 J
Ethanol		110		28 J	410 J	44 J
Acetonitrile						
Acrolein		4.3 J		1.6 J		2.9 J
Acetone		110		92		210
2-Propanol		9.5 J				21 J
1,1-Dichloroethene	350	3.5 J	540	15	1,400	29
Methylene chloride				1.7 J		1.6 J
Trichlorotrifluoroethane	160	1.5 J	270	7.2	660	13
Carbon disulfide	220 J	7.6 J	190 J	7.9 J	190 J	9.3 J
trans-1,2-Dichloroethene					260 J	
1,1-Dichlorethane						
Vinyl acetate		31 J				51 J
2-Butanone	30 J	7.2 J		4.9 J	61 J	9.8 J
cis-1,2-Dichloroethene	250	3.4 J	210	6.1	320	7.9
Ethyl acetate		20		6.8 J		12
n-Hexane	390	5.0 J	410	11	1,200	26
Chloroform		0.96 J		2.0 J		2.0 J
Tetrahydrofuran	100 J	8.7		5.0 J	51 J	8.7
1,1,1-Trichloroethane	260	2.7 J	310	7.8	590	13
Benzene	120 J	7.4	82 J	15	260 J	34
Cyclohexane	410	5.6 J	360	10 J	1,200	29
1,2-Dichloropropane						
Trichloroethene	17,000	330	19,000	580	49,000	1,300
Methyl methacrylate						
n-Heptane	860	15	660	20	2,000	62
4-Methyl-2-pentanone						
Toluene	84 J	7.2	90 J	8.5	290	16
2-Hexanone						
n-Octane	2,100	65	1,600	61	3,800	200
Tetrachloroethene					280	1.6 J
Ethylbenzene	520	25	440	22	910	78
m,p-Xylenes	1,000	54	740	39	1,400	130
Styrene		1.1 J		1.3 J		1.4 J
o-Xylene	1,200	72	910	50	1,700	180
n-Nonane	3,900	220	2,500	140	4,200	410
Cumene	380	45	280	53	480	130
alpha-Pinene				1.4 J		2.3 J
n-Propylbenzene	610	51	400		600	96
4-Ethyltoluene	700	66	470	38	650	130
1,3,5-Trimethylbenzene	870	81	610	48	750	140
1,2,4-Trimethylbenzene	2,700	290	1,700	160	1,900	420
d-Limonene		22	33 J	14		25
1,2,4-Trichlorobenzene						
Naphthalene	100 J	28	41 J	9.7		15

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	7/9/2018		7/17/2018		7/24/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene		2.9 J				
Dichlorodifluoromethane						
Chloromethane						
Vinyl chloride						
1,3-Butadiene						
Ethanol		38 J		84 J		
Acetonitrile						
Acrolein		2.6 J				
Acetone		56				180 J
2-Propanol						
1,1-Dichloroethene	1,500	7.5	3,600	98	3,900	140
Methylene chloride		8.3				
Trichlorotrifluoroethane	840	3.4 J	1,600	42	1,700 J	58 J
Carbon disulfide	160 J	11 J		11 J		
trans-1,2-Dichloroethene						
1,1-Dichlorethane						
Vinyl acetate						
2-Butanone		4.2 J		8.7 J		
cis-1,2-Dichloroethene	380 J	3.0 J	640 J	18.0 J	720 J	27 J
Ethyl acetate		8.8 J				
n-Hexane	1,200	8.0	3,200	78.0	3,800	150
Chloroform		18.0		5.2 J		
Tetrahydrofuran		6.7		6.5 J		
1,1,1-Trichloroethane	600	4.4 J	840 J	22 J	680 J	25 J
Benzene	270 J	15	570 J	24 J	650 J	33 J
Cyclohexane	1,200	10 J	3,100	79	3,300 J	130 J
1,2-Dichloropropane					270 J	
Trichloroethene	91,000	790	240,000	6,300	200,000	9,400
Methyl methacrylate						
n-Heptane	2,200	27	5,900	140	5,900	260
4-Methyl-2-pentanone						
Toluene	260 J	10	420 J	20 J	590 J	34 J
2-Hexanone						
n-Octane	4,400	110	12,000	280	9,600	610
Tetrachloroethene		1.2 J	1,300 J	5.4 J		
Ethylbenzene	1,000	40	1,800	49	1,400 J	120
m,p-Xylenes	1,800	78	3,700	99	3,100 J	280
Styrene		1.0 J				
o-Xylene	2,100	99	4,700	130	3,600	360
n-Nonane	6,200	300	17,000	410	15,000	1,700
Cumene	610	51	1,500	43	1,100 J	130
alpha-Pinene						
n-Propylbenzene	880	62	2,100	59	1,600 J	230
4-Ethyltoluene	1,100	80	2,300	66	1,700 J	270
1,3,5-Trimethylbenzene	1,300	110	2,800	78	1,900	340
1,2,4-Trimethylbenzene	3,400	330	8,200	250	5,200	1,100
d-Limonene		23		14 J		
1,2,4-Trichlorobenzene						
Naphthalene		32		23 J		56 J

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	**7/30/2018**		**8/6/2018**		**8/24/2018**	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene				26		
Dichlorodifluoromethane						
Chloromethane						
Vinyl chloride						
1,3-Butadiene				7.6 J		
Ethanol				84 J		
Acetonitrile						
Acrolein						
Acetone				69 J		
2-Propanol				29 J		
1,1-Dichloroethene	5,100	380	2,200	41	13,000	80 J
Methylene chloride						
Trichlorotrifluoroethane	1,700	130 J	500 J	8.3 J	3,100	22 J
Carbon disulfide		94 J		13 J		
trans-1,2-Dichloroethene						
1,1-Dichlorethane						
Vinyl acetate						
2-Butanone					670 J	
cis-1,2-Dichloroethene	400 J	59 J	430 J	6.2 J	3,300	27 J
Ethyl acetate				15 J		
n-Hexane	4,300	330	2,700	38	12,000	49 J
Chloroform				4.6 J	300 J	100 J
Tetrahydrofuran						
1,1,1-Trichloroethane	680 J	55 J			2,800	25 J
Benzene	980 J	97 J	560 J	18 J	3,900	42 J
Cyclohexane	4,400	360 J	2,800	41 J	18,000	71 J
1,2-Dichloropropane						
Trichloroethene	350,000	31,000	200,000	2,900	2,000,000	13,000
Methyl methacrylate						
n-Heptane	9,500	790	6,400	89	35,000	170
4-Methyl-2-pentanone						
Toluene	1400	140 J	860 J	21 J	6,500	89 J
2-Hexanone						
n-Octane	16,000	1400	13,000	160	53,000	630
Tetrachloroethene	270 J	840			1,800	52 J
Ethylbenzene	3,600	340	2,700	31	10,000	270
m,p-Xylenes	8,100	770	6,300	71	18,000	580
Styrene						
o-Xylene	7,100	680	6,000	67	14,000	530
n-Nonane	22,000	2,200	18,000	220	32,000	1,300
Cumene	2,000	200	1,700	23	3,500	170
alpha-Pinene						
n-Propylbenzene	2,800	300	2,600	29	3,500	270
4-Ethyltoluene	2,900	320	2,700	28	3,100	270
1,3,5-Trimethylbenzene	3,500	390	3,500	40	3,500	330
1,2,4-Trimethylbenzene	9,200	1,100	11,000	110	5,900	800
d-Limonene				10 J		
1,2,4-Trichlorobenzene						
Naphthalene			970 J			

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	9/4/2018		9/10/2018		9/17/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene	130	7.3			160 J	35
Dichlorodifluoromethane						
Chloromethane		1.7 J				6.4 J
Vinyl chloride						
1,3-Butadiene		2.3 J				13 J
Ethanol	77 J	92			410 J	22 J
Acetonitrile						
Acrolein		9.0 J				9.9 J
Acetone	2,100	100			3,300 J	110 J
2-Propanol		8.0 J				28 J
1,1-Dichloroethene	1,300	2.8 J	4,200		3,300	21
Methylene chloride						
Trichlorotrifluoroethane	280				550	2.9 J
Carbon disulfide	52 J	22				6.1 J
trans-1,2-Dichloroethene						
1,1-Dichlorethane						
Vinyl acetate						
2-Butanone	390	9.5 J			710	13 J
cis-1,2-Dichloroethene	390	0.85 J			860	9.6 J
Ethyl acetate		14				15 J
n-Hexane	1,400	2.6 J	3,800		2,900	15 J
Chloroform	29 J	4.7 J			75 J	4.2 J
Tetrahydrofuran		3.2 J				2.3 J
1,1,1-Trichloroethane	80 J				95 J	
Benzene	420	9.5			1,000	26
Cyclohexane	2,100	3.1 J	5,500		4,700	29
1,2-Dichloropropane						
Trichloroethene	250,000	540	630,000	9,200	480,000	2,800
Methyl methacrylate						
n-Heptane	4,800	8.3	14,000	160	10,000	70
4-Methyl-2-pentanone						
Toluene	1,100	16	2,400		2,500	37
2-Hexanone						
n-Octane	10,000	41	26,000	650	22,000	220
Tetrachloroethene	290	1.3 J			680	7.0 J
Ethylbenzene	2,600	21	4,900	200	6,900	75
m,p-Xylenes	6,100	53	11,000	540	15,000	170
Styrene	5,300	1.1 J				
o-Xylene		56	9,300	590	14,000	170
n-Nonane	14,000	170	30,000	2,500	33,000	470
Cumene	1,700	26	2,800	230	4,200	57
alpha-Pinene						
n-Propylbenzene	2,600	36	4,000	490	6,500	85
4-Ethyltoluene	3,000	43	4,500	680	7,500	95
1,3,5-Trimethylbenzene	3,500	62	5,300	990	9,200	140
1,2,4-Trimethylbenzene	8,300	160	14,000	3000	23,000	350
d-Limonene		21				
1,2,4-Trichlorobenzene						
Naphthalene	230	17		320	1,100	17

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	9/24/2018		10/1/2018		10/9/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene	2,900	19		30		
Dichlorodifluoromethane						
Chloromethane		6.0 J		4.6 J		
Vinyl chloride		1.5 J				
1,3-Butadiene		7.0 J		9.1 J		
Ethanol		29 J				
Acetonitrile						
Acrolein		13 J		13 J		
Acetone	17,000 J	250	11,000 J	420	8,300 J	490 J
2-Propanol		29 J	890 J	43 J		
1,1-Dichloroethene	2,100 J	8.4 J	770 J	9.3 J	890 J	67 J
Methylene chloride						
Trichlorotrifluoroethane	340 J					
Carbon disulfide		9.4 J		12 J		
trans-1,2-Dichloroethene						
1,1-Dichlorethane						
Vinyl acetate						
2-Butanone	2,200 J	33	1,600 J	50	1,900 J	100 J
cis-1,2-Dichloroethene	710 J	2.7 J	440 J	5.0 J	500 J	36 J
Ethyl acetate		14 J		14 J		
n-Hexane	3,400	8.6 J	1,800 J	16 J	2,200	170 J
Chloroform		6.7 J		5.2 J		
Tetrahydrofuran		3.2 J		4.1 J		
1,1,1-Trichloroethane						
Benzene	1,900 J	28	1,500 J	40	1,300 J	120 J
Cyclohexane	4,800	11 J	2,900 J	24 J	3,000 J	230 J
1,2-Dichloropropane						
Trichloroethene	380,000	1,600	260,000	2,200	260,000	28,000
Methyl methacrylate						
n-Heptane	12,000	30	7,800	60	7,800	610
4-Methyl-2-pentanone						
Toluene	3,800	41	3,300	39	3,100	260
2-Hexanone						
n-Octane	29,000	86	25,000	180	24,000	2,000
Tetrachloroethene	1,400 J	2.6 J	3,600	4.4 J	320 J	27 J
Ethylbenzene	7,900	37	7,900	62	7,500	620
m,p-Xylenes	17,000	86	18,000	140	17,000	1,400
Styrene						
o-Xylene	14,000	80	14,000	120	15,000	1,200
n-Nonane	40,000	200	46,000	370	44,000	3,800
Cumene	3,700	30	4,400	47	4,200	380
alpha-Pinene						
n-Propylbenzene	5,500	40	6,700	63	6,600	590
4-Ethyltoluene	5,700	45	7,400	71	6,800	630
1,3,5-Trimethylbenzene	7,200	70	10,000	110	10,000	950
1,2,4-Trimethylbenzene	16,000	180	22,000	260	23,000	2,200
d-Limonene		21	630 J	21		
1,2,4-Trichlorobenzene						
Naphthalene	780 J	22	610 J	16 J		61 J

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

TABLE 4
Summary of Influent and Effluent Vapor Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample Date	10/15/2018		10/23/2018		10/29/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene		66 J	390 J	14 J	440 J	
Dichlorodifluoromethane						
Chloromethane						8.1 J
Vinyl chloride						
1,3-Butadiene						7.3 J
Ethanol			1,400 J	66 J		
Acetonitrile			290 J			
Acrolein				9.4 J		10 J
Acetone	7,700 J	570 J	7,000 J	320	7,100	420
2-Propanol				25 J		18 J
1,1-Dichloroethene	790 J	79 J	510 J	13 J	600	19 J
Methylene chloride						
Trichlorotrifluoroethane				2.8 J	200 J	4.1 J
Carbon disulfide				10 J		11 J
trans-1,2-Dichloroethene						
1,1-Dichlorethane						
Vinyl acetate						
2-Butanone	1,600 J	130 J	1,700 J	67	1,600	70
cis-1,2-Dichloroethene	250 J	28 J	420 J	8.5 J	420 J	12 J
Ethyl acetate						
n-Hexane	2,600	240	1,400	33	2,000	44
Chloroform				3.6 J		5.8 J
Tetrahydrofuran						
1,1,1-Trichloroethane						
Benzene	1,300 J	150	1,200	32	830	30
Cyclohexane	4,400	430	2,100	52	2,000	43 J
1,2-Dichloropropane						
Trichloroethene	260,000	28,000	180,000	4,100	140,000	3,300
Methyl methacrylate						
n-Heptane	7,500	800	5,600	130	5,500	110
4-Methyl-2-pentanone			220 J	6.0 J		
Toluene	2,300	270	2,100	49	1,800	33
2-Hexanone						
n-Octane	20,000	2,500	17,000	360	15,000	250
Tetrachloroethene	990 J	110 J	1,700		440 J	
Ethylbenzene	5,000	680	4,600	90	2,700	44
m,p-Xylenes	11,000	1,500	10,000	200	6,800	110
Styrene						
o-Xylene	10,000	1,500	9,600	180	6,400	100
n-Nonane	33,000	4,900	33,000	650	23,000	410
Cumene	3,200	490	2,600	59	1,600	31
alpha-Pinene						
n-Propylbenzene	4,600	730	4,100	75	2,300	40
4-Ethyltoluene	4,800	800	4,200	77	2,200	38
1,3,5-Trimethylbenzene	6,700	1,100	5,600	110	2,600	49
1,2,4-Trimethylbenzene	15,000	2,700	13,000	240	6,700	130
d-Limonene			280 J	7.9 J		5.8 J
1,2,4-Trichlorobenzene			370 J			
Naphthalene		60 J	730 J	6.5 J	220 J	

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 4

Summary of Influent and Effluent Vapor Results

CTS of Asheville, Inc. Superfund Site

Asheville, North Carolina

Wood Project 6252-16-2012

Sample Date	11/5/2018		11/12/2018	
Analyte	**Influent**	**Effluent**	**Influent**	**Effluent**
Propene	370 J		830 J	15
Dichlorodifluoromethane				
Chloromethane				
Vinyl chloride				
1,3-Butadiene				4.0 J
Ethanol				11 J
Acetonitrile				1.3 J
Acrolein				3.7 J
Acetone	5,600 J	160 J	12,000	370
2-Propanol				7.0 J
1,1-Dichloroethene	470 J	18 J	1,600	7.6
Methylene chloride				
Trichlorotrifluoroethane			370 J	1.4 J
Carbon disulfide				
trans-1,2-Dichloroethene				
1,1-Dichlorethane				
Vinyl acetate				
2-Butanone	1,800 J	46 J	3,500	100
cis-1,2-Dichloroethene	410 J	16 J	830 J	4.9 J
Ethyl acetate				6.2 J
n-Hexane	1,000 J	43 J	3,600	100
Chloroform				2.3 J
Tetrahydrofuran				1.4 J
1,1,1-Trichloroethane			200 J	0.79 J
Benzene	560 J	29 J	1,300	11
Cyclohexane	1,400 J	60 J	3,700	17
1,2-Dichloropropane				
Trichloroethene	170,000	7,800 J	200,000	890
Methyl methacrylate				
n-Heptane	4,700	200	8,300	41
4-Methyl-2-pentanone			360 J	6.8
Toluene	1,700	85	3,300	29
2-Hexanone				42
n-Octane	15,000	700	15,000	96
Tetrachloroethene	880 J	41 J	550 J	0.76 J
Ethylbenzene	3,400	190	3,700	31
m,p-Xylenes	8,300	480	8,700	81
Styrene				
o-Xylene	8,700	530	8,000	88
n-Nonane	27,000	1,600	22,000	200
Cumene	2,500	170	2,100	25
alpha-Pinene			530 J	
n-Propylbenzene	3,500	250	2,900	
4-Ethyltoluene	3,700	280	2,800	48
1,3,5-Trimethylbenzene	4,600	360	3,300	65
1,2,4-Trimethylbenzene	12,000	1,000	7,700	190
d-Limonene			440 J	6.6
1,2,4-Trichlorobenzene				
Naphthalene		29 J		19

Notes:
1. Concentrations are in micrograms per cubic meter (ug/m3).
2. J - estimated concentration.
3. Blank cells indicate analyte not detected above the method detection limit.

Prepared By: SEA 11/16/18
Checked By: MNQ 11/16/18

TABLE 5
Summary of Confirmation Samples
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample ID	Sample Depth (feet bgs)	Date	Associated QC Samples
MW-23A	47.5	9/18/2018	TB-22
MW-24A	52.5	9/18/2018	TB-22
MW-25A	47.1	9/18/2018	TB-22
MW-26A	40.1	9/18/2018	TB-22
MW-27	20.5	9/18/2018	TB-23
MW-29	20.6	9/18/2018	TB-22
MW-29A	33.2	9/18/2018	TB-22
MW-30A	32.8	9/18/2018	TB-22/FD-26
MW-31A	51.7	9/18/2018	TB-22
MW-2	23.3	9/19/2018	TB-23
MW-23	32.2	9/19/2018	TB-22
MW-24	25.3	9/19/2018	TB-22
MW-25	32.6	9/19/2018	TB-22/FD-27
MW-26	27.7	9/19/2018	TB-23
MW-28	28.0	9/19/2018	TB-23
MW-28A	42.9	9/19/2018	TB-23
MW-30	24.0	9/19/2018	TB-23
MW-31	32.8	9/19/2018	TB-23
MW-32	34.8	9/19/2018	TB-23
EB-08	NA	9/24/2018	TB-24
SS-106-29B	29	9/24/2018	TB-24
SS-106-39B	39	9/24/2018	TB-24/FD-28
SS-106-49B	49	9/24/2018	TB-24
SS-106-55B	55	9/24/2018	TB-24
SS-107-28B	28	9/24/2018	TB-25
SS-107-38B	38	9/24/2018	TB-25
SS-107-48B	48	9/24/2018	TB-25/FD-29
SS-110-24B	24	9/24/2018	TB-25
SS-110-34B	34	9/24/2018	TB-25
SS-110-38B	38	9/24/2018	TB-25
SS-112-23B	23	9/24/2018	TB-24
SS-112-25B	25	9/24/2018	TB-24
SS-113-23B	23	9/24/2018	TB-25
SS-113-26B	26	9/24/2018	TB-25
SS-116-21B	21	9/24/2018	TB-24
SS-120-35B	35	9/24/2018	TB-24
SS-108-27B	27	9/25/2018	TB-26
SS-108-37B	37	9/25/2018	TB-26
SS-108-47B	47	9/25/2018	TB-26
SS-108-53B	53	9/25/2018	TB-26
SS-109-25B	25	9/25/2018	TB-26

TABLE 5
Summary of Confirmation Samples
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample ID	Sample Depth (feet bgs)	Date	Associated QC Samples
SS-109-35B	35	9/25/2018	TB-26
SS-109-45B	45	9/25/2018	TB-27
SS-111-25B	25	9/25/2018	TB-26/FD-30
SS-111-35B	35	9/25/2018	TB-27
SS-111-45B	45	9/25/2018	TB-27
SS-111-51B	51	9/25/2018	TB-24
SS-114-24B	24	9/25/2018	TB-27
SS-114-34B	34	9/25/2018	TB-27
SS-114-41B	41	9/25/2018	TB-27
SS-115-24B	24	9/25/2018	TB-28
SS-115-34B	34	9/25/2018	TB-28
SS-117-24B	24	9/25/2018	TB-28
SS-118-24B	24	9/25/2018	TB-27/FD-31
SS-118-31B	31	9/25/2018	TB-28
SS-119-28B	28	9/25/2018	TB-28
SS-119-38B	38	9/25/2018	TB-28
SS-119-48B	48	9/25/2018	TB-27
MW-3	31.0	10/8/2018	TB-29
MW-26	27.7	10/8/2018	TB-29
MW-29	20.6	10/8/2018	TB-29
MW-30	23.1	10/8/2018	TB-29
MW-30A	32.8	10/8/2018	TB-29
MW-31A	51.1	10/8/2018	TB-29/FD-32
MW-3	32.0	10/22/2018	TB-31
MW-26	27.7	10/22/2018	TB-31
MW-29	20.6	10/22/2018	TB-31
MW-30	23.1	10/22/2018	TB-31
MW-30A	32.8	10/22/2018	TB-31/FD-34
MW-31A	51.7	10/22/2018	TB-31
MW-32	33.9	10/22/2018	TB-31
MW-29	25.0	11/12/2018	TB-33
MW-30	25.0	11/12/2018	TB-33
MW-30A	32.8	11/12/2018	TB-33/FD-36
MW-31A	48.7	11/12/2018	TB-33

Notes:
1. bgs = feet below ground surface, TB = trip blank, FD= field duplicate, EB = equipment blank
2. The sample depth for groundwater samples is the depth of the tubing intake.

Prepared By: GLH 3/11/18
Checked By: SEA 3/14/18

TABLE 6
Summary of Baseline and Confirmation Saturated Soil Analytical Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample ID	Baseline TCE Concentration (3/5/18 - 3/12/18)	Confirmation TCE Concentration (9/24/18 - 9/15/18)
SS-106-29B	172,000	0.91 J
SS-106-39B	1,140	0.12*/**
SS-106-49B	5,800	0.095**
SS-106-55B	3,750	0.095**
SS-107-28B	68,600	0.40 J
SS-107-38B	2,060	0.12**
SS-107-48B	6,300*	3.2* J
SS-108-27B	190,000	1.8 J
SS-108-37B	132,000	2.6 J
SS-108-47B	4,450	0.125**
SS-108-53B	2,460	0.115**
SS-109-25B	114,000	2.9 J
SS-109-35B	82,900	0.73 J
SS-109-45B	3,530	0.115**
SS-110-24B	175	1.2 J
SS-110-34B	401	0.13**
SS-110-38B	1,070	0.12**
SS-111-25B	38,200	2.15* J
SS-111-35B	4,320	0.12**
SS-111-45B	8,830	0.125**
SS-111-51B	2,440	2.1 J
SS-112-23B	7.2	0.12**
SS-112-25B	15.9	0.10**
SS-113-23B	79,900*	10,100
SS-113-26B	2,660	48.2
SS-114-24B	32,300	0.80 J
SS-114-34B	21,700	0.13**
SS-114-41B	2,176.5*	3.2 J
SS-115-24B	198,000	5.1 J
SS-115-34B	11,385*	17,700
SS-115-41B	727	NS

TABLE 6
Summary of Baseline and Confirmation Saturated Soil Analytical Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Sample ID	Baseline TCE Concentration (3/5/18 - 3/12/18)	Confirmation TCE Concentration (9/24/18 - 9/15/18)
SS-116-21B	1,610	0.095**
SS-117-24B	741,000	46.1
SS-118-24B	149,000	0.50* J
SS-118-31B	138,000	14,300
SS-119-38B	27,600	0.145**
SS-119-48B	2,480	0.89 J
SS-120-35B	7,850	6,540 J

Notes:
1. TCE - trichloroethene, according to USEPA Method 8260.
2. Concentrations are in micrograms per kilogram (µg/kg).
3. J - Estimated concentration.
4.* - The average of field sample and duplicate sample concentrations is indicated.
5. ** Where TCE was not detected in a confirmation soil sample, one-half of the method detection limit concentration is indicated.
6. NS - sample not collected; baseline TCE concentration used to calculated the TCE percent reduction from baseline.
7. The sample depth is the last two digits in the sample ID (e.g., the sample depth of SS-106-29B is 29 feet below ground surface).

Prepared By: SEA 3/5/19
Checked By: GLH 3/8/19

TABLE 7
Summary of Baseline and Confirmation Groundwater Analytical Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

Monitoring Well	Baseline TCE Concentration	TCE Concentration (9/18/18 - 9/19/18)	TCE Concentration (10/8/18)	TCE Concentration (10/22/18)	TCE Concentration (11/12/18)
MW-2	3,140	775	NS	NS	NS
MW-3	15,000	NS	3,410	22.6	NS
MW-23	13,900	112	NS	NS	NS
MW-23A	21,700	321	NS	NS	NS
MW-24	8,130	97.1	NS	NS	NS
MW-24A	44,900	556	NS	NS	NS
MW-25	12,000	462*	NS	NS	NS
MW-25A	24,900	588	NS	NS	NS
MW-26	28,800	3,720	2,030	3,070	NS
MW-26A	7,730*	389	NS	NS	NS
MW-27	9,620	42.3	NS	NS	NS
MW-28	1,940	217	NS	NS	NS
MW-28A	51,300	465	NS	NS	NS
MW-29	1,950	8,040	2,330	9,420	3,250
MW-29A	40,400	610	NS	NS	NS
MW-30	6,400*	9,420	3,530	1,120 J+	484
MW-30A	26,600	12,050*	7,040	4,210*	947* J+
MW-31	772	270	NS	NS	NS
MW-31A	8,690	13,800	14,350*	16,700	475
MW-32	2,590	2,560	NS	1,570	NS

Notes:
1. TCE - trichloroethene, according to USEPA Method 8260.
2. Concentrations are in micrograms per liter (µg/L).
3. * - The average of field sample and duplicate sample concentrations is indicated and used in calculating the overall average concentration.
4. NS - not sampled.
5. J+ - estimated concentration, biased high.
6. Shaded values indicate the TCE concentration used to calculate the average confirmation concentration for the percent reduction calculation.

Prepared By: SEA 3/5/19
Checked By: GLH 3/8/19

TABLE 8
TCE Reductions in Confirmation Samples
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Wood Project 6252-16-2012

SOIL (µg/kg)			
TCE Average Baseline Concentration	**TCE RAO Concentration (95% reduction)**	**TCE Confirmation Average Concentration**	**Percent Reduction from Baseline Average Concentration**
59,496	2,975	1,318	97.8

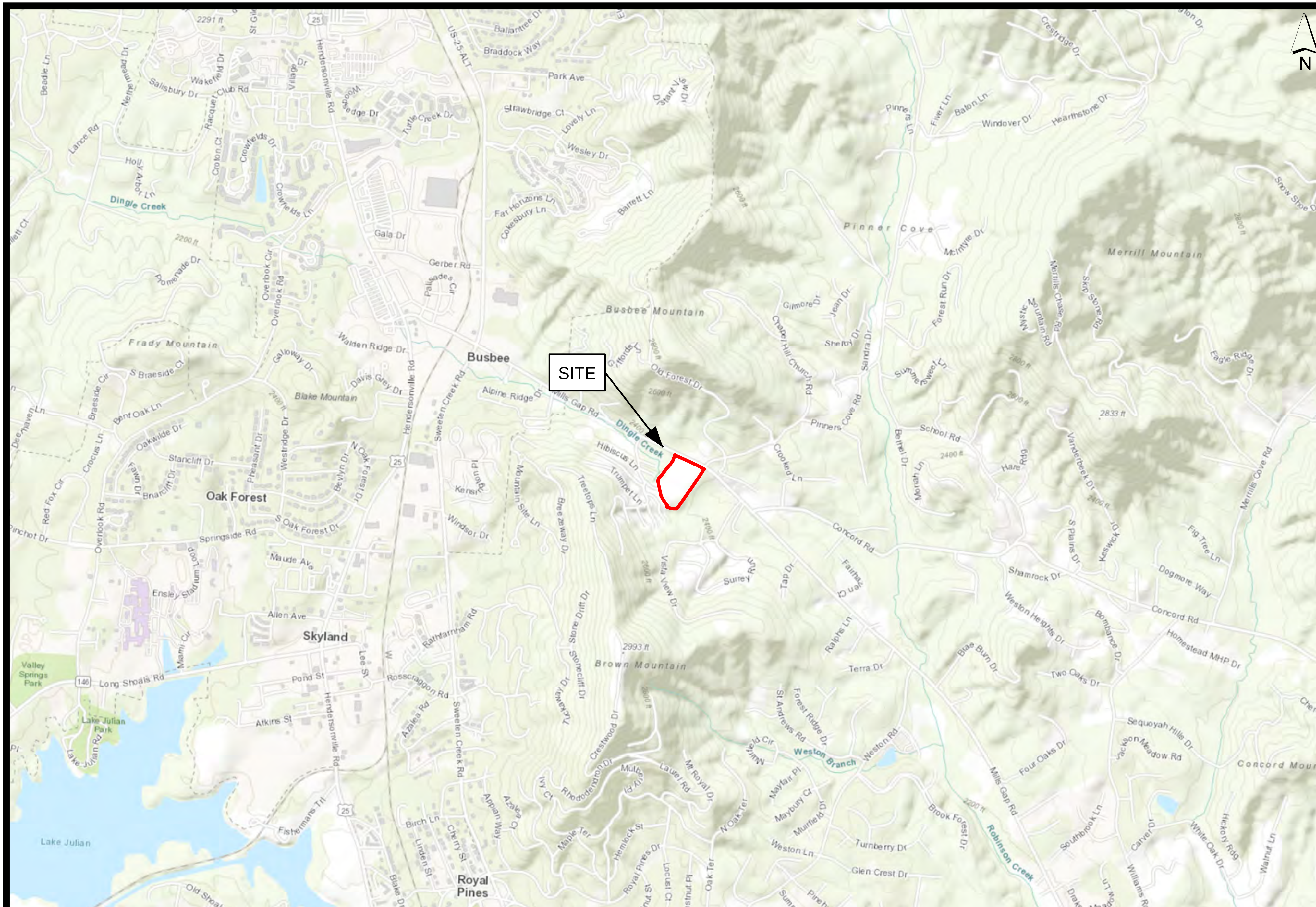
GROUNDWATER (µg/L)			
TCE Average Baseline Concentration	**TCE RAO Concentration (95% reduction)**	**TCE Confirmation Average Concentration**	**Percent Reduction from Baseline Average Concentration**
16,523	826	736	95.5

LNAPL (mg/kg)			
TCE Average Baseline Concentration	**TCE RAO Concentration (95% reduction)**	**TCE Confirmation Average Concentration**	**Percent Reduction from Baseline Average Concentration**
8,080	404	0*	100.0

Notes:
1. TCE - trichloroethene, according to USEPA Method 8260.
2. RAO - remedial action objective.
3. Concentrations: µg/kg - micrograms per kilogram; µg/L - micrograms per liter; mg/kg - milligrams per kilogram
4. LNAPL - light non-aqueous phase liquid
5. * - per the Interim Remedial Action Objective Determination Technical Memorandum, dated September 13, 2017, if sufficient LNAPL is not present in a monitoring well for confirmation sampling, the TCE concentration will be considered zero for averaging purposes.

Prepared By: SEA 3/5/19
Checked By: GLH 3/8/19

FIGURES



Topographic Site Map
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

Project 6252162012 — Figure 1
Drawn By: GLH 02/25/19 — Approved By: SEA 02/25/19

1:24,000 — 0, 2,000, 4,000 Feet

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

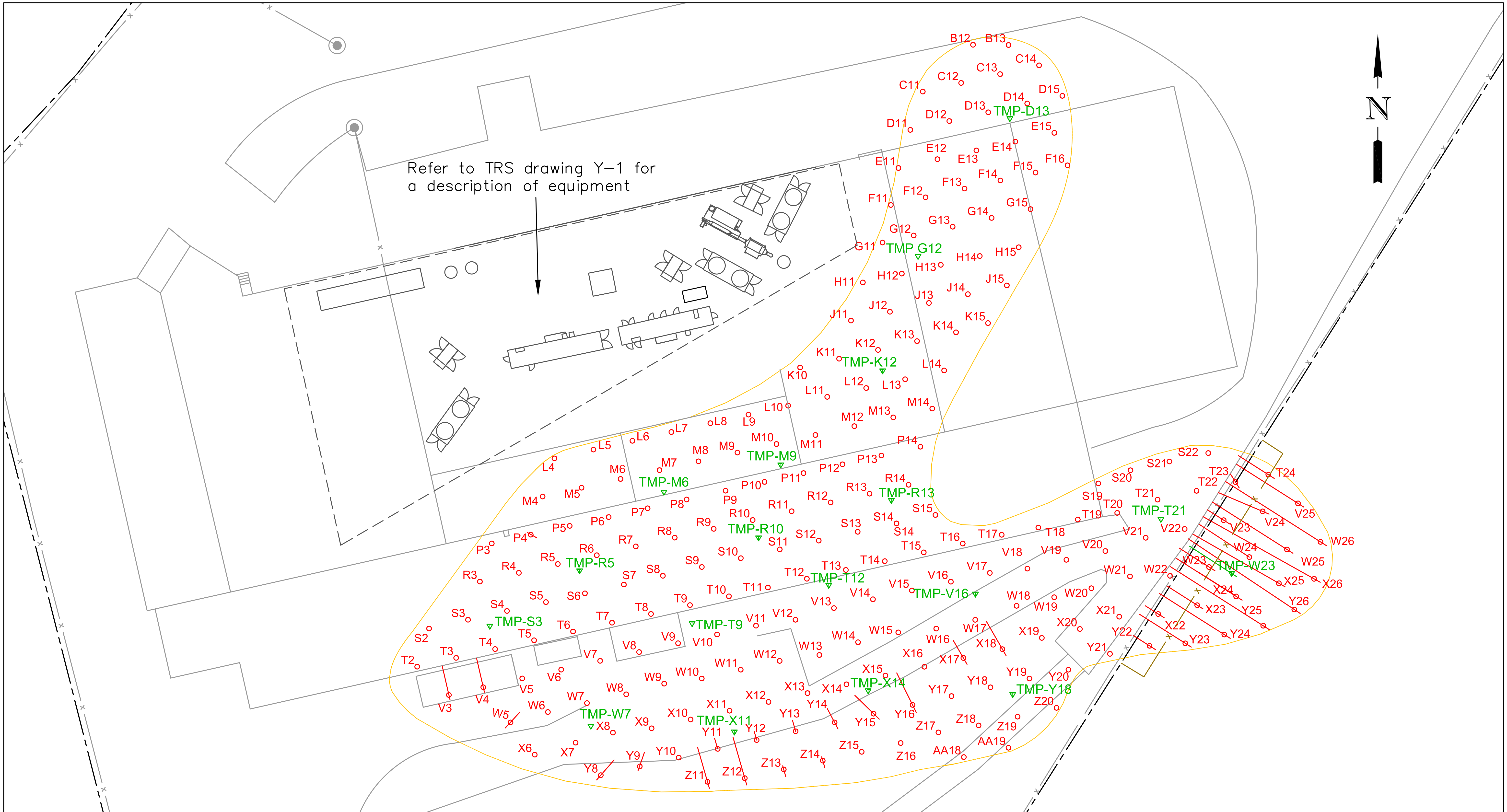
wood.

CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

Site Map

Project 6252162012

Figure 2



LEGEND

B12	Vertical Electrode
Y-8	Angled Electrode
TMP-D13	Temperature Monitoring Point

0 20 40 80

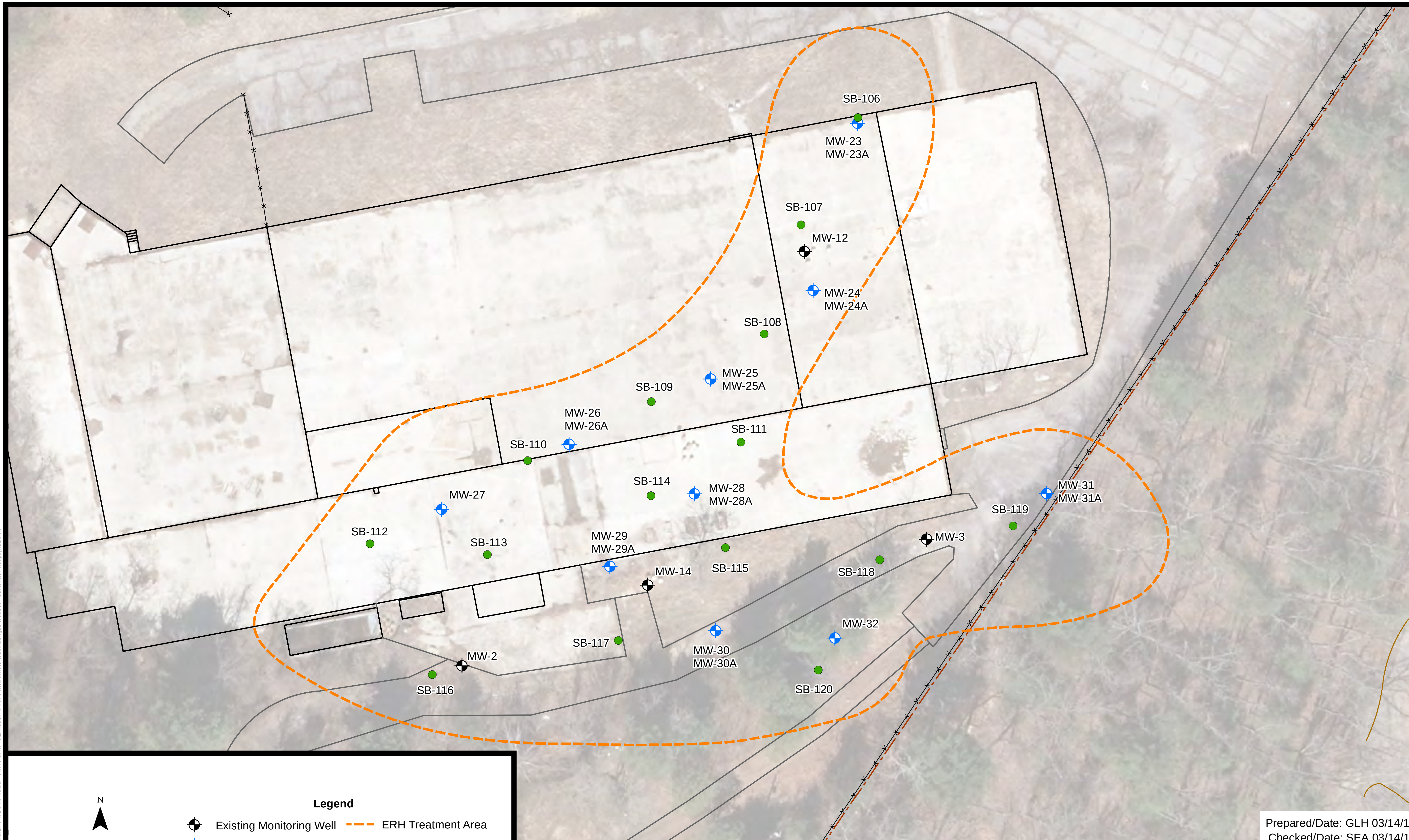
SCALE IN FEET

wood.

ELECTRODE AND TMP LAYOUT
CTS OF ASHEVILLE, INC. SUPERFUND SITE
ASHEVILLE, NORTH CAROLINA

DRAWN: SEA	DATE: 7/23/18
DFT CHECK:	SCALE: 1" = 40'
ENG CHECK:	PROJ: 6252-16-2012
APPROVAL: MEW	FIG: 3

REFERENCE: Drawing Y-1 of TRS Group's Construction and Start-up Report



wood.

CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

ERH Treatment Area and Sampling Locations

Project 6252162012

Figure 4

Legend

N

0 60 120 Feet

- Ambient Air Sampling/Monitoring Location
- Spring
- Fence
- Property Line

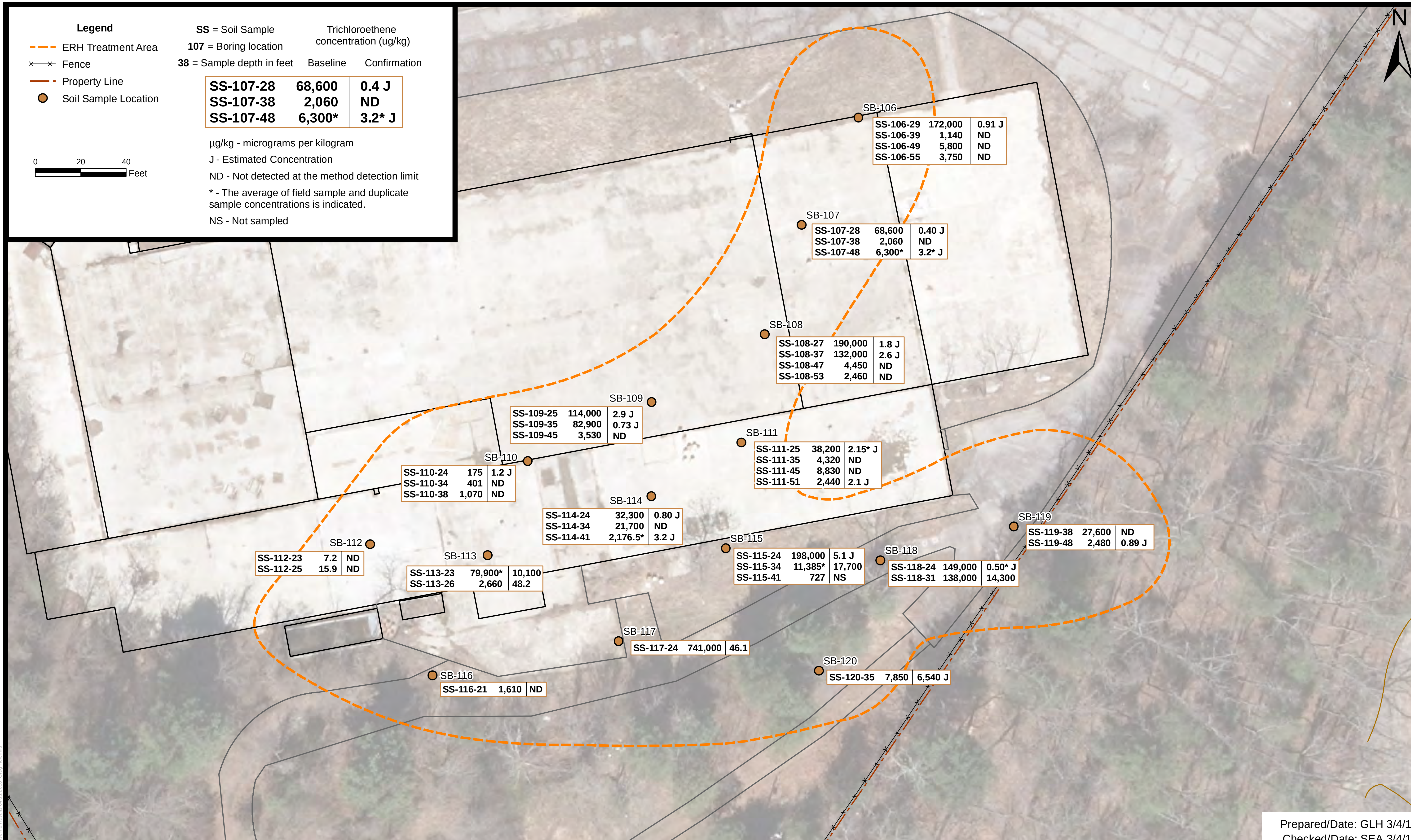
wood.

CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

Ambient Air Monitoring/SamplingLocations

Project 6252162012

Figure 5



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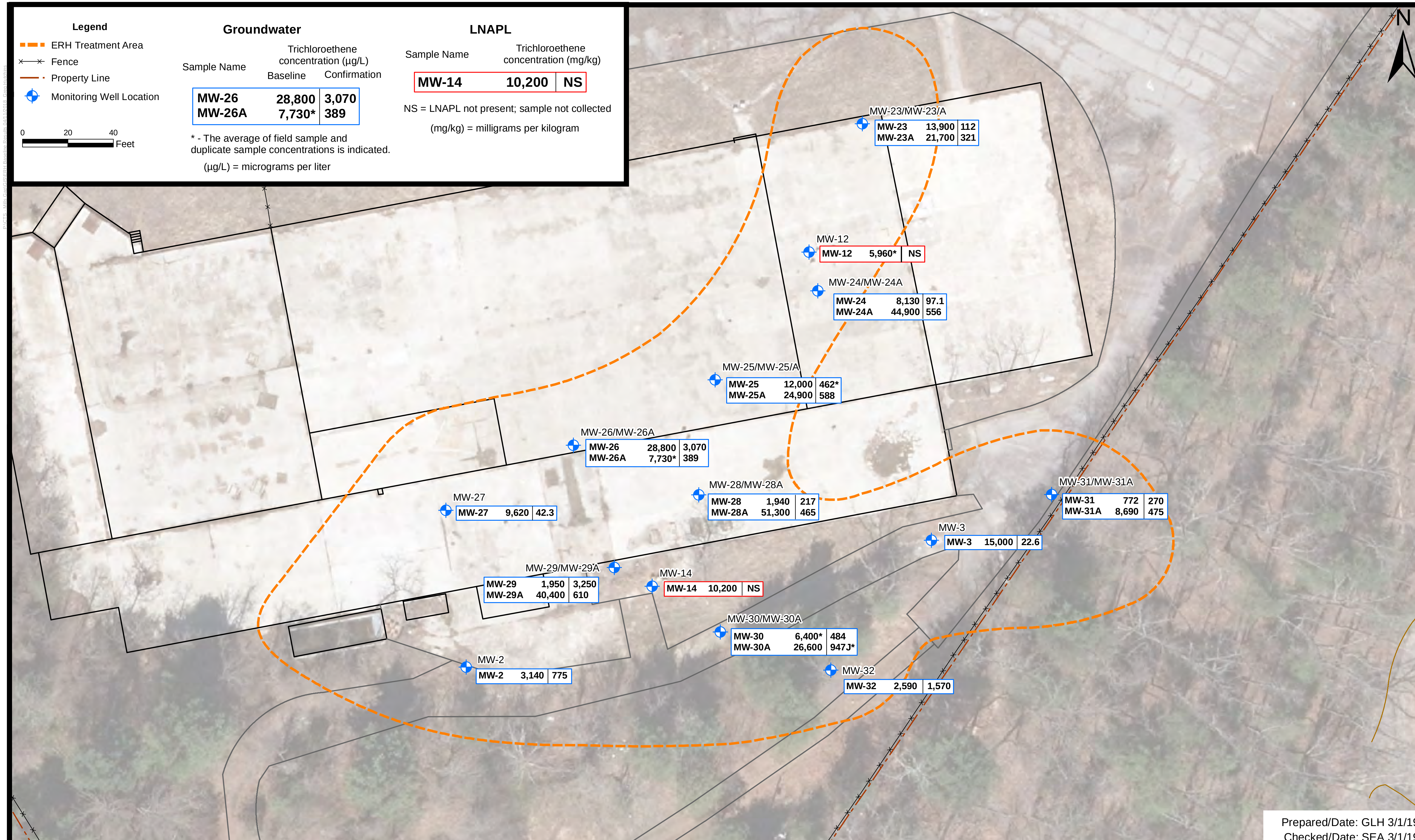
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

ERH Baseline and Confirmation Soil Analytical Results

Project 6252162012

Figure 6



Legend

- ERH Treatment Area
- Fence
- Property Line
- Monitoring Well Location

0 20 40 Feet

Groundwater

Sample Name	Trichloroethene concentration (µg/L) Baseline	Confirmation
MW-26	28,800	3,070
MW-26A	7,730*	389

* - The average of field sample and duplicate sample concentrations is indicated.

(µg/L) = micrograms per liter

LNAPL

Sample Name	Trichloroethene concentration (mg/kg)	
MW-14	10,200	NS

NS = LNAPL not present; sample not collected

(mg/kg) = milligrams per kilogram

Prepared/Date: GLH 3/1/19
Checked/Date: SEA 3/1/19

wood.

CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

ERH Baseline and Confirmation Groundwater and LNAPL Analytical Results

Project 6252162012

Figure 7

APPENDIX A

WELL ABANDONMENT RECORDS

APPENDIX B

COPIES OF LOG BOOKS AND FIELD DATA RECORDS

APPENDIX C

MONITORING WELL CONSTRUCTION DIAGRAMS AND NCDEQ WELL CONSTRUCTION RECORDS

APPENDIX D

ANALYTICAL REPORTS FOR WASTE CHARACTERIZATION

APPENDIX E

WASTE MANIFESTS

APPENDIX F

TRS FINAL REPORT

APPENDIX G

WASTEWATER SAMPLING ANALYTICAL REPORTS

APPENDIX H

WASTEWATER SAMPLING TABLES

APPENDIX I

VAPOR SAMPLING ANALYTICAL REPORTS

APPENDIX J

CONFIRMATION SOIL ANALYTICAL REPORTS

APPENDIX K

CONFIRMATION GROUNDWATER ANALYTICAL REPORTS

APPENDIX L

DATA VALIDATION REPORT FOR SOIL SAMPLES

APPENDIX M

DATA VALIDATION REPORT FOR GROUNDWATER SAMPLES