REDACTED

REPORT OF DECEMBER 2015 VAPOR INTRUSION MONITORING

CTS OF ASHEVILLE, INC. SUPERFUND SITE

235 Mills Gap Road
Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
CERCLA Docket No. CERCLA-04-2012-3762

Prepared for:

CTS Corporation
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Lisle, Illinois 60532

Prepared by:

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Amec Foster Wheeler Project 6252-12-0006

January 13, 2016

January 13, 2016

Mr. Craig Zeller
Superfund Remedial and Site Evaluation Branch
U.S. Environmental Protection Agency
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960
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Subject: **Report of December 2015 Vapor Intrusion Monitoring**
CTS of Asheville, Inc. Superfund Site
235 Mills Gap Road, Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
CERCLA Docket No. CERCLA-04-2012-3762
Amec Foster Wheeler Project 6252-12-0006

Dear Mr. Zeller:

Please find attached the Report of December 2015 Vapor Intrusion Monitoring (VI Monitoring Report) for the above-referenced Site. Amec Foster Wheeler Environment & Infrastructure, Inc. prepared this VI Monitoring Report on behalf of CTS Corporation pursuant to the requirement set forth in Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study between the United States Environmental Protection Agency (USEPA) Region 4 and CTS Corporation (effective date of January 26, 2012), and in accordance with the Supplement to Vapor Intrusion Assessment Work Plan, Revision 4, dated June 11, 2014, which the USEPA conditionally approved in a letter dated June 13, 2014.

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

Sincerely,

Amec Foster Wheeler Environment & Infrastructure, Inc.

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LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
COPC	constituent of potential concern
HI	Hazard Index
IRIS	Integrated Risk Information System
IUR	inhalation unit risk
MDL	method detection limit
µg/m^3	micrograms per cubic meter
MGRA	Mills Gap Road Associates
RfC	reference concentration
RSL	Regional Screening Level
SIM	selective ion monitoring
trans-1,2-DCE	trans-1,2-dichloroethene
TCE	trichloroethene (also, trichloroethylene)
USEPA	United States Environmental Protection Agency
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level
VOC	volatile organic compound

EXECUTIVE SUMMARY

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), on behalf of CTS Corporation, has prepared this Report of December 2015 Vapor Intrusion Monitoring (VI Report) for the CTS of Asheville, Inc. Superfund Site (Site). Based on preliminary analytical results of ambient air samples collected east of the Site in October and November 2015, ambient, crawlspace and indoor air samples were collected east of the Site in December 2015 and submitted for an expedited analysis.

This VI Report describes work conducted in general accordance with the Supplement to Vapor Intrusion Assessment Work Plan, Revision 4 (Supplemental VI Work Plan), dated June 11, 2014 (Amec Foster Wheeler, 2014), which the United States Environmental Protection Agency (USEPA) conditionally-approved in a letter dated June 13, 2014. The vapor intrusion monitoring was conducted pursuant to Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (Settlement Agreement) between the USEPA and CTS Corporation (effective date January 26, 2012). This VI Report describes the activities that were undertaken to monitor vapor intrusion at residences located east of the Site.

The objective of this VI monitoring was to monitor Site-related volatile organic compounds (VOCs) at two occupied residences located east of the Site. The detected analytes were compared to risk-based screening values to determine the potential for the occurrence of vapor intrusion to pose a potential risk to the residential receptors.

Previous investigations have identified VOCs at the Site, primarily trichloroethene (TCE). The TCE groundwater plume generally extends from the area of the former facility to areas east and west of the Site, coincident with the direction of shallow groundwater flow. Groundwater discharge zones are located east and west of the Site at seeps and springs. Unnamed tributaries form at these seep/spring areas and flow topographically away from those areas.

Indoor and crawlspace air samples were collected at two residences located east of the Site. Ambient air samples were collected between the seep/spring area and the indoor/crawlspace sample locations. The air samples were submitted for Site-specific VOCs according to USEPA Method TO-15 SIM (selective ion monitoring). The data collected for the monitoring are considered 100 percent complete and usable for meeting the objectives presented in the VI Work Plan and the Supplemental VI Work Plan.

Concentrations of TCE, cis-1,2-dichloroethene, and vinyl chloride were detected in the collected air samples. Concentrations of the three detected volatile compounds were compared to USEPA risk-based screening levels for residential indoor air. Only TCE exceeded the screening concentration and thus was selected as the focus of the risk evaluation. Risk calculations were completed using the detected indoor air concentrations of TCE by comparing these concentrations to inhalation toxicity benchmarks. The estimated hazard indices and incremental risks do not indicate unacceptable risks or hazards for residential receptors potentially exposed via indoor air.

Ambient air samples are scheduled to be collected east and west of the Site in January 2016. Based on the results of the January 2016 ambient air monitoring, the need for future sampling at these locations will be evaluated.

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), on behalf of CTS Corporation, has prepared this Report of December 2015 Vapor Intrusion Monitoring (VI Report) for the CTS of Asheville, Inc. Superfund Site (Site). This VI Report describes work conducted in accordance with the Supplement to Vapor Intrusion Assessment Work Plan, Revision 4 (Supplemental VI Work Plan), dated June 11, 2014 (Amec Foster Wheeler, 2014), which was conditionally approved by the United States Environmental Protection Agency (USEPA) in a letter dated June 13, 2014. Based on preliminary analytical results of ambient air samples collected east of the Site in October and November 2015, ambient, crawlspace and indoor air samples were collected east of the Site in December 2015 and submitted for an expedited laboratory analysis.

This vapor intrusion monitoring was conducted pursuant to Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (Settlement Agreement) between the USEPA and CTS Corporation (effective date January 26, 2012). This VI Report describes the activities that were undertaken to monitor vapor intrusion at occupied residences located east of the Site in the "Springs Area".

1.1 SITE DESCRIPTION

The Site is approximately nine acres on Mills Gap Road in Asheville, Buncombe County, North Carolina and the areal extent of the contamination. The approximate center of the Site is located at north latitude 35°29'36" and west longitude 82°30'25" (Figure 1). The Site formerly contained an approximate 95,000-square foot, single-story brick and metal structure in the southern portion of the Site (Figure 2). 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 former building and southeast (rear) of the former building. 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.

1.2 SITE OPERATIONAL HISTORY

International Resistance Company (now Northrop Grumman Systems Corporation as the result of a series of mergers) owned and operated a manufacturing facility at the Site from 1952 until 1959, when CTS of Asheville, Inc. purchased the real property, building, and equipment. CTS of Asheville, Inc. manufactured electronic components at the facility from 1959 until April 1986. Arden Electroplating, Inc. leased a portion of the building from approximately December 1, 1985, until November 30, 1986, and the Site was conveyed to Mills Gap Road Associates (MGRA) on December 23, 1987. MGRA reportedly leased portions of the facility to various tenants, and otherwise utilized the building for business interests. The Site has been vacant/unoccupied since the mid-1990s.

Electronic components utilized in automotive parts and hearing aids were manufactured by CTS of Asheville, Inc. until plant operations ceased in April 1986. Small electronic components were electroplated with tin, nickel, zinc, and silver as one step in the process. Wastes generated from the process included sludge containing heavy metals and solvents. Solvents, including trichloroethene (TCE) and acetone, were used in the process to clean and/or degrease metal objects prior to electroplating.

Disposal/recycling activities at the facility prior to 1959 are unknown. From 1959 to 1986, solvents and metals were reportedly reclaimed whenever possible. Between 1959 and 1980, metal-bearing rinse waters and alkaline cleaners that could not be reclaimed from the electroplating process were reportedly disposed of through the municipal sewer system, while concentrated metals and solvent wastes were placed in drums for off-site disposal/recycling. After 1980, wastes were accumulated in drums on-site prior to off-site disposal or recycling.

1.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Environmental investigations have been conducted at the Site by several entities since 1987. The results of previous investigations have been described in other Site documents, and will be presented in the Remedial Investigation/Feasibility Study Work Plan to be prepared for the Site. The results of previous investigations have identified volatile organic compounds (VOCs), primarily TCE, at the Site.

The shallow/overburden TCE groundwater plume terminates within approximately 350 feet of the seep/spring area west of the Site. Although the shallow/overburden TCE groundwater plume has not been completely delineated to the east, the plume is expected to terminate near or slightly beyond the seep/spring area east of the Site. Volatilization of TCE and degradation products from the groundwater plume represents a potential pathway for vapor intrusion into residential structures located in the vicinity of the groundwater plume. The surface waters that emanate from the springs east and west of the Site contain TCE; therefore the volatilization of TCE from the surface waters is a potential pathway affecting ambient air in the vicinity of the surface waters.

Soil contamination associated with the Site has not been identified on adjacent properties; therefore, volatilization of constituents from soil contamination is not expected to contribute to vapor intrusion into residences located adjacent to the Site property. As summarized below, air sampling has been conducted in the vicinity of the Site and has included sampling of soil gas, crawlspace air, indoor air and ambient/outside air.

1.3.1 December 2007 and August 2008 Air Sampling

The USEPA and their contractors conducted air sampling in the vicinity of the Site in December 2007. The sampling included 10 subslab and 12 crawlspace air samples collected from 22 residences, as well as ambient air and 'slam bar' soil gas samples (T N & Associates, 2008).

A Trace Atmospheric Gas Analyzer (TAGA) was also used to screen air quality in the vicinity of the Site. TCE was detected in crawlspace air samples collected at residences located on properties adjacent to the Site at concentrations ranging from an estimated concentration of 0.243 micrograms per cubic meter ($\mu g/m^3$) at 108 Nodding Lane (west of Site) to 20.3 $\mu g/m^3$ at 275 Mills Gap Road (east of Site). Concentrations of detected constituents in the subslab and crawlspace air samples were not above USEPA's stated action levels.

In August 2008, USEPA and their contractors collected five crawlspace air samples, two indoor air samples, and one soil gas sample (as well as ambient and duplicate air samples) from six residences in the area of the Site (T N & Associates, 2009). TCE was

detected in crawlspace air samples collected at residences located on properties adjacent to the Site at concentrations ranging from an estimated concentration of 1.15 μg/m^3 at (b) (6) (b) (6) (west of Site) to 7.41 μg/m^3 at (b) (6) (east of Site). Concentrations of detected constituents in the air samples were not above USEPA's stated action levels.

Ambient air samples were collected during the aforementioned sampling events. Concentrations of TCE detected in the ambient air samples were highest near the seep/spring areas. The concentration of TCE in the vicinity of the springs east of the Site during the August 2008 air sampling event was 1,490 μg/m^3 and the concentration of TCE in the vicinity of the spring(s) west of the Site during the August 2008 air sampling event was 5.24 μg/m^3 (T N & Associates, 2009). The concentrations of TCE detected in other ambient air samples decreased with distance from the seep/spring areas.

1.3.2 October 2012 Air Sampling

Section 1.3.4 of the Settlement Agreement Scope of Work requires an evaluation of vapor intrusion at residences immediately contiguous to the Site and/or proximate to the currently known groundwater plume. Air samples were collected at properties west of the Site in October 2012. Access to properties east of the Site had not been obtained at the time of the October 2012 sampling event.

Concentrations of TCE, cis-1,2-dichloroethene, and/or vinyl chloride were detected in the collected air samples. Concentrations of detected constituents were generally similar to or slightly less than constituent concentrations detected during previous sampling events conducted by USEPA and its contractors. A screening-level risk assessment was conducted using the detected TCE concentrations. The calculated Hazard Indices and incremental risks did not indicate unacceptable risks or hazards for potential residential receptors.

1.3.3 April 2014 Air Sampling

Air samples were collected at properties east of the Site in April 2014. Concentrations of TCE and cis-1,2-DCE were detected in the collected air samples. Concentrations of trans-1,2-dichloroethene (trans-1,2-DCE) and vinyl chloride were estimated (i.e., above the

method detection limit, but below the laboratory reporting limit) in several air samples. Concentrations of detected constituents during the April 2014 VI assessment are generally similar to (i.e., within the same order of magnitude) those constituent concentrations detected during previous sampling events conducted by USEPA and its contractors.

Concentrations of TCE detected in the crawlspace and indoor air at (b) (6) (b) (6) were similar to the associated ambient air samples. The indoor and crawlspace concentrations of TCE detected at (b) (6) were elevated with respect to TCE detected in the associated adjacent ambient air samples. The cis-1,2-DCE to TCE ratio for the air samples collected at (b) (6) indicated a different biodegradation pattern than other air samples collected during the investigation, indicating a separate distinct source of TCE inside the (b) (6) residence. The source of the TCE concentrations in crawlspace and indoor air at (b) (6) was not identified; however, the source is not considered to be ambient air in the vicinity of the residence and is not a result of vapor intrusion from the ground.

A screening-level risk assessment was conducted using the detected TCE concentrations. The calculated Hazard Indices and incremental risks indicated unacceptable risks or hazards for potential residential receptors.

1.3.4 June 2014 Air Sampling

In an email dated June 6, 2014, USEPA required additional air sampling at residences located farther east of the Site based on the results of the April 2014 air sampling event. Air samples were collected from in and/or near eight residences east of the Site ("Outer Perimeter" residences). Concentrations of TCE and cis-1,2-DCE were detected in the collected air samples. Estimated concentrations of trans-1,2-DCE and vinyl chloride were detected in several air samples. Concentrations of detected constituents were generally similar to those constituent concentrations detected during previous sampling events conducted by USEPA and its contractors. A screening-level risk assessment was conducted using the detected TCE concentrations. The calculated Hazard Indices and incremental risks did not indicate unacceptable risks or hazards for potential residential receptors.

1.3.5 October/November 2014 through April 2015 Air Monitoring

Air samples were collected from in and/or near the nine residences east of the Site where samples were collected in April and June 2014. A springs area removal action, consisting of installation of a Springs Vapor Removal and Capture System, was completed in October 2014. Concentrations of TCE and cis-1,2-DCE were detected in the air samples collected in October 2014, November 2014, January 2015, February 2015, and April 2015. Concentrations above the method detection limit and estimated concentrations (i.e., above the method detection limit, but below the laboratory reporting limit) of trans-1,2-DCE and/or vinyl chloride were detected in some of the air samples. Concentrations of detected constituents were less than those constituent concentrations detected during previous sampling events conducted by USEPA contractors and Amec Foster Wheeler. Screening-level risk assessments for indoor air samples were conducted using the detected TCE concentrations. The calculated Hazard Indices and incremental risks did not indicate unacceptable risks or hazards for potential residential receptors.

In accordance with the USEPA-approved Springs Removal Action Work Plan, dated September 2, 2014, the April 2015 air sampling event was the final monitoring event for indoor air in residences east of the Site. Based on the results of indoor and ambient air sampling in October/November 2014, January/February/April 2015, in varied weather conditions, and the operational performance of the Springs Vapor Removal and Capture System, it was determined that future indoor air sampling at the residences east of the Site was not warranted, but that quarterly ambient air monitoring would be conducted until no longer warranted.

1.3.6 July/October/November 2015 Ambient Air Monitoring (East of Site)

Ambient air samples were collected from historically-located locations AAS-05 and AAS-06 in July 2015. The laboratory analytical results indicated constituent concentrations that were similar to or less than concentrations in samples collected from the same ambient locations since October 2014. Ambient air samples were collected at AAS-05 and AAS-06 in October 2015, and the detected constituent concentrations were greater than had been reported since October 2014. TCE concentrations were reported as 2.4 µg/m^3 and 7.5 µg/m^3 in samples AAS-06 and AAS-05, respectively.

Based on preliminary analytical results of the ambient air samples collected east of the Site in October 2015, ambient air samples also were collected east of the Site in November 2015 and were submitted for an expedited laboratory analysis. The laboratory analytical results again indicated constituent concentrations greater than those detected since October 2014. TCE concentrations were reported as 5.6 µg/m^3 and 9.2 µg/m^3 in samples AAS-05 and FD-29 (duplicate of AAS-06), respectively.

1.3.7 June/August/October 2015 Ambient Air Monitoring (West of Site)

During the Western Area Remediation Investigation, ambient air samples were collected west of the Site in June and August 2015. Two ambient air samples (AAS-01 and AAS-16) were collected in June 2015 on the Southside Village (SSV) property, and three additional ambient air samples (AAS-17, AAS-18, and AAS-19) were collected as requested by USEPA on the property north of SSV in August 2015.

The concentrations of TCE detected in ambient air samples AAS-01 and AAS-16, 9.8 µg/m^3 and 3.7 µg/m^3, respectively, were higher than the concentrations historically detected in these areas. There is not an action level for TCE in outside air. However, the concentrations of TCE detected at AAS-01 and AAS-16 in June 2015 were high enough for USEPA to recommend indoor and crawlspace air sampling at the four residential units located north of Silk Tree Lane in SSV.

On July 28, 2015, USEPA sent letters to the residents of the four units asking for permission to sample their indoor and crawlspace air. The residents of the four units denied USEPA access to conduct the recommended sampling. In addition, the SSV Homeowners' Association denied USEPA's request to resample ambient air at the AAS-01 and AAS-16 locations. As a result, USEPA added three ambient air sampling locations (AAS-17, AAS-18, and AAS-19) on adjacent private property north of the SSV property, where USEPA does have permission to gather data. Ambient air samples were collected from those three locations in August 2015, and TCE concentrations ranged from 0.61 µg/m^3 at AAS-18 to 13 µg/m^3 at AAS-17.

Ambient air monitoring was conducted west of the Site in October 2015 as requested by USEPA in an email dated July 24, 2015. An ambient air sample and field duplicate sample

were collected at the AAS-17 location. Constituent concentrations detected in the ambient air samples were less than the concentrations detected in the August 2015 ambient air sample. TCE concentrations were reported as 3.9 µg/m^3 and 4.3 µg/m^3 in FD-28 (the duplicate sample) and AAS-17, respectively.

1.4 OBJECTIVE OF THE VAPOR INTRUSION MONITORING

Based on the TCE concentrations detected in ambient air samples collected east of the Site in October and November 2015, indoor, crawlspace, and ambient air samples were collected and analyzed on an expedited basis in December 2015. The objective of this December 2015 air sampling was to monitor site-related VOCs at occupied residences located east of the Site in the Springs Area. This monitoring event was performed to determine if concentrations of Site-related VOCs were present in indoor air and crawlspaces at the residences. The detected concentrations in indoor air were compared to risk-based screening values to indicate the potential for the occurrence of vapor intrusion to pose a potential risk to the residential receptors.

2.0 VAPOR INTRUSION MONITORING ACTIVITIES

The VI monitoring was conducted in accordance with the USEPA-approved Supplemental VI Work Plan. The collected air samples were analyzed for TCE, which is the primary volatile constituent known to be present in groundwater associated with the Site, as well as for compounds that are degradation products of TCE.

2.1 SAMPLING ACTIVITIES

Sampling activities were conducted on December 1 and 2, 2015. The USEPA Remedial Project Manager accompanied Amec Foster Wheeler personnel during the sampling activities.

2.1.1 Access to Sample Off-Site Properties

Prior to the April 2014 sampling events, the USEPA sent access agreements to property owners where air samples were proposed to be collected prior to initiating the air sampling activities. The access agreements requested access for Amec Foster Wheeler and USEPA personnel to enter the subject property for collection of air samples. Access agreements were obtained from the owners of the properties located at (b) (6) (b) (6) and (b) (6) . Property owners were notified by the USEPA of the date of the December 2015 sampling activities and USEPA coordinated the sample deployment/retrieval date and time with each resident.

2.1.2 Crawlspace and Indoor Sample Locations

Prior to collecting interior air samples in April 2014, the interior of each residence to be sampled was surveyed to collect information about the structure (e.g., configuration, heating/cooling systems, etc.) and to assess factors that could influence the air sampling results (e.g., products or chemicals containing VOCs). An Occupied Dwelling Questionnaire was completed in coordination with the occupant of the residence. The Questionnaires were included in the Vapor Intrusion Assessment: (b) (6) (b) (6), dated June 30, 2014.

For this December 2015 VI monitoring event, indoor and crawlspace air samples were collected from residences located at (b) (6) and (b) (6) , which

are located east of the Site (Figure 3). The residence at (b) (6) , which is also in the Springs Area, was not occupied at the time of sampling; therefore, samples were not collected from the (b) (6) residence.

The residence at (b) (6) is a one-story mobile home with a crawlspace. The ground surface of the crawlspace is soil and is partially covered with a polyethylene moisture barrier. Items or materials were not being stored in the crawlspace during the sampling activities. The indoor air sample (IAS-06) was collected in the living room of the residence and the crawlspace air sample (CAS-06) was collected in the western portion of the crawlspace.

The residence at (b) (6) is a 1.5-story home with a crawlspace. The ground surface of the crawlspace is soil and is partially covered with a polyethylene moisture barrier. There were no items being stored in the crawlspace during the sampling activities. A motorcycle was being stored in the living room area of the residence. The indoor air sample (IAS-05) was collected in the living room of the residence and the crawlspace air sample (CAS-05) was collected in the south-central portion of the crawlspace. A field duplicate sample (FD-31) was collected with CAS-05 and field duplicate sample (FD-32) was collected with IAS-05.

Photographs of the sampling locations are provided in Appendix A.

2.1.3 Ambient Air Sample Locations

Two ambient air samples were collected at historically-designated locations, AAS-05 and AAS-06, between the spring/seep area and residences located east of the Site in December 2015. A field duplicate sample (FD-30) was collected with AAS-06. Photographs of the sampling locations are provided in Appendix A.

2.1.4 Sample Collection

Air samples were collected using individually-certified or batch-certified, 6-Liter, electropolished, stainless steel (SUMMA®) canisters. The canisters were equipped with flow controllers that were set to collect an air sample over a 24-hour period.

The indoor air sample canisters were placed on a plastic bucket on the floor surface for sample collection. The sample inlet heights were approximately two to three feet above the floor surface.

The crawlspace air sample canisters were placed on the ground surface. The sample inlet height was approximately 1.3 feet above ground surface at CAS-06. Sample canister CAS-05 was placed in the approximate location as historic air samples collected by USEPA, and the sample inlet height for sample CAS-05 was approximately 4.4 feet above ground surface (i.e., the canister was placed on a 'knee wall' built in the crawlspace).

Ambient air samples AAS-06 and duplicate FD-30 were secured to a metal fence post driven into the ground and ambient air sample AAS-05 was affixed to a metal fence. The sample inlet heights ranged from approximately four to five feet above ground surface.

Vacuum gauges were attached to each canister and sample personnel recorded vacuum gauge readings at the beginning and end of sample collection. The air temperature also was recorded at the beginning and end of sample collection (for indoor and crawlspace air samples, the indoor/crawlspace temperature and ambient/outdoor temperature were both recorded). A calibrated photoionization detector was used to measure potential volatile vapors in the vicinity of the sample canister during sample deployment and retrieval. Each canister was deployed for 24 hours and a sample tag was affixed to the canisters during deployment and shipment to the laboratory.

Copies of the field data records and logbook for the sampling activities are included in Appendix B. Table 1 contains a summary of the air samples collected and quality assurance/quality control samples submitted to the laboratory for the December ambient air sampling event. Copies of the laboratory certifications for the canisters are included in Appendix C.

The air samples were shipped under chain-of-custody protocol via overnight delivery to ESC Lab Sciences in Mt. Juliet, Tennessee for an expedited analysis.

2.2 ANALYSIS OF AIR SAMPLES

The air samples were submitted for analysis of the following Site-related VOCs according to USEPA Method TO-15 SIM (selective ion monitoring):

- trichloroethene
- cis-1,2-dichloroethene (cis-1,2-DCE)
- trans-1,2-dichloroethene (trans-1,2-DCE)
- vinyl chloride

3.0 ANALYTICAL RESULTS AND DATA USABILITY

The following sections describe the laboratory analytical results of the submitted air samples, as well as the results of data validation and data usability. The laboratory analytical report is included as Appendix D.

A summary of the December 2015 analytical results and historical laboratory analytical results are presented in Table 2. TCE was detected at concentrations ranging from 0.893 µg/m^3 to 4.15 µg/m^3 in the crawlspace air samples; 0.797 µg/m^3 to 4.05 µg/m^3 in the indoor air samples; and 2.59 µg/m^3 to 6.51 µg/m^3 in the ambient air samples. Concentrations of cis-1,2-DCE were detected in the indoor air, crawlspace air, and ambient air samples at concentrations ranging from 0.299 µg/m^3 to 3.20 µg/m^3. Vinyl chloride was detected in ambient air sample AAS-05 at a concentration 0.0573 µg/m^3.

3.1 DATA VALIDATION

Data validation was conducted based on procedures in the USEPA Region 4 Data Validation Standard Operating Procedures for Organic Analysis (USEPA, 2008), in conjunction with Method TO-15 SIM and the laboratory's Method TO-15 standard operating procedure. Full validation, including raw data verification and calculation checks, was completed on the laboratory data.

The data validation narrative is included in Appendix E. The results of the data validation did not indicate the presence of quality control issues.

3.2 DATA USABILITY SUMMARY

The laboratory used, ESC Lab Sciences (ESC), is different than the laboratory identified in the Supplemental VI Work Plan (Quality Assurance Project Plan, Revision 4). Due to the expedited sampling activities, the laboratory identified in the Supplemental VI Work Plan, ALS Environmental, was unable to prepare and send the sampling equipment in the time needed. ESC's available canisters were either individually or batch-certified. Also, ESC does not individually certify flow controllers or vacuum gauges, so batch-certified flow controllers and vacuum gauges were used.

Raw data from the laboratory blank sample and trip blank sample indicate that the four Site-specific VOCs were not detected. Therefore, the laboratory used, use of batch-certified equipment, and the results of the data validation indicated that the data collected during this sampling event is not considered to be negatively impacted, despite not strictly adhering to the Supplemental VI Work Plan.

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 Supplemental VI Work Plan.

4.0 INDOOR AIR SCREENING-LEVEL RISK EVALUATION

Amec Foster Wheeler evaluated air quality for occupied residences located in the Springs Area east of the Site. Indoor and crawlspace air samples were collected on December 2, 2015, at two residences, and ambient air samples were collected from two locations (Figure 3). The analytical data for the December 2015 air samples are summarized in Table 2 and risk assessment tables are included in Appendix F.

4.1 EXPOSURE ASSESSMENT

In order to identify constituents of potential concern (COPCs) for the air pathway, the detected air constituents were compared to target indoor air concentrations from the USEPA's Vapor Intrusion Screening Level (VISL) Calculator, Version 3.4 (USEPA, 2015a) and the USEPA Regional Screening Levels (RSLs) for residential air (USEPA, 2015b). These screening levels are presented in Table F.1 and are based on a residential exposure scenario with target carcinogenic risk of 1×10^{-6} and target hazard index of 0.1. As a result of this screening step, TCE was identified as an indoor air COPC and carried through the screening-level risk evaluation. There is no air screening criteria for 1,2-cis-DCE. Trans-1,2-DCE and vinyl chloride were not detected above the laboratory reporting limit in the indoor air samples.

Incremental risks and hazards were calculated for indoor air using default adult and child resident exposure assumptions (Tables F.2 through F.6). The risk assessment assumes future residents will be present 350 days a year with exposure durations of 26 years for a residential adult (6 years as a child and 20 years as an adult for age-adjusted exposures) and 6 years for residential children (USEPA, 1991a; USEPA, 2014a).

4.2 TOXICITY ASSESSMENT

TCE is a man-made, colorless liquid used mainly as a solvent to remove grease from metal parts. It has also been an ingredient in some consumer products such as typewriter correction fluid, adhesives, spot removers, carpet cleaners, paint strippers/removers (USEPA, 2014b), and spray fixatives (USEPA, 2014c). The possible health effects from breathing TCE depend on the levels in indoor air, the length of exposure, and whether and when a pregnant woman is exposed. According to the USEPA, women who are in the first

trimester of pregnancy are most sensitive to TCE exposures with exposures during this time potentially increasing the risk of heart malformations in a developing fetus (USEPA, 2012). Chronic exposure to TCE may affect the immune system and increase susceptibility to infections. Exposure to TCE is associated with an increased risk of cancers of the kidney, liver, and non-Hodgkin lymphoma (USEPA, 2011a).

Toxicity values [Inhalation Reference Concentrations (RfCs) and Inhalation Unit Risks (IURs)] used in this evaluation were obtained from the USEPA Integrated Risk Information System (IRIS) (USEPA, 2011a). IRIS released a Toxicity Assessment for TCE that recommends TCE be addressed as a potential mutagen with risk for kidney-related impacts being assessed using age-specific adjustment factors, and with liver and non-Hodgkin lymphoma (NHL) risk addressed using the standard carcinogenic risk equations. Separate TCE IURs have been derived for the kidney and liver-NHL endpoints. These IURs, the age-specific adjustment factors used to adjust the exposure intakes, and the TCE RfC used in this assessment, are listed in Appendix F, Tables F.2 through F.5.

The RfC is used to estimate non-carcinogenic inhalation hazards. The RfC is an estimate of the daily exposure to the human population, including sensitive subgroups such as children and women of child-bearing age, which is likely to be without an appreciable risk of deleterious effects. The estimated hazard is compared to a target hazard index (HI) of 1. Cumulative hazards less than 1 are not likely to be associated with systemic or non-carcinogenic health risks. Non-carcinogenic hazards associated with inhalation exposures to TCE are associated with potential damage to the thymus and heart.

Using the endpoint-specific IURs for TCE, the cumulative carcinogenic risk for the indoor vapor intrusion pathway was calculated and compared to a target risk of 1×10^{-6}. A carcinogenic risk range of 1×10^{-6} to 1×10^{-4} is considered acceptable for incremental carcinogenic risk under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; USEPA, 1991b). The IUR is characterized as an upper-bound estimate designed to be protective of the majority of the human population.

4.3 RISK CHARACTERIZATION

The TCE concentration detected in the indoor air sample collected at (b) (6) (0.797 µg/m^3) was used to assess potential indoor air exposures and calculate incremental risks and hazards for both adult/child and child residents (Tables F.2 and F.3). A potentially sensitive receptor (a woman of child-bearing age) currently resides at this location. The estimated incremental risk from indoor air is 2 x 10^{-6} for residential adults/children and 6 x 10^{-7} for residential children. The estimated HI for TCE in indoor air is 0.4 for both residential adults and children. The estimated HI is less than 1 and the estimated incremental risks are within the CERCLA carcinogenic risk range of 1 x 10^{-4} to 1 x 10^{-6}. Based on these results, the air pathway would not pose an unacceptable hazard or risk to current or future residential receptors living at (b) (6) .

The TCE concentration detected in the indoor air sample collected at (b) (6) (4.05 µg/m^3) was used to assess potential indoor air exposures and calculate incremental risks and hazards for both adult/child and child residents (Tables F.4 and F.5). A non-sensitive receptor currently resides at this residence. The estimated incremental risk from indoor air is 8 x 10^{-6} for residential adults/children and 3 x 10^{-6} for residential children. The estimated HI for TCE in indoor air is 1.9 for both residential adults and children. Because women of child-bearing age are not present, a higher exposure level remains protective of human receptors present in this residence. Estimated carcinogenic risk for adults at this residence are estimated at 8 x 10^{-6}. Because this estimate falls within the CERCLA risk range of 1 x 10^{-6} to 1 x 10^{-4}, the estimated incremental carcinogenic risk is considered acceptable. Based on these results, the air pathway would not pose an unacceptable hazard or risk to current or future non-sensitive residential receptors living at (b) (6) (b) (6)

4.4 UNCERTAINTY ANALYSIS

The intent of the monitoring was to evaluate current Site-specific VOC concentrations in air inside and in the vicinity of residences and to compare current concentrations to previously measured concentrations of Site-specific VOCs. Conservative risk-based screening criteria were used to complete a preliminary evaluation of risks and hazards for the residents. Key uncertainties associated with an inhalation risk evaluation include the

estimation of representative exposure concentrations and exposure intakes, the choice of toxicity values, and the approach to estimating risks (USEPA, 2009).

This assessment assumes that the air concentrations at the residences will remain consistent over time, although the detected constituents are potentially biodegradable and air concentrations typically vary due to weather/seasonal fluctuations that influence volatilization, air mixing, pressure differentials, etc. The assessment also assumes that the air concentrations at the sampled locations will be spatially uniform, although air concentrations may vary within structures due to locations of underground utilities, subsurface fill and/or moisture barriers, foundation cracks, air flow, and dilution and mixing within the indoor air space. These spatial and temporal variations could affect the risk estimates calculated.

The assessment assumes that the source of TCE is the groundwater plume. However, other man-made sources of TCE may be contributing to the concentrations observed in indoor air. As noted in Section 4.2, USEPA has determined that a variety of household products can contribute to observed indoor air TCE concentrations.

The assessment assumes that future residents will be present 350 days a year with exposure durations of 26 years for a residential adult (6 years as a child and 20 years as an adult for age-adjusted exposures) and 6 years for residential children. While consistent with current USEPA risk assessment guidance, these assumptions would tend to overestimate risks because national residential tenure in one location averages approximately 9 years (USEPA, 2011b).

The non-carcinogenic reference concentration for TCE is based on cardio-malformations for pre-birth exposures that might occur during the first trimester of pregnancy. Otherwise, exposure limits could be 10-fold higher and still remain protective for the majority of the general public (USEPA, 2012). The possible health effects from breathing TCE depends on the levels in indoor air, the length of exposure, and whether and when a pregnant woman is exposed.

There is some degree of uncertainty associated with the characterization of risks of local residents because residential adults and children are assumed to be present in the residence for 24 hours per day for 350 days per year. Working adults and children attending day care or school would not be present in the residence continuously every day.

4.5 COMPARISON TO PREVIOUS AIR INVESTIGATIONS

Ambient, crawlspace and/or indoor air samples were previously collected by USEPA contractors and Amec Foster Wheeler at the residences sampled during this VI monitoring. A summary of the analytical results from the previous sampling events, as well as this VI monitoring, are included in Table 2. Concentrations of TCE during this VI monitoring are slightly greater than constituent concentrations detected during sampling events conducted by Amec Foster Wheeler since installation of the Springs Vapor Removal and Capture System in October 2014 (Section 1.3.5); however, the estimated hazards and risks do not indicate unacceptable risk or hazards for the residential receptors potentially exposed via indoor air.

5.0 DISCUSSION AND CONCLUSIONS

The VI monitoring was conducted in general accordance with the USEPA-approved Supplemental VI Work Plan. The data collected for the assessment are considered 100 percent complete and usable for meeting the objectives presented in the Supplemental VI Work Plan.

Between September and October 2014, a removal action, consisting of installation of a Springs Vapor Removal and Capture System, was performed in the area of the springs. This removal action effectively reduced TCE and other constituent concentrations in air in the area east of the Site. Concentrations of detected constituents during this December 2015 VI monitoring are slightly greater than sampling events conducted by Amec Foster Wheeler since implementation of the Springs Vapor Removal and Capture System.

The concentrations of TCE detected in two indoor air samples, including the duplicate sample, were greater than the Target Residential Indoor VISL/RSL. As a result of this screening step, TCE was identified as an indoor air COPC and carried through the screening-level risk evaluation. Risk calculations were completed using the detected air concentrations of TCE in indoor air samples and comparing these concentrations to inhalation toxicity benchmarks. Table 2 contains a summary of the risk and hazard estimates for the indoor air samples.

The estimated hazards and risks do not indicate unacceptable risk or hazards for the residential receptors potentially exposed via indoor air.

Ambient air samples are scheduled to be collected at locations AAS-05, AAS-06, and AAS-17 in January 2016. Based on the results of the January 2016 ambient air monitoring, the need for future sampling at these locations will be evaluated.

6.0 REFERENCES

Amec Foster Wheeler, 2014. Supplement to Vapor Intrusion Assessment Work Plan (Revision 4), CTS of Asheville, Inc. Superfund Site, EPA ID: NCD003149556, June 11, 2014.

T N & Associates, Inc., USEPA Region 4 START, 2008. Subsurface Soil and Groundwater Sampling Report, Revision 1, Mills Gap, April 23, 2008.

T N & Associates, Inc., USEPA Region 4 START, 2009. Vapor Sampling Letter Report, Revision 2, Mills Gap, June 16, 2009.

USEPA, 1991a. Human Health Evaluation Manual, Supplemental Guidance, OSWER Directive 9285.6-03, March 1991.

USEPA, 1991b. Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim, EPA/540/R-92/003, December 1991.

USEPA, 2008. Data Validation Standard Operating Procedures for Organic Analyses; USEPA Region 4, Science and Ecosystem Support Division Quality Assurance Section, MTSB; Athens, Georgia; August 2008.

USEPA, 2009. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), Final, EPA-540-R-070-002, January 2009.

USEPA, 2011a. Toxicological Review of Trichloroethylene (CAS No. 79-01-6) In Support of Summary Information on the Integrated Risk Information System (IRIS), EPA/635/R-09/011F, September 2011.

USEPA, 2011b. Exposure Factors Handbook, 2011 Edition. EPA/600/R-090/052F, September 2011.

USEPA, 2011c. Background Indoor Air Concentrations of Volatile Organic Compounds in North America Residences (1990 – 2005): A Compilation of Statistics for Assessing Vapor Intrusion, EPA 530-R-10-001, June 2011.

USEPA, 2012. OEA Recommendations Regarding Trichloroethylene Toxicity in Human Health Risk Assessments, December 13, 2012.

USEPA, 2014a. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Values, OSWER Directive 9200.1-120, February 6, 2014.

USEPA, 2014b. Trichloroethylene (Technology Transfer Network-Air Toxics Website). http://www.epa.gov/ttn/atw/hlthef/tri-ethy.html, accessed June 12, 2014.

USEPA, 2014c. TSCA Work Plan Chemical Risk Assessment, Trichloroethylene: Degreasing, Spot Cleaning and Arts & Crafts Uses. USEPA Document 740-R1-4002, June 2014.

USEPA, 2014d. Region 4 Human Health Risk Assessment Supplemental Guidance: January 2014 Draft Final.

USEPA, 2015a. Vapor Intrusion Screening Level Calculator, Version 3.4.

USEPA, 2015b. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites (November 2015).

TABLES

TABLE 1
Summary of Air Samples and Sampling Conditions - December 2015
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

Sample ID	Sample Location/Address	Date Start	Time	Interior Air Temperature (°F)		Ambient Air Temperature (°F)		PID Reading (ppm)	PID Reading (ppm)	Vacuum (inches Hg)	
			Start/Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop
AAS-06	between springs and (b) (6)	12/1/2015	15:28	NA	NA	54	53	0.0	0.0	-27.0	-5.5
CAS-06	(b) (6)	12/1/2015	15:39	54	53	61	61	0.0	2.2	-25.0	0.0
IAS-06	(b) (6)	12/1/2015	15:47	65	66	54	53	0.0	3.5	-27.0	-3.0
AAS-05	between springs and (b) (6)	12/1/2015	15:59	NA	NA	54	54	0.0	2.8	-27.0	-5.5
CAS-05	(b) (6)	12/1/2015	16:12	54	54	54	53	0.0	3.2	-29.0	-8.0
IAS-05	(b) (6)	12/1/2015	16:22	78	74	54	53	0.0 - 7.7	5.4	-26.0	-5.0
FD-30 (AAS-06)	between springs and (b) (6)	12/1/2015	15:28	NA	NA	54	53	0.0	0.0	-27.0	-5.0
FD-31 (CAS-05)	(b) (6)	12/1/2015	16:12	54	54	54	53	0.0	3.2	-25.0	-9.0
FD-32 (IAS-05)	(b) (6)	12/1/2015	16:22	78	74	54	53	0.0 - 7.7	5.4	-26.5	-4.0
TB-16	NA	lab prep	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1. °F: degrees Fahrenheit
2. PID: photoionization detector
3. ppm: parts per million
4. Hg: mercury
5. NA: not applicable

Prepared By: AAS 12/04/15
Checked By: SEK 12/04/15

TABLE 2
Summary of December 2015 and Historical Laboratory Analytical Results with Risk Assessment Evaluation Summary ("Springs Area" Residences)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

AMBIENT AIR SAMPLES

Location	Date	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
Upwind of (b) (6)	4/24/2014	AAS-03	2.2	0.49	<0.011	<0.011
Between springs and	4/24/2014	AAS-06	3.6	0.83	0.011 J	<0.011
Between springs and	4/24/2014	FD-04 (AAS-06)	3.7	0.85	0.013 J	<0.011
Between springs and	10/24/2014	AAS-06	0.50	0.83	0.011 J	0.018 J
Between springs and	11/5/2014	AAS-06	1.8	3.3	0.033 J	0.11
Between springs and	11/5/2014	FD-13 (AAS-06)	1.9	3.4	0.036	0.12
Between springs and	1/14/2015	AAS-06	0.67	0.92	0.010 J	0.056
Between springs and	1/14/2015	FD-14 (AAS-06)	0.86	1.1	0.010 J	0.061
Between springs and	2/19/2015	AAS-06	0.96	1.2	0.013 J	0.025 J
Between springs and	2/19/2015	FD-19 (AAS-06)	1.1	1.3	0.013 J	0.027 J
Between springs and	4/16/2015	AAS-06	0.93 J	1.1	<0.019	0.16
Between springs and	7/16/2015	AAS-06	0.20	0.26	<0.013	<0.013
Between springs and	7/16/2015	FD-26 (AAS-06)	0.21	0.26	<0.013	0.028 J
Between springs and	10/21/2015	AAS-06	2.4	3.1	0.035	0.062
Between springs and	11/21/2015	AAS-06	7.7	6.0	0.047	0.057
Between springs and	11/21/2015	FD-29 (AAS-06)	9.2	7.1	0.057	0.066
Between springs and	12/2/2015	AAS-06	2.65	1.16	<0.0793	<0.0511
Between springs and	12/2/2015	FD-30 (AAS-06)	2.59	1.13	<0.0793	<0.0511
Upwind of (b) (6)	4/24/2014	AAS-04	6.4	1.3	0.017 J	<0.010
Between springs and	8/7/2008	MG-25-AMB2	8.60	2.29	<0.264	<0.171
Between springs and	4/1/2009	AA-1*	15.87	3.12 J	<1.64	<1.06
Between springs and	4/24/2014	AAS-05	16	3.5	0.036 J	0.019 J
Between springs and	10/24/2014	AAS-05	0.42	1.7	0.019 J	0.038 J
Between springs and	11/5/2014	AAS-05	1.9	6.1	0.055	0.15
Between springs and	1/14/2015	AAS-05	0.78	1.8	0.017 J	0.032 J
Between springs and	2/19/2015	AAS-05	0.15	0.19	<0.0086	0.0097 J
Between springs and	4/16/2015	AAS-05	1.6	2.2	<0.047	<0.049 J
Between springs and	7/16/2015	AAS-05	0.80	1.6	0.020	0.079
Between springs and	10/21/2015	AAS-05	7.5	8.2	0.066	0.10
Between springs and	11/21/2015	AAS-05	5.6	4.5	0.035	0.034 J
Between springs and	12/2/2015	AAS-05	6.51	3.20	<0.0793	0.0573

(b) (6)

TABLE 2
Summary of December 2015 and Historical Laboratory Analytical Results with Risk Assessment Evaluation Summary ("Springs Area" Residences)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

CRAWLSPACE AIR SAMPLES

Address	Date	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
(b) (6)	12/13/2007	MGSC23	2.63	0.860	<0.198	<0.128
	4/24/2014	CAS-06	10	0.26	<0.012	<0.012
	4/24/2014	FD-05 (CAS-06)	10	0.26	<0.010	<0.011
	11/5/2014	CAS-06	0.47	1.1	0.015 J	0.040
	1/14/2015	CAS-06	0.18	0.24	<0.0081	0.0099 J
	2/19/2015	CAS-06	0.11	0.097	<0.0090	<0.0095
	2/19/2015	FD-20 (CAS-06)	0.10	0.097	<0.011	<0.011
	4/16/2015	CAS-06	0.52	0.62	<0.0098	0.042
	12/2/2015	CAS-06	0.893	0.376	<0.0793	<0.0511
	4/24/2014	CAS-04	2.3	0.54	<0.011	<0.012
	11/5/2014	CAS-04	0.85	2.1	0.031 J	0.079
	1/14/2015	CAS-04	0.36	0.51	<0.0079	0.021 J
	2/19/2015	CAS-04	0.45 J	0.59 J	0.0080 J	0.014 J
	4/16/2015	CAS-04	0.32	0.38	0.29	0.031 J
	12/13/2007	MGSC25	20.3	5.67	<0.198	<0.128
	8/7/2008	MGSC25	7.42	1.53	<0.264	<0.171
	4/24/2014	CAS-05	14	2.7	0.034 J	0.013 J
	11/5/2014	CAS-05	1.5	4.7	0.050	0.084
	1/14/2015	CAS-05	0.40	0.74	<0.0083	0.010 J
	2/19/2015	CAS-05	0.13	0.16	<0.0092	<0.0098
	4/16/2015	CAS-05	0.33	0.37	<0.010	<0.011
	12/2/2015	CAS-05	4.10	1.56	<0.0793	<0.0511
	12/2/2015	FD-31 (CAS-05)	4.15	1.53	<0.0793	<0.0511

TABLE 2
Summary of December 2015 and Historical Laboratory Analytical Results with Risk Assessment Evaluation Summary ("Springs Area" Residences)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

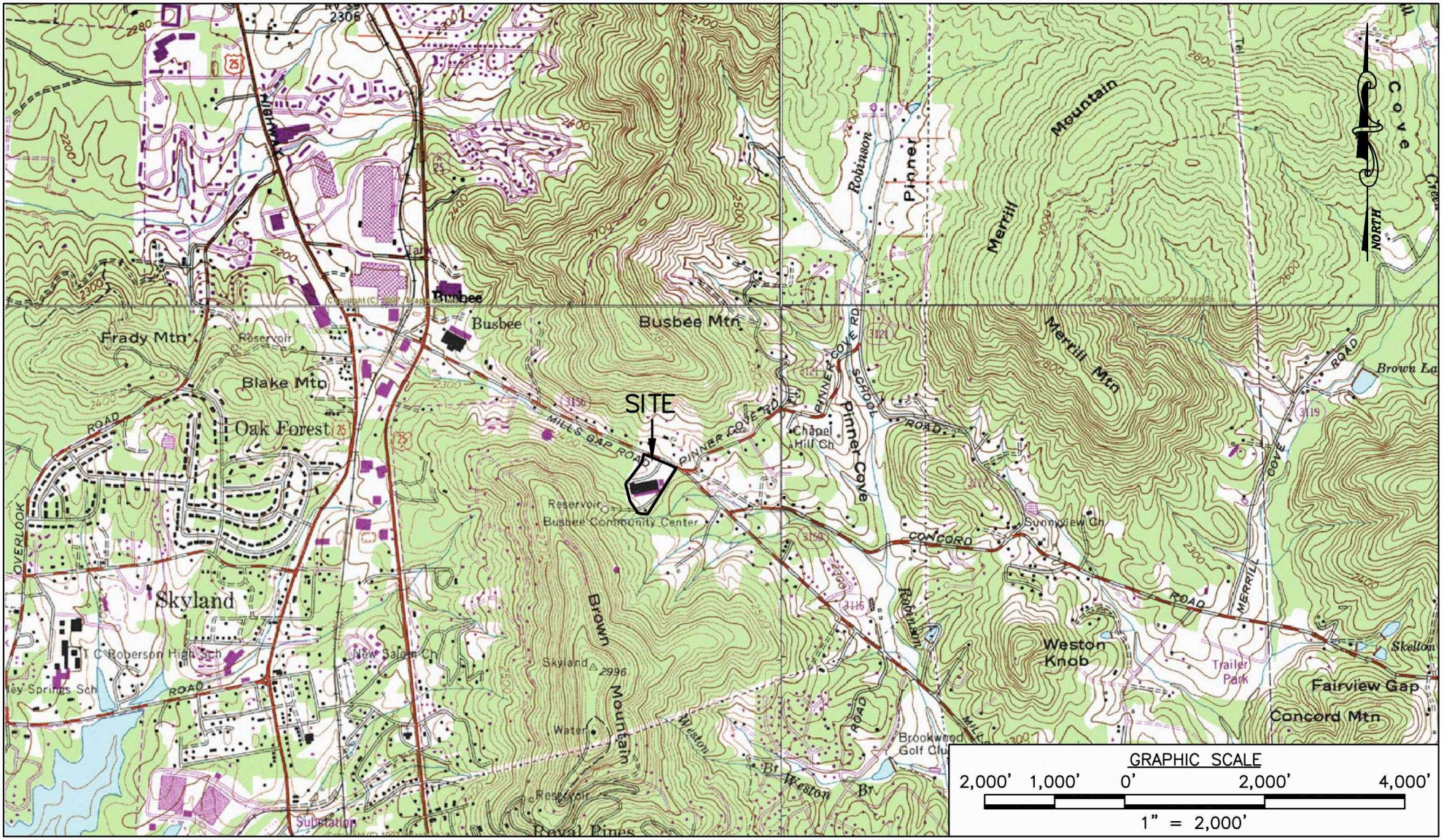
INDOOR AIR SAMPLES

Address	Date	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC	TCE Hazard Quotient***	TCE Cancer Risk (Adult)	TCE Cancer Risk (Child)
(b) (6)	4/24/2014	IAS-06	87**	0.21	0.013 J	<0.011	42	2E-04	6E-05
	11/5/2014	IAS-06	0.40	0.85	0.015 J	0.033 J	0.2	8E-07	3E-07
	1/14/2015	IAS-06	0.23	0.30	<0.010	<0.011	0.1	5E-07	2E-07
	1/14/2015	FD-15 (IAS-06)	0.16	0.19	<0.0084	<0.0089	0.1	3E-07	1E-07
	2/19/2015	IAS-06	0.095	0.082	<0.0090	<0.0096	0.1	2E-07	7E-08
	2/19/2015	FD-21 (IAS-06)	0.10	0.087	<0.0084	<0.0089	0.1	2E-07	7E-08
	4/16/2015	IAS-06	0.58	0.70	<0.0099	0.046	0.3	1E-06	4E-07
	12/2/2015	IAS-06	0.797	0.299	<0.0793	<0.0511	0.4	2E-06	6E-07
	4/24/2014	IAS-04	2.6	0.63	<0.011	0.021 J	1	5E-06	2E-06
	11/5/2014	IAS-04	0.73	1.6	0.030 J	0.071	0.4	2E-06	5E-07
	1/14/2015	IAS-04	0.36	0.44	<0.0084	0.018 J	0.2	8E-07	2E-07
	2/19/2015	IAS-04	0.37	0.44	<0.010	0.020 J	0.2	8E-07	3E-07
	4/16/2015	IAS-04	0.31	0.35	0.016 J	0.030 J	0.1	6E-07	2E-07
	8/7/2008	MGIA25	6.82	1.49	<0.264	<0.171			
	4/24/2014	IAS-05	11	2.4	0.032 J	0.018 J	5	2E-05	8E-06
	4/24/2014	FD-03 (IAS-05)	11	2.5	0.027 J	0.026 J	5	2E-05	8E-06
	11/5/2014	IAS-05	0.91	3.1	0.046	0.068	0.4	2E-06	6E-07
	11/5/2014	FD-12 (IAS-05)	1.4	4.7	0.059	0.10	0.7	3E-06	1E-06
	1/14/2015	IAS-05	0.30	0.60	0.014 J	0.0094 J	0.1	6E-07	2E-07
	2/19/2015	IAS-05	0.11	0.14	<0.0088	0.0096 J	0.1	2E-07	8E-08
	4/16/2015	IAS-05	0.30	0.37	<0.0099	<0.010	0.1	6E-07	2E-07
	12/2/2015	IAS-05	4.05	1.75	<0.0793	<0.0511	1.9	8E-06	3E-06
	12/2/2015	FD-32 (IAS-05)	3.92	1.71	<0.0793	<0.0511	1.9	8E-06	3E-06

Notes:
1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. TCE = trichloroethene; cis-1,2-DCE = cis-1,2-dichloroethene; trans-1,2-DCE = trans-1,2-dichloroethene; VC = vinyl chloride
3. J - Concentration is estimated.
4. '<' - Constituent not detected above the indicated method detection limit.
5. * - concentrations calculated from results in parts per billion by volume (ppbv).
6. ** - Elevated result possibly attributable to new carpet or other indoor activities.
7. *** - For both adult and child/adult.
8. The risk evaluation is based on the current recommended default exposure values (OSWER Directive 9200.1-120, dated February 6, 2014).
9. The risk evaluation did not include historical sample results, as the historical samples were collected prior to the current USEPA risk assessment guidance.

Prepared By: SEK 12/07/15
Checked By: AAS 12/09/15

FIGURES

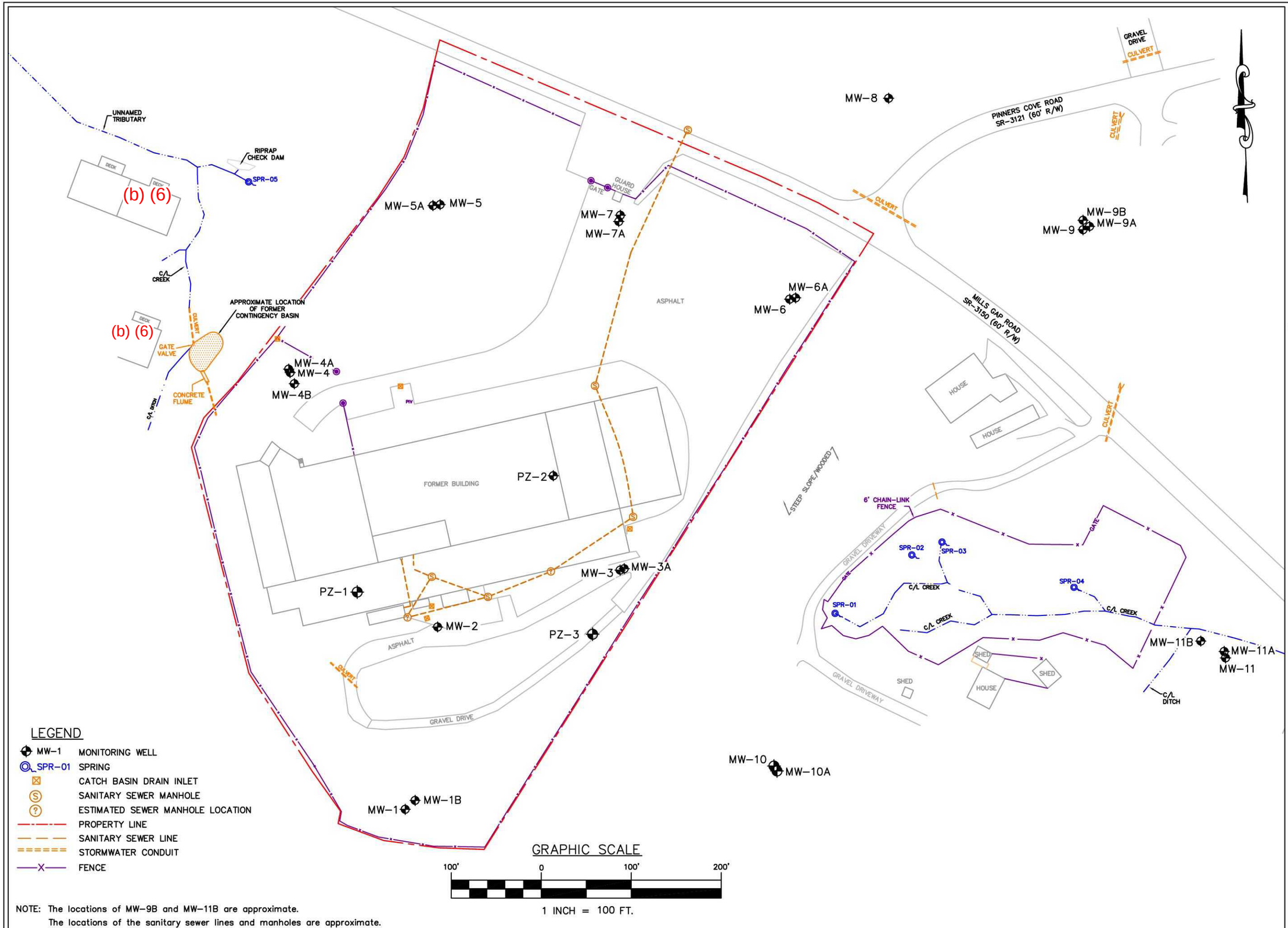


TOPOGRAPHIC SITE MAP
CTS OF ASHEVILLE, INC. SUPERFUND SITE
ASHEVILLE, NORTH CAROLINA

amec foster wheeler

DRAWN: SEK	ENG CHECK: --	DATE: DECEMBER 2015	PROJECT: 6252-12-0006
DFT CHECK: MEW	APPROVAL: MEW	SCALE: 1" = 2,000'	FIGURE: 1

REFERENCE: USGS QUADRANGLES: ASHEVILLE (1961), OTEEN (1962), FRUITLAND (1978) AND SKYLAND (1978)



LEGEND

- MW-1 MONITORING WELL
- SPR-01 SPRING
- CATCH BASIN DRAIN INLET
- SANITARY SEWER MANHOLE
- ESTIMATED SEWER MANHOLE LOCATION
- PROPERTY LINE
- SANITARY SEWER LINE
- STORMWATER CONDUIT
- FENCE

GRAPHIC SCALE

100' 0 100' 200'

1 INCH = 100 FT.

NOTE: The locations of MW-9B and MW-11B are approximate.
The locations of the sanitary sewer lines and manholes are approximate.

amec foster wheeler

SITE MAP
CTS OF ASHEVILLE, INC. SUPERFUND SITE
ASHEVILLE, NORTH CAROLINA

DRAWN: SEK
DFT CHECK: MEW
DATE: DECEMBER 2015
SCALE: 1"=100'
ENG CHECK: --
APPROVAL: MEW
JOB: 6252-12-0006
FIG: 2

REFERENCE: SURVEY PREPARED BY FREELAND & ASSOCIATES.

Document: P:\Projects\CTS Corporation\4.0 Project Deliverables\4.5 Databases\GIS\MapDocuments\CTS_AIR_2015_11x17LS.mxd PDF: P:\Projects\CTS Corporation\4.0 Project Deliverables\4.5 Databases\GIS\Figures\YI 2015\Figure 3 - Dec 2015 Air.pdf 12/23/2015 2:27 PM bradford.schoonard

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

December 2015
Air Sampling Locations
Project 6252120006 Figure 3

APPENDIX A

PHOTOGRAPHS OF SAMPLING LOCATIONS

Photograph No. 1: View of ambient air sample (AAS-06) and duplicate (FD-30).	**Location:** (b) (6) (b) (6)
Photographer: Susan Kelly (Amec Foster Wheeler)	**Date:** December 1, 2015

Photograph No. 2: View of crawlspace air sample (CAS-06).	**Location:** (b) (6)
Photographer: Susan Kelly (Amec Foster Wheeler)	**Date:** December 1, 2015

Photograph No. 3: View of indoor air sample (IAS-06).	**Location:** (b) (6)
Photographer: Susan kelly (Amec Foster Wheeler)	**Date:** December 2, 2015

Photograph No. 4: View of crawlspace air sample (CAS-05) with duplicate (FD-31).	**Location:** (b) (6)
Photographer: Susan Kelly (Amec Foster Wheeler)	**Date:** December 1, 2015

Photograph No. 5: View of indoor air sample (IAS-05) with duplicate (FD-32).	**Location:** (b) (6)
Photographer: Susan Kelly (Amec Foster Wheeler)	**Date:** December 1, 2015

APPENDIX B

LOGBOOK AND FIELD DATA RECORDS

Location Asheville, NC Date 12/1/15

Project / Client CTS of Asheville, Inc.

6025120006 S. Kelly / AnecFW P.1/1

1445- S. Kelly / AnecFW arrives at (b) (6)

M. Wallace and A. Steurer of AnecFW are at property, as well a C. Zeller / EPA, and Adams (documentary crew)

-S. Kelly calibrates PID (see calibration FDR

-M. Wallace leaves

15:15 deploy canisters AAS-06 (15:28) with FD-20

15:39 deploy crawl space canister CAS-06 at (b) (6)

15:47 deploy indoor canister IAS-06 at (b) (6)

15:50 travel to (b) (6)

(b) (6)

15:59 deploy ambient air canister AAS-05

16:12 deploy crawlspace canister CAS-05 w/ duplicate FD-31

16:22- deploy indoor canister IAS-05 w/ duplicate FD-32

16:30 all personnel leave property

58

Location Asheville, NC Date 12/2/15

Project / Client CTS of Asheville

625212000b S. Kelly | Amec FW. Pl 1

1515 - S. Kelly | Amec FW arrives at (b) (6) property; C. Zeller | EPA is at property

- S. Kelly calibrates PID (see calibration FDR)

1525 - A. Steuver | Amec FW arrives

- Stop | retrieve canisters AAS-06 and FD-30

1535 - travel to (b) (6) and retrieve canisters CAS-06 and IAS-06

1550 - travel to (b) (6)

- WLOS is at property; interviews C. Zeller and D. Rice while Amec FW personnel retrieve canisters AAS-05, CAS-05/FD-31, and IAS-05/FD-32

1630 - personnel leave property complete chain of custody and deliver canisters to FedEx for overnight delivery.

12/2/15

FIELD INSTRUMENT CALIBRATION RECORD

Project Name: CTS of Asheville Date: 12/1/15

Project Number: 625212.0006 Name: S. Kelly

Water Quality Meter Calibration

	Standard Value		Meter Value		Acceptance Criteria
Manufacturer:	pH:	SU	pH:	SU	+/- 10% of standard
Model No.:	Conductivity:	mS/cm	Conductivity:	mS/cm	+/- 10% of standard
Unit ID:	Redox:	+/- mV	Redox:	+/- mV	see note 1
	DO:	mg/L *	DO:	mg/L	+/- 10% of standard
	Thermometer Temperature:	C°	Temperature:	C°	+/- 2.0 C°

Turbidity Meter Calibration

	Standard Value		Meter Value	Acceptance Criteria
Manufacturer:		NTU (low)	NTU	+/- 10% of standard
Model No.:		NTU (med)	NTU	+/- 10% of standard
Unit ID:		NTU (high)	NTU	+/- 10% of standard

Photoionization Detector

					Acceptance Criteria
Manufacturer: RAE Systems	Background:	0 ppmv	Meter:	0.0 ppmv	within 5 ppmv of Zero
Model No.: mini-RAE 2000	Span Gas:	100 ppmv	Meter:	100 ppmv	+/- 10% of standard
Unit ID: Ashe-01					

Calibration Sources

	Source	Value		Lot Number	Expiration Date
pH			SU		
Conductivity			mS/cm		
Redox:			mV		
Turbidity (low)			NTU		
Turbidity (med):			NTU		
Turbidity (high):			NTU		
PID gas:	PortaCyl (isobutylene)	100	ppmv	LAO-248-100-9	12/2018
Other:					

NOTES:

* = Indicate in notes section what was used as the DO standard (i.e., based on saturation at room temperature)

** = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the parameter was not calibrated to the acceptance criteria.

1 = meter must read within specified range of the Zobell solution (usually 231 +/- 10 mv).

FIELD INSTRUMENT CALIBRATION RECORD

Project Name: CTS of Asheville Date: 12/2/15

Project Number: 625212000G Name: S. Kelly

Water Quality Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer: _____	pH: _____	SU	pH: _____	SU	+/- 10% of standard
Model No.: _____	Conductivity: _____	mS/cm	Conductivity: _____	mS/cm	+/- 10% of standard
Unit ID: _____	Redox: _____	+/- mV	Redox: _____	+/- mV	see note 1
	DO: _____	mg/L *	DO: _____	mg/L	+/- 10% of standard
	Thermometer Temperature: _____	C°	Temperature: _____	C°	+/- 2.0 C°

Turbidity Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer: _____	_____	NTU (low)	_____	NTU	+/- 10% of standard
Model No.: _____	_____	NTU (med)	_____	NTU	+/- 10% of standard
Unit ID: _____	_____	NTU (high)	_____	NTU	+/- 10% of standard

Photoionization Detector						Acceptance Criteria
Manufacturer: RAE Systems	Background:	0	ppmv	Meter:	0.0	ppmv within 5 ppmv of Zero
Model No.: mini-RAE 2000	Span Gas:	100	ppmv	Meter:	101	ppmv +/- 10% of standard
Unit ID: Ashe-01						

Calibration Sources

	Source	Value		Lot Number	Expiration Date
pH	_____	_____	SU	_____	_____
Conductivity	_____	_____	mS/cm	_____	_____
Redox:	_____	_____	mV	_____	_____
Turbidity (low)	_____	_____	NTU	_____	_____
Turbidity (med):	_____	_____	NTU	_____	_____
Turbidity (high):	_____	_____	NTU	_____	_____
PID gas:	PortaCyl (isobutylene)	100	ppmv	LAO-248-100-9	12/2018
Other:	_____	_____		_____	_____

NOTES:

* = Indicate in notes section what was used as the DO standard (I.e., based on saturation at room temperature)

** = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the parameter was not calibrated to the acceptance criteria.

1 = meter must read within specified range of the Zobell solution (usually 231 +/- 10 mv).

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS/SEK

Sample ID: AAS-06

Sample Address: (b) (6)

Sample Location: Ambient

Canister ID: 631 (IND)

Flow Controller ID: 541

Gauge ID: N/A

Intake Height (ft): 4.7'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	15:28	15:28
Canister Vacuum ("Hg):	-27	-5.5
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	N/A	N/A
PID Reading (ppm):	0.0	0.0
Wind Direction:	Calm	Calm

Antecedent weather conditions:

Overcast, rain; low 40s°F to Mid 50s°F

Weather conditions during sample period:

Rain, clearing on 12/2/15; low 40's °F to upper 50s °F

Sketch of sampling area:

Same as historical location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS / SEK

Sample ID: FD-30

Sample Address: (b) (6)

Sample Location: Ambient (AAS-06)

Canister ID: 710 (BATCH)

Flow Controller ID: 642

Gauge ID: N/A

Intake Height (ft): 4.7'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	15:28	15:28
Canister Vacuum ("Hg):	-27	-5
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	N/A	N/A
PID Reading (ppm):	0.0	0.0
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same location as AAS-06.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS/SEK

Sample ID: CAS-06

Sample Address: (b) (6)

Sample Location: Crawlspace

Canister ID: 674 (BATCH)

Flow Controller ID: 199

Gauge ID: N/A

Intake Height (ft): 1.3'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	15:39	15:39
Canister Vacuum ("Hg):	-25	0
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	61°	61°
PID Reading (ppm):	0.0	2.2
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same as historical location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS / SEK

Sample ID: IAS-06

Sample Address: (b) (6)

Sample Location: Indoor

Canister ID: 836 (Batch)

Flow Controller ID: 188

Gauge ID: N/A

Intake Height (ft): 2.5'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	15:47	15:47
Canister Vacuum ("Hg):	-27	-3
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	65°	66°
PID Reading (ppm):	0.0	3.5
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same as historical location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS / SEK

Sample ID: AAS-05

Sample Address: (b) (6)

Sample Location: Ambient

Canister ID: 1022 (IND)

Flow Controller ID: 429

Gauge ID: N/A

Intake Height (ft): 4.6'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	15:59	15:59
Canister Vacuum ("Hg):	-27	-5.5
Outdoor Temperature (°F):	54°	54°
Interior Temperature (°F):	N/A	N/A
PID Reading (ppm):	0.0	2.8
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same as historical location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS/SEK

Sample ID: CAS-05

Sample Address: (b) (6)

Sample Location: Crawlspace

Canister ID: 1630 (BATCH)

Flow Controller ID: 443

Gauge ID: N/A

Intake Height (ft): 1.3'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	16:12	16:12
Canister Vacuum ("Hg):	-29	-8
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	54°	54°
PID Reading (ppm):	0.0	3.2
Wind Direction:	Calm	Calm

Antecedent weather conditions:

Same as AAS-06

Weather conditions during sample period:

Same as AAS-06

Sketch of sampling area:

Same as historical sampling location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252120006

Sampling Personnel: AAS/SEK

Sample ID: FD-31

Sample Address: (b) (6)

Sample Location: Crawlspace (CAS-05)

Canister ID: 620 (BATCH)

Flow Controller ID: 633

Gauge ID: N/A

Intake Height (ft): 1.3'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	16:12	16:12
Canister Vacuum ("Hg):	-25	-9
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	54°	54°
PID Reading (ppm):	0.0	3.2
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same location as CAS-05.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville

Project Numer: 6252 120006

Sampling Personnel: AAS/SEK

Sample ID: IAS-05

Sample Address: (b) (6)

Sample Location: Indoor

Canister ID: 13 (IND)

Flow Controller ID: 544

Gauge ID: N/A

Intake Height (ft): 2.5'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	16:22	16:22
Canister Vacuum ("Hg):	-26	-5
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	78°	74°
PID Reading (ppm):	0.0-7.7	5.4
Wind Direction:	Calm	Calm

Antecedent weather conditions:

See AAS-06

Weather conditions during sample period:

See AAS-06

Sketch of sampling area:

Same as historical location.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville
Project Numer: 6252120006
Sampling Personnel: AAS/SEK
Sample ID: FD-32
Sample Address: (b) (6)
Sample Location: Indoor (IAS-05)
Canister ID: 6 (Batch)
Flow Controller ID: 554
Gauge ID: N/A
Intake Height (ft): 2.5'

	Start	Stop
Sample Date:	12/1/15	12/2/15
Sample Time:	16:22	16:22
Canister Vacuum ("Hg):	-26.5	-4
Outdoor Temperature (°F):	54°	53°
Interior Temperature (°F):	78°	74°
PID Reading (ppm):	0.0 - 7.7	5.4
Wind Direction:	Calm	Calm

Antecedent weather conditions:
See AAS-06

Weather conditions during sample period:
See AAS-06

Sketch of sampling area:
Same location of IAS-05.

APPENDIX C

LABORATORY CERTIFICATION DOCUMENTS

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#1018SIM	50mtorr	11/09/2015	MS1	
2	#526SIM	50mtorr	11/09/2015	MS1	
3	#674SIM	50mtorr	11/09/2015	MS1	
4	#710SIM	50mtorr	11/09/2015	MS1	
5	#1630SIM	50mtorr	11/09/2015	MS1	
6	#620SIM	50mtorr	11/09/2015	MS1	1109_07
7					
8					
9					
10					

QC Canister _#620SIM__ GC/MS Analysis File 1109_07 Date 11/9/2015
Analyzed_11/09/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#1022SIM	50mtorr	11/09/2015	MS1	1109_06
2					
3					
5					
6					
7					
8					
9					
10					

QC Canister _#1022SIM__ GC/MS Analysis File 1109_06 Date 11/9/2015
Analyzed _11/09/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#631SIM	50mtorr	11/09/2015	MS1	1109_11
2					
3					
5					
6					
7					
8					
9					
10					

QC Canister _#631SIM__ GC/MS Analysis File 1109_11 Date 11/9/2015
Analyzed _11/09/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#13SIM	50mtorr	09/07/2015	MS1	0907_10
2					
3					
5					
6					
7					
8					
9					
10					

QC Canister _#13SIM__ GC/MS Analysis File 0907_10 Date 9/7/2015
Analyzed _9/7/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#6SIM	50mtorr	06/20/2015		
2	#15SIM	50mtorr	06/20/2015	MS5	0620_05
3					
5					
6					
7					
8					
9					
10					

QC Canister #15SIM GC/MS Analysis File 0620_05 Date 6/20/2015
Analyzed 6/20/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

Environmental Science Corp.
LABORATORY SERVICES

Canister Certification Results

Number	Canister ID	Vacuum	Date Cleaned	GC/MS Analysis File	
1	#836SIM	50mtorr	03/30/2015		
2	#8SIM	50mtorr	03/30/2015	MS1	0330_06
3					
5					
6					
7					
8					
9					
10					

QC Canister _#8SIM__ GC/MS Analysis File 0330_06 Date 03/30/2015
Analyzed_03/30/2015

Analyst Initials MF
ND = Not detected

Compounds	CAS #	mwt.	pbbv	Result
Chloromethane	74-87-3	50.5	0.02	ND
Vinyl chloride	75-01-4	62.5	0.02	ND
Chloroethane	75-00-3	64	0.02	ND
1,1-Dichloroethene	75-35-4	97	0.02	ND
1,1-dichloroethane	75-34-3	98.96	0.02	ND
Trans-1,2-dichloroethene	156-60-5	96.94	0.02	ND
Vinyl Acetate	108-05-4	86.09	0.02	ND
Cis-1,2-Dichloroethene	156-60-5	96	0.02	ND
Chloroform	67-66-3	119	0.02	ND
1,1,1-Trichloroethane	71-55-6	133.4	0.02	ND
Carbon Tetrachloride	56.23-5	153.8	0.02	ND
Benzene	71-43-2	78	0.02	ND
1,2-Dichloroethane	107-06-2	99	0.02	ND
Trichloroethylene	79-01-6	131.4	0.02	ND
1,2-Dichloropropane	78-87-5	113	0.02	ND
Cis-1,3-Dichloropropene	10061-01-5	110.98	0.02	ND
Trans-1,3-Dichloropropene	542-75-6	110.98	0.02	ND
1,1,2-Trichloroethane	79-00-5	133.4	0.02	ND
Tetrachloroethylene	127-18-4	165.8	0.02	ND
1,2-Dibromoethane	106-93-4	187.9	0.02	ND
Ethyl benzene	100-41-4	106.2	0.02	ND
1,1,2,2-Tetrachloroethane	79-34-5	167.9	0.02	ND
1,4-Dichlorobenzene	106-46-7	147	0.02	ND

APPENDIX D

LABORATORY ANALYTICAL REPORT

ANALYTICAL REPORT

December 07, 2015

AMEC - Asheville, NC

Sample Delivery Group:	L804332
Samples Received:	12/03/2015
Project Number:	6252120006.0003
Description:	CTS of Asheville
Site:	CTS OF ASHEVILLE
Report To:	Susan Kelly 1308-C Patton Avenue Asheville, NC 28806

Entire Report Reviewed By:

Jimmy Hunt
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

TB-16 L804332-01 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 00:00 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 03:35	12/06/15 03:35	SNH

FD-30 L804332-02 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 00:00 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 04:19	12/06/15 04:19	SNH

FD-31 L804332-03 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 00:00 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 05:17	12/06/15 05:17	SNH

FD-32 L804332-04 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 00:00 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 06:05	12/06/15 06:05	SNH

AAS-06 L804332-05 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 15:28 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 06:48	12/06/15 06:48	SNH

CAS-06 L804332-06 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 15:39 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 07:29	12/06/15 07:29	SNH

IAS-06 L804332-07 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 15:47 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 08:13	12/06/15 08:13	SNH

AAS-05 L804332-08 Air

Collected by: Susan Kelly | Collected date/time: 12/02/15 15:59 | Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 08:57	12/06/15 08:57	SNH

CAS-05 L804332-09 Air

Collected by: Susan Kelly
Collected date/time: 12/02/15 16:12
Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 12:15	12/06/15 12:15	SNH

IAS-05 L804332-10 Air

Collected by: Susan Kelly
Collected date/time: 12/02/15 16:22
Received date/time: 12/03/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG833538	1	12/06/15 10:30	12/06/15 10:30	SNH

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jimmy Hunt
Technical Service Representative

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	ND	ND		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	ND	ND		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*104*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	ppbv	ug/m3	Qualifier	Dilution	Batch
			ppb	ug/m3	ppb				
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.285	1.13		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.484	2.59		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*104*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.387	1.53		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.775	4.15		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*121*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.432	1.71		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.732	3.92		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*108*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	ppbv	ug/m3	Qualifier	Dilution	Batch
			ppb	ug/m3	ppb				
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.293	1.16		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.495	2.65		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*104*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.0949	0.376		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.167	0.893		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*113*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.0754	0.299		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.149	0.797		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*112*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	ppbv	ug/m3	Qualifier	Dilution	Batch
			ppb	ug/m3	ppb				
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.807	3.20		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	1.22	6.51		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	0.0224	0.0573		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*106*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppb	RDL2 ug/m3	ppbv ppb	ug/m3	Qualifier	Dilution	Batch
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.393	1.56		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.764	4.10		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*118*				WG833538

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	ppbv	ug/m3	Qualifier	Dilution	Batch
			ppb	ug/m3	ppb				
cis-1,2-Dichloroethene	156-59-2	96.90	0.0200	0.0793	0.442	1.75		1	WG833538
trans-1,2-Dichloroethene	156-60-5	96.90	0.0200	0.0793	ND	ND		1	WG833538
Trichloroethylene	79-01-6	131	0.0200	0.107	0.756	4.05		1	WG833538
Vinyl chloride	75-01-4	62.50	0.0200	0.0511	ND	ND		1	WG833538
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*126*				WG833538

Method Blank (MB)

(MB) 12/06/15 01:27

Analyte	MB Result	MB Qualifier	MB RDL
	ppb		ppb
cis-1,2-Dichloroethene	ND		0.0200
trans-1,2-Dichloroethene	ND		0.0200
Trichloroethylene	ND		0.0200
Vinyl chloride	ND		0.0200
(S) 1,4-Bromofluorobenzene	*105*		*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 12/05/15 23:22 • (LCSD) 12/06/15 00:03

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppb	ppb	ppb	%	%	%			%	%
cis-1,2-Dichloroethene	0.500	0.474	0.476	94.7	95.2	70.0-130			0.520	25
trans-1,2-Dichloroethene	0.500	0.477	0.478	95.3	95.6	70.0-130			0.310	25
Trichloroethylene	0.500	0.485	0.489	97.0	97.8	70.0-130			0.810	25
Vinyl chloride	0.500	0.470	0.480	94.0	95.9	70.0-130			1.97	25
(S) 1,4-Bromofluorobenzene				*105*	*105*	*60.0-140*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [14]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

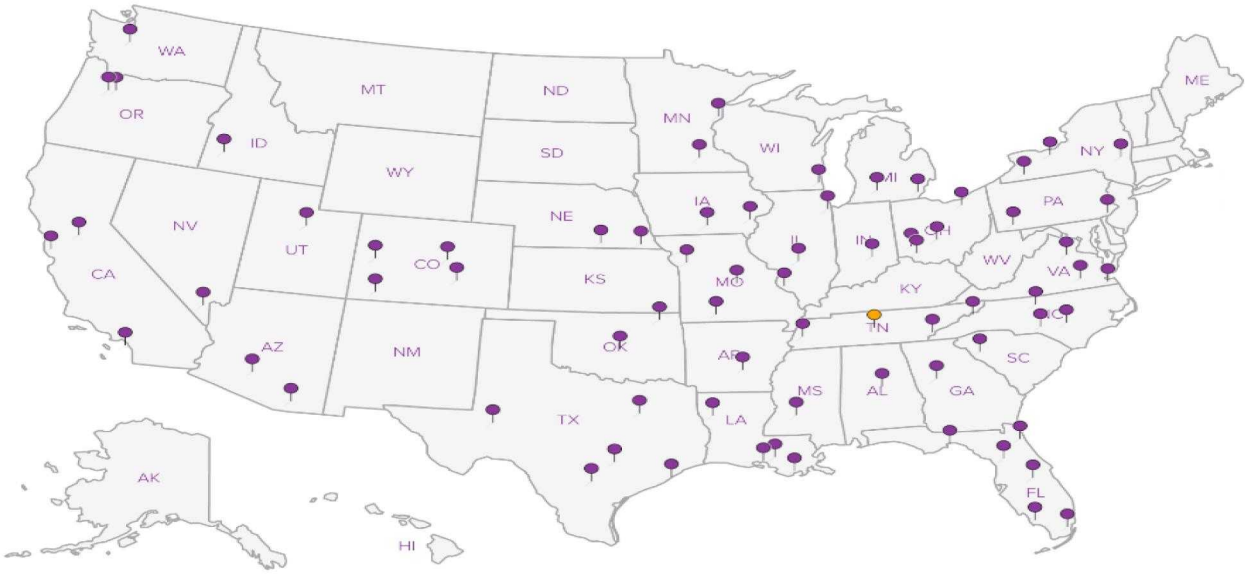
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



Company Name/Address:
Amec Foster Wheeler
1308-C Patton Avenue
Asheville, NC 28806

Billing Information:
email to: susan.kelly@amecfw.com
ESC quote: LAWENGAN120115S

Analysis

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 204336
K165

Report to: Susan Kelly
Email To: susan.kelly@amecfw.com
Project Description: CTS of Asheville
City/State Collected: Asheville, NC
Phone: 828-252-8130
Fax:
Client Project # 6252120006.0003
Lab Project # LAWENGAN120115S
Collected by (print): Susan Kelly
Site/Facility ID # CTS of Asheville
P.O. # to be provided
Collected by (signature):
Rush? (Lab MUST Be Notified)
___ Same Day 200%
✓ Next Day 100%
___ Two Day 50%
___ Three Day 25%
Date Results Needed COB 12/04/15
Email? ___No ✓Yes
FAX? ___No ___Yes
Canister Pressure/Vacuum

Acctnum: LAWENGAN
Template:
Prelogin: P532090
TSR: 350-Jimmy Hunt
PB:
Shipped Via:

Sample ID	Sample Description	Can #	Date	Time	Initial	Final	TO-15 SIM Summa (see remarks)				Rem./Contaminant	Sample # (lab only)
	TB-16	1018	NA	NA	NA	NA	X					01
	FD-30	710	12/2/15	00:00	-27	-5	X					02
	FD-31	620	12/2/15	00:00	-25	-9	X					03
	FD-32	6	12/2/15	00:00	-26.5	-4	X					04
	AAS-06	631	12/2/15	15:28	-27	-5.5	X					05
	CAS-06	674	12/2/15	15:39	-25	0	X					06
	IAS-06	836	12/2/15	15:47	-27	-3	X					07
	AAS-05	1022	12/2/15	15:59	-27	-5.5	X					08
	CAS-05	1630	12/2/15	16:12	-29	-8	X					09
	IAS-05	135	12/2/15	16:22	-26	-5	X					10

Remarks: *site-specific VOCs: TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ ____	Condition: (lab use only) 10 Fumble -24 TO
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: Amb. °C Bottles Received: 10 summa	COC Seal Intact: ✓ Y ___ N ___ NA
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12-3-15 Time: 0900	pH Checked: NCF:

12/2/15 1600

APPENDIX E

DATA VALIDATION REPORT

DATA VALIDATION REPORT (December 2015)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

Introduction

Air samples were collected at the CTS of Asheville, Inc. Superfund Site (Site) in Asheville, North Carolina in December 2015 and submitted for off-site laboratory analysis. Samples were analyzed by ESC Lab Sciences in Mount Juliet, Tennessee. Results were reported in Sample Delivery Group (SDG): L804332.

A listing of samples included in this Data Validation Report is presented in Table E.1. A summary of the analytical results is presented in Table E.2. Samples were analyzed by the following method:

- Volatile organic compounds (VOCs) by USEPA Method TO-15 (project list only)

Deliverables for the off-site laboratory analyses included a Level IV data package.

Data validation was completed based on procedures in the USEPA Region 4 Data Validation Standard Operating Procedures (Region 4 SOP) for Organic Analysis (USEPA, 2008), in conjunction with the laboratory's Method TO-15 Selective Ion Monitoring (SIM) SOP (ESC, 2015) and the CTS of Asheville, Inc. Superfund Site Quality Assurance Project Plan (QAPP), Revision 4 (Amec, 2014). Quality control limits listed in the Region 4 SOP and QAPP were used during the data evaluation. The validation included the following evaluations:

- Lab report narrative
- Sample collection and chain of custody
- Data package completeness
- Holding times
- Quality control data (blanks, instrument tune and calibrations, lab control samples, duplicates, and surrogate recovery)
- Internal standard response and retention time
- Data transcription
- Calculations
- Electronic data reporting
- Data qualification

The following laboratory or data validation qualifiers are used in the final data presentation.

U = target analyte is not detected at the reported detection limit
J = concentration is estimated

Results were not qualified during the data validation. Results are interpreted to be usable as reported by the laboratory.

Data Validation Results

Data validation observations are discussed below.

Field Duplicates

A summary of field duplicate results is presented in Table E.3. Good agreement was observed for all target analytes in all field duplicate pairs: AAS-06/FD-30, CAS-05/FD-31, and IAS-05/FD-32. Relative percent differences (RPDs) between results were less than the QAPP specified control limit of 50 percent.

Sample Reporting

A subset of project-specific TO-15 compounds (trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride) was reported in the data set.

References

Amec, 2014. "Vapor Intrusion Assessment Plan: Quality Assurance Project Plan"; Revision 4, March 14, 2014.

USEPA Region 4, 2008. "Data Validation Standard Operating Procedures for Organic Analysis" Science and Ecosystem Support Division, Quality Assurance Section, MTSB, Revision 3.1.

Data Validator: Julie Ricardi

Julie Ricardi

Date: 12/29/2015

Reviewed by Chris Ricardi, NRCC-EAC

Chris Ricardi

Date: 1/7/2016

TABLE E.1
Data Validation Report: Sample Summary (December 2015)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

Sample Location	Field Sample ID	SDG	Sample Date	Lab Sample ID
AAS-05	AAS-05	L804332	12/02/15	L804332-08
AAS-06	AAS-06	L804332	12/02/15	L804332-05
AAS-06	FD-30	L804332	12/02/15	L804332-02
CAS-05	CAS-05	L804332	12/02/15	L804332-09
CAS-05	FD-31	L804332	12/02/15	L804332-03
CAS-06	CAS-06	L804332	12/02/15	L804332-06
IAS-05	FD-32	L804332	12/02/15	L804332-04
IAS-05	IAS-05	L804332	12/02/15	L804332-10
IAS-06	IAS-06	L804332	12/02/15	L804332-07
QC	TB-16	L804332	12/02/15	L804332-01

Prepared By: WCG 12/17/15
Checked By: JAR 12/28/15

TABLE E.2
Data Validation Report: Summary of Results (December 2015)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

	Sample Location	AAS-05		AAS-06		AAS-06		CAS-05		CAS-05	
	Sample Date	12/2/2015		12/2/2015		12/2/2015		12/2/2015		12/2/2015	
	Field Sample ID	AAS-05		AAS-06		FD-30		CAS-05		FD-31	
Method	**Parameter**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
TO-15 SIM	cis-1,2-Dichloroethene	3.2		1.16		1.13		1.56		1.53	
TO-15 SIM	trans-1,2-Dichloroethene	0.0793	U	0.0793	U	0.0793	U	0.0793	U	0.0793	U
TO-15 SIM	Trichloroethene	6.51		2.65		2.59		4.1		4.15	
TO-15 SIM	Vinyl chloride	0.0573		0.0511	U	0.0511	U	0.0511	U	0.0511	U

	Sample Location	CAS-06		IAS-05		IAS-05		IAS-06		QC	
	Sample Date	12/2/2015		12/2/2015		12/2/2015		12/2/2015		12/2/2015	
	Field Sample ID	CAS-06		FD-32		IAS-05		IAS-06		TB-16	
Method	**Parameter**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
TO-15 SIM	cis-1,2-Dichloroethene	0.376		1.71		1.75		0.299		0.0793	U
TO-15 SIM	trans-1,2-Dichloroethene	0.0793	U	0.0793	U	0.0793	U	0.0793	U	0.0793	U
TO-15 SIM	Trichloroethene	0.893		3.92		4.05		0.797		0.107	U
TO-15 SIM	Vinyl chloride	0.0511	U	0.0511	U	0.0511	U	0.0511	U	0.0511	U

Notes:

1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. U - constituent not detected at the reporting limit.
3. J - concentration is estimated.

Prepared By: WCG 12/30/15
Checked By: JAR 1/04/15

TABLE E.3
Data Validation Report: Field Duplicate Results (December 2015)
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
Amec Foster Wheeler Project 6252-12-0006

Sample ID	Constituent	Field Sample Result	Flag	Duplicate Sample Result	Flag	RPD (%)
AAS-06/FD-30	cis-1,2-Dichloroethene	1.16		1.13		3
AAS-06/FD-30	trans-1,2-Dichloroethene	0.079	U	0.079	U	NC
AAS-06/FD-30	Trichloroethene	2.65		2.59		2
AAS-06/FD-30	Vinyl chloride	0.051	U	0.051	U	NC
CAS-05/FD-31	cis-1,2-Dichloroethene	1.56		1.53		2
CAS-05/FD-31	trans-1,2-Dichloroethene	0.079	U	0.079	U	NC
CAS-05/FD-31	Trichloroethene	4.10		4.15		1
CAS-05/FD-31	Vinyl chloride	0.051	U	0.051	U	NC
IAS-05/FD-32	cis-1,2-Dichloroethene	1.75		1.71		2
IAS-05/FD-32	trans-1,2-Dichloroethene	0.079	U	0.079	U	NC
IAS-05/FD-32	Trichloroethene	4.05		3.92		3
IAS-05/FD-32	Vinyl chloride	0.051	U	0.051	U	NC

Notes:
1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. RPD - relative percent difference (between duplicate results).
3. U - constituent not detected at the reported detection limit.
4. J - estimated value
5. NC - not calculated; results non-detect or below RL

Prepared By: JAR 12/29/15
Checked By: CSR 12/30/15

APPENDIX F

RISK ASSESSMENT CALCULATION TABLES

TABLE F.1
Summary of Laboratory Analytical Results

INDOOR AIR SAMPLES

Address	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
(b) (6)	IAS-06	**0.797**	0.299	<0.0793	<0.0511
(b) (6)	IAS-05	**4.05**	1.75	<0.0793	<0.0511
(b) (6) (duplicate)	FD-32 (IAS-05)	**3.92**	1.71	<0.0793	<0.0511
Target Residential Air RSL		0.21	NE	NE	0.17

Notes:

1. Concentrations in micrograms per cubic meter (µg/m^3).
2. TCE = trichloroethene; cis-1,2-DCE = cis-1,2-dichloroethene; trans-1,2-DCE = trans-1,2-dichloroethene; VC = vinyl chloride
3. Regional Screening Level Table - Residential Air (USEPA, November 2015)
   for residential land use assuming 10^{-6} target risk and 0.1 target hazard quotient.
4. NE - a screening level has not been established for constituent.
5. Bold value indicates concentration greater than Target Residential Indoor VISL.

Prepared By: SEK 12/07/15
Checked By: LMS 12/14/15

TABLE F.2
Calculations of Risk to Indoor Air Concentrations –(b) (6)
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [4] (Unitless)	Kidney Excess Cancer Risk [5] (Unitless)	Liver Excess Cancer Risk [6] (Unitless)	Total Excess Cancer Risk [7] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic [3] (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk (ug/m^3)$^{-1}$	Inhalation Liver Unit Risk (ug/m^3)$^{-1}$					
Trichloroethylene	0.797	Sampled	7.6E-01	7.9E-01	2.8E-01	2.0E-03	1.0E-06	3.1E-06	IRIS	0.4	7.9E-07	8.8E-07	2E-06

Notes:

m = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the indoor air (IAS-06).

[2] Exposure Concentration = See Equations below

[3] Mutagenic risk for TCE includes age-adjusted risk for ages 0 to 26 years.

[4] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[5] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[6] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[7] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF2)+(ED4 x AF4)+(ED10 x AF10)+(ED16 x AF16)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	26	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED16 = Exposure Duration ≥16 (mutagen)	10	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF16 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	227,760	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: SEK 12/07/15

Checked By: LMS 12/14/15

TABLE F.3
Calculations of Risk to Indoor Air Concentrations – (b) (6)
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk (ug/m^3) [1]	Inhalation Liver Unit Risk (ug/m^3) [1]					
Trichloroethylene	0.797	Sampled	7.6E-01	3.5E-01	6.6E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.4	3.5E-07	2.0E-07	6E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the indoor air (IAS-06).

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: SEK 12/07/15

Checked By: LMS 12/14/15

TABLE F.4
Calculations of Risk to Indoor Air Concentrations – (b) (6)
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [4] (Unitless)	Kidney Excess Cancer Risk [5] (Unitless)	Liver Excess Cancer Risk [6] (Unitless)	Total Excess Cancer Risk [7] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic [3] (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Trichloroethylene	4.05	Sampled	3.9E+00	4.0E+00	1.4E+00	2.0E-03	1.0E-06	3.1E-06	IRIS	1.9	4.0E-06	4.5E-06	8E-06

Notes:

m = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the indoor air sample (IAS-05).

[2] Exposure Concentration = See Equations below

[3] Mutagenic risk for TCE includes age-adjusted risk for ages 0 to 26 years.

[4] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[5] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[6] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[7] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF2)+(ED4 x AF4)+(ED10 x AF10)+(ED16 x AF16)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	26	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED16 = Exposure Duration ≥16 (mutagen)	10	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF16 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	227,760	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: SEK 12/07/15

Checked By: LMS 12/14/15

TABLE F.5
Calculations of Risk to Indoor Air Concentrations –(b) (6)
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk (ug/m^3) [1]	Inhalation Liver Unit Risk (ug/m^3) [1]					
Trichloroethylene	4.05	Sampled	3.9E+00	1.8E+00	3.3E-01	2.0E-03	1.0E-06	3.1E-06	IRIS	1.9	1.8E-06	1.0E-06	3E-06

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the indoor air (IAS-05).

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: SEK 12/07/15

Checked By: LMS 12/14/15

TABLE F.6
Summary of Risk to Indoor Air Concentrations
Adult and Child Residents (Current and Future)
Inhalation of Indoor Air

Location	Adult (a)		Child	
	Hazard Quotient	Excess Cancer Risk	Hazard Quotient	Excess Cancer Risk
(b) (6)	0.4	2E-06	0.4	6E-07
(b) (6)	1.9	8E-06	1.9	3E-06

Note:

(a) Adult excess cancer risk includes mutagenic exposures for multiple ages (TCE).

Prepared By: SEK 12/07/15
Checked By: LMS 12/14/15