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December 15, 2009

Ms. Mary Ellen Kowalewski
Director of Community Development
Capitol Region Council of Governments
241 Main Street
Hartford, CT 06106

RE: Limited Phase II/Limited Phase III Environmental Site Assessment
Amerbelle Textiles
104 East Main Street
Vernon, Connecticut

Dear Ms. Kowalewski:

We are pleased to submit the enclosed report of the Limited Phase II/Limited Phase III Environmental Site Assessment for the above-referenced site. The assessment was conducted in general conformance with the Connecticut Department of Environmental Protection Site Characterization Guidance Document and the EPA-approved Quality Assurance Project Plan Addendum.

The results of this investigation are summarized in the attached report. Thank you for the opportunity to conduct this work. Please contact the undersigned if we can be of further assistance.

Sincerely,

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Senior Hydrogeologist

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Vice President

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **Organizations** | |
| CTDEP | Connecticut Department of Environmental Protection |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| **Units of Measurement** | |
| ug | Micrograms |
| mg | Milligrams |
| kg | Kilograms |
| L | Liter |
| ppb | Parts per billion |
| ppm | Parts per million |
| **Analytical Parameters and Chemical Compounds** | |
| ETPH | Extractable total petroleum hydrocarbons |
| PAHs/PNAs | Polynuclear aromatic hydrocarbons |
| PCBs | Polychlorinated biphenyls |
| PCE | Tetrachloroethylene |
| SPLP | Synthetic precipitate leaching procedure |
| SVOCs | Semivolatile organic compounds |
| TCLP | Toxicity characteristic leaching procedure |
| TCE | Trichloroethylene |
| TPH | Total petroleum hydrocarbons |
| VOCs | Volatile organic compounds |
| **Other** | |
| AOC | Area of concern |
| AST | Aboveground storage tank |
| CFR | Code of Federal Regulations |
| QA/QC | Quality assurance/quality control |
| RCSA | Regulations of Connecticut State Agencies |
| RSRs | Remediation Standard Regulations |
| UST | Underground storage tank |

# Executive Summary

Fuss & O'Neill was retained by the Capitol Region Council of Governments (CRCOG) on behalf of the Town of Vernon to perform a Limited Phase II/Limited Phase III Environmental Site Assessment (ESA) at the Amerbelle Textiles facility located at 104 East Main Street in Vernon, Connecticut. The objective of the investigation was to characterize potential contaminant source areas located in the shallow unconsolidated material to the extent that these areas are accessible. In addition, the potential for the migration of contaminated groundwater onto and off of the site in the shallow bedrock aquifer was also evaluated.

Fourteen (14) of the twenty-three (23) site Areas of Environmental Concern (AOCs) were investigated during this mobilization. Not all of the AOCs at the site were investigated due to funding limitations. The investigation included the advancement of soil borings, installation of monitoring wells, and collection of groundwater samples. The investigation was performed in accordance with the Quality Assurance Project Plan approved by the US Environmental Protection Agency.

The results of the investigation indicate that fill comprised of sand and silt with trace amounts of asphalt and concrete fragments is present across the surface of the site. The thickness of the fill ranges between 1 foot and 1.5 feet. The fill is polluted with polynuclear aromatic hydrocarbons and metals consisting of arsenic, cadmium, chromium, copper, mercury, lead, and zinc.

No evidence of releases of hazardous substances or petroleum products was found at the following AOCs.

- AOC 9 – Building 13, Latex Coating
- AOC 11 – Buildings 1 and 2
- AOC 21 – Former Off-site Gasoline Station

The determination of "no release" was based on physical inspections, document reviews and analytical data from soil samples. Based on the data collected during our Limited Phase II/Limited Phase III investigations as well as analytical data from previous investigations, we conclude that releases of hazardous substances or petroleum products have occurred at the following AOCs.

- AOC 10 – Building 2, Loading Dock
- AOC 12 – Building 3
- AOC 13 – Solvent coaters
- AOC 14 – Fuel Oil Above-ground Storage Tanks
- AOC 15 – Transformers
- AOC 16 – Building 7, Loading Dock
- AOC 17 – Building 9
- AOC 18 – Building 8
- AOC 19 – Building 11, Former Dyeing/Current Chemical Storage
- AOC 20 – Building 11, Loading dock
- AOC 23 – Site Groundwater

Site groundwater quality has been negatively impacted by releases of petroleum and hazardous constituents that have occurred to soil at several of the above-referenced AOCs. The solvent tetrachloroethylene (PCE) exists in the overburden groundwater in the northeast portion of the site at Building Number 11. The concentrations of PCE in groundwater in this area represent a potential vapor intrusion issue for Buildings 8 and 11.

PCE and the semi volatile organic compound (SVOC) (bis(2-ethylhexyl)phthalate) were also identified in groundwater located in the northwest portion of the property north of Brooklyn Street, which is upgradient of the Paper Mill Pond. It is unknown whether the groundwater contaminant plumes have migrated off-site to Paper Mill Pond or the north abutting property.

We recommend further investigation of the Building 11 PCE release to determine the degree and extent of the release areas and to assess the possibility of vapor intrusion. We also recommend investigation of the AOCs associated with the textile dyeing operations in Building Number 14, which were not assessed during this mobilization due to funding issues. The source area for the SVOC groundwater contaminated plume may originate from Building Number 14.

Further investigation is also needed at several of the AOCs investigated during this mobilization to determine the degree and extent of contamination. Recommendations for investigation at each of these areas is provided in the Technical Memoranda included with this report.

# 1 Introduction

## 1.1 Project Objective

Fuss & O'Neill was retained by the Capitol Region Council of Governments (CRCOG) on behalf of the Town of Vernon to perform a Limited Phase II/Limited Phase III Environmental Site Assessment (ESA) at the Amerbelle Textiles facility located at 104 East Main Street in Vernon, Connecticut. The investigation was completed as part of the Metro Hartford Community Wide Brownfield Assessment Program. The purpose of the investigation was to characterize potential contaminant source areas located in the shallow unconsolidated material to the extent that these areas are accessible. In addition, we evaluated the potential for the migration of contaminated groundwater onto and off of the site in the shallow bedrock aquifer.

The assessment was completed in accordance with the QAPP Addendum that was submitted to the United States Environmental Protection Agency (USEPA) in August 2008. To achieve this objective, our Limited Phase II/Limited Phase III investigation was conducted in general conformance with the Connecticut Department of Environmental Protection (CTDEP) 2007 Site Characterization Guidance Document. For this phase of the project, only a portion of the EPA-approved QAPP Addendum was implemented due to funding limitations. Implementation of the remaining parts of the QAPP Addendum may be completed in the future when sufficient funds are available.

# 2 Site Information and Preliminary Conceptual Model

This section provides a summary of the information used to construct the initial conceptual model for the site, which, in turn, guided the physical investigations. Information such as the site's operational history, geology, hydrogeology, and potential receptors help identify areas where releases of hazardous materials could occur and how they might impact human health and the environment.

## 2.1 Site Description and History

The subject site, the current Amerbelle Corporation, is located on the western side of East Main Street in an industrial zone of Vernon, Connecticut (Tolland County). A portion of a United States Geological Survey (USGS) topographic map showing the subject site location is provided as Figure 3-1. Amerbelle Corporation produces specialty textiles for various applications.

The subject site is divided into two parcels, one 2.7-acre parcel located south of Brooklyn Street and one 1.5-acre parcel located north of Brooklyn Street. The site building on the southern parcel contains Amerbelle's dyeing, mixing and finishing operations, while the building on the northern parcel is used for coating operations and as a storage area. Several aboveground storage tanks (ASTs) are located throughout the property as follows:

- Two 18,000-gallon waste oil storage tanks
- One 27,000-gallon production water supply tank
- One 500-gallon tank containing sodium hydroxide for dyeing processes
- Two 275-gallon finishing resin tanks
- Two 7,500-gallon pH neutralization tanks
- One 275-gallon tank containing sodium hydroxide for pH neutralization
- One 275-gallon tank containing sulfuric acid for pH neutralization
- One 10,000-gallon hot water storage tank.

A site plan is provided as Figure 2. The site buildings, numbered 1 through 14, are distributed over the two parcels. Buildings 12 and 14 are the only two located on the southern parcel. A summary of operations conducted in each building is provided below. This information was compiled based on Fuss & O'Neill's review of existing environmental documents and a site visit performed in July 2008.

*Buildings 1 and 2*

Building 1 is used for the mixing and storage of flammable, organic coatings. Raw materials are stored on the northern side of the building. Constituents noted in the storage area included formaldehyde, toluene, and isopropyl alcohol as well as brand-named compounds. The mixing area is located on the southern side. A hazardous waste storage area is located in the northwestern portion of the mixing area. The floor in Building 1 is concrete. A wood-floored basement and earth/stone sub-basement underlie this area. The main floor appears to have been reinforced with additional steel support columns that extend to bedrock in the sub-basement. We suspect that the original floor was likely wood and that the new construction was completed to accommodate the current use.

*Building 2*

Building 2 is a storage area with three loading docks on the southwest side. Rolls of fabric were stored in this area at the time of Fuss & O'Neill's site visit, which was made in July 2008. The floor of Building 2 is concrete with a wood-floored basement area below. The area in front of the loading docks is asphalt paved. Files held by the Fire Marshal indicate that tank trailers were used for the temporary storage of oil in 1989 (GeoDesign, 2004).

*Buildings 3, 4 and 5*

These buildings are used for general storage. Building 5 is located above the raceway. Buildings 3 and 4 both have basements. The basement of Building 3 is used for storage. The basement of Building 4 houses fire pumps that draw water from American Mill Pond.

*Building 6*

Building 6 is located adjacent to the boiler room and built around the base of the boiler stack. No manufacturing processes appear to take place in this area. A shallow floor trough (less than three inches deep) is present to provide drainage for groundwater infiltration. Boiler operations are located to the northwest and northeast of Building 6. Concrete cradles for a historical AST are located outside Building 6, adjacent to the raceway.

*Building 7*

Building 7 houses two solvent coater lines. The solvents are primarily methyl ethyl ketone (MEK)- and toluene-based. The solvents are stored in Building 1. Emissions from the coating lines are discharged to a gas-fired thermal oxidizer to destroy volatile compounds prior to discharge to the air. The solvent coaters operate in conjunction with air-to-air heat dryers which utilize heat from exhaust gases coming from the oxidizer. The coating lines are located above the raceway. A two-bay loading dock is located in the eastern end of Building 7.

*Building 8*

Water is withdrawn from the Hockanum River for use in manufacturing operations. The water is processed through a filtration system in the western portion of the Building 8 basement and pumped to a 27,000-gallon holding tank in the eastern portion. Process wastewater is discharged to the sanitary sewer. A floor drain system in the basement also discharges to the sanitary sewer. Non-contact cooling water that is withdrawn from the raceway is discharged back to the river. Several 55-gallon drums containing waste oil are stored on containment pallets. Equipment that may have been used in former mixing or wastewater treatment operations is also located in the basement. Building 8 was used as a dye house until 1927 (GeoDesign, 2004).

*Building 9*

This area is used for general storage. Groundwater seepage from the raceway is evident and a sump pump pumps water to the floor drain system in Building 8. Building 9 was used for dye storage from 1868 to 1927 (GeoDesign, 2004). A Hazardous Materials Survey in 1986 identified several miscellaneous chemicals as being stored on the ground of this building.

*Building 10*

Building 10 is not identified on available mapping.

*Building 11*

This area is used for the storage of equipment, drums of oil, and chemicals. The building was previously used for dye operations prior to 1927 (GeoDesign, 2004). A floor trench system currently conveys groundwater infiltration but in the past may have conveyed liquid seepage from former operations. The central collection point of the trench system is not known, but is suspected to have discharged to American Mill Pond. One loading bay is located along the northern edge of the building. An elevator shaft is present on the west wall. Dyeing operations subsequently moved to Building 14.

*Building 12*

This area is used as a machine shop and storage area. Operations include welding, turning, milling, grinding and electrical repair. A small parts cleaner area is located here. The 4-floor building was constructed between 1885 and 1892 (GeoDesigns, 2004). It is not known if historical manufacturing operations were conducted in this building.

*Building 13*

The latex coating line is located in the eastern end of Building 13. The latex coatings are stored in a storage area located just east of the coating line. The western end of the building is usually empty. At the time of the July 2008 site visit, the facility was shut down for maintenance and this area was used to temporarily store rolls of fabric.

*Building 14*

This building occupies most of the southern parcel and is used for textile dyeing and finishing. Two loading docks are located at the southwest end of the facility; three are located on the southeast side. A textile storage area with an elevator is located in the southern corner of the building.

Most of the dying operations occur in the western portion of the building. A dye mixing room is located in the northwest corner of the ground floor. Dyes are stored just outside the dyeing room in 55-gallon drums. The rest of the ground floor is generally open and houses dyeing and finishing machines. A floor drain trench system is located throughout the ground floor to collect oversplash and drips that occur when cleaning the equipment and removing processed material from the machines. The liquid is directed to a wastewater sump, approximately 20 feet deep, located in the southwestern end of the building. Two 7,500-gallon pH neutralization tanks are located in a loading dock west of the sump. Wastewater treatment chemicals (including sodium hydroxide, citric acid, soda ash, and sodium bicarbonate) are stored in 55-gallon drums in the vicinity of the sump. Treated wastewater is discharged to the sanitary sewer.

Most of the finishing operations occur in the southwestern portion of the building. Finishing products are applied to fabrics which are then dried. Finishing chemicals (including formaldehyde, fabric protector, and brand name chemicals) are stored in the southwestern portion of the building.

*18,000-Gallon Fuel Oil ASTs*

Two 18,000-gallon fuel oil ASTs are located east of Building 13 in a concrete containment structure. The structure is walled and roofed.

Two 20,000-gallon fuel oil USTs were formerly located in this area. The USTs were removed in 1989 along with an undocumented quantity of contaminated soil (GeoDesign, 2004).

*Exterior Pad-Mounted Transformers*

Three PCB-containing transformers and one non-PCB-containing transformer are located south of Building 7 in a fenced-in area. The PCB transformers are on a concrete pad that adjoins a concrete paved bridge over the raceway to the northeast and the concrete wall of the AST structure to the southwest.

## 2.2 Physiographic Setting

The topography of the subject site slopes sharply to the north and northwest with an approximately 80 foot difference in elevation across the site (USGS, 1992). The site is bounded on the east by the Paper Mill Pond. A raceway connects the pond with the Hockanum River, located south of the site across Grove Street. The Amerbelle facility is built around a raceway. Water flows from a small dam in the river through a raceway running from the southeastern corner of the site to the north into the Paper Mill Pond. Groundwater migration at the site is controlled primarily by drainage to the raceway and Paper Mill Pond and the bedrock surface.

The Hockanum River and Paper Mill Pond are classified by the State of Connecticut as C/B (CTDEP, 1993). Such inland surface waters are known or presumed to be suitable for the following designated uses: recreational use, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses (CTDEP, 2002).

## 2.3 Site Geology and Hydrogeology

### Site Geology

Surficial material at the subject site is mapped as till (Stone, 1992). Test hole logs for borings advanced in the vicinity of the site by the Connecticut Department of Transportation in association with the CTDEP Water Resources Bulletin in 1960 indicate that the soil near the site is sand with some silt and clay up to a depth of 9 feet. To the east of the site unconsolidated material consists of varved clay to a depth of 36 feet. Based on observations made during Limited Phase II/Limited Phase III field investigations, fill comprised of sand and silt with trace amounts of asphalt and concrete fragments is present across the surface of the site. The thickness of the fill ranges between 1 foot and 1.5 feet. Native soil was encountered at a depth of 1 to 1.5 feet below the ground surface and consists primarily of compact fine-sand and silt and clay.

Bedrock beneath the subject site is mapped as Glastonbury Gneiss, a well-foliated, grey to silver gneiss (Rodgers, 1985). Suspected bedrock was encountered during drilling at various depths, as summarized in the table below.

| Location | Refusal Depth (feet) |
|---|---|
| MW-01 | 14 |
| MW-02 | 19 |
| MW-03 | 24 |
| SB-101 | 4.0 |
| SB-102 | 2.0 |
| SB-103 | 2.0 |
| SB-116 | 6.2 |

Since portions of the Amerbelle facility foundation was constructed in bedrock and the Paper Mill Pond raceway flows through the central portion of the building, the shallow refusals were likely on bedrock. A bedrock outcrop is visible in the northwestern portion of the site.

**Site Groundwater**

The quality of groundwater beneath the subject site is classified by the Connecticut Department of Environmental Protection as GB (CTDEP, 1993). Groundwater classified as GB is defined by CTDEP as groundwater within a historically highly-urbanized area or an area of intense industrial activity and where public water-supply service is available. Class GB groundwater may be not be suitable for human consumption without treatment due to waste discharges, spills, or leaks of chemicals or land use impacts. The designated uses for Class GB groundwater are as industrial process water and cooling waters and as baseflow for hydraulically-connected surface water bodies. Class GB groundwater are presumed not suitable for human consumption without treatment (CTDEP, 1996).

Limited Phase II/Limited Phase III investigations indicate the depth to groundwater at the site ranges from 5.3 feet bgs to 19 feet bgs. Groundwater flow at the site is generally toward the northwest and is primarily influenced by the adjacent Hockanum River, Paper Mill Pond and underlying raceway. Seepage from the raceway and drainage features around the building and parking lots are likely affecting the water table elevation at monitoring wells MW-01 and MW-03.

A summary of well detail information and depth to groundwater measurements is provided in the table below.

| Well I.D. | Well Diameter (inches) | Well Depth (feet) | Screened Interval (feet) | Depth to Bedrock (feet) | Measurement Date | Depth to Water (feet) |
|---|---|---|---|---|---|---|
| MW-01 | 2 | 50.0 | 40 – 50 | 14.0 | 7/6/2009 | 7.18 |
| | | | | | 7/13/2009 | 5.38 |
| MW-02 | 2 | 33.0 | 23 – 33 | 19.0 | 7/6/2009 | 20.15 |
| | | | | | 7/13/2009 | 18.98 |
| MW-03 | 2 | 37.5 | 27.5 – 37.5 | 24.0 | 7/6/2009 | 10.70 |
| | | | | | 7/13/2009 | 10.72 |
| ME-1 | 2 | 14.9 | 4.9 - 14.9 | 3.0 | 7/13/2009 | 5.44 |
| ME-2 | 2 | 18.0 | 8 – 18 | 5.3 | 7/13/2009 | 6.92 |
| ME-6 | 2 | 25.5 | 15.5 – 25.5 | 13.5 | 7/13/2009 | 18.51 |
| AM-1 | 2 | 12.0 | 7 – 12 | 10.3 | 7/13/2009 | 11.44 |
| AM-5 | 2 | 12.5 | 7.5 – 12.5 | 10.0 | 7/6/2009 | 12.27 |
| | | | | | 7/13/2009 | 12.27 |
| AM-7 | 2 | 9.5 | 4.5 – 9.5 | NE | 7/6/2009 | 5.43 |
| | | | | | 7/13/2009 | 8.30 |

NE = not encountered

The groundwater flow direction at the site was not determined during this investigation. Vertical gradients at the site have also not been determined. Seepage from the raceway

influences local groundwater flow direction. The existing well network at the site includes wells screened in the unconsolidated deposits aquifer, the shallow bedrock aquifer, and the deeper bedrock aquifer. The well network needs to be better defined for the unconsolidated deposits aquifer and bedrock aquifer to assess groundwater flow direction and to determine vertical gradients. Recommendations for expanding the well network at the site are provided in the Technical Memoranda provided as *Appendix A*.

## 2.4 Previous Site Investigations

This section provides a summary of previous investigations conducted at the site, including Phase I and Phase II investigations completed by GeoDesign, Inc. and a Targeted Brownfields Assessment Report completed in 2006 by Metcalf & Eddy. The reports contained information regarding description of AOCs, locations of AOCs, and a summary of constituents of concern identified from these investigations.

A Phase I report prepared by GeoDesign, Inc. in 2004 identified 21 AOCs on the subject site. After reviewing this information as well as the results of the Phase II investigation, Fuss & O'Neill identified 2 additional AOCs. A list of AOCs identified for the subject site properties is detailed below. A detailed description of each AOC is summarized in the AOC-Specific Technical Memoranda provided in Appendix A.

- AOC 1 – Former xylene USTs south of Building 14
- AOC 2 – Building 14 south loading dock
- AOC 3 – Building 14 west loading dock
- AOC 4 – Northwest corner of Building 14
- AOC 5 – Building 14 wastewater conveyance trenches
- AOC 6 – Southeast corner of Building 14
- AOC 7 – Building 12, Maintenance
- AOC 8 – Slope west of Buildings 1 and 2
- AOC 9 – Building 13, Latex Coating
- AOC 10 – Building 2 loading dock
- AOC 11 – Buildings 1 and 2, Coating Storage
- AOC 12 – Building 3, Storage
- AOC 13 – Building 7, Solvent Coating
- AOC 14 – Fuel oil ASTs
- AOC 15 – Transformers
- AOC 16 – Building 7 loading dock
- AOC 17 – Building 9, Dye Storage
- AOC 18 – Building 8, Former Dye House
- AOC 19 – Building 11, Former Dyeing/Current Chemical Storage
- AOC 20 – Building 11 loading dock
- AOC 21 – Former off-site gasoline station
- AOC 22 – Fill
- AOC 23 – Groundwater

**Phase I and II Environmental Site Assessments (ESAs)**, *February and March 2004*, completed by GeoDesign, Inc.: Environmental investigations included the following:

- Site history and file review
- Interior and exterior site inspection
- Identification of AOCs
- Five exterior soil borings
- Six interior soil borings
- Installation of four groundwater monitoring wells.

Analytical results from the Phase II soil sampling indicated the presence of trace VOCs at several locations throughout the site. ETPH was detected at low concentrations at almost all of the sample locations. Formaldehyde was detected in two samples, both collected from the northwestern portion of Building 14. No SVOCs or PCBs were detected in any of the samples.

Groundwater samples were analyzed for VOCs, SVOCs, ETPH, formaldehyde, aniline and dissolved metals. Trace VOC concentrations were detected in several of the groundwater samples. ETPH was detected at concentrations up to 1,100 ug/L. Arsenic (11 ug/L) and copper (82 ug/L) were detected in the groundwater sample from the monitoring well installed in Building 11. The sample collected from the town well on Brooklyn Street showed zinc at a concentration of 171 ug/L.

**Targeted Brownfields Assessment Report,** *August 2006,* completed by Metcalf & Eddy: Between November 28 and December 3, 2005, five soil borings were drilled, and overburden soil samples were collected. Four monitoring wells were installed during drilling-three in bedrock (ME-1, 2 and 6) and one in the overburden (ME-5). See Figure 3-2 for a map showing sampling locations. Soil analytical results are summarized below:

- VOCs were detected at trace concentrations in several of the shallow soil samples collected throughout the site.
- SVOCs were detected throughout the site and may be associated with fill. Coal ash, which contains SVOC compounds, was found to be present in fill in one of the borings.
- The sample from soil boring AM-1 (south of the Building 7 loading dock) also contained arsenic at a concentration of 54.4 mg/kg.
- ETPH concentrations ranging from 21 to 75 mg/kg were detected, the highest concentrations being detected in samples collected from Building 3, a general storage area, and outside of the Building 7 loading dock.

Groundwater samples were collected from all four of the newly installed wells (ME-1, 2, 5, 6) as well as from an existing monitoring well (AM-7). Analytical results indicated the presence of TCE, PCE and several other VOCs in the groundwater downgradient of Building 11. The source of TCE and PCE contamination is unknown; however PCE and TCE are currently used in several site operations. PCE and TCE have also been identified as constituents of concern in groundwater as a result of an off-site release at the upgradient Roosevelt Mills facility located 0.5 miles east of the site. ETPH was detected at higher than background concentrations. Metals were found at concentrations higher than background at monitoring wells ME-2 (chromium, lead and copper) and AM-7 (copper and zinc). The groundwater sample collected

at ME-2 was reported to have a blue-green tint. ME-2 is located on Brooklyn Street in the area where dye-colored water was encountered during sewer installation.

# 3 Regulatory Framework

The Connecticut Remediation Standard Regulations (RSRs) are the clean-up standards in the State of Connecticut. They also contain procedures to evaluate whether actions (e.g., remediation or institutional controls) will be required to address identified releases of hazardous substances.

The RSRs require that the nature and extent of release areas be fully characterized prior to making a final determination of compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data. However, RSR criteria can be used to gauge the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For this reason, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool, and the RSR criteria that apply to Amerbelle Textiles are discussed in the following subsections.

## 3.1 RSR Soil Criteria

The RSR Soil Remediation Standards (RCSA Section 22a-133k-2) require polluted soil at a release area to be remediated to meet the Direct Exposure Criteria (DEC) to protect human health from exposure to constituents of concern (COCs). Soil must also meet the Pollutant Mobility Criteria (PMC), which is intended to prevent the pollution of groundwater through the leaching of constituents from impacted soil. The RSRs also define specific alternatives to strict compliance with the baseline numeric DEC and PMC by including self-implementing options, exceptions, and variances.

*Direct Exposure Criteria*: In general, these criteria apply to soil located within fifteen feet of the ground surface. Soil impacted by a release must be remediated to a concentration that is consistent with the Residential (Res) DEC, unless the site is used exclusively for industrial or commercial activities. In such a case, the Industrial/Commercial (I/C) DEC may be used, provided an Environmental Land Use Restriction (ELUR) is recorded to ensure that the site is used only for industrial/commercial activities. In addition, it is possible to use institutional or engineered controls to manage impacted soil on-site.

*Pollutant Mobility Criteria*: The PMC is dependent upon the groundwater quality classification of the site. Based on the site's location in a GB-designated area, the GB PMC apply to the Site. In a GB-area, these criteria apply to soil located above the seasonal high water table. Since groundwater at the site is relatively shallow (5-20 ft below the ground surface), the GB PMC may not apply at certain release areas. As with the DEC, it is possible to use engineered controls to manage impacted soil on-site. Variances also exist for the presence of widespread, polluted fill and constituents associated with fill that contains only asphalt fragments, coal fragments, or coal/wood ash.

## 3.2 RSR Groundwater Criteria

The RSR Groundwater Remediation Standards (RCSA Section 22a-133k-3) require that remediation of a groundwater plume shall result in the attainment of the Surface Water Protection Criteria (SWPC) and Volatilization Criteria (VC) *or* the background concentration for groundwater for each substance in the plume. The criteria which apply to the subject site are discussed in more detail below. As with soil, the RSRs specify self-implementing options and exceptions associated with determining compliance with groundwater criteria.

*Surface Water Protection Criteria (SWPC)*: The SWPC ensure that surface water quality is not impaired by the discharge of contaminated groundwater into a surface water body at constituent concentrations above the Water Quality Standards. The SWPC apply to a groundwater plume at the point where the plume discharges to a surface water body. Alternatively, the SWPC may be evaluated as an average of concentrations within the plume. Site-specific SWPC may also be calculated.

*Volatilization Criteria (VC)*: The VC protects human health from volatile substances in shallow groundwater that may migrate from groundwater into overlying buildings. Under the current regulations, the VC are considered for areas where groundwater is within 15 feet of the ground surface or a structure intended for human occupancy; however, the CTDEP is proposing that this compliance depth be increased to 30 feet. The VC are specific to a site's land use (i.e., residential versus industrial/commercial). Residential criteria apply unless an ELUR is filed to restrict the site's use to industrial/commercial. In evaluating the site with respect to the volatilization criteria, Fuss & O'Neill considered the draft revised VC and the potential for vapor intrusion.

# 4 Limited Phase II/Limited Phase III Scope of Study

As described in Section 2.4, previous investigations have identified releases of VOCs, SVOCs, ETPH and several metals to soil and groundwater at the site. This scope of work targeted the identified areas of concern with supplemental investigations. The site is an active manufacturing facility, and the nature of the processes and arrangement of the buildings prevented access to sampling in some areas.

The objectives of the investigation are identified below:

1) Characterize potential releases to shallow, unconsolidated soil to the extent that identified AOCs are accessible.

2) Evaluate the potential for the off-site migration of impacted groundwater in the shallow bedrock. Fuss O'Neill consulted the CTDEP on development of the scope of work for assessment of groundwater quality. On June 5, 2008 Fuss & O'Neill met with CTDEP's Tom O'Connor to review groundwater quality for the area surrounding the site. CTDEP is involved in the investigation and remediation of the upgradient Roosevelt Mills site where releases of chlorinated solvents to groundwater at that property have occurred. The releases at Roosevelet Mills have migrated off-site and have affected groundwater quality in the area and potentially the Amerbelle site. The

degree of groundwater characterization at this phase of investigation at the site focused on identifying potential hot spot contaminant source areas and evaluating groundwater quality in the shallow aquifer at the downgradient property boundary.

This section provides an overview of the methods used to investigate the site and evaluate the data collected and describes data quality objectives (DQOs), constituents of concern (COCs), laboratory methods used to analyze environmental samples, and field investigation methods.

## 4.1 Data Quality Objectives and Reasonable Confidence Protocols

DQOs are used to ensure that data is collected in a manner that permits it to be used to evaluate a site and support decisions based on those evaluations. Procedures used to ensure that the DQOs for the project were met include:

- Work was conducted in accordance with the EPA approved Quality Assurance Project Plan (QAPP) dated November 2008
- Selection of analytical methods with appropriate detection limits
- Use of pre-determined sampling handling and custody procedures
- Use of pre-determined data management and documentation procedures
- Selection of sampling locations and COCs appropriate to the potential release area
- Collection of samples from locations most likely to exhibit evidence of a release based on the AOC conceptual model
- Use of Connecticut's soil VOC sampling procedures
- Use of trip blanks, equipment blanks, duplicates, and laboratory matrix spikes for quality assurance/quality control
- Use of Connecticut's Reasonable Confidence Protocols (RCP)and laboratory QA/QC procedures

QA/QC data and laboratory RCP reporting were reviewed to confirm that objectives for investigation data were met. Our observations are summarized below.

**Trip Blanks**: Trip blanks for VOC analysis were provided by the laboratory to accompany each cooler of environmental samples to be analyzed for VOCs. Trip blank results were used to determine whether samples may have been compromised as a result of sample container handling or transport. No VOCs were detected in trip blanks. Trip blank analytical results are included in the laboratory reports.

**Duplicates**: Duplicate samples were generally submitted at a frequency of 1 per 20 samples per matrix. Both soil and aqueous duplicate samples were submitted to Phoenix Laboratories to check the precision of laboratory analysis and field sampling procedures during our Limited Phase II and Limited Phase III investigations. Each duplicate was collected at the same time as the corresponding primary sample and was analyzed for the same parameters.

Duplicate sample concentrations were comparable with reported concentrations for the primary samples. Minor differences in primary and duplicate sample results were generally due to sample heterogeneity and matrix interference. Duplicate results are included in tables with the primary sample.

**Reasonable Confidence Protocols**: The reasonable confidence protocol packages provided with laboratory reports were reviewed. The laboratory reported that "reasonable confidence" was achieved on all analyses conducted. This checklist is included in the analytical report in Appendix D and Appendix E. A review of the narratives revealed no notes that affect the usability of the data. The lab answered "no" to the following QA/QC questions with the following explanations:

3. *Were samples received at an appropriate temperature (<6 degrees C)?* Soil and groundwater samples were greater than 6 degrees C upon arrival at the laboratory. No bias in the sample results is suspected due to temperature.

4. *Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved?* During the analysis of one soil sample (993090630-07 collected at location SB-107), the surrogate dibromofluoromethane exhibited a negative interference. The sample was re-analyzed with similar results indicating matrix interference. Since this sample is beings used to assess the environmental quality of soil, a negative surrogate recovery does not affect the usability of the results.

5b. *Were all reporting limits specified or referenced on the chain-of-custody met?* Due to the presence of petroleum in the shallow soil sample collected at boring location SB-109 (Lab ID AR89517), both the volatile and semi-volatile analysis required a dilution. As a result, the requested reporting limits for volatiles and semi-volatiles could not be achieved. Although the reporting limits were elevated, the primary constituents of concern for this AOC (PCE and TCE) were detected in the sample. In addition, samples collected from adjacent locations did not require a dilution; therefore the absence/presence of AOC-specific constituents of concern at these locations could be evaluated.

   Reporting limits for the semi-volatile pyridine and the volatiles acrylonitrile and dibromoethane did not meet the requested groundwater protection criteria for groundwater samples. Groundwater samples collected from monitoring wells AM-1 and ME-2 required a dilution due to non-target material in the sample. As a result, not all requested reporting limits were achieved for these two samples.

6. *For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists present in the Reasonable Confidence Protocol documents?* On the chain of custody, polynuclear aromatic hydrocarbons (PAHs) were requested via EPA Method 8270. This list refers to all semi-volatile organic compounds; however PAHs are a sub-set of SVOCs and the lab used a shortened list of compounds.

## 4.2 Constituents of Concern

A list of COCs to be investigated was developed for each REC. The COC list comprises those compounds most likely to be released, based on knowledge of site operations and results of previous investigations. The COCs include:

- Volatile Organic Compounds (VOCs)
- Polychlorinated Biphenyls (PCBs)
- Semi-volatile Organic Compounds (SVOCs)

- Extractable total petroleum hydrocarbons (ETPH)
- RCRA 8 (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) metals plus copper, nickel and zinc
- Formaldehyde
- Glycols
- Methanol
- Ammonia

The analytical methods presented in the following table were selected to identify and evaluate potential releases because they are capable of achieving analytical detection limits less than the baseline numeric RSR clean-up criteria applicable to the Site.

| Constituent of Concern (COC) | Analytical Method |
|---|---|
| VOCs | EPA Method 8260. Soil samples were collected using Terracores and preserved using the 5035 preservation method. |
| SVOCs (and PAHs) | EPA Method 8270 |
| Petroleum hydrocarbons | Connecticut ETPH Method |
| RCRA 8 metals (plus Cu, Ni, Zn) | SW6010 and SW-7471 |
| SPLP metals | SW6010 and 1323/245.1 |
| PCBs | EPA Method 8082 |
| Formaldehyde | SW8315 |
| Glycols | 8015MOD |
| Methanol | SW8015 |
| Ammonia | E350.1 |

Sample analysis was conducted by Phoenix Environmental Laboratories of Manchester, Connecticut.

## 4.3 Limited Phase II/Limited Phase III Investigative Procedures

The Limited Phase II/ Limited Phase III field activities conducted between June 26, 2009 and July 13, 2009 were broken down into the following general tasks, which are described in the following subsections:

- Bedrock monitoring well installation and development (3 locations)
- Geoprobe™ soil sampling (21 locations)
- Groundwater sampling (8 locations)

Sample locations are depicted on Figure 2.

**Bedrock Monitoring Well Installation**

Prior to initiating field work associated with this Limited Phase II/Limited Phase III ESA, potential sampling locations were marked at the site. As required by law, a state-wide underground utility locating service was contacted prior to commencement of subsurface

sampling activities to mark the location of public underground utilities entering the property. Because providers do not mark out utilities on the property, Fuss & O'Neill contracted NAEVA Geophysics of Congers, New York to clear proposed drilling locations. Fuss & O'Neill contracted Aquifer Drilling and Testing (ADT) of Bloomfield, Connecticut to conduct a portion of the work using a direct-push drill rig. Because the site has several unique conditions likely to complicate drilling operations, Fuss & O'Neill walked the site with the contracted driller to ensure that all proposed investigation areas were accessible to either a track-mounted or portable drill rig.

Three 2-inch diameter groundwater monitoring wells (MW-01 through -03) were installed at the site using a Geoprobe™ drill rig. Monitoring well MW-01 was installed adjacent to the boiler room at the Building 4 loading dock, monitoring well MW-01 was installed near the Building 2 loading dock at AOC 10 and monitoring well MW-03 was installed in the southeastern corner of Building 14 along Grove Street to assess upgradient groundwater quality. Bedrock was encountered between 14 and 24 feet bgs.

The monitoring wells were constructed with standard PVC materials and ten feet of screen. Two of the wells (MW-02 and MW-03) are screened in the shallow bedrock aquifer and MW-01 is screened in deep bedrock (40-50 feet bgs). During drilling, the shallow bedrock wells were advanced several feet below the soil/bedrock interface to ensure that the screened interval was contained within bedrock. The interval above the well screen at the soil/bedrock interface was sealed with bentonite to prevent vertical migration of potential contamination between the unconsolidated deposits and the bedrock. Each monitoring well was finished with flush-mount curb boxes. Well completion details are provided with boring logs in Appendix A and are further described in Section 2.3.

**Geoprobe™ Soil Sampling**

A total of 21 soil borings were drilled in areas associated with 16 of the 23 areas of concern (AOCs) where manufacturing operations may have resulted in a release of hazardous materials and/or petroleum products to soil. In general, soil sampling was conducted to depths of up to 5 feet below the ground surface (bgs). Bedrock was encountered at several locations, including SB-101, SB-102, SB-103 and SB-116, above the desired boring depth. Deeper borings were advanced in areas where underground structures (such as storage tanks) may have been the source of a release, such as AOC 14. Soil boring SB-104 was drilled to the water table to assess the presence of contaminants in the soil and groundwater at AOC 12.

Soil sampling intervals were selected to characterize the maximum concentrations of release constituents within a release area and confirm the extent of impacted soil. At the majority of AOCs, the release mechanism is expected to be shallow in nature (spills, leaks from equipment, etc.). Therefore, a release to the subsurface would be concentrated in the shallow sub-slab soil beneath concrete floor or exterior asphalt paving. If visual inspection and field screening did not yield evidence of impacted soil, samples were selected for laboratory analysis from predetermined intervals based on the conceptual model for the parcel.

Each soil sample was inspected by a field scientist from Fuss & O'Neill for physical evidence of contamination, such as staining or odors. Where VOCs were a potential COC, samples were also field screened for VOCs using a photoionization detector (PID). In addition, we screened

for select metals (arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, and zinc) using X-Ray Fluorescence (XRF) technology at some locations. The field scientist recorded soil descriptions, changes in stratigraphy and evidence of potential contamination on boring logs (included in Appendix A).

Fill material, including asphalt, brick, debris and ash, were observed in several borings throughout the site. Fill thickness at the site varies; however, according to boring logs, increases towards the east. Borings drilled in the Building 2 loading dock and southern parking lot indicate fill to a depth of two feet bgs. Borings drilled at AOC 17, 18 and 19 indicate fill to a depth of three feet bgs. The maximum fill thickness (5 feet) observed during this investigation was at AOC 16.

### Monitoring Well Development

Monitoring wells were developed immediately after installation using surge-and-purge techniques to remove suspended sediments from the well and to increase the hydraulic connection between the wells and the aquifer.

### Groundwater Sampling

An attempt was made to locate existing monitoring wells from previous investigations. Five existing monitoring wells (AM-1, AM-7, ME-1, ME-2 and MW-6) were located and sampled along with the three new wells (MW-01, MW-02 and MW-03). AM-5 was located; however there was not enough water in the well to sample.

Eight wells in total were sampled on July 13, 2009. Due to poor recharge, MW-02, AM-1 and AM-7 could not be sampled using low-flow techniques; a grab sample was collected from available groundwater in the well. The rest of the wells were sampled by the low-flow method. Groundwater samples were analyzed for VOCs, SVOCs, including polynuclear aromatic hydrocarbons (PAHs), RCRA 8 metals plus copper, nickel and zinc, ammonia, formaldehyde, aniline and phenols. Elevated metal concentrations in a sample can be the result of high turbidity (>10 NTU). If a sample did not exhibit a turbidity of less than 10 NTU, an extra metals bottle was collected and field filtered using a 10 micron disposable filter. These samples were analyzed for both total and dissolved metals. The measured turbidity in wells ME-2, MW-01 and MW-03 was less than 10 NTU, therefore samples from these wells were not field filtered and were analyzed only for total metals.

# 5 Phase II/III Results

This section presents the findings of the Limited Phase II/Limited Phase III investigation and relates the data gathered to the conceptual model developed in Section 2. Each AOC investigated is discussed in detail in the Technical Memoranda for AOCs 9 through 23 included in Appendix A. Sampling locations are shown on Figure 2. Analytical results are summarized on Table 1 and Table 2. Boring logs and well completion reports are included in Appendix B. Low-flow groundwater sampling data sheets are included in Appendix C. Laboratory reports are included in Appendix D and Appendix E. A discussion of site-wide groundwater is presented in the following subsections as well as the Technical Memorandum for AOC 23.

## 5.1 Soil Analytical Results

*Volatile Organic Compounds (VOCs)*

A total of sixteen (16) samples were analyzed for VOCs. Tetrachloroethene (PCE) was detected above the laboratory reporting limit at AOC 18, 19 and 20. The highest concentration of PCE detected during this investigation was 36000 ug/kg in the sample collected from SB-109. Borings drilled downgradient (northwest) of this location contained PCE at lesser concentrations. The VOCs cis-1,2-dichloroethene and trichloroethene (TCE) were also detected at SB-109.

*Semi-volatile Organic Compounds (SVOCs)*

Polynuclear aromatic hydrocarbons (PAHs), which are a sub-set of SVOCs commonly associated with petroleum products, were detected in eight of the 17 samples in which they were analyzed. Most of the detections can be attributed to fill; however PAH detections at AOC 15, 16 and 18 are likely associated with a release of petroleum that has occurred as a result of site operations. Samples collected at these three AOCs were analyzed for PAHs after extraction via synthetic precipitation leaching procedure (SPLP). SPLP analysis assesses the potential mobility and transport of contaminants in soil. A detection indicates that leaching of the constituent to groundwater may be a concern. Phenanthrene was present in the analysis for PAHs after extraction by SPLP in one of the samples collected from boring SB-106. This indicates that the leaching of petroleum compounds is a concern at AOC 18.

*ETPH*

A total of twenty one (21) samples were analyzed for petroleum hydrocarbons (ETPH). A summary of the results is presented in Table 1. Eight of the samples exhibited concentrations of ETPH. Detected concentrations ranged from 46 mg/kg to 4700 mg/kg. The highest concentration of ETPH was in the sample collected from SB-109 (AOC 19).

*PCBs*

PCBs were analyzed for one sample (SB-111) collected adjacent to the transformers (AOC 15). Analytical results indicate that PCBs were not detected in this sample.

*Metals*

A total of nineteen (19) samples were selected for metal analysis. Metals detected throughout the site include arsenic, barium, cadmium, chromium, copper, mercury, nickel, lead, selenium and zinc. A background range for these constituents was determined based on samples collected from the southern parking lot (upgradient) that did not appear to contain fill material. Lab results from the samples collected at SB-115 and SB-120, which contained small amounts of fill material, showed slightly elevated levels of the same metals detected in the background sample plus arsenic and selenium. The approximate ranges of detected metals in soil associated with fill quality are provided in the table below.

| Metal | Concentration Range (mg/kg) |
|---|---|
| Arsenic | ND – 5.9 |
| Barium | 14 – 78.8 |
| Cadmium | ND |
| Chromium | 5.42 – 36.6 |
| Copper | 4.38 – 19 |
| Mercury | ND – 0.21 |
| Nickel | 8.12 – 42 |
| Lead | 2.52 – 65.5 |
| Selenium | ND – 26 |
| Zinc | 15.1 - 116 |

A summary of detected metal concentrations is provided as Table 1. An AOC-specific release of metals was suspected to occur if the concentration of a metal significantly exceeded the inferred background range in the table above. Releases of one or more metals consisting of arsenic, cadmium, chromium, copper, mercury, lead and zinc are suspected to have occurred at AOC 10, 13, 16, 17, 18 and 19. AOC 19 had the highest concentrations of metals detected above inferred site background. This may be due to the presence of metals in the fill at these AOCs or may be associated with releases that have occurred at the AOCs. Based on review of the mass metal analysis, samples were additionally analyzed for select metals after extraction via synthetic precipitation leaching procedure (SPLP). The results are summarized in the table below.

| Area of Concern | AOC 10 | AOC 12 | AOC 13 | AOC 17 | AOC 18 | AOC 19 | AOC 22 |
|---|---|---|---|---|---|---|---|
| Site I.D. | SB-112 | SB-104 | SB-103 | SB-107 | SB-106 | SB-109 | SB-115 |
| Arsenic | ---- | ---- | ---- | <0.004 | ---- | <0.004 | ---- |
| Barium | ---- | ---- | ---- | ---- | ---- | 0.085 | ---- |
| Cadmium | ---- | ---- | ---- | ---- | ---- | <0.005 | ---- |
| Chromium | ---- | <0.010 | ---- | ---- | ---- | <0.010 | <0.010 |
| Copper | ---- | ---- | ---- | ---- | ---- | 0.033 | ---- |
| Mercury | ---- | <0.001 | <0.001 | ---- | ---- | <0.001 | ---- |
| Nickel | ---- | ---- | ---- | ---- | ---- | ---- | <0.010 |
| Lead | <0.015 | <0.015 | 0.107 | <0.015 | ---- | 0.127 | <0.015 |
| Selenium | ---- | ---- | ---- | ---- | ---- | ---- | <0.020 |

--- = sample not analyzed for this constituent
<value = not detected above laboratory reporting limit

SPLP analysis assesses the potential mobility and transport of contaminants in soil. A detection indicates that leaching of the constituent to groundwater may be a concern.

*Formaldehyde*

Formaldehyde was not detected in any of the five samples in which it was analyzed.

*Glycols*

Glycols, including ethylene glycol and propylene glycol, were not detected in the six samples in which they were analyzed.

*Ammonia*

A total of five samples were analyzed for ammonia. Four of the five samples contained a detectable amount of ammonia. Concentrations ranged from non-detect to 190 mg/kg. Ammonia is commonly used to treat textiles. Detections are indicative of a release to the subsurface as a result of site operations.

*Methanol*

Methanol was not detected in any of the five samples in which it was analyzed.

## 5.2 Soil – Discussion of Conceptual Site Model

Releases of hazardous substances or petroleum products have been identified at ten areas of the site. The table below summarizes the potential source areas and the associated constituents of concern.

| AOC | Area | Release Constituent(s) |
|---|---|---|
| 10 | Building 2, Loading Dock | PAHs, cadmium, lead |
| 12 | Building 3 | PAHs, ETPH, metals |
| 13 | Solvent coaters | PAHs, ETPH, metals |
| 14 | Fuel Oil Above-ground Storage Tanks | ETPH |
| 15 | Transformers | PAHs, ETPH |
| 16 | Building 7, Loading Dock | Ammonia, arsenic, ETPH |
| 17 | Building 9 | ETPH, metals |
| 18 | Building 8 | PCE, PAHs, ETPH, ammonia, metals |
| 19 | Building 11, Former Dyeing/Current Chemical Storage | VOCs, ETPH, ammonia, metals |
| 20 | Building 11, Loading dock | PCE, TCE |

Fill material was encountered at ten boring locations during this investigation up to a depth of five feet below the ground surface. Fill material consisted of asphalt and brick fragments and building material debris. Fill thickness at the site varies; however, according to boring logs, increases towards the east. Borings drilled in the Building 2 loading dock and southern parking lot indicate fill to a depth of two feet bgs. Borings drilled in the eastern buildings along East Main Street, which are used for chemical storage, indicate fill to a depth of three feet bgs. The maximum fill thickness (5 feet) observed during this investigation was at AOC 16. Metals associated with fill at the site include arsenic, barium, chromium, copper, mercury, nickel, lead, selenium and zinc. These metals are present throughout the site at various concentrations, however a background range has been determined based on analytical results of samples collected upgradient (the southeastern portion of the site) of site operations. Elevated metal detections at AOCs 10, 12, 13, 16, 17 and 18 are likely associated with fill material in soil.

Several of the borings where fill was encountered contain elevated ETPH and PAH concentrations when compared with the inferred background range for the site. At AOCs 12, 13, 16, 17 and 18, ETPH and/or PAH concentrations associated with fill exceeded one or more of the applicable RSR criteria. PAH concentrations at AOC 10 were also elevated when compared with the concentrations detected in upgradient, background samples. Since asphalt contains petroleum hydrocarbons, the detected constituents are these AOCs are inferred to be the result of fill material having impacted the surrounding soil. The presence of EPTH and PAHs in soil at these six AOCs is not likely indicative of a release of petroleum products associated with the AOC.

The release of ETPH at AOC 14 is inferred to be the result of a previous underground storage tank leak. Two 20,000-gallon fuel oil tanks were removed in 1989 along with petroleum contaminated soil. Tank closure samples were collected to document that soil remaining in place after the excavation did not contain petroleum concentrations above the RSR criteria. Petroleum compounds were not detected during this investigation and a release associated with the current above-ground storage tanks is not expected to have occurred.

Soil adjacent to the active concrete transformer pad (AOC 15) has been impacted by petroleum compounds (ETPH and PAHs). The transformer pad appeared to be in good condition and there was no evidence of staining on either the concrete pad or the adjacent asphalt pavement. The release may be the result of a minor surficial spill of non-PCB containing transformer oil.

VOCs (primarily PCE, TCE and VC) have impacted soil in the eastern portion of the site beneath Building 11 and Building 8. This area is used for chemical storage and was historically used to dry clean test fabric. Since PCE and TCE are typical compounds used in dry cleaning operations, the release of these constituents to the soil is likely a result of former site operations. The source of this contamination appears to be the central portion of Building 11 and has impacted downgradient areas, including Building 8 (AOC 18) and the Building 11 loading dock (AOC 20).

## 5.3 Groundwater Analytical Results

Three monitoring wells (MW-01 through MW-03) were installed on the subject site as part of the Limited Phase II/Limited Phase III investigation. Monitoring well MW-01 was installed in deeper bedrock and MW-02 and MW-03 were installed to intersect the shallow bedrock aquifer. Each well contains a 2-inch diameter 10 feet PVC screen and is finished with a flush-mount curb box.

Each of the three newly installed wells was sampled on July 13, 2009. Five existing wells were also sampled on this date. Groundwater flow at the site is towards the north and northwest. Flow direction is influenced by the raceway running across the site and the adjacent Paper Mill Pond and Hockanum River. The water table around MW-01 is elevated; this is likely due to water seepage from the raceway, located west of the monitoring well.

A site-wide groundwater evaluation is presented in the Technical Memoranda for AOC 23. Groundwater at the site contains metals, including arsenic, barium, cadmium, chromium, copper, nickel, lead, silver and zinc. Background metal concentrations in groundwater were determined based on the sample collected from upgradient monitoring well MW-03. A

summary of the metals detected at this location and the background concentration is provided in the table below.

| Metal (mg/L) | Inferred Site Background Concentrations Detected at MW-03 |
|---|---|
| Barium | 0.457 |
| Copper | 0.005 |
| Nickel | 0.004 |
| Silver | 0.001 |
| Zinc | 0.056 |

Detected concentrations of metals throughout the site were generally within the same order of magnitude for each constituent, based on comparison with data collected at MW-03. Exceptions to this are summarized below:

- At monitoring well AM-7, all metals that were analyzed exceeded background.
- Concentrations of arsenic, chromium, copper, nickel and lead exceeded background at ME-2. Concentrations of the same metals, except for arsenic, only slightly exceeded background at MW-02, which is located downgradient of ME-2.
- At ME-6, detected chromium and copper concentrations exceeded background.
- Only the concentration of chromium exceeded the background concentration at AM-1.

A description of the current conceptual model for various areas of the site that have impacted groundwater is provided below. The summaries provide a description of the groundwater impact, the rationale for the source of the groundwater impact and current assessment of the fate and transport of the groundwater impact.

*Building 1 and Building 2*

During the subsurface investigation for AOC 11, Building1 and Building 2, a release to groundwater of the SVOC bis(2-ethylhexyl)phthalate and the metals arsenic, barium, cadmium, chromium, copper, nickel, lead, silver and zinc were identified, however the source of the release is not likely the result of AOC 11 operations. Blue tinted groundwater was encountered during a sewer line installation along Brooklyn Street and again when sampling well ME-2, located upgradient of Building 1 and Building 2. The presence of dye compounds such as aniline and formaldehyde at ME-2, as well as the presence of blue dye-tinted water, indicates that chemicals associated with Building 14 (AOC 4 and 5, which were not investigated during this mobilization) operations have impacted the groundwater. Both monitoring wells at which these constituents were detected screens groundwater in the shallow bedrock. Additional information pertaining to the source area for the detected constituents and the degree and extent of the groundwater contamination plume will be obtained during the investigation of AOC 04 and AOC 05.

*Building 7*

Groundwater at AOC 16, the Building 7 loading dock, contained detectable concentrations of the PAHs benzo(a)anthracene, benzo(b)fluoranthene, and phenanthrene. These constituents were not detected in the groundwater sample collected from the upgradient monitoring well MW-03, therefore their presence in groundwater at AOC 16 is indicative of a release. No other constituents detected in soil at this AOC were detected in groundwater at concentrations above background, with the exception of ammonia. Gasoline or automobile fluid spilled from trucks during loading and unloading may have migrated to the subsurface through cracks in the asphalt pavement. Since the monitoring well located in the Building 7 loading dock, AM-1, screens the shallow overburden, it is likely that the release to groundwater is the result of surficial spills.

*Buildings 8, 9 and 11*

VOCs are the primary concern in groundwater at AOC 19 and 20. Chlorinated VOCs consisting of tetrachloroethene (PCE), trichloroethene (TCE) and vinyl chloride (VC) have impacted the shallow bedrock groundwater downgradient from Building 11. Soil at AOC 20 only contains trace constituents of PCE and TCE, indicating that although groundwater in this location has been impacted by these constituents, the Building 11 loading dock is not the primary source of contamination. PCE and TCE are present in soil at AOC 19, primarily in the area of SB-109, at higher concentrations. The greatest concentrations of PCE and TCE detected in groundwater were at monitoring well ME-6 (210 ug/l and 220 ug/l, respectively). Vinyl chloride was only detected in the sample collected from ME-6. Monitoring well AM-7 is located slightly upgradient to this boring location and does not exhibit any detectable concentration of PCE or TCE. Groundwater contamination at AOC 20 is likely from an on-site source, possibly AOC 19. Monitoring well MW-01 is located downgradient of AOC 19 and 20 and screens groundwater in deep bedrock (40 to 50 feet below the ground surface). The samples collected from this well did not contain detectable concentrations of PCE or TCE, indicating that the plume does not extend vertically to this depth and in contained primarily in the shallow bedrock groundwater. The degree and the extent of the VOC plume in this area have not been fully delineated. Specifically, it is not known in the plume extends off-site to the north onto the Daniel Management, Inc. warehouse property.

Elevated concentrations of metals, PAHs and the SVOC bis(2-ethylhexyl)phthalate were also detected in overburden groundwater at AOC 19. A release of these constituents was identified from the results of shallow soil sampling at AOC 19 (SB-109 and SB-110). PAHs and SVOCs were not detected at the downgradient location ME-6, which is screened in the shallow bedrock and only the metals chromium and copper were detected at concentrations slightly above background.

# 6 Conclusions and Recommendations

Fuss & O'Neill conducted a Limited Phase II/Limited Phase III Environmental Site Assessment (ESA) of Amerbelle Textiles located at 104 East Main Street in Vernon, Connecticut to determine if releases of hazardous substances or hazardous wastes have occurred at sixteen previously identified AOCs. Our investigations included the advancement of soil borings, installation of monitoring wells and the collection of groundwater samples.

No evidence of releases of hazardous substances or petroleum products was found at the following AOCs:

- AOC 9 – Building 13, Latex Coating
- AOC 11 – Buildings 1 and 2
- AOC 21 – Former Off-site Gasoline Station

The determination of "no release" was based on physical inspections, document reviews and analytical data from soil samples.

Based on the data collected during our Limited Phase II/Limited Phase III investigations as well as analytical data from previous investigations, we conclude that releases of hazardous substances or petroleum products have occurred at the following AOCs:

- AOC 10 – Building 2, Loading Dock*
- AOC 12 – Building 3
- AOC 13 – Solvent coaters
- AOC 14 – Fuel Oil Above-ground Storage Tanks
- AOC 15 – Transformers
- AOC 16 – Building 7, Loading Dock
- AOC 17 – Building 9
- AOC 18 – Building 8
- AOC 19 – Building 11, Former Dyeing/Current Chemical Storage
- AOC 20 – Building 11, Loading dock**
- AOC 23 – Site Groundwater

* Constituents of concern detected at these areas may be associated with fill material; however additional investigation must be conducted in order to confirm that the releases are not the result of site operations. Fill is discussed in the Technical Memorandum for AOC 22.

** Contamination at this AOC does not appear to be a result of loading dock operations. The source is likely a release that has occurred at AOC 19.

Technical memorandums for each AOC describing the investigation and sampling results is provided as an appendix to this report.

Several of the above-referenced AOCs contain releases that have the potential to impact the site buildings and/or adjacent properties. The presence of PCE in overburden groundwater at ME-6 suggests that there is a potential concern for vapor intrusion into Buildings 8 and 11. The PCE and SVOC (bis(2-ethylhexyl)phthalate) contamination plumes identified on the property north of Brooklyn Street are upgradient of the Paper Mill Pond. It is unknown whether these plumes have migrated off-site to affect either the Paper Mill Pond of the north abutting property. We recommend further investigation of the Building 11 PCE release to assess the possibility of vapor intrusion and off-site migration of the plume. The source of the SVOC plume was not identified during the first mobilization of the investigation because it is likely originating from a release below Building No. 14, the textile dyeing building, which is located on the southern portion of the site. We also recommend implementation of the EPA-approved scope of work in the QAPP Addendum for Buildings 12 and 14.

Further investigation at the above-referenced AOCs where a release of hazardous material was identified is needed to determine the degree and extent of contamination. Area-specific conceptual models (Technical Memoranda) are included as Attachment A. Each area of concern investigated as part of this Limited Phase II/Limited Phase III First Mobilization Investigation is described and the potential release mechanism is identified. Recommendations for future investigations at AOCs 9 through 23 are given in the Technical Memoranda.

# 7 References

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# 8 Limitations of Work Product

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5. If the purpose of this project was to assess the physical characteristics of the subject site with respect to the presence in the environment of hazardous substances, waste or petroleum and chemical products and wastes as defined in the work product, unless otherwise noted, no specific attempt was made to check the compliance of present or past owners or operators of the subject site with Federal, state, or local laws and regulations, environmental or otherwise.

6. If water level readings have been made, these observations were made at the times and under the conditions stated in the report. However, it must be noted that fluctuations in water levels may occur due to variations in rainfall, passage of time and other factors and such fluctuations may effect the conclusions and recommendations presented herein.

7. Except as noted in the work product, no quantitative laboratory testing was performed as part of the project. Where such analyses have been conducted by an outside laboratory, Consultant has relied upon the data provided, and unless otherwise described in the work product has not conducted an independent evaluation of the reliability of these tests.

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9. Chemical analyses may have been performed for specific parameters during the course of this project, as described in the work product. However, it should be noted that additional chemical constituents not included in the analyses conducted for the project may be present in soil, groundwater, surface water, sediments or building materials at the subject site.

10. Ownership and property interests of all documents, including reports, electronic media, drawings and specifications, prepared or furnished by Consultant pursuant to this project are subject to the terms and conditions specified in the contract between the Consultant and CRCOG, whether or not the project is completed.

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12. In the event that any questions arise with respect to the scope or meaning of Consultant's work product, immediately contact Consultant for clarification, explanation or to update the work product. In addition, Consultant has the right to verify, at the party's expense, the accuracy of the information contained in the work product, as deemed necessary by Consultant, based upon the passage of time or other material change in conditions since conducting the work.

13. Any use of or reliance on the work product shall constitute acceptance of the terms hereof.

# Tables

Table 1
Summary of Detected Constituents in Soil
Amerbelle Textiles
104 East Main Street
Vernon, Connecticut

| | | | | Area of Concern: | AOC-9 | | AOC-10 | | | AOC-12 | AOC-13 | AOC-14 | | AOC-15 | | AOC-16 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Site I.D.: | SB-101 | SB-102 | SB-112 | SB-113 | SB-114 | SB-104 | SB-103 | SB-116 | SB-116 | SB-111 | SB-111 | SB-117 | SB-118 |
| | | | | Sample No.: | 993090630-03 | 993090630-04 | 993090702-18 | 993090702-19 | 993090702-20 | 993090630-12 | 993090630-15 | 993090702-23 | 993090702-24 | 993090630-13 | 993090630-14 | 993090702-25 | 993090702-26 |
| | | | | Date: | 6/30/2009 | 6/30/2009 | 7/2/2009 | 7/2/2009 | 7/2/2009 | 6/30/2009 | 6/30/2009 | 7/2/2009 | 7/2/2009 | 6/30/2009 | 6/30/2009 | 7/2/2009 | 7/2/2009 |
| | | | | Depth (feet): | 1.25 | 1.25 | 1.25 | 2.25 | 1.25 | 8 | 1.25 | 3 | 4.6 | 0.25 | 0.25 (DUP.) | 1.25 | 1.25 |
| CONSTITUENT | UNITS | GB PMC | I/C DEC | Res DEC | | | | | | | | | | | | | |
| **Metals** | | | | | | | | | | | | | | | | | |
| Arsenic | (mg/kg) | ---- | 10 | 10 | 3.6 | 0.7 | 3.1 | 2.8 | 1 | 4.6 | 9.3 | ---- | ---- | ---- | ---- | 3.5 | **[15.0]** |
| Barium | (mg/kg) | ---- | 140000 | 4700 | 78.7 | 69.3 | 46.4 | 62.2 | 31 | 90.8 | 87.9 | ---- | ---- | ---- | ---- | 97.1 | 50.6 |
| Cadmium | (mg/kg) | ---- | 1000 | 34 | <0.34 | <0.33 | <0.35 | 0.41 | <0.37 | 0.56 | <0.36 | ---- | ---- | ---- | ---- | <0.42 | <0.35 |
| Chromium | (mg/kg) | ---- | 100 | 100 | 16.8 | 17.1 | 18.9 | 21.1 | 18.8 | 32.1 | 15.4 | ---- | ---- | ---- | ---- | 9.67 | 12.6 |
| Copper | (mg/kg) | ---- | 76000 | 2500 | 20.6 | 12.5 | 36.2 | 19.8 | 17.9 | 119 | 46.5 | ---- | ---- | ---- | ---- | 20.4 | 18.8 |
| Mercury | (mg/kg) | ---- | 610 | 20 | 0.21 | 0.08 | 0.14 | <0.07 | 0.07 | 1.3 | 1.36 | ---- | ---- | ---- | ---- | <0.09 | 0.14 |
| Nickel | (mg/kg) | ---- | 7500 | 1400 | 12.9 | 12.5 | 8.45 | 15 | 12.2 | 11.6 | 9.87 | ---- | ---- | ---- | ---- | 11.3 | 10.5 |
| Lead | (mg/kg) | ---- | 1000 | 400 | 11.8 | 14.3 | 190 | 14.8 | 5.32 | 88.3 | 272 | ---- | ---- | ---- | ---- | 27.8 | 39.8 |
| Selenium | (mg/kg) | ---- | 10000 | 340 | <1.7 | <1.7 | <1.8 | <1.8 | <1.9 | <1.8 | <1.8 | ---- | ---- | ---- | ---- | <2.1 | <1.7 |
| Zinc | (mg/kg) | ---- | 610000 | 20000 | 34.8 | 56 | 40.9 | 59.9 | 29.2 | 142 | 73.8 | ---- | ---- | ---- | ---- | 25.2 | 43.5 |
| SPLP Barium | (mg/l) | 10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| SPLP Copper | (mg/l) | 13 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| SPLP Lead | (mg/l) | 0.15 | ---- | ---- | ---- | ---- | <0.015 | ---- | ---- | <0.015 | 0.107 | ---- | ---- | ---- | ---- | ---- | ---- |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | |
| cis-1,2-Dichloroethene | (ug/kg) | 14000 | 1000000 | 500000 | <5.3 | <5.4 | <5.0 | <5.0 | <4.9 | <6.0 | <5.5 | ---- | ---- | ---- | ---- | <10 | <10 |
| Tetrachloroethene | (ug/kg) | 1000 | 110000 | 12000 | <5.3 | <5.4 | <5.0 | <5.0 | <4.9 | <6.0 | <5.5 | ---- | ---- | ---- | ---- | <10 | <10 |
| Trichloroethene | (ug/kg) | 1000 | 520000 | 56000 | <5.3 | <5.4 | <5.0 | <5.0 | <4.9 | <6.0 | <5.5 | ---- | ---- | ---- | ---- | <10 | <10 |
| **Polynuclear Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | | | | | | | |
| Acenaphthene | (ug/kg) | 84000 | 2500000 | 1000000 | <340 | <350 | <250 | <250 | <270 | <390 | <340 | <270 | <260 | 1600 | 3200 | 630 | <260 |
| Anthracene | (ug/kg) | 400000 | 2500000 | 1000000 | <340 | <350 | <250 | <250 | <270 | <390 | <340 | <270 | <260 | 1500 | 3500 | 1300 | 540 |
| Benzo(a)anthracene | (ug/kg) | 1000 | 7800 | 1000 | <340 | 620 | <250 | <250 | <270 | 720 | 560 | <270 | <260 | **[3900]** | **[11000]** | **[3700]** | **[2700]** |
| Benzo(a)pyrene | (ug/kg) | 1000 | 1000 | 1000 | <340 | 510 | <250 | <250 | <270 | 760 | 560 | <270 | <260 | **[4000]** | **[10000]** | **[3300]** | **[2600]** |
| Benzo(b)fluoranthene | (ug/kg) | 1000 | 7800 | 1000 | <340 | 640 | 300 | <250 | <270 | **[1000]** | 950 | <270 | <260 | **[5400]** | **[12000]** | **[4500]** | **[3200]** |
| Benzo(ghi)perylene | (ug/kg) | 42000 | 2500000 | 1000000 | <340 | <350 | <250 | <250 | <270 | 410 | <340 | <270 | <260 | 5500 | 8700 | 2000 | 1400 |
| Benzo(k)fluoranthene | (ug/kg) | 1000 | 78000 | 8400 | <340 | <350 | <250 | <250 | <270 | <390 | <340 | <270 | <260 | **[2000]** | **[5900]** | **[1400]** | **[1200]** |
| Chrysene | (ug/kg) | 1000 | 780000 | 84000 | <340 | 570 | 260 | <250 | <270 | 790 | **[1000]** | <270 | <260 | **[4200]** | **[11000]** | **[3800]** | **[2300]** |
| Dibenzo(a,h)anthracene | (ug/kg) | 1000 | 1000 | 1000 | <340 | <350 | <250 | <250 | <270 | <390 | <340 | <270 | <260 | <1300 | **[2100]** | 570 | 430 |
| Fluoranthene | (ug/kg) | 56000 | 2500000 | 1000000 | <340 | 1300 | 380 | <250 | <270 | 1200 | 1300 | <270 | <260 | 7900 | 16000 | 7400 | 3800 |
| Fluorene | (ug/kg) | 56000 | 2500000 | 1000000 | <340 | <350 | <250 | <250 | <270 | <390 | <340 | <270 | <260 | 1400 | 2100 | 580 | <260 |
| Indeno (1,2,3-cd)pyrene | (ug/kg) | 1000 | 7800 | 1000 | <340 | <350 | <250 | <250 | <270 | 410 | <340 | <270 | <260 | **[3400]** | **[6700]** | **[1600]** | **[1300]** |
| Phenanthrene | (ug/kg) | 40000 | 2500000 | 1000000 | <340 | 940 | 380 | <250 | <270 | <390 | 730 | <270 | <260 | 9600 | 14000 | 6500 | 2000 |
| Pyrene | (ug/kg) | 40000 | 2500000 | 1000000 | <340 | 1100 | 270 | <250 | <270 | 960 | 1100 | <270 | <260 | 6200 | 12000 | 5600 | 3000 |
| **SPLP PAHs** | | | | | | | | | | | | | | | | | |
| Phenanthrene | (ug/l) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.3 | <0.3 | <0.3 | ---- |
| **Extractable Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | |
| ETPH | (mg/kg) | 2500 | 2500 | 500 | <11 | <10 | <11 | <11 | <12 | <12 | **[600]** | <11 | <11 | **[3900]** | **[2400]** | 58 | <11 |
| **PCBs** | | | | | | | | | | | | | | | | | |
| None Detected | (ug/kg) | ---- | 10000 | 1000 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <370 | <360 | ---- | ---- |
| **Other Parameters** | | | | | | | | | | | | | | | | | |
| Methanol | (mg/kg) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1.14 | <1.07 | ---- | ---- | ---- | ---- | <1.18 | ---- |
| Ethylene glycol | (mg/kg) | ---- | ---- | ---- | <10 | <10 | ---- | ---- | ---- | ---- | <10 | ---- | ---- | ---- | ---- | <10 | ---- |
| Propylene glycol | (mg/kg) | ---- | ---- | ---- | <10 | <10 | ---- | ---- | ---- | ---- | <10 | ---- | ---- | ---- | ---- | <10 | ---- |
| Formaldehyde | (ug/kg) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <2000 | <2000 | ---- | ---- | ---- | ---- | <1200 | ---- |
| Ammonia | (mg/kg) | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <52 | 100 | ---- | ---- | ---- | ---- | 140 | ---- |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
GB PMC = GB-area Pollutant Mobility Criteria
Res or I/C VC = Residential or Industrial/Commercial Volatilization Criteria
**Bold** denotes an exceedance of one of more criteria
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit

Table 1
Summary of Detected Constituents in Soil
Amerbelle Textiles
104 East Main Street
Vernon, Connecticut

| | | | | Area of Concern: | AOC-17 | AOC-18 | | AOC-19 | | | AOC-20 | AOC-22 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Site I.D.: | SB-107 | SB-105 | SB-106 | SB-108 | SB-109 | SB-110 | SB-119 | SB-115 | SB-115 | SB-120 | SB-121 |
| | | | | Sample No.: | 993090630-07 | 993090630-05 | 993090630-06 | 993090630-10 | 993090630-09 | 993090630-08 | 993090702-27 | 993090702-21 | 993090702-22 | 993090702-28 | 993090702-29 |
| | | | | Date: | 6/30/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 7/2/2009 | 7/2/2009 | 7/2/2009 | 7/2/2009 | 7/2/2009 |
| | | | | Depth (feet): | 1.25 | 1.25 | 1.25 | 1.75 | 1.75 | 1.75 | 2.25 | 1.25 | 1.25 (DUP.) | 1.05 | 1.05 |
| CONSTITUENT | UNITS | GB PMC | I/C DEC | Res DEC | | | | | | | | | | | |
| **Metals** | | | | | | | | | | | | | | | |
| Arsenic | (mg/kg) | ---- | 10 | 10 | **[22.9]** | 9.4 | <0.7 | 0.7 | **[10.8]** | <0.7 | <0.7 | 5.9 | 0.8 | 1.2 | <0.8 |
| Barium | (mg/kg) | ---- | 140000 | 4700 | 112 | 50.2 | 31.8 | 62.2 | 2310 | 86.1 | 95.2 | 61.4 | 60.7 | 32.2 | 14 |
| Cadmium | (mg/kg) | ---- | 1000 | 34 | 0.6 | <0.37 | <0.33 | <0.33 | 3.66 | <0.34 | <0.37 | <0.34 | <0.37 | <0.36 | <0.42 |
| Chromium | (mg/kg) | ---- | 100 | 100 | 17.8 | 17.5 | 19.1 | 11.9 | 30.5 | 16.4 | 22.6 | 36.3 | 16.2 | 8.69 | 5.42 |
| Copper | (mg/kg) | ---- | 76000 | 2500 | 49.8 | 40.2 | 17.1 | 49.6 | 304 | 13.2 | 30.4 | 15.4 | 19 | 16.4 | 4.38 |
| Mercury | (mg/kg) | ---- | 610 | 20 | 0.1 | 0.18 | 0.19 | 0.14 | 1.13 | 0.17 | 0.91 | <0.07 | <0.07 | <0.08 | <0.08 |
| Nickel | (mg/kg) | ---- | 7500 | 1400 | 9.58 | 11.6 | 8.34 | 9.14 | 16.7 | 9.28 | 16.4 | 42 | 11.9 | 8.34 | 8.12 |
| Lead | (mg/kg) | ---- | 1000 | 400 | 113 | 65.5 | 21.9 | 65 | **[6030]** | 12.7 | 13.1 | 25 | 5.82 | 5.27 | 2.52 |
| Selenium | (mg/kg) | ---- | 10000 | 340 | <1.8 | <1.9 | <1.7 | <1.7 | <1.9 | <1.7 | <1.8 | 26 | <1.8 | <1.8 | <2.1 |
| Zinc | (mg/kg) | ---- | 610000 | 20000 | 99.9 | 107 | 386 | 52.8 | 675 | 31.4 | 135 | 116 | 36.1 | 31.8 | 15.1 |
| SPLP Barium | (mg/l) | 10 | ---- | ---- | ---- | ---- | ---- | ---- | 0.085 | ---- | ---- | ---- | ---- | ---- | ---- |
| SPLP Copper | (mg/l) | 13 | ---- | ---- | ---- | ---- | ---- | ---- | 0.033 | ---- | ---- | ---- | ---- | ---- | ---- |
| SPLP Lead | (mg/l) | 0.15 | ---- | ---- | <0.015 | ---- | ---- | ---- | 0.127 | ---- | ---- | <0.015 | ---- | ---- | ---- |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | |
| cis-1,2-Dichloroethene | (ug/kg) | 14000 | 1000000 | 500000 | <5.8 | <5.0 | <4.9 | <4.7 | 430 | <5.4 | <4.8 | ---- | ---- | ---- | ---- |
| Tetrachloroethene | (ug/kg) | 1000 | 110000 | 12000 | <5.8 | 41 | <4.9 | <4.7 | **[36000]** | 15 | 7.2 | ---- | ---- | ---- | ---- |
| Trichloroethene | (ug/kg) | 1000 | 520000 | 56000 | <5.8 | <5.0 | <4.9 | <4.7 | **[2000]** | <5.4 | <4.8 | ---- | ---- | ---- | ---- |
| **Polynuclear Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | | | | | |
| Acenaphthene | (ug/kg) | 84000 | 2500000 | 1000000 | ---- | ---- | <350 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Anthracene | (ug/kg) | 400000 | 2500000 | 1000000 | ---- | ---- | <350 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Benzo(a)anthracene | (ug/kg) | 1000 | 7800 | 1000 | ---- | ---- | **[1600]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Benzo(a)pyrene | (ug/kg) | 1000 | 1000 | 1000 | ---- | ---- | **[1600]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Benzo(b)fluoranthene | (ug/kg) | 1000 | 7800 | 1000 | ---- | ---- | **[2400]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Benzo(ghi)perylene | (ug/kg) | 42000 | 2500000 | 1000000 | ---- | ---- | 1200 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Benzo(k)fluoranthene | (ug/kg) | 1000 | 78000 | 8400 | ---- | ---- | **[2400]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Chrysene | (ug/kg) | 1000 | 780000 | 84000 | ---- | ---- | **[1500]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Dibenzo(a,h)anthracene | (ug/kg) | 1000 | 1000 | 1000 | ---- | ---- | <350 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Fluoranthene | (ug/kg) | 56000 | 2500000 | 1000000 | ---- | ---- | 2900 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Fluorene | (ug/kg) | 56000 | 2500000 | 1000000 | ---- | ---- | <350 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Indeno (1,2,3-cd)pyrene | (ug/kg) | 1000 | 7800 | 1000 | ---- | ---- | **[1000]** | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Phenanthrene | (ug/kg) | 40000 | 2500000 | 1000000 | ---- | ---- | <350 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| Pyrene | (ug/kg) | 40000 | 2500000 | 1000000 | ---- | ---- | 2800 | ---- | <1900 | ---- | ---- | <250 | <240 | <250 | <280 |
| **SPLP PAHs** | | | | | | | | | | | | | | | |
| Phenanthrene | (ug/l) | ---- | ---- | ---- | ---- | ---- | 1.1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| **Extractable Petroleum Hydrocarbons** | | | | | | | | | | | | | | | |
| ETPH | (mg/kg) | 2500 | 2500 | 500 | **[680]** | <10 | 130 | 230 | **[4700]** | <10 | 46 | <10 | <10 | <10 | <12 |
| **PCBs** | | | | | | | | | | | | | | | |
| None Detected | (ug/kg) | ---- | 10000 | 1000 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| **Other Parameters** | | | | | | | | | | | | | | | |
| Methanol | (mg/kg) | ---- | ---- | ---- | ---- | ---- | <1.05 | ---- | <1.14 | ---- | ---- | ---- | ---- | ---- | ---- |
| Ethylene glycol | (mg/kg) | ---- | ---- | ---- | ---- | ---- | <10 | ---- | <10 | ---- | ---- | ---- | ---- | ---- | ---- |
| Propylene glycol | (mg/kg) | ---- | ---- | ---- | ---- | ---- | <10 | ---- | <10 | ---- | ---- | ---- | ---- | ---- | ---- |
| Formaldehyde | (ug/kg) | ---- | ---- | ---- | ---- | ---- | <2000 | ---- | <2000 | ---- | ---- | ---- | ---- | ---- | ---- |
| Ammonia | (mg/kg) | ---- | ---- | ---- | ---- | ---- | 74 | ---- | 190 | ---- | ---- | ---- | ---- | ---- | ---- |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
GB PMC = GB-area Pollutant Mobility Criteria
Res or I/C VC = Residential or Industrial/Commercial Volatilization Criteria
**Bold** denotes an exceedance of one of more criteria
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit

Table 1
Summary of SPLP Analytical Results in Soil
Amerbelle Textiles
104 East Main Street
Vernon, Connecticut

| | | Area of Concern: | AOC 10 | AOC 12 | AOC 13 | AOC 15 | | AOC 16 | AOC 17 | AOC 18 | AOC 19 | AOC 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Site I.D.: | SB-112 | SB-104 | SB-103 | SB-111 | SB-111 | SB-117 | SB-107 | SB-106 | SB-109 | SB-115 |
| | | Sample No.: | 993090702-18 | 993090630-12 | 993090630-15 | 993090630-13 | 993090630-14 | 993090702-25 | 993090630-07 | 993090630-06 | 993090630-09 | 993090702-21 |
| | | Date: | 7/2/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 7/2/2009 | 6/30/2009 | 6/30/2009 | 6/30/2009 | 7/2/2009 |
| | | Depth (feet): | 1.25 | 8 | 1.25 | 0.25 | 0.25 (DUP.) | 1.25 | 1.25 | 1.25 | 1.75 | 1.25 |
| CONSTITUENT | UNITS | GB PMC | | | | | | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic | (mg/l) | 0.5 | ---- | ---- | ---- | ---- | ---- | ---- | <0.004 | ---- | <0.004 | ---- |
| Barium | (mg/l) | 10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.085 | ---- |
| Cadmium | (mg/l) | 0.05 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | ---- |
| Chromium | (mg/l) | 0.5 | ---- | <0.010 | ---- | ---- | ---- | ---- | ---- | ---- | <0.010 | <0.010 |
| Copper | (mg/l) | 13 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.033 | ---- |
| Mercury | (mg/l) | 0.02 | ---- | <0.001 | <0.001 | ---- | ---- | ---- | ---- | ---- | <0.001 | ---- |
| Nickel | (mg/l) | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.010 |
| Lead | (mg/l) | 0.15 | <0.015 | <0.015 | 0.107 | ---- | ---- | ---- | <0.015 | ---- | 0.127 | <0.015 |
| Selenium | (mg/l) | 0.5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.020 |
| **Extractable Petroleum Hydrocarbons** | | | | | | | | | | | | |
| ETPH | (mg/l) | 1 | ---- | ---- | ---- | <0.1 | <0.1 | ---- | ---- | ---- | ---- | ---- |
| **Polynuclear Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | | |
| 2-Methylnaphthalene | (ug/l) | 490* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Acenaphthene | (ug/l) | 4200* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Acenaphthylene | (ug/l) | 4200* | ---- | ---- | ---- | <0.3 | <0.3 | <0.3 | ---- | <0.3 | ---- | ---- |
| Anthracene | (ug/l) | 20000* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Benzo(a)anthracene | (ug/l) | 0.6* | ---- | ---- | ---- | <0.06 | <0.06 | <0.06 | ---- | <0.06 | ---- | ---- |
| Benzo(a)pyrene | (ug/l) | 2* | ---- | ---- | ---- | <0.2 | <0.2 | <0.2 | ---- | <0.2 | ---- | ---- |
| Benzo(b)fluoranthene | (ug/l) | 0.8* | ---- | ---- | ---- | <0.08 | <0.08 | <0.08 | ---- | <0.08 | ---- | ---- |
| Benzo(ghi)perylene | (ug/l) | 2100* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Benzo(k)fluoranthene | (ug/l) | 5* | ---- | ---- | ---- | <0.3 | <0.3 | <0.3 | ---- | <0.3 | ---- | ---- |
| Chrysene | (ug/l) | 48* | ---- | ---- | ---- | <4.8 | <4.8 | <4.8 | ---- | <4.8 | ---- | ---- |
| Dibenzo(a,h)anthracene | (ug/l) | 2* | ---- | ---- | ---- | <0.2 | <0.2 | <0.2 | ---- | <0.2 | ---- | ---- |
| Fluoranthene | (ug/l) | 2800* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Fluorene | (ug/l) | 2800* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Indeno (1,2,3-cd)pyrene | (ug/l) | 5* | ---- | ---- | ---- | <0.2 | <0.2 | <0.2 | ---- | <0.2 | ---- | ---- |
| Naphthalene | (ug/l) | 2800* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |
| Phenanthrene | (ug/l) | 2000* | ---- | ---- | ---- | <0.3 | <0.3 | <0.3 | ---- | 1.1 | ---- | ---- |
| Pyrene | (ug/l) | 200* | ---- | ---- | ---- | <10 | <10 | <10 | ---- | <10 | ---- | ---- |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
GB PMC = GB-area Pollutant Mobility Criteria
**Bold denotes an exceedance of one of more criteria**
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit
* = Alternative pollutant mobility criteria equal to the RSR groundwater protection criteria (GWPC) multiplied by ten in accordance with RSR 22a-133k-2(c)2(d)

Table 2
Summary of Detected Constituent in Groundwater
Amerbelle Corportation
104 East Main Street
Vernon, Connecticut

| CONSTITUENT | UNITS | SWPC | I/C VC | Res VC | AM-01 993090713-05 7/13/2009 Primary | AM-07 993090713-07 7/13/2009 Primary | ME-01 993090713-02 7/13/2009 Primary |
|---|---|---|---|---|---|---|---|
| **Field Parameters** | | | | | | | |
| pH | (SU) | ---- | ---- | ---- | 6.61 | ---- | 5.99 |
| Specific Conductance | (uMhos/cm) | ---- | ---- | ---- | 284 | ---- | 3886 |
| **Metals** | | | | | | | |
| Silver | (mg/l) | 0.012 | ---- | ---- | <0.001 | 0.009 | <0.001 |
| Arsenic | (mg/l) | 0.004 | ---- | ---- | <0.004 | **[0.009]** | <0.004 |
| Barium | (mg/l) | ---- | ---- | ---- | 0.111 | 6.24 | 0.203 |
| Cadmium | (mg/l) | 0.006 | ---- | ---- | <0.001 | **[0.054]** | <0.001 |
| Chromium | (mg/l) | 0.11 | ---- | ---- | 0.006 | **[0.389]** | <0.001 |
| Copper | (mg/l) | 0.048 | ---- | ---- | 0.005 | **[3.99]** | 0.006 |
| Nickel | (mg/l) | 0.88 | ---- | ---- | 0.003 | 0.244 | 0.002 |
| Lead | (mg/l) | 0.013 | ---- | ---- | <0.002 | **[12.1]** | <0.002 |
| Zinc | (mg/l) | 0.123 | ---- | ---- | 0.036 | **[26.0]** | 0.033 |
| Barium, Dissolved | (mg/l) | ---- | ---- | ---- | 0.118 | 0.12 | 0.216 |
| Chromium, Dissolved | (mg/l) | 0.11 | ---- | ---- | <0.001 | 0.002 | <0.001 |
| Copper, Dissolved | (mg/l) | 0.048 | ---- | ---- | 0.005 | **[0.059]** | 0.008 |
| Nickel, Dissolved | (mg/l) | 0.88 | ---- | ---- | 0.003 | 0.004 | 0.003 |
| Lead, Dissolved | (mg/l) | 0.013 | ---- | ---- | 0.004 | **[0.099]** | <0.002 |
| Zinc, Dissolved | (mg/l) | 0.123 | ---- | ---- | 0.021 | **[0.130]** | 0.027 |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| 1,2,4-Trichlorobenzene | (ug/l) | ---- | ---- | ---- | <1.0 | <1.0 | <1.0 |
| cis-1,2-Dichloroethene | (ug/l) | ---- | 11000 | 830 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | (ug/l) | 88 | 810 | 340 | <1.0 | <1.0 | <1.0 |
| Trans-1,2-Dichloroethene | (ug/l) | ---- | 13000 | 1000 | <1.0 | <1.0 | <1.0 |
| Trichloroethene | (ug/l) | 2340 | 67 | 27 | <1.0 | <1.0 | <1.0 |
| Vinyl Chloride | (ug/l) | 15750 | 52 | 1.6 | <1.0 | <1.0 | <1.0 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | |
| Benzo(a)anthracene | (ug/l) | 0.3 | ---- | ---- | 0.19 | **[1.3]** | <0.040 |
| Benzo(a)pyrene | (ug/l) | 0.3 | ---- | ---- | <0.18 | **[1.3]** | <0.16 |
| Benzo(b)fluoranthene | (ug/l) | 0.3 | ---- | ---- | 0.19 | **[2.4]** | <0.064 |
| Benzo(k)fluoranthene | (ug/l) | 0.3 | ---- | ---- | <0.28 | **[0.93]** | <0.24 |
| Bis(2-ethylhexyl)phthalate | (ug/l) | 59 | ---- | ---- | <1.8 | 8.4 | <1.6 |
| Indeno (1,2,3-cd)pyrene | (ug/l) | ---- | ---- | ---- | <0.2 | 0.93 | <0.20 |
| Phenanthrene | (ug/l) | 0.3 | ---- | ---- | 0.28 | **[1.3]** | <0.060 |
| **Other Parameters** | | | | | | | |
| Ammonia | (mg/l) | ---- | ---- | ---- | 0.05 | 0.75 | 0.07 |
| Formaldehyde | (ug/l) | ---- | ---- | ---- | <100 | <100 | <100 |
| Aniline | (ug/l) | ---- | ---- | ---- | <5 | <5 | <5 |
| Phenol | (ug/l) | 92000000 | ---- | ---- | <10 | <10 | <10 |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
SWPC = Surface Water Protection Criteria
Res or I/C VC = Residential or Industrial/Commercial Volatilization Criteria
**Bold** denotes an exceedance of one of more criteria
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit

Table 2
Summary of Detected Constituent in Groundwater
Amerbelle Corportation
104 East Main Street
Vernon, Connecticut

| CONSTITUENT | UNITS | SWPC | I/C VC | Res VC | ME-02 993090713-04 7/13/2009 Primary | ME-06 993090713-06 7/13/2009 Primary | ME-06 993090713-08 7/13/2009 Duplicate |
|---|---|---|---|---|---|---|---|
| **Field Parameters** | | | | | | | |
| pH | (SU) | ---- | ---- | ---- | 7.45 | ---- | ---- |
| Specific Conductance | (uMhos/cm) | ---- | ---- | ---- | 6165 | 1000 | 1000 |
| **Metals** | | | | | | | |
| Silver | (mg/l) | 0.012 | ---- | ---- | <0.001 | <0.001 | <0.001 |
| Arsenic | (mg/l) | 0.004 | ---- | ---- | **[0.048]** | <0.004 | <0.004 |
| Barium | (mg/l) | ---- | ---- | ---- | 0.179 | 0.15 | 0.102 |
| Cadmium | (mg/l) | 0.006 | ---- | ---- | <0.010 | <0.001 | <0.001 |
| Chromium | (mg/l) | 0.11 | ---- | ---- | **[1.75]** | 0.011 | 0.007 |
| Copper | (mg/l) | 0.048 | ---- | ---- | **[0.077]** | 0.02 | 0.014 |
| Nickel | (mg/l) | 0.88 | ---- | ---- | 0.037 | <0.001 | <0.001 |
| Lead | (mg/l) | 0.013 | ---- | ---- | **[0.033]** | <0.002 | <0.002 |
| Zinc | (mg/l) | 0.123 | ---- | ---- | 0.054 | 0.01 | 0.011 |
| Barium, Dissolved | (mg/l) | ---- | ---- | ---- | ---- | 0.057 | 0.058 |
| Chromium, Dissolved | (mg/l) | 0.11 | ---- | ---- | ---- | 0.002 | 0.003 |
| Copper, Dissolved | (mg/l) | 0.048 | ---- | ---- | ---- | 0.006 | 0.006 |
| Nickel, Dissolved | (mg/l) | 0.88 | ---- | ---- | ---- | <0.001 | <0.001 |
| Lead, Dissolved | (mg/l) | 0.013 | ---- | ---- | ---- | <0.002 | <0.002 |
| Zinc, Dissolved | (mg/l) | 0.123 | ---- | ---- | ---- | <0.002 | <0.002 |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| 1,2,4-Trichlorobenzene | (ug/l) | ---- | ---- | ---- | <10 | 3.2 | <1.0 |
| cis-1,2-Dichloroethene | (ug/l) | ---- | 11000 | 830 | <10 | 190 | 160 |
| Tetrachloroethene | (ug/l) | 88 | 810 | 340 | <10 | **[210]** | **[160]** |
| Trans-1,2-Dichloroethene | (ug/l) | ---- | 13000 | 1000 | <10 | 2.6 | 2.7 |
| Trichloroethene | (ug/l) | 2340 | 67 | 27 | <10 | **[220]** | **[150]** |
| Vinyl Chloride | (ug/l) | 15750 | 52 | 1.6 | <10 | **[10]** | **[9.4]** |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | |
| Benzo(a)anthracene | (ug/l) | 0.3 | ---- | ---- | <10 | <0.040 | <0.040 |
| Benzo(a)pyrene | (ug/l) | 0.3 | ---- | ---- | <10 | <0.16 | <0.16 |
| Benzo(b)fluoranthene | (ug/l) | 0.3 | ---- | ---- | <10 | <0.064 | <0.064 |
| Benzo(k)fluoranthene | (ug/l) | 0.3 | ---- | ---- | <10 | <0.24 | <0.24 |
| Bis(2-ethylhexyl)phthalate | (ug/l) | 59 | ---- | ---- | 15 | <1.6 | <1.6 |
| Indeno (1,2,3-cd)pyrene | (ug/l) | ---- | ---- | ---- | <10 | <0.20 | <0.20 |
| Phenanthrene | (ug/l) | 0.3 | ---- | ---- | <10 | <0.060 | <0.060 |
| **Other Parameters** | | | | | | | |
| Ammonia | (mg/l) | ---- | ---- | ---- | 6.8 | 0.06 | 0.08 |
| Formaldehyde | (ug/l) | ---- | ---- | ---- | 930 | <100 | <100 |
| Aniline | (ug/l) | ---- | ---- | ---- | 260 | <5 | <5 |
| Phenol | (ug/l) | 92000000 | ---- | ---- | 780 | <10 | <10 |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
SWPC = Surface Water Protection Criteria
Res or I/C VC = Residential or Industrial/Commercial Volatilization Criteria
**Bold** denotes an exceedance of one of more criteria
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit

Table 2
Summary of Detected Constituent in Groundwater
Amerbelle Corportation
104 East Main Street
Vernon, Connecticut

| CONSTITUENT | UNITS | SWPC | I/C VC | Res VC | MW-01<br>993090713-09<br>7/13/2009<br>Primary | MW-02<br>993090713-03<br>7/13/2009<br>Primary | MW-03<br>993090713-10<br>7/13/2009<br>Primary |
|---|---|---|---|---|---|---|---|
| **Field Parameters** | | | | | | | |
| pH | (SU) | ---- | ---- | ---- | 6.82 | 7.39 | 5.76 |
| Specific Conductance | (uMhos/cm) | ---- | ---- | ---- | 733 | 1373 | 5768 |
| **Metals** | | | | | | | |
| Silver | (mg/l) | 0.012 | ---- | ---- | <0.001 | <0.001 | 0.001 |
| Arsenic | (mg/l) | 0.004 | ---- | ---- | <0.004 | <0.004 | <0.004 |
| Barium | (mg/l) | ---- | ---- | ---- | 0.037 | 0.156 | 0.457 |
| Cadmium | (mg/l) | 0.006 | ---- | ---- | <0.001 | <0.001 | <0.001 |
| Chromium | (mg/l) | 0.11 | ---- | ---- | <0.001 | 0.019 | <0.001 |
| Copper | (mg/l) | 0.048 | ---- | ---- | <0.001 | 0.019 | 0.005 |
| Nickel | (mg/l) | 0.88 | ---- | ---- | 0.003 | 0.076 | 0.004 |
| Lead | (mg/l) | 0.013 | ---- | ---- | <0.002 | 0.005 | <0.002 |
| Zinc | (mg/l) | 0.123 | ---- | ---- | 0.004 | 0.048 | 0.056 |
| Barium, Dissolved | (mg/l) | ---- | ---- | ---- | ---- | 0.084 | ---- |
| Chromium, Dissolved | (mg/l) | 0.11 | ---- | ---- | ---- | 0.001 | ---- |
| Copper, Dissolved | (mg/l) | 0.048 | ---- | ---- | ---- | 0.005 | ---- |
| Nickel, Dissolved | (mg/l) | 0.88 | ---- | ---- | ---- | 0.071 | ---- |
| Lead, Dissolved | (mg/l) | 0.013 | ---- | ---- | ---- | <0.002 | ---- |
| Zinc, Dissolved | (mg/l) | 0.123 | ---- | ---- | ---- | 0.016 | ---- |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| 1,2,4-Trichlorobenzene | (ug/l) | ---- | ---- | ---- | <1.0 | <1.0 | <1.0 |
| cis-1,2-Dichloroethene | (ug/l) | ---- | 11000 | 830 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | (ug/l) | 88 | 810 | 340 | <1.0 | <1.0 | <1.0 |
| Trans-1,2-Dichloroethene | (ug/l) | ---- | 13000 | 1000 | <1.0 | <1.0 | <1.0 |
| Trichloroethene | (ug/l) | 2340 | 67 | 27 | <1.0 | <1.0 | <1.0 |
| Vinyl Chloride | (ug/l) | 15750 | 52 | 1.6 | <1.0 | <1.0 | <1.0 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | |
| Benzo(a)anthracene | (ug/l) | 0.3 | ---- | ---- | <0.040 | <0.040 | <0.040 |
| Benzo(a)pyrene | (ug/l) | 0.3 | ---- | ---- | <0.16 | <0.16 | <0.16 |
| Benzo(b)fluoranthene | (ug/l) | 0.3 | ---- | ---- | <0.064 | <0.064 | <0.064 |
| Benzo(k)fluoranthene | (ug/l) | 0.3 | ---- | ---- | <0.24 | <0.24 | <0.24 |
| Bis(2-ethylhexyl)phthalate | (ug/l) | 59 | ---- | ---- | <1.6 | 7.2 | <1.6 |
| Indeno (1,2,3-cd)pyrene | (ug/l) | ---- | ---- | ---- | <0.20 | <0.20 | <0.20 |
| Phenanthrene | (ug/l) | 0.3 | ---- | ---- | <0.060 | <0.060 | <0.060 |
| **Other Parameters** | | | | | | | |
| Ammonia | (mg/l) | ---- | ---- | ---- | 0.04 | 0.14 | 0.04 |
| Formaldehyde | (ug/l) | ---- | ---- | ---- | <100 | <100 | <100 |
| Aniline | (ug/l) | ---- | ---- | ---- | <5 | <5 | <5 |
| Phenol | (ug/l) | 92000000 | ---- | ---- | <10 | <10 | <10 |

Notes:
UNITS: ug = microgram, mg = miligram, L = liter
---- = Constituent not analyzed
SWPC = Surface Water Protection Criteria
Res or I/C VC = Residential or Industrial/Commercial Volatilization Criteria
**Bold** denotes an exceedance of one of more criteria
<value = Constituent not detected above laboratory reporting limit
ND = Constituent not detected above laboratory reporting limit

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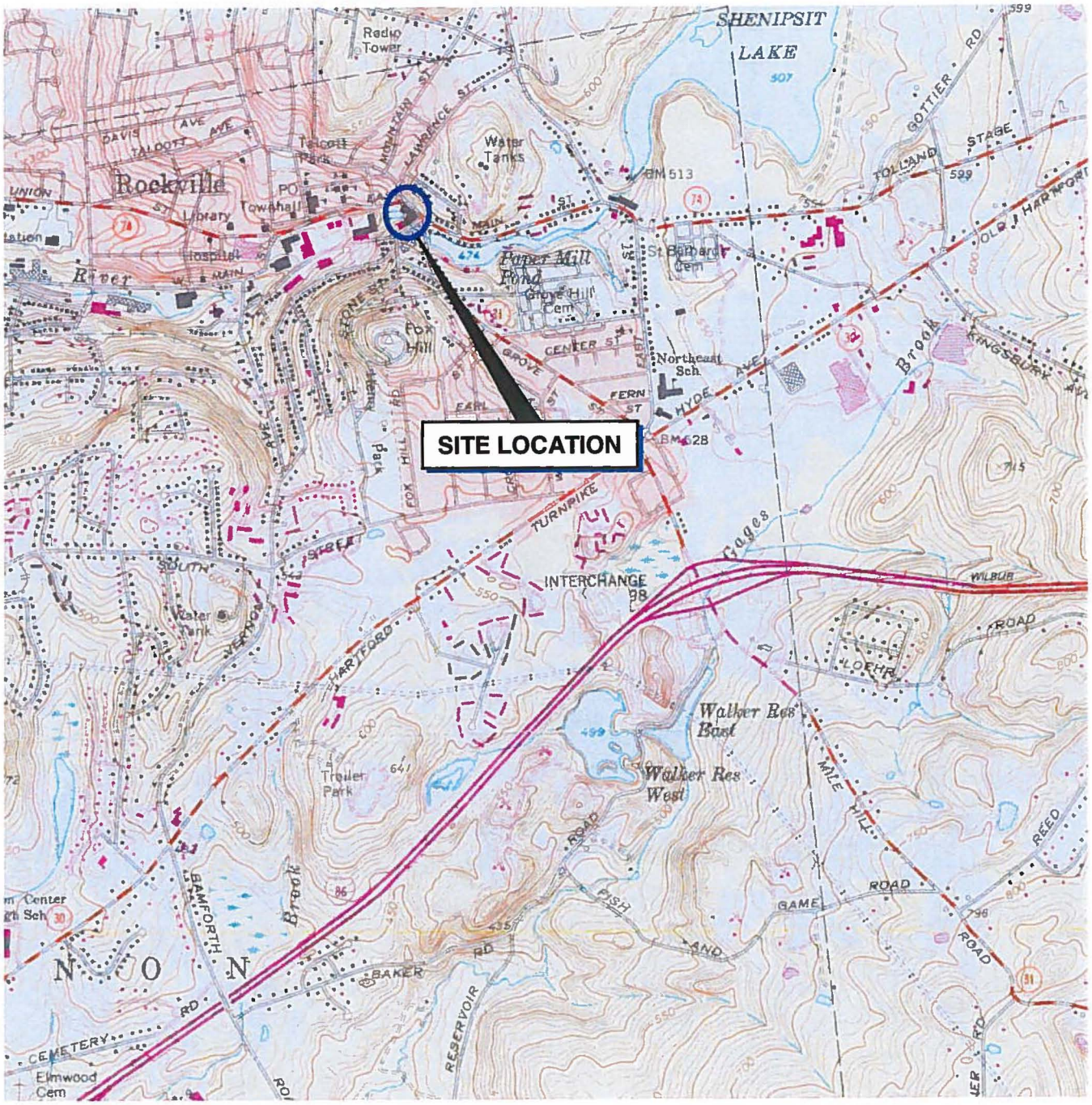
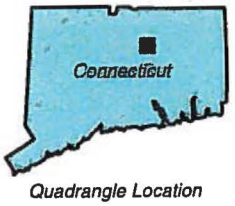
# Figures




**MAP REFERENCE:**
THIS MAP WAS PREPARED FROM THE FOLLOWING
7.5 MINUTE SERIES TOPOGRAPHIC MAP:
SPRINGFIELD SOUTH, MASS-CONN. 1958 PHOTOREVISED 1979




*Quadrangle Location*

0 1000 2000
GRAPHIC SCALE
SCALE: 1"=2000'

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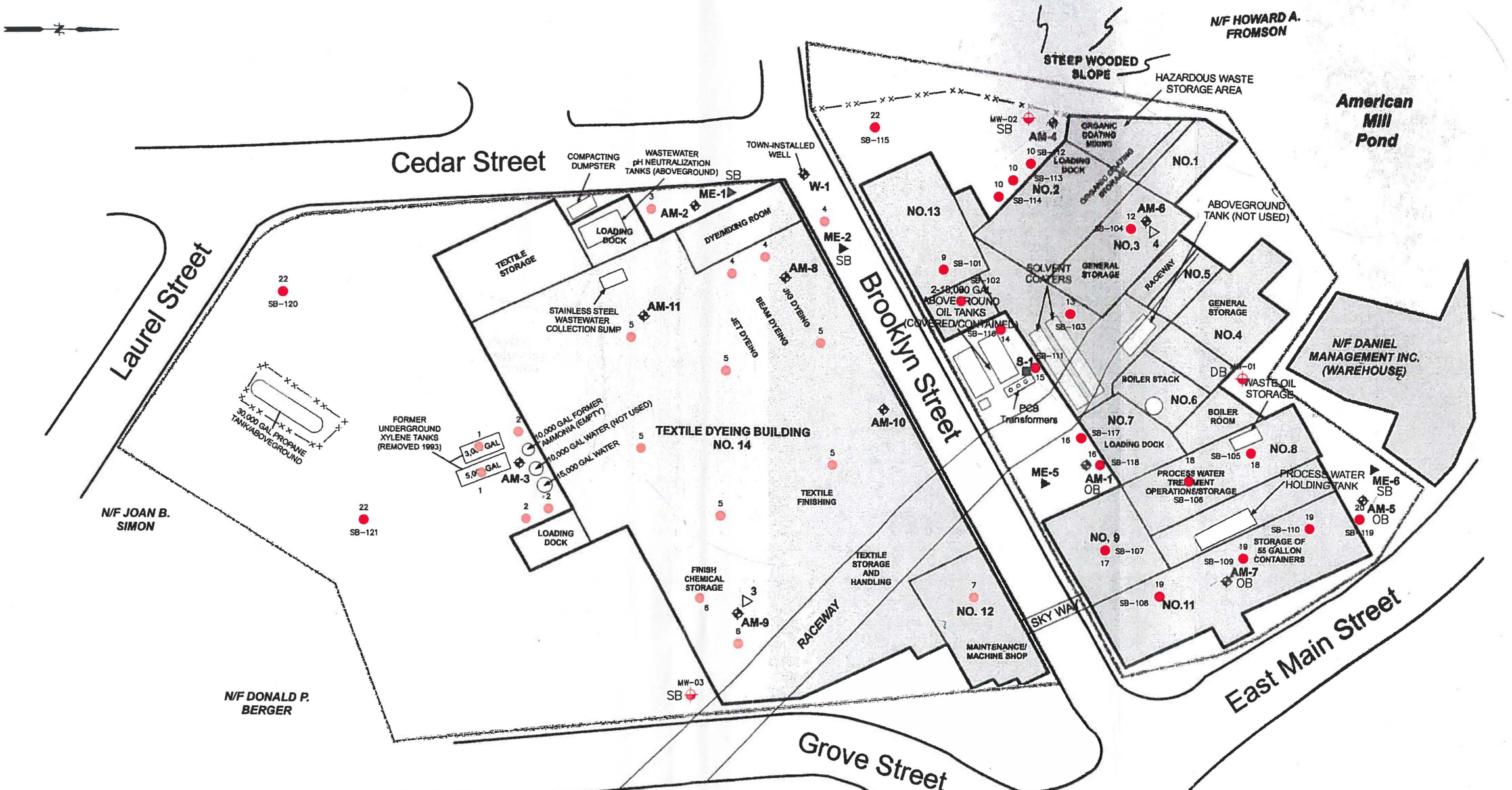
**SITE LOCATION MAP**
AMERBELLE CORPORATION
104 EAST MAIN STREET
VERNON CONNECTICUT

PROJ. No: 20080371.A20
DATE: AUGUST 2009

FIGURE 1

20080371\A20\SITELOC.PPT




| No. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1. | | | |

REVISIONS

PROJ. MANAGER:
CHIEF DESIGNER:
REVIEWED BY: DATE

NOTE:
BASEMAPPING FROM "FIGURE 3. SAMPLING LOCATIONS" AMERBELLE TEXTILES, VERNON, CONNECTICUT, METCALF & EDDY/AECOM.

SCALE:
HORZ.: 1" = 60'
VERT.:
DATUM:
HORZ.:
VERT.:
0 30 60
GRAPHIC SCALE

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PROPOSED AND EXISTING SAMPLING LOCATIONS
AMERBELLE TEXTILES
VERNON CONNECTICUT

PROJ. No. 20080371A20
DATE: AUGUST 2009

FIGURE 2

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# Appendix A

## AOC-Specific Conceptual Models

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# AOC-Specific Conceptual Model
# AOC 9 – BUILDING 13, LATEX COATING
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 13, located north of Brooklyn Street (Figure 2). The latex coating line is located at the eastern end of Building 13. The latex coatings are stored in a storage area located just east of the coating line. The western end of the building is usually empty. At the time of Fuss & O'Neill's July 2008 site visit, the facility was shut down for maintenance and this area was used to temporarily store rolls of fabric. A shallow floor drain was observed running east-west in the western portion of Building 13.

### Historical Information/Processes

Building 13 is currently used for latex supply storage and water-based latex coating operations.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Glycols
- Ammonia
- Metals

### Potential Release Mechanisms

Since there have been no previous investigations at this AOC, it has not been determined whether a release of hazardous material to the subsurface has occurred. A release to the subsurface may have occurred as the result of spills or cracks in the floors. Cracks in the floor drain bottom or sides would provide a potential pathway for spilled material to impact the shallow soil beneath Building 13.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to determine if chemicals associated with latex coating operations have impacted the shallow sub-slab soil. Two soil borings (SB-101 and SB-102) were advanced inside Building 13 to characterize the shallow soil beneath the concrete floor. No staining of the concrete floor was observed. Boring SB-101 was placed adjacent to the floor drain in the western portion of the building. Boring SB-101 was drilled to a depth of four feet below grade and boring SB-102 was drilled to a depth of two feet below grade. Rock was encountered at both locations at the final boring depth. Material at both locations consisted of primarily fine to medium grained sand with little gravel. No staining or evidence of a release was encountered during drilling. No evidence of fill was observed.

One soil sample was collected at each location from the sub-slab interval at 0.5-2 feet below grade. The two samples collected at AOC 9 were analyzed for VOCs, SVOCs (including PAHs), ETPH, RCRA 8 metals plus copper, nickel and zinc and glycols.

*Soil Analytical Results*

Several PAHs, a sub-set of SVOCs, were detected in one sample collected adjacent to the storage area east of the solvent coating line (SB-102). PAHs were not detected in the sample collected from SB-101. VOCs and ETPH were not detected in the two samples collected at AOC 9. Several metals were detected above laboratory reporting limits, including arsenic, barium, chromium, copper, mercury, nickel, lead and zinc; however concentrations of metals were within the inferred background range for the site. Background metals concentrations are based on the results of previous investigations and soil samples collected at upgradient locations.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. Regulatory criteria used to assess soil quality are the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC). Baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool.

## IV. AOC Findings

The presence of fill in a number of borings advanced at the site indicates that it is present throughout the site. The concentrations of PAHs detected in the sample collected from SB-102 are likely associated with fill material and are not attributed to a release of constituents of concern at AOC 9. This conclusion is based on the following lines of evidence:

- Observations made during drilling reported no evidence of stained soil.
- VOCs were not detected in either sample collected from this AOC. SVOCs were not detected in either sample, except for PAHs, which are usually associated with asphalt fragments and petroleum. If a release to the subsurface at this AOC has occurred, the

primary constituents of concern would be VOCs (associated with solvents used to clean the coater line) and latex compounds.

- Soil sampling of the shallow sub-slab soil indicates that low levels (total concentration of 5680 ug/kg) of PAHs are present in the eastern portion of the building (SB-102).

## V. Conclusions and Recommendations

No releases associated with AOC 9 have been identified. We do not recommend any further sampling at this AOC. Fill quality is discussed in the Technical Memorandum for AOC 22. A site-wide groundwater quality summary is included as a Technical Memorandum for AOC 23.

# AOC-Specific Conceptual Model
# AOC 10 – BUILDING 2, LOADING LOCK

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 2 is a storage area, located along the north side of Brooklyn Street in the central portion of the facility, with three loading docks on the southwest side (Figure 2). Building 1 is connected to Building 2 and lies north of the loading dock area. The area in front of the loading docks is asphalt paved.

### Historical Information/Processes

Building 2 is used as general storage. Adjacent buildings are occupied by latex and solvent coaters and a hazardous waste storage area. The loading docks may have been used during the transportation of coating solvents and stored waste removal. Files held by the Fire Marshal indicate that tank trailers were used for the temporary storage of oil in this area in 1989 (GeoDesign, 2004). There is also documentation that temporary tank trailers have been used in the past to store oil in the vicinity of Building 2.

Building 1 is used for the mixing and storage of flammable, organic coatings. Raw materials are stored on the northern side of the building. Constituents noted in the storage area included formaldehyde, toluene, and isopropyl alcohol as well as brand-named compounds. The mixing area is located on the southern side. A hazardous waste storage area is located in the northwestern portion of the mixing area. The floor in Building 1 is concrete. A wood-floored basement and earth/stone sub-basement underlie this area. The main floor appears to have been reinforced with additional steel support columns that extend to bedrock in the sub-basement. We suspect that the original floor was likely wood and that the new construction was completed to accommodate the current use.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Glycols
- Ammonia
- Formaldehyde
- Methanol
- Metals

### Potential Release Mechanisms

There is a potential that chemicals and solvents associated with latex and solvent coating processes were spilled during truck loading or unloading. Leaking containers temporarily stored in this area may have also resulted in the release of hazardous material to the subsurface. Spilled material may have migrated to the subsurface through cracks in the asphalt and impacted the shallow soil beneath.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

The Building 2 loading dock was identified as an area of concern (AOC) during a Phase I ESA completed by GeoDesign, Inc. One monitoring well (AM-4) was installed outside (west) of Building 2 in 2004 as part of a Phase II investigation completed by GeoDesign, Inc. Samples were collected from this boring; analytical results reveal ETPH at a concentration of 360 mg/kg at a depth of 3-5 feet, and lead at a concentration of 438 mg/kg at a depth of 5-7 feet. This boring is located approximately ten feet west of the loading docks. A release associated with loading or unloading at AOC 10 would be concentrated directly adjacent to the loading docks. Soil boring AM-4 is located too far from the edge of the loading docks to be considered representative of soil quality at AOC 10.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to determine if chemicals associated with latex coating operations have impacted the shallow sub-slab soil. Three soil borings (SB-112, SB-113 and SB-114) were advanced adjacent to the loading dock along the western side of Building 2. The borings were drilled to characterize the shallow soil adjacent to each of the three loading bays. Borings SB-112, SB-113 and SB-114 were drilled to a depth of five feet below the ground surface (bgs). Material at each location consisted primarily of fine to coarse grained sand with trace silt and gravel. No staining or evidence of a release was encountered during drilling. Trace fill material was observed in boring SB-112 to a depth of two feet bgs.

One soil sample was collected at each location from the interval at 0.5-2 feet below grade, which is below the asphalt. The three samples collected at AOC 10 were analyzed for VOCs, SVOCs (including PAHs), ETPH, RCRA 8 metals plus copper, nickel and zinc. Based on the analytical results for metals, one additional sample (SB-112) was analyzed for SPLP lead.

*Soil Analytical Results*

Several polynuclear aromatic hydrocarbons (PAHs) were detected in the sample collected from the boring advanced beneath the northern-most loading dock (SB-112). PAHs were not detected in the samples collected from SB-113 or SB-114. Several metals, including lead and chromium, were detected at concentrations above the inferred background range for the site. One sample collected at this REC, which contained the highest concentration of lead, was selected for additional analysis of lead via synthetic precipitation leaching procedure (SPLP). Analytical results indicate that the sample was non-detect for SPLP lead.

ETPH was detected in this area during a previous investigation at a concentration of 360 mg/kg, however ETPH was not detected in the three samples collected at AOC 10 during this Phase II/III investigation. No VOCs were detected in the three samples collected at this AOC.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. Regulatory criteria used to assess soil quality are the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC). Baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool.

## IV. AOC Findings

The detections of PAHs, cadmium and lead above the site's background range are likely associated with fill material present in the shallow soil at AOC 10. Fill may have been used to level the surface grade of the loading dock area. This conclusion is based on the following lines of evidence:

- Observations made during drilling reported no evidence of stained soil; however the top two feet of soil at SB-112 contained fill material. PAHs from asphalt fragments and metals are present in the fill material.

- Soil sampling of the shallow soil intervals directly below each loading dock indicates that PAH and lead impacted soil is present at the northern-most loading dock (SB-112). Cadmium is present in the shallow soil beneath the central loading dock (SB-113).

- Analytical results indicate that samples collected from the shallow soil beneath the central and southern loading dock are non-detect for PAHs. Lead concentrations at these locations are within background range for the site.

- Lead and chromium concentrations in the material may be the result of fill and likely do not represent a release that has occurred as a result of loading dock operations.

## V. Conclusions and Recommendations

No releases associated with AOC 10 have been identified. Detections of PAHs and several metals in the area of the Building 2 loading docks are attributed to the presence of fill material in the shallow soil. Concentrations of lead in the vicinity of boring SB-112 at the loading dock are above the inferred site background range of concentrations. We recommend additional sampling at deeper depth intervals at SB-112 and that additional samples be collected near SB-112 to document the extent of fill in this area. Although boring AM-4 is located too far from the loading docks to represent a release at AOC 10, it may be used to assist in defining the extent of lead-impacted soil. Fill quality is discussed in the Technical Memorandum for AOC 22. A site-wide groundwater quality summary is included as a Technical Memorandum for AOC 23.

# AOC-Specific Conceptual Model
# AOC 11 – BUILDINGS 1 AND 2
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Buildings 1 and 2 are located along the north side of Brooklyn Street in the northwestern and central portion of the facility. The floor in Building 1 is concrete. A wood-floored basement and earth/stone sub-basement underlie this area. The main floor appears to have been reinforced with additional steel support columns that extend to bedrock in the sub-basement. We suspect that the original floor was likely wood and that the new construction was completed to accommodate the current use. Directly west of Building 1, the topography slopes down steeply to the west.

Building 2 is a storage area, with three loading docks on the southwest side (Figure 2). Rolls of fabric were stored in this area at the time of Fuss & O'Neill's site visit, which was made in July 2008. The floor of Building 2 is concrete with a wood-floored basement area below. The area in front of the loading docks is asphalt paved.

### Historical Information/Processes

Building 1 is used for the mixing and storage of flammable, organic coatings. Raw materials are stored on the northern side of the building. Constituents noted in the storage area included formaldehyde, toluene, and isopropyl alcohol as well as brand-named compounds. The mixing area is located on the southern side. A hazardous waste storage area is located in the northwestern portion of the mixing area. Personnel from the Vernon Sewer department reported seeing water seeping from the embankment west of the building in 1994. The seepage was observed at the same time as dye-colored water was noted in a sewer line excavation adjacent to Building 14. It was inferred that a release of wastewater had occurred from the Amerbelle facility (GeoDesign, 2004). GeoDesign also noted solid waste debris in this area in the winter of 2004, when vegetation was minimal.

Building 2 is a storage area with three loading docks on the southwest side. The area in front of the loading docks is asphalt paved. Files held by the Fire Marshal indicate that tank trailers were used for the temporary storage of oil in 1989 (GeoDesign, 2004). The loading docks may have been used during the transportation of coating solvents and stored waste removal. There is also documentation that temporary tank trailers have been used in the past to store oil in the vicinity of Building 2.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Methanol
- Metals

### Potential Release Mechanisms

Sub-slab sampling in the subbasement below Buildings 1 and 2 is not possible because the buildings are underlain by bedrock. For a release of potentially hazardous substances to the subsurface to occur from Buildings 1 and 2, the release would have to migrate through the concrete floor and the wood floor, leak into the basement below and seep into the bedrock. As a result, the potential for a release is low.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

One monitoring well (AM-4) was installed outside (west) of Building 2, in the vicinity of the three loading docks, in 2004 as part of a Phase II investigation completed by GeoDesign, Inc. Groundwater data at this location may be used to determine whether a release has occurred beneath Building 1 and 2. The groundwater sample was analyzed for VOCs, aniline, formaldehyde, ETPH and dissolved metals.

*Groundwater Analytical Results*

Several metals, including barium, copper, nickel and zinc were detected in the groundwater sample collected from AM-4. The concentrations of these constituents are consistent with their respective background ranges for the site and are not indicative of a release of coating solvents or materials associated with AOC 11. ETPH was detected at a concentration of 0.260 ug/l.

***Visual Inspection of the Basement***
***Fuss & O'Neill, Inc., June 2008***

In July 2008, Fuss & O'Neill performed an inspection of the accessible areas of the basement area below Building 1 and Building 2. No staining or evidence of a release was observed on the bedrock surface in the accessible areas of the basement.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

One bedrock monitoring well (MW-02) was installed in the area of the Building 2 loading dock, west of Buildings 1 and 2. The well was screened to intersect groundwater migrating through the bedrock to the raceway, the Hockanum River, and American Mills Pond. Bedrock was encountered at a depth of 19 feet below the ground surface (bgs). A 2-inch diameter well was installed with the screened interval set at 23 – 33 feet bgs. The newly installed monitoring well was developed to ensure proper hydraulic connection with the aquifer. Excess sediment that had accumulated within the well screen during installation was purged.

A groundwater sample was collected from MW-02 on July 13, 2009. Due to poor recharge, a sample could not be collected using low-flow techniques; a grab groundwater sample was collected using a dedicated stainless steel bailer. The sample was analyzed for VOCs, SVOCs, including polynuclear aromatic hydrocarbons (PAHs), total and dissolved RCRA 8 metals plus copper, nickel and zinc, ammonia, formaldehyde, aniline and phenols. The sample to be analyzed for dissolved metals was filtered in the field using a 10 micron disposable filter.

*Groundwater Analytical Results*

Analytical results indicate metals present at concentrations within the inferred background range. Metal concentrations at MW-02 are only slightly above the concentrations detected in the upgradient monitoring well MW-03. Metals results are summarized in the table below.

| Metal (mg/L) | Upgradient Background Location | AOC 11 |
|---|---|---|
| | MW-03 | MW-02 |
| Arsenic | <0.004 | <0.004 |
| Barium | 0.457 | 0.156 |
| Cadmium | <0.001 | <0.001 |
| Chromium | <0.001 | 0.019 |
| Copper | 0.005 | 0.019 |
| Nickel | 0.004 | 0.076 |
| Lead | <0.002 | 0.005 |
| Silver | 0.001 | <0.001 |
| Zinc | 0.056 | 0.048 |

The SVOC bis(2-ethylhexyl)phthalate and ammonia are present in groundwater at this location. No VOCs were detected in the sample collected from MW-02.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

Ammonia, ETPH and the SVOC bis(2-ethylhexyl)phthalate were detected in groundwater near AOC 11. However, we conclude that a release of these constituents at AOC 11 has not occurred based on the following lines of evidence.

- The release mechanism at this AOC is for potentially hazardous substances to migrate through the floor of Building 1 or Building 2, seep into the lower basement area, which is approximately ten to twelve feet below the floor level, and infiltrate into the bedrock.

- Observations of the floor area in Building 1 and Building 2 revealed no significant evidence of staining. Observation of the accessible areas in the basement revealed no evidence of staining on the bedrock.

- Both ammonia and bis(2-ethylhexyl)phthalate were detected in groundwater upgradient of this AOC at higher concentrations.

## V. Conclusions and Recommendations

Groundwater at this AOC contains bis(2-ethylhexyl)phthalate and ammonia. These two constituents were detected at greater concentrations in a groundwater sample collected from an upgradient monitoring well (ME-2). This well is located directly downgradient from dyeing operations in Building 14. The source of groundwater contamination at AOC 11 is likely a release of dye components from Building 14. Groundwater quality at the site is summarized in the TM for AOC 23.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 12 – BUILDING 3
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 3 is located in the northwestern portion of the building north of Brooklyn Street. The floor in Building 3 is wood and is underlain by a basement. The main floor appears to have been reinforced with additional steel support columns that extend to soil and bedrock in the basement.

### Historical Information/Processes

Building 3, as well as the basement, is used for storage.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Methanol
- Metals

### Potential Release Mechanisms

There is a potential that chemicals or solvents stored in this area were released to the soil and bedrock as a results of spills or leaking containers. Cracks in the floor may have provided a preferential pathway for contaminants to impact the soil, bedrock and/or groundwater beneath Building 3.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

Building 3 was identified as an area of concern (AOC) during a Phase I ESA completed by GeoDesign, Inc. Results from soil samples collected in the basement of Building 3 as part of a Phase II investigation show ETPH to be present at a depth of 5-6 feet below grade at a concentration of 770 mg/kg.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to determine if materials stored in Building 3 have had a negative impact on the sub-slab soil and/or groundwater at this AOC. One soil boring (SB-104) was advanced in the basement of Building 3. The boring location was placed adjacent to a break in the concrete floor, approximately 15 feet south of monitoring well AM-6, where a potential release of hazardous material would most likely effect the sub-slab soil. The boring was drilled to a depth of nine feet below the concrete floor. Soil at this location consists primarily of fine to medium grained sand and trace silt and crushed rock. A layer of fine-grained sand and silt was present from the three and a half to seven foot interval.

Groundwater was encountered at a depth of seven feet and a sample was collected from the 7-9 foot depth interval to assess both groundwater and soil quality. The sample collected at AOC 12 was analyzed for VOCs, SVOCs (including PAHs), ETPH, RCRA 8 metals plus copper, nickel and zinc, ammonia, methanol and formaldehyde.

*Soil Analytical Results*

No VOCs were detected in the sample collected from Building 3. ETPH was not detected. Several metals, including barium, cadmium, chromium, copper, mercury, lead and zinc, were detected above the inferred background range for the site. Based on review of the mass results for metals, samples were selected for additional analysis after extraction by SPLP using the 20 times screening method. The results after extraction by SPLP were non-detect, indicating that the potential leaching of metals is low. Polynuclear aromatic hydrocarbons (PAHs), a sub-group of SVOCs typically associated with petroleum products, were present in the sample.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT

RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

Based on the following lines of evidence, a release of PAHs, ETPH and metals has occurred to soil at this AOC.

- Samples collected from the sub-basement of Building 3 at a depth of 7-9 feet below the concrete floor contains PAH and metal concentrations above the site's background range.
- Results from a previous investigation completed by GeoDesign, Inc. in 2004 identify the presence of ETPH in soil at a depth of 5-6 feet below the concrete floor.

## V. Conclusions and Recommendations

A release of PAHs, ETPH and metals, including barium, cadmium, chromium, copper, mercury, lead and zinc was identified at AOC 12. Further sampling of the shallow soil for analysis of metals and PAHs is recommended to determine the degree and extent of the release.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 13 – BUILDING 7, SOLVENT COATERS

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 7 is located in the central portion of the building north of Brooklyn Street. Building 7 houses two solvent coater lines, which are located above the raceway. A two-bay loading dock is located in the eastern end of Building 7. During a site inspection in 2008, oily material was observed on the floor near the west end of the coating line.

### Historical Information/Processes

Solvent coating is the primary operation which takes place at AOC 13. The solvents used in the coating material are primarily methyl ethyl ketone (MEK)- and toluene-based. The solvents are stored in Building 1. Emissions from the coating lines are discharged to a gas-fired thermal oxidizer to destroy volatile compounds prior to discharge to the air. The solvent coaters operate in conjunction with air-to-air heat dryers which utilize heat from exhaust gases coming from the oxidizer.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Methanol
- Metals

### Potential Release Mechanisms

Releases to the subsurface of hazardous material may have occurred as a result of spills from coating operations. Solvent-based coating chemicals primarily include toluene, formaldehyde, isopropyl alcohol, and MEK could potentially seep through cracks in the concrete floor. The majority of this AOC is located above the raceway. Therefore, the most likely receptor if a release had occurred at this AOC is direct seepage of a release substance through the floor to the raceway.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to determine if materials associated with solvent coating have had a negative impact on the sub-slab soil at this AOC. Access to the coaters is restricted and the raceway runs beneath the equipment,. Access for collection of subsurface samples at AOC 13 is very limited. No staining or cracks in the concrete floor was observed during the investigation. One soil boring (SB-103) was drilled along the northern-most solvent coating line. Concrete at this location was measured to be approximately four inches thick. Refusal was encountered at two feet below the concrete floor and weathered rock was observed at the bottom of the boring core. AOC 13 is located above the raceway, refusal at this location was likely on bedrock. Soil at SB-103 consists primarily of fine to medium grained sand, little silt and trace gravel. No staining or evidence of contamination was observed during drilling.

One sample was collected from the shallow sub-slab 0.5-2 foot below the concrete floor depth interval. The sample collected at AOC 13 was analyzed for VOCs, SVOCs (including PAHs), ETPH, RCRA 8 metals plus copper, nickel and zinc, ammonia, glycols, methanol and formaldehyde.

*Soil Analytical Results*

No VOCs were detected in the sample collected from the location adjacent to the solvent coaters in Building 7. Several metals, including arsenic, barium, copper, mercury and lead, were detected above the inferred background range for the site. Based on the analytical results for metals, the sample was selected for additional analysis of lead via synthetic precipitation leaching procedure (SPLP); the result was 0.107 mg/l. The sample was also analyzed for SPLP mercury; the result was non-detect. ETPH was detected at a concentration of 600 mg/kg. PAHs, a sub-group of SVOCs typically associated with petroleum products, were present in the sample.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary

evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

Based on the following lines of evidence, a release of PAHs, ETPH and metals has been identified in the soil at this AOC.

- Soil collected beneath the concrete floor adjacent to the solvent coating lines in Building 7 contains PAH, ETPH and metal concentrations above the site's background range.
- Bedrock was encountered at a depth of two feet below the concrete floor; since groundwater is not present at this depth, it is unlikely that a release of hazardous material would migrate vertically to impact deeper soil or groundwater.

## V. Conclusions and Recommendations

A release of PAHs, ETPH and metals, including arsenic, barium, copper, mercury and lead was identified at AOC 13. Further investigation is recommended to determine whether the sample location SB-103 is representative of the maximum degree of contamination at AOC 13 and to determine the lateral extent of the release. Access to AOC 13 is very limited due to the presence of the active solvent coater lines and the raceway. Two to three additional shallow soil samples should be advanced in the vicinity of the two solvent coater lines to further characterize the release area.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 14 – FUEL OIL ABOVE-GROUND STORAGE TANKS

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Two 18,000-gallon fuel oil above ground storage tanks (ASTs) are located east of Building 13 in a concrete containment structure. The structure is walled and roofed.

### Historical Information/Processes

Two 20,000-gallon fuel oil underground storage tanks (USTs) were formerly located in this area. The USTs were removed in 1989 along with an undocumented quantity of contaminated soil (GeoDesign, 2004). Tank closure soil samples were collected by the tank contractor after an unknown amount of soil was excavated and disposed of at the Manchester Landfill.

### Constituents of Concern

- Polynuclear Aromatic Hydrocarbons (PAHs)
- Extractable Total Petroleum Hydrocarbons (ETPH )

### Potential Release Mechanisms

Releases to the subsurface of petroleum products may have occurred as a result of spills, overfills or leaks in the piping associated with the former underground storage tanks.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil

**Former Underground Storage Tank Removal**

According to a *Targeted Brownfields Assessment Report* completed by Metcalf & Eddy in 2006, Amerbelle located a letter sent to the CTDEP documenting approval from the Town of Manchester Landfill for the disposal of excavated soil. Soil samples collected from the excavation by the tank contractor after the contaminated soils was removed had a maximum concentration of TPH of 150 mg/kg.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

To confirm the previous closure sampling results, one soil boring was advanced in the vicinity of the former USTs, outside of the enclosed AST area. On July 2, 2009, Fuss & O'Neill drilled one boring (SB-116) with a direct-push drill rig until refusal on bedrock at a depth of six feet and two inches below the ground surface (bgs). The boring location was off-set three feet south and a second attempt was made to advance the boring to the water table. Refusal was experienced on the second attempt at the same depth of six feet and two inches bgs. Approximately one foot of weathered rock was present at the bottom of the boring core. Material at AOC 14 consists of fine to coarse grained sand with some gravel. Trace amounts of fill debris was observed in soil to a depth of three feet and eight inches bgs. No petroleum odor or staining was observed during drilling. Groundwater was not encountered.

Two soil samples were collected from this boring; one from the 2-4 foot depth interval to assess soil quality below the depth of the containment slab and one from the material above bedrock at the 4-5.2 foot depth interval. Both samples were analyzed for PAHs and ETPH.

At the time of the soil investigation in July 2009, the ASTs appeared to be in good condition. There was no noticeable staining to the floor beneath the ASTs and no cracks in the concrete were evident, indicating that a release has not occurred as a result of the ASTs.

*Soil Analytical Results*

PAHs and ETPH were not detected above laboratory reporting limits in the two samples collected at AOC 14.

## III. Regulatory Compliance Analysis

Connecticut Remediation Standard Regulation (CT RSR) criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. Baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria used to assess soil quality are the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

Phase II/Limited Phase III investigations did not reveal detectable petroleum concentrations in soil at AOC 14. Analytical results from tank closure samples collected in 1989 indicate that TPH remains in soil at a maximum concentrations of 150 mg/kg, which is below the baseline Res DEC.

## IV. AOC Findings

Based on the following lines of evidence, there is no evidence of a release from the ASTs. Soil remaining in place after the UST removal and contaminated soil excavation in 1989 does not contain petroleum hydrocarbon concentrations above the applicable CT RSR criteria.

- Due to the AST containment structure and the adjacent transformer fenced-in area, soil access around the former UST area was limited.
- Analytical results from tank closure samples show a maximum TPH concentrations of 150 mg/kg, which is well below the Res DEC of 500 mg/kg.
- Observations made during drilling reported no evidence of stained soil or a petroleum odor.
- Soil samples collected from a location adjacent to the current AST containment structures contain no detectable concentration of ETPH or PAHs.

## V. Conclusions and Recommendations

According to historical records and recent soil sampling, petroleum-impacted soil is remaining in place around the area of two former USTs. It is uncertain whether post-excavation sampling was conducted in accordance with Connecticut's Underground Storage Tank Regulations. However, data collected from accessible locations in the former excavation area indicated that constituents of concern in soil are below the baseline RSRs. No further soil sampling is recommended at AOC 14. Post-remediation groundwater monitoring to demonstrate the effectiveness of the excavation activities completed for the former UST and to achieve compliance with the RSRs. If, in the future, any soil excavation is anticipated, a soil management plan should be development to limit exposure to potentially hazardous contaminants.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 15 – TRANSFORMERS

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Three PCB-containing transformers and one non-PCB-containing transformer are located south of Building 7 in a fenced-in area. The PCB transformers are on a concrete pad that adjoins a concrete paved bridge over the raceway to the northeast and the concrete wall of the AST structure to the southwest.

### Historical Information/Processes

Prior to the late 1970s, PCBs were a common component in transformer oil due to their thermal resistance. Three of the four transformers at the site contain oil with PCBs.

### Constituents of Concern

- Polynuclear Aromatic Hydrocarbons (PAHs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Polychlorinated Biphenyls (PCBs)

### Potential Release Mechanisms

There is a potential for oil, possibly containing PCBs, to leak from a transformer onto the concrete pad and spill onto the adjacent ground surface. Because much of this area is concrete paved, the potential for a release to the subsurface is low.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

One surface soil sample (S-1) was collected from the most likely discharge point around the base of the transformers. No PCBs were detected in the soil sample from AOC 15.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

On June 30, 2009, Fuss & O'Neill collected one surface soil sample (SB-111) from the ground surface adjacent to the enclosed transformer pad. This sample was collected to determine whether a release of PCB-containing oil had occurred since the Phase II investigation in 2004. The transformer pad appeared to be in good condition and there was no evidence of staining on either the concrete pad or the adjacent asphalt pavement. Since the concrete transformer pad is enclosed in a chain-link fence, and the transformers are active, the sample was collected directly outside of the fenced area. Soil at this location consists primarily of topsoil and fine-grained sand and silt with little organics. No staining or odor was observed that would suggest a release had occurred. The sample was analyzed for ETPH, PAHs and PCBs. A duplicate sample was collected at this location and analyzed for the same parameters as the primary sample. Duplicate results are comparable to the corresponding primary sample results with typical sample heterogeneity.

*Soil Analytical Results*

PCBs were not detected in the sample. PAHs were detected in the sample ranging in concentration from 1400 ug/kg to 12000 ug/kg. ETPH was present in the sample at a concentration of 3900 mg/kg. To determine whether the detected constituents would leach in soil, the sample was analyzed for ETPH and PAHs via synthetic precipitation leaching procedure (SPLP); the results were non-detect.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

The detection of PAHs and ETPH are indicative of a release of petroleum products to the shallow soil at AOC 15. This conclusion is based on the following lines of evidence:

- Analytical results from a sample collected from the soil adjacent to the concrete transformer pad revealed PAH and ETPH concentrations that would suggest a release of oil from the transformers had occurred.

- No staining of the concrete transformer pad or surrounding soil was observed. This indicates that the PAHs and ETPH in soil are not likely the result of an on-going release.

## V. Conclusions and Recommendations

A release of PAHs and ETPH has been identified at AOC 15. The sample collected from this area did not contain PCBs; however one of the four transformers contains non-PCB oil. Access to this AOC is extremely limited and for health and safety reasons, sampling near the active transformers is not recommended. When the transformers are taken out of service, additional soil sampling is recommended at this AOC to determine whether the release has impacted soil below 0.5 feet bgs. We also recommend concrete chip sampling of the transformer base pad be conducted when the transformers are taken out of service to determine if a release of transformer oil to the concrete occurred.

# AOC-Specific Conceptual Model
# AOC 16 – BUILDING 7, LOADING DOCK

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 7 is located in the central portion of the building north of Brooklyn Street. Building 7 houses two solvent coater lines, which are located above the raceway. A two-bay loading dock is located in the eastern end of Building 7. During a site inspection in 2008, oily material was observed on the floor near the west end of the coating line.

### Historical Information/Processes

Solvent coating is the primary operation which takes place at Building 7. The solvents used in the coating material used are primarily methyl ethyl ketone (MEK)- and toluene-based. These solvents and other chemicals associated with site operations may be received through the Building 7 loading dock. Emissions from the coating lines are discharged to a gas-fired thermal oxidizer to destroy volatile compounds prior to discharge to the air. The solvent coaters operate in conjunction with air-to-air heat dryers which utilize heat from exhaust gases coming from the oxidizer.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

There is a potential that chemicals and solvents associated with the coating processes were spilled during truck loading or unloading. Spilled material may have migrated to the subsurface through cracks in the asphalt and impacted the shallow soil beneath.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

The Building 7 loading dock was identified as an area of concern (AOC) during a Phase I ESA completed by GeoDesign, Inc. Soil samples collected in 2004 show ETPH at a concentration of 920 mg/kg at a depth of 1-3 feet below surface and arsenic at a concentration of 122 mg/kg at a depth of 3-5 feet. The only constituents detected in the groundwater were trace concentrations of barium, copper and zinc.

**Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

One soil boring (ME-5) was drilled south of boring AM-1 in the Building 7 loading dock area. ETPH was detected in soil samples from this boring between 25 to 33 mg/kg. Samples collected from this boring showed the presence of several PAHs and the following metals-cadmium, copper, lead and vanadium. A monitoring well was installed in the completed ME-5 and a groundwater sample was collected. ETPH was found to be present in the groundwater at a concentration of 0.47 mg/l.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

To characterize the shallow soil in the vicinity of the Building 7 loading dock, two soil borings (SB-117 and SB-118) were advanced adjacent to the building in the asphalt driveway. Boring SB-118 was drilled to five feet below the ground surface (bgs). Refusal was encountered on suspected bedrock at four a half feet bgs while drilling boring SB-117. Fill material, including slightly stained debris and brick, was present at both locations down to the final boring depth. Yellow-orange sand, visibly discolored when compared with the surrounding soil, was present just below the asphalt at SB-118. No odor was observed; however stained soil was encountered around 0.25 feet bgs at SB-117 and around 2.5 feet bgs at SB-118.

One sample was collected from each boring from the 0.5-2 foot depth interval below the asphalt. Both samples were analyzed for VOCs, ETPH, PAHs and RCRA 8 metals plus copper, nickel and zinc. Since staining was more visible in the soil at SB-117, the sample collected from this boring was also analyzed for the full set of SVOCs (which include PAHs), glycols, methanol, ammonia and formaldehyde. Based on the initial analytical results, the sample collected from SB-117 was selected for additional analysis of PAHs via synthetic precipitation leaching procedure (SPLP).

On July 13, 2009, a groundwater sample was collected from the previously installed AM-1. The monitoring well did not have sufficient recharge to sample using low-flow techniques; therefore a grab sample was collected. The sample was analyzed for VOCs, SVOCs, total and dissolved RCRA 8 metals plus copper, nickel and zinc, methanol, glycols, ammonia and formaldehyde.

*Soil Analytical Results*

Ammonia was detected at a concentration of 140 mg/kg. ETPH was present in soil at a concentration of 58 mg/kg. The sample collected from SB-118 exhibited no detectable concentration of ETPH. Several metal concentrations were elevated when compared with their inferred background ranges for the site, including barium at SB-117 and arsenic and lead at SB-118. PAHs were detected in both samples at concentrations indicative of a release. The soil sample from SB-117 did not contain glycols, methanol, formaldehyde or SPLP PAHs above the laboratory reporting limits.

*Groundwater Analytical Results*

Detected constituents in the groundwater at AOC 15 generally correspond with the parameters detected in soil. Several metals, including barium, chromium, copper, nickel, lead and zinc, the PAHs benzo(a)anthracene, benzo(b)fluoranthene and phenanthrene, and ammonia was detected in the groundwater at this AOC.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

The following lines of evidence support the conclusion that a release had occurred at this AOC. The background concentration for ammonia at the site is non-detect, therefore its presence in the soil at SB-117 is indicative of a release. The presence of ETPH at boring location AM-1 at a concentration of 920 mg/kg during the Phase II investigation indicates that a release of petroleum substance has occurred. Borings placed on either side of AM-1 (as well as ME-5, located further south in the loading dock area) were either non-detect for ETPH or contained a much lower concentration, indicating that the petroleum release at AOC 16 is localized to a small area around AM-1. The elevated concentration of arsenic may be associated with fill

material; however it may also be indicative of a release. The detections of PAHs and metals, including barium and lead are likely associated with fill. The site conceptual model for AOC 22 discusses site-wide fill in more detail.

- Stained soil was observed at both boring locations along the loading dock at depths ranging from 0.25 feet bgs to 5 feet bgs, but no petroleum odor was noted.

- Fill material was present in the loading dock area to a depth of at least five feet bgs. This includes a small amount of uncharacteristically yellow-orange sand observed just below the asphalt at SB-118.

- Soil samples collected beneath the asphalt adjacent to the two loading docks contains PAH concentrations above the site's background range. Soil at the western loading bay (SB-117) contains ETPH and barium and soil at the eastern loading bay (SB-118) contains arsenic and lead above the site's inferred background ranges for each constituent.

- Previous soil investigation results show a release of petroleum at boring and monitoring well location AM-1 adjacent to the loading docks. The concentration of ETPH decreases laterally to the west, east and south.

- Analytical results from the groundwater sample collected at AM-1 indicate that constituents of concern present in the shallow soil at AOC 15 are present in the groundwater.

## V. Conclusions and Recommendations

A release of ammonia, arsenic and ETPH to the overburden soil and groundwater at AOC 15 has been identified. The presence of PAHs and metals in the area of the Building 7 loading docks can be attributed to the presence of fill material in the shallow soil; however these constituents were detected at elevated concentrations. Further investigation is recommended to adequately characterize the release at AOC 16. An additional two to three soil samples would assist in defining the limits of the release of ETPH and arsenic. Observations made during drilling additional soil borings would assist in determining whether the PAHs and metals present in soil are associated with fill or a release that has occurred at the loading dock.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 17 – BUILDING 9
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 9 is located in the central portion of the building along the north side of Brooklyn Street. The southern wall of the basement floor is stone and the other walls are concrete. The floor is concrete. The second and third floors of this building are constructed of wood.

### Historical Information/Processes

This area is used for general storage. Groundwater seepage from the raceway is evident and a sump pump transfers water to the floor drain system in Building 8. Building 9 was used for dye storage from 1868 to 1927 (GeoDesign, 2004). A Hazardous Materials Survey in 1986 identified several miscellaneous chemicals as being stored on the ground of this building.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

Releases to the subsurface of chemicals stored in this area may have occurred as a result of spills or leaking containers. Groundwater seeping from the adjacent raceway may have washed spilled material from the concrete floor to the floor drain system. Cracks in the floor drain system may have created a preferential pathway for contaminants to impact the groundwater.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to determine if materials or chemicals stored in the building have had a negative impact on the sub-slab soil at this AOC. One soil boring (SB-107) was drilled along the northern-most solvent coating line. Concrete at this location was measured to be approximately two inches thick. Fill material consisting of gravel, brick and debris was observed to a depth of three feet below the concrete floor. Native soil at SB-107 was present in the three to five foot depth interval, and consists primarily of fine-grained sand and silt. Weathered rock flour was present within this interval.

One sample was collected from the shallow sub-slab soil (0.5-2 foot depth interval). The sample collected at AOC 17 was analyzed for VOCs, ETPH and RCRA 8 metals plus copper, nickel and zinc. Since evidence of contamination, via staining or an odor, was not observed at AOC 17, the sample was not analyzed for additional constituents of concern such as SVOCs, glycols or ammonia.

*Soil Analytical Results*

No VOCs were detected in the sample collected from SB-107. Several metals, including arsenic, barium, cadmium, copper, lead and zinc were detected at concentrations above their respective background range for the site. ETPH was detected at a concentration of 680 mg/kg. Based on the results of metal analysis, sample was selected for additional analysis of lead and arsenic via synthetic precipitation leaching procedure (SPLP); the results were non-detect.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. Regulatory criteria used to assess soil quality are the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC). Baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool.

## IV. AOC Findings

Based on the following lines of evidence, a release to the soil of metals, including arsenic, barium, cadmium, copper, lead and zinc and ETPH may have occurred at this AOC.

- During drilling, fill material was observed below the concrete floor to a depth of three feet. Although the fill/soil encountered in this interval did not have a petroleum odor and did not show evidence of staining, a small amount of ash was noted.

- Elevated concentrations of metals, including arsenic, barium, cadmium, copper, lead and zinc were detected in the sub-slab sample, as well as ETPH at a concentration of 680 mg/kg.

## V. Conclusions and Recommendations

The release of ETPH and metals to the shallow soil is potentially associated with fill material present throughout the site. We recommend additional investigation, including the sampling of deeper soil, to determine whether the detected constituents of concern are the result of a release or are associated with fill.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 18 – BUILDING 8
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Building 8 is located north of Brooklyn Street and has three floors. A waste oil storage tank and filtration system are located in the western portion of the building and a 27,000 gallon process water holding tank is located in the eastern portion of Building 8. Several 55-gallon drums containing waste oil are stored on containment pallets. Equipment that may have been used in former mixing or wastewater treatment operations is also located in the basement.

### Historical Information/Processes

Building 8 was used as a dye house until approximately 1927. Currently, quality control testing is conducted on the second floor of this building. Tetrachloroethylene (PCE) is used to dry clean and test the fabrics at a rate of one to three gallons per month. Used PCE solvent is stored here and shipped off-site as hazardous waste. Filtration of water to be used in manufacturing processes is also conducted in this area. Floor drains in this building discharge to the sanitary sewer.

Water is withdrawn from the Hockanum River for use in manufacturing operations. The water is processed through a filtration system in the western portion of the Building 8 basement and pumped to a 27,000-gallon holding tank in the eastern portion. Process wastewater is discharged to the sanitary sewer. A floor drain system in the basement also discharges to the sanitary sewer. Non-contact cooling water that is withdrawn from the raceway is discharged back to the river.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

Releases to the subsurface of waste oil or wastewater stored in Building 8 may have occurred as a result of leaks in the storage tanks or associated drainage system. Used PCE stored in containers in this area may have leaked to the concrete floor and migrated into the floor drain system, impacting the shallow soil or groundwater.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

To determine whether former dyeing operations or current stored chemicals have negatively impacted the sub-slab soil at this AOC, Fuss & O'Neill drilled two soil borings in the basement of Building 8. One boring (SB-105) was placed adjacent to the process water holding tank and another (SB-106) was placed adjacent to a floor drain. Both borings were advanced to a depth of five feet below the ground surface (bgs). Fill material, including brick, was observed in both borings to a depth of approximately three feet bgs. Trace amount of ash was present in the fill at SB-106. Native soil encountered at AOC 18 consisted primarily of fine to coarse grained sand and trace gravel and silt.

One sub-slab sample was collected from each soil boring drilled in Building 8. Samples were analyzed for VOCs, ETPH and RCRA 8 metals plus copper, nickel and zinc. The sample collected at SB-106 was analyzed for additional parameters- SVOCs (including PAHs), ammonia, methanol, glycols and formaldehyde- that were constituents of concern. Based on the analytical results for SVOCs, the sample was selected for additional analysis of PAHs via synthetic precipitation leaching procedure (SPLP).

*Soil Analytical Results*

Concentrations of metals above site background, including zinc at both boring locations and arsenic and copper at SB-105, were present in samples collected from AOC 18. PCE was detected at SB-105 at a concentration of 41 ug/kg. PAHs were present in the sample (SB-106) in which they were analyzed and the PAH phenanthrene was present at a concentration of 1.1 ug/l when analyzed after extraction by SPLP, indicating that metal mobility is a potential concern. ETPH and ammonia were also detected at AOC 18.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

Based on the following lines of evidence, a release of PAHs, ETPH, ammonia, arsenic, copper, zinc and PCE has been identified in the soil at this AOC.

- Soil collected adjacent to the process wastewater storage tank contained PCE at a concentration of 41 ug/kg and several metals, including arsenic, copper and zinc above the site's inferred background range for each constituent.

- Soil collected adjacent to the discharge drain showed concentrations of PAHs, ETPH and zinc above what would be associated with the presence of fill material in soil. Ammonia is not typically present in soil at the site; however it was detected at a concentration of 74 mg/kg at this AOC.

## V. Conclusions and Recommendations

A release of PCE, PAHs, ETPH, ammonia, arsenic, copper and zinc was identified at AOC 18. Additional sampling is recommended to determine whether the concentration found of PCE in soil represents the maximum concentration present in the soil at AOC 18 and to determine the vertical extent of contamination. Further investigation of the soil is required to fully characterize the release of ETPH, PAHs and metals.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 19 – BUILDING 11, FORMER DYEING/CURRENT CHEMICAL STORAGE

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Currently, Building 11 is a chemical storage area. One loading dock is located along the northern edge of the building on paved asphalt. During site inspection, several 55-gallon drums were present on palettes. One loading bay is located along the northern edge of the building. An elevator shaft is present on the west wall.

### Historical Information/Processes

This area is used for the storage of equipment, drums of oil, and chemicals. The building was previously used for dye operations prior to 1927 (GeoDesign, 2004). A floor trench system currently conveys groundwater infiltration but in the past may have conveyed liquid seepage from former operations. The central collection point of the trench system is not known, but is suspected to have discharged to American Mill Pond. Dyeing operations have subsequently moved to Building 14.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

Releases to the subsurface of chemicals associated with former dye operations or chemicals currently stored in this area may have occurred as a result of spills or punctured containers. Fluids spilled on the floor may have seeped into the floor trenches, impacting the groundwater.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

The Building 11 storage area was identified as an area of concern (AOC) during a Phase I ESA completed by GeoDesign, Inc. One soil boring was drilled in the central portion of Building 11 and a monitoring well was installed at this location (AM-7). Soil and groundwater samples were collected from AM-7. Sampling results from the Phase II investigation indicate ETPH in the soil at a concentration of 83 mg/kg at a depth of 3-5 feet below grade. Arsenic and copper are present in the groundwater at elevated concentrations above site background

**Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

The previously installed monitoring well AM-7 was sampled again in 2006. The second round of groundwater sampling confirms the presence of both copper and zinc at elevated concentrations at AOC 19.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During June 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to further characterize the degree and extent of released contaminants to the sub-slab soil surrounding this AOC. It was also unknown whether samples previously collected from the well at this AOC are representative of actual groundwater conditions. High turbidity was reported during each sampling event and subsequently, the samples were field filtered before being submitted to the laboratory. Three soil borings (SB-108, SB-109 and SB-110) were drilled to a depth of five feet below the ground surface (bgs) throughout the basement of Building 11. Fill material consisting of brick and unidentifiable debris fragments was observed to a depth of three feet bgs at boring location SB-109. Soil at AOC 19 consists primarily of fine to medium grained sand with some silt and little crushed, weathered rock (rock flour). No staining or evidence of contamination was observed during drilling.

One sample was collected from the sub-slab soil at each boring location and analyzed for VOCs, ETPH and RCRA 8 metals plus copper, nickel and zinc. One sample was selected for analysis of additional parameters, including SVOCs (including PAHs), ammonia, glycols, methanol and formaldehyde.

One groundwater sample was collected from AM-7 on July 13, 2009. According to water level measurements, there was less than one foot of groundwater in the monitoring well at the time of sampling. Insufficient recharge prevented the sample from being collected via low-flow techniques and a grab sample was collected instead. Since high turbidity may have affected the metals analysis during previous sampling events, the sample was field filtered with a 10 micron filter. The sample was analyzed for VOCs, SVOCs, total and dissolved metals, ammonia, formaldehyde, aniline and phenols.

*Soil Analytical Results*

The VOCs cis-1,2-dichloroethene, tetrachloroethene (PCE) and trichloroethene (TCE) were detected in the shallow soil at SB-109. The concentrations of PCE (36000 ug/kg) and TCE (2000 ug/kg) are elevated. PCE was also detected at a lesser concentration (15 ug/kg) in the sample collected from SB-110. No other VOCs were detected. ETPH was present in soil at SB-108 and SB-109 at a concentration of 230 mg/kg and 4700 mg/kg, respectively. Metal concentrations at SB-108 and SB-110 were consistent with the inferred background range for the site; however at SB-109, metal concentrations were elevated. Lead was reported at a concentration of 6030 mg/kg. This sample was analyzed for barium, copper and lead via synthetic precipitation leaching procedure (SPLP); the sample exhibited a detection of the three metals. No SVOCs were detected at SB-109. The laboratory reporting limit was slightly elevated (1900 ug/kg for PAHs) due to matrix interference.

*Groundwater Analytical Results*

Metals, including silver, arsenic, barium, cadmium, chromium, copper, nickel, lead and zinc, SVOCs and ammonia were present in the groundwater sample collected at AOC 19. Several metal detections, including arsenic, cadmium, chromium, copper, lead and zinc, exceeded their applicable SWPC. Several SVOCs also exceeded their applicable SWPC. A criterion for ammonia in groundwater has not been established.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

Elevated concentrations of PCE, TCE and lead were detected in soil collected from a depth less than two feet below the surface at SB-109. These data were compared to thirty times the RSR residential direct exposure criteria (Res DEC) to determine if a Significant Environmental

Hazard Notification would be required under C.G.S. Section 22a-6(u). The concentrations did not exceed thirty times the Res DEC.

## IV. AOC Findings

Based on the following lines of evidence, a release of PAHs, ETPH, ammonia and metals has been identified in the soil and shallow groundwater at this AOC.

- Soil samples collected at boring location SB-109 contain the VOCs cis-1,2-dichloroethene, tetrachloroethene (PCE) and trichloroethene (TCE) at elevated concentrations. This sample also contains ETPH at a concentration of 4700 mg/kg.
- Metals were detected at SB-109 well above their inferred background range for the site.
- Soil at SB-108 exhibited slightly elevated concentrations of ETPH and copper.
- VOC and metal concentrations decrease to the north and south as exhibited by analytical results from SB-108 and SB-110.
- Metals detections in groundwater samples collected from this AOC correspond with metal detections in soil. Several SVOC detections in groundwater (mainly PAHs) exceeded their applicable SWPC criteria.

## V. Conclusions and Recommendations

A release of VOCs, including PCE and TCE, ETPH, ammonia and metals, including arsenic, barium, cadmium, chromium, copper, mercury, lead and zinc was identified at AOC 19. The soil sample collected at SB-109 represents shallow sub-slab soil; PCE and TCE typically increase in concentration with depth. This sample may not represent the maximum extent of soil contamination at this AOC. PCE and metal concentrations appear to decrease to the north and south; however these borings are located approximately 30 feet apart. Further investigation is recommended to determine the lateral and vertical extent of contamination and to delineate the PCE and TCE plume in soil.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 20 – BUILDING 11, LOADING DOCK

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Currently, Building 11 is used as a chemical storage area. One loading dock is located along the northern edge of the building on paved asphalt.

### Historical Information/Processes

Building 11 is used for the storage of equipment, drums of oil, and chemicals. The building was previously used for dye operations prior to 1927 (GeoDesign, 2004). Dyeing operations subsequently moved to Building 14.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

There is a potential that chemicals and solvents associated with dye operations were spilled during truck loading or unloading. The transportation of leaking containers containing miscellaneous dye and coating chemicals stored in Building 11 may have also resulted in the release of hazardous material to the subsurface. Spilled material may have migrated to the subsurface through cracks in the asphalt and impacted the shallow soil beneath.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

The Building 11 loading dock was identified as an area of concern (AOC) during a Phase I ESA completed by GeoDesign, Inc. PCE was detected at a trace concentration in the shallow soil sample collected at this AOC. Several metals were detected in both the shallow (0.5-4 ft.) and deep (10-13.5 ft.) samples, and several SVOCs were detected in the shallow sample. One groundwater monitoring well was installed (AM-5) and sampled. Analytical results from this groundwater sample indicated tetrachloroethene (PCE) and trichloroethene (TCE) contamination.

**Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

One overburden monitoring well (ME-6) was installed in the Building 11 loading dock and a groundwater sample was collected. Analytical results indicate the presence of TCE, PCE and several other VOCs in the groundwater downgradient of Building 11.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During July 2009, Fuss & O'Neill performed a Supplemental Phase II/Limited Phase III at this AOC. The investigation was completed to further characterize the SVOC and metal impacted soil and to delineate the horizontal and vertical degree and extent of the PCE and TCE groundwater contamination. One soil boring (SB-119) was drilled near existing monitoring well ME-6. One soil sample was collected from the 0.5-4 foot depth interval and analyzed for VOCs, ETPH and RCRA 8 metals plus copper, nickel and zinc. Soil at this location consists primarily of fine to medium grained sand with some silt and trace gravel. No evidence of contamination or fill material was observed during drilling.

Existing monitoring well ME-6 was sampled on July 13, 2009 using low-flow techniques. Monitoring well AM-5 could not be located and therefore, was not sampled. Since high turbidity may have affected the metals analysis during previous sampling events, the groundwater sample was field filtered with a 10 micron filter. The sample was analyzed for VOCs, SVOCs, total and dissolved metals, ammonia, formaldehyde, aniline and phenols.

*Soil Analytical Results*

ETPH was detected at 46 mg/kg and several metals were detected above their inferred background range for the site. PCE was present in the soil sample at a concentration of 7.2 ug/kg, which is a lower concentration than those detected in the samples collected from AOC 19.

*Groundwater Analytical Results*

Metals, corresponding with those detected in soil, were present in the groundwater sample collected from AOC 20. Ammonia was detected. VOCs, including 1,2,4-trichlorobenzene, cis-1,2-dichloroethene, PCE, trans-1,2-dichloroethene, TCE and vinyl chloride were detected at elevated concentrations.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. At this point in the investigation process, release areas have not been fully characterized, and it is not appropriate to make a compliance determination based on this initial data; however, RSR criteria can be used to gage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality when the site has been fully characterized is the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

## IV. AOC Findings

Based on the following lines of evidence, a release of PCE to the soil and groundwater and a release of VOCs to the groundwater have been identified at AOC 20. The source for some of the constituents on groundwater at this AOC may be attributed to the release of VOCs that occurred at the upgradient AOC 19. Detected concentrations of ETPH and metals are likely associated with fill material present throughout the site.

- Soil analytical results indicate the presence of PCE at a concentration of 7.2 ug/kg, which is a lower concentration than those detected in samples collected below the concrete floor in Building 11 (AOC 19).
- The groundwater sample collected at this AOC reveals the presence of PCE and TCE at elevated concentrations.
- Additional investigation of the soil and groundwater completed at AOC 19 reveals the source of PCE and TCE in shallow soil surrounding SB-109; however groundwater samples collected at Building 11 do not exhibit detectable concentrations of these constituents.
- Results from previous investigations completed by GeoDesign and Metcalf & Eddy identify the presence of metals and SVOCs in shallow soil. Soil samples collected as part of this Phase II/Limited Phase III investigation confirm the presence of metals and ETPH in soil. These concentrations are consistent with a site-wide fill evaluation.

- Although fill material was not observed during this investigation, the boring log for ME-6 indicates the presence of fill at AOC 20.

## V. Conclusions and Recommendations

A release to the soil of PCE and TCE has been identified at AOC 20. Groundwater below AOC 20 also contains PCE and TCE, however the source may be the release at the upgradient AOC 19 and not a result of activities occurring at the loading dock. Further investigation is recommended to determine the degree and extent of the AOC 19 release and to determine the source of the groundwater contamination.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 21 – FORMER OFF-SITE GASOLINE STATION

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

A gas station formerly operated southeast of the site across Grove Street.

### Historical Information/Processes

The dates of operation of the gas station are unknown. Common compounds associated with gasoline are BTEX volatile organic compounds and total petroleum hydrocarbons.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Extractable Total Petroleum Hydrocarbons (ETPH )

### Potential Release Mechanisms

A release to the subsurface of petroleum related products may have occurred as a result of a leaking underground storage tank, overfills or leaks in the associated piping. Since the gas station is upgradient from the site, a release has the potential to migrate and affect the groundwater at the site.

### Applicable Regulatory Criteria

The site will be evaluated with respect to Connecticut's Remediation Standard Regulations (RSRs). The site is located in a GB groundwater classification area. CTDEP has indicated that property owners are not responsible for remediation of off-site upgradient releases migrating onto their property. However, site owners may need to take action if off-site releases migrating onto their property result in potential vapor intrusion into on-site structures.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized below.

**Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

On-site wells were sampled in 2006 and analyzed for BTEX, PAHs and ETPH. It was assumed that if there had been a release of petroleum to the groundwater at the gas station, these constituents would be present in the groundwater at the Amerbelle site. No BTEX compounds or PAHs were detected in groundwater. ETPH was detected; however the sample with the highest concentration came from a well on the western side of the site.

**Limited Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

During an on-site soil and groundwater investigation in 2009, Fuss & O'Neill installed one upgradient monitoring well (MW-03) in the southeastern portion of the property along Grove Street. This monitoring well is downgradient of the former off-site gas station. The monitoring well screens the shallow bedrock at 27.5 to 37.5 feet below the ground surface. A groundwater sample was collected to determine if a release from the gas station was migrating onto the site. No VOCs or SVOCs were detected in the sample collected from MW-03. The only detected constituents were ammonia, which was present in groundwater throughout the site, and low concentrations of the metals silver, barium, copper, nickel and zinc. Based on the results of the sample collected at MW-03, there is no evidence of an off-site release from the gas station migrating onto the site.

## III. Regulatory Compliance Analysis

Groundwater samples that were collected to determine whether potential VOC and ETPH contamination from an off-site source had impacted groundwater at the site did not contain constituents of concern at concentrations exceeding the applicable RSR criteria.

## IV. AOC Findings

The following lines of evidence support the conclusion that a release has not occurred at this AOC.

- It was unknown whether a release of petroleum to the groundwater had occurred at the former off-site gas station.
- No BTEX compounds or PAHs were detected in groundwater. ETPH was detected; however the sample with the highest concentration came from a well on the western side of the site.

## V. Conclusions and Recommendations

No releases have been identified as a result of the former gas station. The source of ETPH in groundwater at the western portion of the site is not likely the off-site gas station. No additional investigation is recommended.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 22 – FILL
Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

Boring logs completed in 2004 identify the presence of fill throughout the site up to a depth of 13 feet below grade. Logged fill material at the site consists of asphalt, coal, ash and brick.

### Historical Information/Processes

Since the site overlies the Hockanum River raceway and slopes steeply to the north and northeast, construction of the Amerbelle facility may have required re-grading of the ground surface. Asphalt is a petroleum by-product and is often present in urban fill.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Ammonia
- Formaldehyde
- Glycols
- Methanol
- Metals

### Potential Release Mechanisms

Often, PAH and ETPH detections are the result of asphalt or coal fragments present in soil. Building debris fragments that are painted or contain polluted materials and small metal scraps buried in fill material have the potential to impact the surrounding soil.

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 1 Summary of Constituents Detected in Soil
- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***
**and Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

Thirteen soil borings were drilled; several boring logs indicate the presence of fill material in soil, including asphalt, coal, ash and brick. Analytical results showing arsenic above direct exposure criteria suggests that coal ash was used as fill over a portion of the site.

**Supplemental Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

To characterize site-wide fill material and establish a site specific background range for PAHs, ETPH and metals, three borings were drilled upgradient of site AOCs. Two of the borings (SB-120 and SB-121) were located in the southern parking lot and one of the borings (SB-119) was placed west of Building 17 in a paved parking area. Fill material consisting of unidentifiable stained debris and asphalt was observed in soil from SB-119 and SB-120; however no fill was observed in SB-121 and a sample was collected from the shallow 0.5-2 foot interval to represent upgradient background conditions. Fill was observed at several other locations throughout the site and was present up to a depth of five feet below the ground surface (bgs) at AOC 16 and to a depth of three feet bgs in Buildings 8, 9 and 11. Samples collected from these areas may also be reviewed to form a background fill quality assessment.

*Soil Analytical Results*

At boring location SB-121, metals, including barium, chromium, copper, nickel, lead and zinc were detected. No PAHs or ETPH was detected at this location, which was determined to be representative of background conditions. Lab results from the samples collected at SB-115 and SB-120, which contained small amounts of fill material, showed slightly elevated levels of the same metals detected in the background sample plus arsenic and selenium. Based on analytical results from samples collected at other AOCs, mercury is also identified as a metal present in soil containing fill material. The approximate ranges of detected metals in soil associated with fill quality are provided in the table below.

| Metal | Concentration Range (mg/kg) |
|---|---|
| Arsenic | ND – 5.9 |
| Barium | 14 – 78.8 |
| Cadmium | ND |
| Chromium | 5.42 – 36.6 |
| Copper | 4.38 – 19 |
| Mercury | ND – 0.21 |
| Nickel | 8.12 – 42 |
| Lead | 2.52 – 65.5 |
| Selenium | ND – 26 |
| Zinc | 15.1 - 116 |

ETPH was present in soil up to a concentration of 600 mg/kg in samples that had been impacted by fill material. These concentrations are not believed to be the result of a release from site operations, but from asphalt or coal fragments mixed in with the sample material. PAHs were also detected in samples where a release is not believed to have occurred and fill material was present in the soil.

## III. Regulatory Compliance Analysis

The Connecticut Remediation Standard Regulations (CT RSRs) require that the nature and extent of release areas be fully characterized prior to making a final determination compliance with the RSRs. RSR criteria can be used to guage the relative magnitude of identified releases and assist in the early identification of potential risks to human health and the environment. For these reasons, baseline RSR criteria are presented alongside the analytical data as a preliminary evaluative tool. The site is located within a GB groundwater classification area. Regulatory criteria that will be used to assess soil quality are the CT RSR Residential Direct Exposure Criteria (Res DEC) and GB-area Pollutant Mobility Criteria (GB PMC).

ETPH concentrations in soil associated with fill material exceeding the Res DEC of 500 mg/kg are summarized in the table below.

| Location | Depth (feet) | ETPH Concentration (mg/kg) |
|---|---|---|
| AOC 13 SB-103 | 0.5-2 | 600 |
| AOC 17 SB-107 | 0.5-2 | 680 |

Since asphalt contains petroleum hydrocarbons, PAH detections above their respective criteria may be attributed to fill and are not always indicative of a release of petroleum products associated with the AOC. The following table summarizes locations where PAH concentrations associated with fill material exceed their respective RSR criteria.

| Location | | Depth (feet) | Constituent and RSR Criteria Exceeded |
|---|---|---|---|
| AOC 12 | SB-104 | 7-9 | BBF- GB PMC, Res DEC |
| AOC 13 | SB-103 | 0.5-2 | CHY – GB PMC |
| AOC 16 | SB-117 | 0.5-2 | BAA, BAP, BBF, BKF, CHY, IDP – GB PMC, Res DEC, I/C DEC |
| | SB-118 | 0.5-2 | |
| AOC 18 | SB-106 | 0.5-2 | BAA, BAP, BBF, BKF, CHY, IDP - GB PMC, Res DEC, I/C DEC |

Samples collected from SB-115, SB-120 and SB-121 did not exhibit exceedances of the RSRs for metals, PAHs or ETPH.

## IV. AOC Findings

The purpose of performing an investigation at this AOC was to assess the site-wide fill quality. This will assist in the determination whether constituents of concern detected at other AOCs are associated with fill material or are the result of a release.

- Borings logs completed during previous investigations report the presence of fill up to a depth of 13 feet bgs.
- Fill material was present at ten (10) boring locations during the Phase II/Limited Phase III investigation.
- Fill material consists of asphalt and brick fragments, ash, coal and unidentified debris.
- Fill thickness at the site varies; however, according to boring logs, increases towards the east. Borings drilled in the Building 2 loading dock and southern parking lot indicate fill to a depth of two feet bgs. Borings drilled at AOC 17, 18 and 19 indicate fill to a depth of three feet bgs. The maximum fill thickness (5 feet) observed during this investigation was at AOC 16.
- Metals associated with fill at the site include arsenic, barium, chromium, copper, mercury, nickel, lead, selenium and zinc.
- ETPH and PAHs were detected in soil containing fill material at concentrations above the inferred background range for the site.

## V. Conclusions and Recommendations

Fill identified in ten borings across the site has been impacted by metals, PAHs and ETPH. At AOCs 12, 13, 16, 17 and 18, ETPH and/or PAH concentrations associated with fill exceeded one or more of the applicable RSR criteria. Additional sampling at these areas is recommended to determine the degree and extent of impacted soil. Further investigation will help delineate areas of the site that may require remediation. If, in the future, any soil excavation is anticipated, a soil management plan should be development to limit exposure to potentially hazardous contaminants.

FUSS & O'NEILL

# AOC-Specific Conceptual Model
# AOC 23 – SITE GROUNDWATER

Amerbelle Corporation
Vernon, Connecticut

## I. Background Information

### Physical Description

The site is bounded on the east by the Paper Mill Pond. A raceway connects the pond with the Hockanum River, located south of the site across Grove Street. The Amerbelle facility is built around a raceway. Water flows from a small dam in the River through a raceway running from the southeastern corner of the site to the north into the Paper Mill Pond. Groundwater migration at the site is controlled primarily by drainage to the raceway and Paper Mill Pond and the bedrock surface. The site is located within a GB-groundwater classification area.

### Historical Information/Processes

Water from the Hockanum River, brought to the Paper Mill Pond via the raceway, was historically used to power the textile mills.

During work conducted by the Town of Vernon on the sewer line in Brooklyn Street, dye-colored water was observed infiltrating the excavation near the dye mixing room. A bridge contractor also reportedly observed dye-colored water near the southeast corner of Building 14, near process water overflows (GeoDesign, 2004). Treated wastewater from this building is released to the Town sewer system.

### Constituents of Concern

- Volatile Organic Compounds (VOCs )
- Semi-volatile Organic Compounds (SVOCs)
- Extractable Total Petroleum Hydrocarbons (ETPH )
- Metals
- Ammonia
- Formaldehyde
- Aniline
- Phenols

### Potential Release Mechanisms

Building 14, the dye house, contains numerous wastewater collection sumps and a floor drain trench network to collect process fluids from machinery. A release to the subsurface of dye

material and process fluids may have migrated to the shallow soil and/or groundwater through cracks in the concrete walls of the collection sumps or drains.

There is a potential for a release to have occurred as a result of spills or leaking containers, stored in any of the buildings located north of Brooklyn Street. Cracks in the building floor or loading dock pavement may provide a preferential pathway for contaminants to impact the subsurface.

A release of PCE to groundwater at the site may have occurred as a result of contaminant migration from the off-site PCE DNAPL site the Roosevelt Mills.

### Applicable Regulatory Criteria

The site will be evaluated with respect to Connecticut's Remediation Standard Regulations (RSRs). The site is located in a GB groundwater classification area. Based on this information, the following RSR criteria apply to this AOC:

#### *Soil Criteria*

- Residential direct exposure criteria (Res DEC)
- Industrial/commercial direct exposure criteria (I/C DEC)
- GB pollutant mobility criteria (GB PMC)

#### *Groundwater Criteria*

- Surface water protection criteria (SWPC)
- Residential volatilization criteria (Res VC)
- Industrial/commercial volatilization criteria (I/C VC)

## II. Investigations

Investigations contributing to the development of the conceptual model for this AOC are presented below. Sampling locations are shown on Figure 2. Analytical data is summarized in the following tables:

- Table 2 Summary of Constituents Detected in Groundwater

**Phase I and II Environmental Site Assessments**
***GeoDesign, Inc., February and March 2004***

GeoDesign, Inc. installed five groundwater monitoring wells during a Phase II investigation. Groundwater samples were collected and analyzed for VOCs, SVOCs, ETPH, formaldehyde, aniline and dissolved metals. Trace VOC concentrations were detected in several of the groundwater samples; however none exceeded the applicable CT RSR criteria. ETPH was detected at concentrations up to 1,100 ug/L. The detected concentrations of arsenic (11 ug/L) and copper (82 ug/L) in the groundwater sample from the monitoring well installed in Building 11 exceeded the SWPC for each constituent, 4 ug/L and 48 ug/L respectively. The sample collected from the well (W-1) in Brooklyn Street showed zinc at a concentration of 171 ug/L,

which is above the SWPC of 123 ug/L. There were no other SWPC exceedances in any of the other monitoring wells sampled.

**Targeted Brownfields Assessment Report**
***Metcalf & Eddy, 2006***

Four monitoring wells were installed throughout the site- three in bedrock (ME-1, 2 and 6) and one in the overburden (ME-5). In 2006, groundwater samples were collected from all four of the wells (ME-1, 2, 5, 6) as well as from an existing monitoring well (AM-7). Analytical results indicate the presence of TCE, PCE and several other VOCs in the groundwater downgradient of Building 11. The source of TCE and PCE contamination was unknown; however PCE and TCE are currently used in several site operations. PCE and TCE have also been identified as constituents of concern in groundwater as a result of an off-site release at the upgradient Roosevelt Mills facility located 0.5 miles east of the site. ETPH was detected at concentrations below the CT RSR criteria. Metals were found in exceedance of the SWPC at monitoring wells ME-2 (chromium, lead and copper) and AM-7 (copper and zinc). The groundwater sample collected at ME-2 was reported to have a blue-green tint. ME-2 is located on Brooklyn Street in the area where dye-colored water was encountered during sewer installation.

**Supplemental Phase II/Limited Phase III Investigation**
***Fuss & O'Neill, Inc., June and July 2009***

To further characterize the groundwater beneath the site, three bedrock monitoring wells were installed using a direct-push Geoprobe drill rig. Aquifer Drilling and Testing (ADT) of Bloomfield, Connecticut was contracted to drill and install the wells. Two of the wells (MW-01 and MW-03) are located downgradient of facility operations (one northwest of the boiler room and one southeast of Building 14). One (MW-02) well was installed west of Building 2. Bedrock was encountered between 14 and 24 feet bgs. The wells were screened to intersect groundwater migrating through the bedrock to the raceway, the Hockanum River, and American Mills Pond. A summary of monitoring well completion details is provided below.

| Well ID | Installation Date | Consultant | Geologic Unit Screened | Screened Interval (feet below grade) |
|---|---|---|---|---|
| AM-1 | 1/22/2004 | GeoDesign | Overburden at top of bedrock | 7 - 12 |
| AM-3 | 1/22/2004 | GeoDesign | Overburden at top of bedrock | 9.5 - 14.5 |
| AM-4 | 1/22/2004 | GeoDesign | Overburden at top of bedrock | 9 - 19 |
| AM-5 | 1/22/2004 | GeoDesign | Overburden at top of bedrock | 7.5 - 12.5 |
| AM-7 | 1/23/2004 | GeoDesign | Overburden at top of bedrock | 4.5 - 9.5 |
| ME-1 | 11/29/2005 | Metcalf & Eddy | Shallow Bedrock | 4.9 - 14.9 |
| ME-2 | 11/28/2005 | Metcalf & Eddy | Shallow Bedrock | 8 - 18 |
| ME-5 | 11/28/2005 | Metcalf & Eddy | Overburden at top of bedrock | 4.8 - 12.8 |
| ME-6 | 11/30/2005 | Metcalf & Eddy | Shallow Bedrock | 15.5 - 25.5 |
| W-1 | Unknown | Town of Vernon | Unknown | Unknown |
| MW-01 | 6/26/2009 | Fuss & O'Neill | Deep bedrock | 40 – 50 |
| MW-02 | 6/29/2009 | Fuss & O'Neill | Shallow Bedrock | 23 – 33 |
| MW-03 | 6/29/2009 | Fuss & O'Neill | Shallow Bedrock | 27.5 – 37.5 |

The three newly installed monitoring wells were developed to ensure proper hydraulic connection with the aquifer. Excess sediment that had accumulated within the well screen during installation was purged.

One monitoring well (MW-03) was installed upgradient of the two buildings and facility operations. The well is located in the southeastern corner of the property along Grove Street and is adjacent to the raceway. Detected constituents in groundwater samples collected at this location can be used to determine site background concentrations for constituents of concern.

An attempt was made to locate existing monitoring wells from previous investigations. Five existing monitoring wells (AM-1, AM-7, ME-1, ME-2 and MW-6) were located and sampled along with the three new wells (MW-01, MW-02 and MW-03). AM-5 was located, however there was not enough water in the well to sample. According to observations made during sampling, the PVC well cap was missing from AM-7 and there was no protective casing. The steel curb box casing around ME-6 had broken off.

Eight wells in total were sampled on July 13, 2009. Due to poor recharge, MW-02, AM-1 and AM-7 could not be sampled using low-flow techniques; a grab sample was collected from available groundwater in the well. The rest of the wells were sampled by low-flow method. Groundwater at ME-2 was reported to have a blue tint. Groundwater samples were analyzed for VOCs, SVOCs, including polynuclear aromatic hydrocarbons (PAHs), RCRA 8 metals plus copper, nickel and zinc, ammonia, formaldehyde, aniline and phenols. Elevated metal concentrations in a sample can be the result of high turbidity (>10 NTU). If a sample did not exhibit a turbidity of less than 10 NTU, an extra metals bottle was collected and field filtered using a 10 micron disposable filter. These samples were analyzed for both total and dissolved metals. The measured turbidity in wells ME-2, MW-01 and MW-03 was less than 10 NTU, therefore samples from these wells were not field filtered and were analyzed only for total metals.

*Groundwater Analytical Results*

Groundwater at the site contains metals, including arsenic, barium, cadmium, chromium, copper, nickel, lead, silver and zinc. Background metal concentrations in groundwater were determined based on the sample collected from upgradient monitoring well MW-03. A summary of the metals detected at this location and the background concentration is provided in the table below.

| Metal (mg/L) | Inferred Site Background Concentrations Detected at MW-03 |
|---|---|
| Barium | 0.457 |
| Copper | 0.005 |
| Nickel | 0.004 |
| Silver | 0.001 |
| Zinc | 0.056 |

Detected concentrations of metals throughout the site were generally within the same order of magnitude for each constituent, based on comparison with data collected at MW-03. Exceptions to this are summarized below:

- At monitoring well AM-7, all metals that were analyzed exceeded background.
- Concentrations of arsenic, chromium, copper, nickel and lead exceeded background at ME-2. Concentrations of the same metals, except for arsenic, only slightly exceeded background at MW-02, which is located downgradient of ME-2.
- At ME-6, detected chromium and copper concentrations exceeded background.
- Only the concentration of chromium exceeded the background concentration at AM-1.

The VOCs 1,2,4-trichlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene and vinyl chloride were detected at one location (ME-6). VOCs were not detected any other groundwater samples collected during this investigation. SVOCs were detected in samples collected from AM-1, AM-7, ME-2 and MW-02. Ammonia, formaldehyde, aniline and phenols were detected at ME-2, located directly downgradient of the dye house where blue tinted water was observed.

Ammonia was detected in groundwater at all eight sampled locations. The highest concentration detected was in the sample collected at monitoring well ME-2. Upgradient groundwater (as inferred from the sample collected at MW-03) contains ammonia at a concentration of up to 0.04 mg/L.

## III. Regulatory Compliance Analysis

A release of VOCs, SVOCs and metals has been identified at AOC 23. The release has not been fully characterized but the data has been compared on a preliminary basis to the RSRs to benchmark the environmental quality.

### Groundwater Compliance Evaluation

#### *Surface Water Protection Criteria*

Compliance with the RSR SWPC is based on the average concentration of a contaminant in a groundwater plume or the concentration of a contaminant in that portion of a plume which is immediately upgradient of a point at which groundwater discharged to a surface water body. The groundwater contaminant plumes at the site have not been fully defined and comparisons to the SWPC have been made based on single well concentrations as described below.
At monitoring well AM-7, located in the chemical storage area of Building 11, the following metals exceed their respective SWPC: copper, lead and zinc. The metal concentrations are based on the results of dissolved metals analysis and the sample was filtered in the field to remove sediment that may bias the result. The following PAHs exceed their respective SWPC:

benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and phenanthrene.

At monitoring well ME-2, located in Brooklyn Street downgradient of the Building 14 dye house, the following metals exceed their respective SWPC: arsenic, chromium, copper and lead. There were no SVOC exceedances; however the laboratory reporting limit for this sample was elevated due to a required dilution. This sample was reported to contain a blue tint.

The SWPC for tetrachloroethene (PCE) was exceeded in the sample collected from ME-6.

### *Volatilization Criteria*

The RSR Volatilization Criteria protect human health from volatile substances in shallow groundwater that may migrate from groundwater into overlying buildings. The Res VC for vinyl chloride and both the Res VC and I/C VC for trichloroethene (TCE) was exceeded at ME-6. There were no other exceedances of the applicable VC.

## IV. Conceptual Release Model and Fate and Transport

The following lines of evidence support the conclusion that groundwater beneath the site has been impacted by AOC-specific releases of VOCs, SVOCs and metals.

Releases of the following constituents of concern to soil have been identified at the following AOCs:

| AOC | Area | Release Constituent(s) | Release to Groundwater? |
|---|---|---|---|
| 10 | Building 2, Loading Dock | PAHs, cadmium, lead | Unknown |
| 12 | Building 3 | PAHs, ETPH, metals | Unknown |
| 13 | Solvent coaters | PAHs, ETPH, metals | Unknown |
| 14 | Fuel Oil Above-ground Storage Tanks | ETPH | Unknown |
| 15 | Transformers | PAHs, ETPH | Unknown |
| 16 | Building 7, Loading Dock | Ammonia, arsenic, ETPH | Yes |
| 17 | Building 9 | ETPH, metals | Unknown |
| 18 | Building 8 | PCE, PAHs, ETPH, ammonia, metals | Unknown |
| 19 | Building 11, Former Dyeing/Current Chemical Storage | VOCs, ETPH, ammonia, metals | Yes |
| 20 | Building 11, Loading dock | PCE, TCE | Yes |

The table above summarizes the potential soil release areas identified during the Limited Phase II/Limited Phase III Investigation.

A description of the current conceptual model for various areas of the site that have impacted groundwater is provided below. The summaries provide a description of the groundwater

impact, the rationale for the source of the groundwater impact and current assessment of the fate and transport of the groundwater impact.

*Building 1 and Building 2*

During the subsurface investigation for AOC 11, Building 1 and Building 2, a release to groundwater of the SVOC bis(2-ethylhexyl)phthalate and the metals arsenic, barium, cadmium, chromium, copper, nickel, lead, silver and zinc were identified, however the source of the release is not likely the result of AOC 11 operations. Blue tinted groundwater was encountered during a sewer line installation along Brooklyn Street and again when sampling well ME-2, located upgradient of Building 1 and Building 2. The presence of dye compounds such as aniline and formaldehyde at ME-2, as well as the presence of blue dye-tinted water, indicates that chemicals associated with Building 14 (AOC 4 and 5, which were not investigated during this mobilization) operations have impacted the groundwater. Dyeing operations occur in Building 14 and this is a potential source for the constituents of concern detected in groundwater at Building 1 and Building 2. Both monitoring wells at which these constituents were detected screens groundwater in the shallow bedrock. Additional information pertaining to the source area for the detected constituents and the degree and extent of the groundwater contamination plume will be obtained during the investigation of AOC 04 and AOC 05 (Building 14).

*Building 7*

Groundwater at AOC 16, the Building 7 loading dock, contained detectable concentrations of the PAHs benzo(a)anthracene, benzo(b)fluoranthene, and phenanthrene. These constituents were not detected in the groundwater sample collected from the upgradient monitoring well MW-03, therefore their presence in groundwater at AOC 16 is indicative of a release. No other constituents detected in soil at this AOC were detected in groundwater at concentrations above background, with the exception of ammonia. Gasoline or automobile fluid spilled from trucks during loading and unloading may have migrated to the subsurface through cracks in the asphalt pavement. Since the monitoring well located in the Building 7 loading dock, AM-1, screens the shallow overburden, it is likely that the release to groundwater is the result of surficial spills.

*Buildings 8, 9 and 11*

VOCs are the primary concern in groundwater at AOC 19 and 20. Chlorinated VOCs consisting of tetrachloroethene (PCE), trichloroethene (TCE) and vinyl chloride (VC) have impacted the shallow bedrock groundwater downgradient from Building 11. Soil at AOC 20 only contains trace constituents of PCE and TCE, indicating that although groundwater in this location has been impacted by these constituents, the Building 11 loading dock is not the primary source of contamination. PCE and TCE are present in soil at AOC 19, primarily in the area of SB-109, at higher concentrations. The greatest concentrations of PCE and TCE detected in groundwater were at monitoring well ME-6 (210 ug/l and 220 ug/l, respectively). Vinyl chloride was only detected in the sample collected from ME-6. Monitoring well AM-7 is located slightly upgradient to this boring location and does not exhibit any detectable concentration of PCE or TCE. Groundwater contamination at AOC 20 is likely from an on-site source, possibly AOC 19. Monitoring well MW-01 is located downgradient of AOC 19 and 20 and screens groundwater in deep bedrock (40 to 50 feet below the ground surface). The samples collected

from this well did not contain detectable concentrations of PCE or TCE, indicating that the plume does not extend vertically to this depth and in contained primarily in the shallow bedrock groundwater. The degree and the extent of the VOC plume in this area have not been fully delineated. Specifically, it is not known in the plume extends off-site to the north onto the Daniel Management, Inc. warehouse property.

Elevated concentrations of metals, PAHs and the SVOC bis(2-ethylhexyl)phthalate were also detected in overburden groundwater at AOC 19. A release of these constituents was identified from the results of shallow soil sampling at AOC 19 (SB-109 and SB-110). PAHs and SVOCs were not detected at the downgradient location ME-6, which is screened in the shallow bedrock and only the metals chromium and copper were detected at concentrations slightly above background.

## V. Conclusions and Recommendations

*Building 1 and Building 2*

A release of bis(2-ethylhexyl)phthalate detected in groundwater at Building 1 and Building 2 likely originated from Building 14. It was detected at a higher concentration (15 ug/l) in monitoring well ME-2, directly downgradient of the dye house, and at a lesser concentration (7.2 ug/l) in downgradient well MW-02. Compounds commonly found in dye, such as aniline, are present in groundwater beneath Brooklyn Street. We recommend the installation of one to two shallow bedrock monitoring wells downgradient of existing ME-2 to determine whether the release has migrated east down Brooklyn Street. The samples should also be analyzed for hexavalent chromium.

*Buildings 8, 9 and 11*

According to analytical results from two rounds of groundwater sampling (in 2006 and 2009), PCE and TCE contamination was only detected at AOC 20, the Building 11 loading dock. Soil samples collected from the eastern portion of the site indicate that the source of PCE and TCE release to soil is concentrations around the center of Building 11 (SB-109). Monitoring well AM-7 is located slightly upgradient to this boring location and does not exhibit any detectable concentration of PCE or TCE. ME-6, located downgradient of AOC 19 and 20 contained PCE, TCE and vinyl chloride at concentrations exceeding the residential volatilization criteria (Res VC). This well is located approximately twenty feet upgradient of an off-site building. A deep bedrock well should in installed next to ME-6 to assess the potential vertical contaminant migration to the deeper aquifer. The potential for vapor intrusion to occur into the building located downgradient of ME-6 should also be further evaluated. To further delineate the extent of the contamination plume in the shallow bedrock, at least one additional well should be installed adjacent to deep bedrock well MW-01. We also recommend performing an off-site well receptor survey to identify private supply wells that may be affected by the release.

FUSS & O'NEILL

# Appendix B

## Boring Logs and Monitoring Well Completion Reports

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# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** MW-01
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Sun, 80s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/26/09
DATE & TIME COMPLETED: 6/26/09 13:15
DEPTH TO SATURATED ZONE: Encountered at 43'
SAMPLE PREFIX: 993090626-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| | N/A | | | Vacuum soil out to 5' Fa case utilities are present | | | No samples collected at this location | | |
| 5 | | 12/60" | 5-10 / 10-12.5 | F-M sand, little f gravel, mod-compact, v. moist, mod. br (5 YR 3/4), no odor. | ND | SP | | | |
| 10' | | 26/48" | 12.5-14 (RM) | Same as above, some f-m gravel | ND | ~~SP~~ (RM) SW | | | |
| ~~12.5'~~ | | | 12.5-14' | F sand + silt, tr. clay, some crushed rock, moist, no odor, Dusky yell. br (10 YR 2/2) | ND | SM | | | |
| | | | | Bedrock @ 14'. MW-01 installed in boring. | | | | | |
| | | | | E.O.B @ 50'. | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 50' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Bedrock at 14. Install shallow bedrock well. E.O.B @ 50'
Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____
See Monitoring Well Completion Report

FUSS & O'NEILL
*Disciplines to Deliver*

# MONITORING WELL COMPLETION REPORT

## GENERAL INFORMATION

Project Name: Amerbelle
Site ID (Boring/Well ID): MW-01
Project Location: Vernon, CT
Project No.: 20080371.A20
F&O Engineer/Geologist: R.M. McQuiggan
Ground Surface Elevation:
Date of Completion: 6/26/09
Permit #:
Boring Location: Building #4 loading dock
E1 Top of Steel Casing:
Drilling Contractor/Name: ADT
E1 Top of PVC Casing:
Drilling Method: Direct push / Geoprobe
Measuring Point: TPS / PVC
Well Cover (see codes):

## WELL CONSTRUCTION

**WELL CASING/RISER**
Diameter: 2 in.
Type: PVC
Stick-up: 0 ft.

**SUMP** (~~below screen~~)
Diameter: RWM in.
Type:
Length: in.

**PROTECTIVE CASING**
Diameter: 8 in.
Type: Road Box / Stand Pipe
Stick-up: 0 ft
Depth to Bottom: 1 ft
Seal Material: Concrete

**SCREEN INTERVALS**
Screen Interval: 40-50 ft
Diameter: 2 in.
Slot Size: 0.01
Description: PVC / Other:
Type: Perforated / Slotted / Wire-Wrap / Other:

**BOREHOLE**
Diameter: 2.25 in.
Total Boring Depth: ~~45~~ 50 ft. RWM
Refusal: y / n Depth: ft.

## ANNULAR FILL

(Approximate volumes if available)

**SURFACE SEAL**
Interval: 0-0.5 ft. Tremied: Y / N Volume: 3.0 bags Description: Concrete / Other:

**BACKFILL**
Interval: 34-0.5 ft. Tremied: Y / N Volume: 0.5 bags Description: Bentonite Grout / Fill / Other: Sand #1

**LOWER SEAL**
Interval: 34-38 ft. Tremied: Y / N Volume: 1.0 bags Description: Bentonite Pellets / Other:

**FILTER**
Interval: 38-50 ft. Tremied: Y / N Volume: 1.5 bags (50 lb bags) Description: Sand Filter (type: #1) / Other:

**LOWER BACKFILL**
Interval: ft. Tremied: Y / N Volume: bags Description: Bentonite Grout / Fill / Other:
RWM

## MONITORING WELL DEVELOPMENT*

Development Method: Surge Block / Submersible Pump / Peristaltic Pump / Watera / Bailer / Other
Date:

*See Monitoring Well Development Data Sheet for details

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*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** MW-02
**SHEET:** 1 of 1
**PROJECT NO:** 20080371A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/29/09
DATE & TIME COMPLETED: 6/29/09 1200
DEPTH TO SATURATED ZONE: ~15
SAMPLE PREFIX: ~~9930906026~~ RM

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 32/60 | 0-0.2 | Asphalt | ND | AS | No samples collected | | |
| | | | 0.2-2.5' | F-M sand, little silt, tr. asphalt, moist, loose, mod. br. (5YR 3/4), no odor | ND | FI | | | |
| 2.5 | | 31/60 | 2.5-5' | Same as above, no asphalt | ND | SP | | | |
| 5 | | 31/60 | 5-10' | F-M sand + f-m gravel, tr. silt + clay, moist, loose, light br (5YR 5/6), no odor. | ND | SW | | | |
| 10' | | 42/60 | 10-15' | Same as above, tr. crushed rock | ND | SW | | | |
| 15' | | 39/48" | 15-17' | M-C sand + f gravel, v moist, loose, mod. br. (5YR 3/4) - no odor | ND | SW | | | |
| | | | 17-19' | F-M sand + f-m gravel, tr. silt + clay, moist, mod. compact, mod. br. (5YR 4/4), no odor | ND | SW | | | |
| | | | | Bedrock @ 19'. MW-02 installed in boring. E.O.B @ 33'. | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 33' |

**REMARKS**
Field Instrument = If refusal is encountered, describe all efforts used to confirm.
PID/OVM
Bedrock at 19'. Install shallow bedrock well. E.O.B. @ 33'.
Field Decon Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

FUSS & O'NEILL
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# MONITORING WELL COMPLETION REPORT

## GENERAL INFORMATION

Project Name: Amerbelle
Site ID (Boring/Well ID): MW-02
Project Location: Vernon, Connecticut
Project No.: 20080371 A20
F&O Engineer/Geologist: R. McQuiggan
Ground Surface Elevation:
Date of Completion: 6/29/09
Permit #:
Boring Location: See map.
E1 Top of Steel Casing:
Drilling Contractor/Name: ADT
E1 Top of PVC Casing:
Drilling Method: Direct-push / Geoprobe
Measuring Point: TPS / PVC
Well Cover (see codes):

## WELL CONSTRUCTION

**WELL CASING/RISER**
Diameter: 2 in.
Type: PVC
Stick-up: 0 ft.

**SUMP** (below screen)
Diameter: RWM in.
Type:
Length: in.

**PROTECTIVE CASING**
Diameter: 8 in.
Type: Road Box / Stand Pipe
Stick-up: 0 ft
Depth to Bottom: __ft
Seal Material: concrete

**SCREEN INTERVALS**
Screen Interval: 23-33 ft
Diameter: 2 in.
Slot Size: 0.01"
Description: PVC / Other:
Type: Perforated / Slotted / Wire-Wrap / Other:

**BOREHOLE**
Diameter: 2.25 in.
Total Boring Depth: 33 ft.
Refusal: y / n Depth: ft.

## ANNULAR FILL

(Approximate volumes if available)

**SURFACE SEAL**
Interval: 0-0.5 ft.
Tremied: Y / N
Volume: 3.0 bags
Description: Concrete / Other:

**BACKFILL**
Interval: 0.5-17 ft.
Tremied: Y / N
Volume: 1.0 bags
Description: Bentonite Grout / Fill / Other: Sand #1

**LOWER SEAL**
Interval: 17-21 ft.
Tremied: Y / N
Volume: 1.0 bags
Description: Bentonite Pellets / Other:

**FILTER**
Interval: 21-33 ft.
Tremied: Y / N
Volume: 1.0 bags (50lb bags)
Description: Sand Filter (type: #1) / Other:

**LOWER BACKFILL**
~~Interval: ft. Tremied: Y / N Volume: bags~~ RWM
Description: Bentonite Grout / Fill / Other:

## MONITORING WELL DEVELOPMENT*

Development Method: Surge Block / Submersible Pump / Peristaltic Pump / Watera / Bailer / Other
Date:

*See Monitoring Well Development Data Sheet for details

# BORING LOG

**FUSS & O'NEILL**
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**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** MW-03
**SHEET:** 1 of 1
**PROJECT NO:** 20080371A20
**WEATHER:** Partial Sun, 70s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/29/09
DATE & TIME COMPLETED: 6/29/09 16:00
DEPTH TO SATURATED ZONE: ~10ft.
SAMPLE PREFIX: ~~9980~~ RWM-25

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 24/60 | 0-0.2' | Asphalt. tr. debris | ND | AS | No samples collected | | |
| | | | 0.2-5' | F-M sand, some silt, tr f gravel, gravel @ 2.5 + 3.5', moist, loose, no odor, Dk. red. br (10R 3/4). | ND | FI | | | |
| 5 | | 27/60 | 5-10' | F-M sand, some silt, v moist, tr. f-m gravel, tr. asphalt + debris, mod. compact, no odor, mod. br. (5YR 3/4) | ND | FI | | | |
| 10' | | 31/60 | 10-15' | F-C sand, some silt, little crushed rock, wet, no odor, mod. br (5YR 4/4) | ND | SW | | | |
| 15' | | 21/60 | 15-20' | F-M sand, little silt, little f-gravel, tr crushed rock, wet, loose, no odor, grayish br. (5YR 3/2). | ND | SW | | | |
| 20' | | 40/48 | 20-21 | F-C sand, tr. f gravel, wet, loose, no odor, Dk. yell-br. (10YR 4/2). | ND | SP | | | |
| | | | 21-24' | F-M sand, some silt, tr. crushed rock, wet, mod. compact, no odor, mod. br (5YR 4/4). | ND | SW | | | |
| | | | | Bedrock @ 24'. Install shallow bedrock MW-03 in boring. EOB @ 37.5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 37.5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Bedrock at 24'. Install shallow bedrock well. EOB @ 37.5'
Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

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# MONITORING WELL COMPLETION REPORT

## GENERAL INFORMATION

Project Name: Amerbelle
Site ID (Boring/Well ID): MW-03
Project Location: Vernon, CT
Project No.: 20080371A20
F&O Engineer/Geologist: R. McQuiggan
Ground Surface Elevation:
Date of Completion: 6/29/09
Permit #:
Boring Location: Along Grove Street. See map.
E1 Top of Steel Casing:
Drilling Contractor/Name: ADT
E1 Top of PVC Casing:
Drilling Method: Direct-push / Geoprobe
Measuring Point: TPS / PVC
Well Cover (see codes):

## WELL CONSTRUCTION

**WELL CASING/RISER**
Diameter: 2 in.
Type: PVC
Stick-up: 0 ft.

**SUMP** (below screen)
~~Diameter: in.~~
~~Type:~~
~~Length: in.~~
RMW

**PROTECTIVE CASING**
Diameter: 8 in.
Type: Road Box / Stand Pipe
Stick-up: 0 ft
Depth to Bottom: 1 ft
Seal Material: Concrete

**SCREEN INTERVALS**
Screen Interval: 27.5-37.5' ft
Diameter: 2 in.
Slot Size: 0.01"
Description: PVC / Other:
Type: Perforated / Slotted / Wire-Wrap / Other:

**BOREHOLE**
Diameter: 2.25 in.
Total Boring Depth: 37.5 ft.
Refusal: y / n Depth: ft.

## ANNULAR FILL

(Approximate volumes if available)

**SURFACE SEAL**
Interval: 0-0.5 ft.
Tremied: Y / N
Volume: 3.0 bags
Description: Concrete / Other:

**BACKFILL**
Interval: 0.5-21 ft.
Tremied: Y / N
Volume: 1.0 bags
Description: Bentonite Grout / Fill / Other: Sand #1

**LOWER SEAL**
Interval: 21-25 ft.
Tremied: Y / N
Volume: 1.0 bags
Description: Bentonite Pellets / Other:

**FILTER**
50 lb. bags
Interval: 25-37.5 ft.
Tremied: Y / N
Volume: 1.5 bags
Description: Sand Filter (type: #1) / Other:

**LOWER BACKFILL**
~~Interval: ft. Tremied: Y / N Volume: bags Description: Bentonite Grout / Fill / Other:~~
RMW

## MONITORING WELL DEVELOPMENT*

Development Method: Surge Block / Submersible Pump / Peristaltic Pump / Watera / Bailer / Other
Date:

*See Monitoring Well Development Data Sheet for details

# Trip Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 9930906030-01 | Well ID<br>Trip Blank (HZN) | |

## Sample Data

| | Container | Quantity | Preservative |
|---|---|---|---|
| Date: 6/30/09 Time: 0842<br>Sampler: RWM Weather: Sun, 70s<br>Blank Supplied By: (Lab) / F&O / Other _____<br>Comments: | VOA | 1 ✓ | MeOH |

Comments:

# Trip Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 993090630-02 | Well ID<br>Trip Blank | |

## Sample Data

| | Container | Quantity | Preservative |
|---|---|---|---|
| Date: 6/30/09 Time: 0843<br>Sampler: RWM Weather: Sun, 70s<br>Blank Supplied By: (Lab) / F&O / Other _____<br>Comments: | VOA | 1 | MeOH |

Comments:

FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB101
**SHEET:** 1 of 1
**PROJECT NO:** 20080371A70
**WEATHER:** Sun, 70s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 0910
DEPTH TO SATURATED ZONE: Not encountered
SAMPLE PREFIX: 9930901030-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 32/48" | 0-04 | Concrete | ND | CR | | | |
| | | | 04-2' | F-C sand, some f gravel, tr. crushed rock, dry, compact, no odor, mod. br. (5 YR 4/4). | ND | SW | -03 0906 | 0.5-2' | Vat DT VOA MeO 8oz. ice 2oz. ice |
| | | | 2-4' | F-M sand, moist, loose, no odor, light. br. (5 YR 4/6) | ND | SP | | | |
| | | | | EOB @ 4'. (Refusal on rock at 4') | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | |
| | | |
| | | |
| | | |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 4'. Refusal on rock @ 4'

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

**FUSS & O'NEILL**
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-102
**SHEET:** 1 of 1
**PROJECT NO:** 20080374A2D
**WEATHER:** Sun, 70F

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-Push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 0916
DEPTH TO SATURATED ZONE: Not encountered
SAMPLE PREFIX: 993090630-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 17/24' | 0-0.4 | Concrete | ND | CR | | | |
| | | | 0.4-2' | F-M sand, little f-m gravel, tr silt, moist, mod-compact, no odor, mod. br (5YR 4/4). | ND | SW | -04 0914 | 0.5 -2' | VOA D1 VOA MeO 8 oz. IC 2 oz. IC |

Refusal @ 2' on rock
Offset boring and re-try →
Refusal @ 1' on rock.
EOB @ 2'.

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 2' |

**REMARKS**
Field Instrument = If refusal is encountered, describe all efforts used to confirm.
PID/OVM Refusal @ 2' on rock. Offset boring 3ft. and re-try. Refusal @ 1' on rock. EOB @ 2'.
Field Decon: (Yes) / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-105
**SHEET:** 1 of 1
**PROJECT NO:** 20080371A20
**WEATHER:** Sun, 70s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1005
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 993090630 –

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 21/36" | 0–0.3' | Concrete | ND | CR | | | |
| | | | 0.3–3' | F-M sand, little silt, tr. brick, dry, mod. compact, no odor, Dusky br. (5 YR 2/2). | ND | FI | -05 1002 | 0.5–2' | VOA-D1 VOA-MeOH 8oz ICE 2oz ICE (x2) |
| 3' | | 15/24 | 3–5' | F-C sand, tr. f-m gravel, dry, loose, no odor, mod. br (5 YR 4/4). | ND | SW | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM

If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal.

Field Decon: (Yes) / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | | |
|---|---|---|---|---|
| Asphalt | | To | | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | | |
| Native Material | 0.2 | To | 5 | |
| Other Concrete | 0 | To | 0.2 | |

**FUSS & O'NEILL**
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-106
**SHEET:** 1 of 1
**PROJECT NO:** 20080037HA20
**WEATHER:**

CONTRACTOR: ADT
OPERATOR:
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1020
DEPTH TO SATURATED ZONE: N.E
SAMPLE PREFIX: 993090630

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 20/36" | 0-0.4' | Concrete | | CR | | | |
| | | | 0.4-3' | F-M sand, tr. C-sand, tr. brick, moist, loose, no odor, mod br (5 YR 4/4). | | FI/SP | -06 1016 | 0.5-2' | DOA OT VOA MeOH 8oz 1G 2oz x2 |
| 3' | | 11/24' | 3-3.25' | F-C sand, Debris, ash, m-gravel, moist, loose, no odor, Black (N1) | | FI | | | |
| | | | 3.25-5' | F-M sand, tr. C-sand, wet mod compact, no odor, mod br. (5 YR 4/4). | | SP | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5! No refusal

Field Decon: (Yes) / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| (Native Material) | 0.2 | To 5' | |
| (Other) Concrete | 0 | To 0.2 | |

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-107
**SHEET:** 1 of 1
**PROJECT NO:** 20080037HA20
**WEATHER:** Sun, 70s

CONTRACTOR: ADT
OPERATOR:
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1035
DEPTH TO SATURATED ZONE: N.E.
SAMPLE PREFIX: 993090103

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 17/36" | 0-0.3' | Concrete | ND | CR | | | |
| | | | 0.3-3' | F-gravel, little debris, ash, tr. brick, moist, loose, Black (N1) to pale yell-br. (10YR 6/2), no odor. | ND | FI | -07 1032 | 0.5 -2' | VOA DI VOA MeOH 8oz. ice 2oz (x2) ice |
| 3' | | 16/24" | 3-5' | F-sand, silt + crushed/weathered rock, moist, loose, no odor ↳ (rock fragm) | ND | ML | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 5' | To 0.2 | |
| Other Concrete | 0.2 | To 0 | |

FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-110
**SHEET:** 1 of 1
**PROJECT NO:** 20080571A20
**WEATHER:**

CONTRACTOR: ADT
OPERATOR:
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push / Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1100
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 993090630-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 12/36" | 0-0.4' | Concrete | ND | CR | | | |
| | | | 0.4-3' | F-M sand, little f-gravel + c-sand, dry, loose, no odor, mod yell-br. (10 YR 5/4). | ND | SW | -08 1058 | 0.5-3' | VOA-D1 VOA-Meoh 8 oz 1 oz 2 oz (x2) |
| 3' | | 19/24" | 3-4' | F-M sand, little f-m gravel, dry, loose, no odor, mod br (5 YR 4/4). | ND | SW | | | |
| | | | 4-4.5' | Crushed rock, some f sand + silt, dry, compact, no odor, pale yell-br. (10 YR 6/2) | ND | ML | | | |
| | | | 4.5-5' | Same as 3-4'. | ND | SW | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 5 | |
| Other Concrete | 0 | To 0.2 | |

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-109
**SHEET:** 1 of 1
**PROJECT NO:** 20080371A20
**WEATHER:** Sun, 80s

CONTRACTOR: ADT
OPERATOR: Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1115
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 993090630-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 14/36" | 0-0.4' | Concrete | ND | CR | | | |
| | | | 0.4-3' | F-sand, some silt, tr. f-gravel, tr brick + debris, moist, loose, no odor, Dusky br. (5YR 2/2) | 0.6 | FI | -09 1112 | 0.5-3' | VOA 01 VOA MeOH 802 ice 2020 ice |
| 3' | | 12/24" | 3-5' | F-sand, some silt, little crushed rock, moist, compact, no odor, mod. yell. br. (10YR 5/4). | ND | SM | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 5 | |
| Other Concrete | 0 | To 0.2 | |

**FUSS & O'NEILL**
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB108
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Sun 80s

CONTRACTOR: ~~Fuss & O'Neill~~ ADT
OPERATOR: ~~D. Lévesque~~ Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1140
DEPTH TO SATURATED ZONE: Not encountered
SAMPLE PREFIX: 993090630—

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 14/36" | 0–0.4' | Concrete | ND | CR | | | |
| | | | 0.4–3' | F-M sand, some silt, tr. f-m gravel, dry, loose, no odor, mod. br. (5YR 3/4). | ND | SW | 10 1134 | 0.5–3' | VOA DI VOA meoh 8oz 2oz (x2) |
| 3' | | 17/24" | 3–4' | Same as above | ND | SW | | | |
| | | | 4–5' | f sand + silt + crushed rock (rock flour), v moist, mod. compact, no odor, mod. yell-br (10YR 5/4). | ND | ML | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite ~~Grout~~/Chips | | To | |
| Native Material | 0.3 | To 5 | |
| Other Concrete | 0 | To 0.3 | |

# Equipment Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, CT | **PROJECT #: 20080371.A70** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 9930906030-11 | Well ID<br>Equip Blank | |

## Sample Data

Date: 6/30/09 Time: 1230

Sampler: RWM Weather: Cloudy 70s

Blank Water Supplied By: (Lab) / F&O / Other _____

Equipment Used: Bailer / Bladder Pump / (Geoprobe) / Split Spoon / Hand Auger / Shovel / Other _____

Filtered in Field? (No) / @ Vehicle

Method of Filtration: Disposable Filter / Other _____

Pump ID #: _____

Appearance: Clear, no odor

Comments:

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 2 | HCl |
| VOA | 4 | Ice |
| P250 | 1 | $HNO_3$ |
| P250 | 1 | $H_2SO_4$ |
| Ar | 2 | Ice |
| A8oz | 1 | Ice |

* - Organic-free DI water used in these containers.

Comments:

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-104
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Sun, 80s

CONTRACTOR: (Parl) ~~Fuss & O'Neill~~ ADT
OPERATOR: D. Levesque Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09
DEPTH TO SATURATED ZONE: 7'
SAMPLE PREFIX: 993090630

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 18/36" | 0-0.2 | Concrete | ND | CR | | | |
| | | | 0.2-2.5 | F-sand + silt, little f-m gravel, tr crushed rock, v. moist, mod. compact, no odor, mod. br (5YR 3/4) | ND | SW | | | |
| | | | 2.5-3' | F-M sand + f-gravel, dry, loose, no odor, Dk. reddish br. (10 R 3/4). | ND | SW | | | |
| 3' | | 20/36" | 3-3.5 | same as above | ND | SW | | | |
| | | | 3.5-6' | F-sand + silt, little crushed rock, no odor, mod. compact, v. moist, mod. br (5 YR 3/4) | ND | ML | | | |
| 6' | | 16/36 | 6-7' | same as above | ND | ML | | | |
| | | | 7-9' | F-M sand, little f-m gravel, tr silt, wet, staining 7.5-8', no odor, light br. (5 YR 5/6). | ND | SW | 12 1328 | 7-9' | VOA DI, VOA Meo, 8oz ice, 2oz (x2) 1' |
| | | | | E.O.B @ 9'. | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 9' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
E.O.B. @ 9'

Field Decon: (Yes) No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| (Native Material) | 0 | To 9 | |
| Other | | To | |

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-111
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Sun 80s

CONTRACTOR: Fuss & O'Neill
OPERATOR: ~~D. Levesque~~ RM
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: ~~Direct push/Geoprobe~~ Shovel
SAMPLING METHOD: ~~Macrocore~~
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09
DEPTH TO SATURATED ZONE: N.E.
SAMPLE PREFIX: 993090080-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | | 0-0.5 | F-M sand, little f-m gravel, tr. organics, moist, loose, no odor, (Topsoil) Dusky yell-or (10YR2/2) | ND | TS | -13 1410 | 0-0.5' | 4oz (x3) ice |
| | | | | Concrete @ 0.5' | | | -14 1412 (Dup.) | 0-0.5 | 4oz ice |
| | | | | -13 (MS/MSDup.) | | | | | |
| | | | | -14 (Duplicate) | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | RM ~~Geoprobe~~ | |

**REMARKS**
Field Instrument = ~~PID~~/OVM

If refusal is encountered, describe all efforts used to confirm.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-103
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Sun 80s

CONTRACTOR: ~~Fuss & O'Neill~~ ADT
OPERATOR: ~~D. Levesque~~ Jason
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 6/30/09
DATE & TIME COMPLETED: 6/30/09 1450
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 993090630-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 18 ~~36~~" | 0-0.4' | Concrete | ND | CR | | | |
| | | | 0.4-2' | Fill sand, WHLE silty, tr. f-m gravel, dry, compact, no odor, Dusky Br. (5 YR 2/2). | ND | SW | -15 1440 | 0.5-2' | VOA DI VOA MeOH 8oz ice 2oz(x2) ice |
| | | | | Refusal @ 2'. E.O.B @ 2' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 2' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Refusal @ 2'. E.O.B @ 2'

Field Decon: (Yes) / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ld) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ld silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| (Native Material) | 0.3 | To 2' | |
| (Other) Concrete | 0 | To 0.3 | |

# Trip Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 993090702-16 | Well ID<br>Trip Blank (H1) | |

## Sample Data

| | Container | Quantity | Preservative |
|---|---|---|---|
| Date: 7/2/09 Time: 0830<br>Sampler: RWM Weather: Cloudy, 70s<br>Blank Supplied By: (Lab) / F&O / Other _____<br>Comments: | VOA | 1 ✓ | MeOH |

Comments:

G:\PAD\ADFLDOPS\FLDOPS\DataSheets\TripBlankFieldData.doc(Format Revised 10/28/05)
Content Revised 6/22/04

# Trip Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 993090702-017 | Well ID<br>Trip Blank (10) | |

## Sample Data

| | Container | Quantity | Preservative |
|---|---|---|---|
| Date: 7/2/09 Time: 0830<br>Sampler: RWM Weather: Cloudy 70s<br>Blank Supplied By: (Lab) / F&O / Other _____<br>Comments: | VOA | 2 | DI H2O |

Comments:

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-112
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: N.E.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 31/60 | 0-0.2 | Asphalt | ND | AS | | | |
| | | | 0.2-2' | F-C sand, tr. f gravel, layer of coal ash 0.75-1', moist, loose, no odor, light br (5YR 5/6). | ↓ | FI | -18 0845 | 0.5-2' | VOA 01 VOA MeOH 8oz. 1CO 2oz(x2) 1C |
| | | | 2-5' | F-M sand, some silt, tr. f-gravel, moist, loose, no odor, light br. (5YR 5/6) | | SP | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.2 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 5' | |
| Other | | To | |

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-113
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: N.E.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 21/60 | 0-0.2 | Asphalt | ND | AS | | | |
| | | | 0.2-5' | FM sand, some silt, tr-f gravel, moist, loose, no odor light br. (5 YR 5/6) | ND | SP | 19 0855 | 0.5-4' | VOA DI VOA MeOH 8oz IC 2oz (x2) |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument PID/OVM
EOB @ 5'. No refusal.

If refusal is encountered, describe all efforts used to confirm.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.2 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 5 | |
| Other | | To | |

**FUSS & O'NEILL**
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-114
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: NE.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 33/60 | 0-0.2 | Asphalt | ND | AS | | | |
| | | | 0.2-1.5 | F-C sand, and silt, tr. crushed rock, wet, mod. compact, no odor, lt. br. (5 YR 5/6). | ND | SM SP (PID) | -20 0905 | 0.5 -21 | VOA DI VOA MeC 8oz ice 2oz (x2) IC |
| | | | 1.5-2.75' | F-C sand, little f-m gravel, moist, compact, no odor, lt. br (5 YR 5/6). | ND | SW | | | |
| | | | 2.75-4.5' | F-M sand, moist, loose, no odor, lt. br. (5 YR 5/6) | ND | SP | | | |
| | | | 4.5-5' | Same as 1.5-2.75'. | ND | SW | | | |
| | | | | EOB @ 5'. | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 5'. No refusal
Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.2 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 5' | |
| Other | | To | |

**FUSS & O'NEILL**
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-15
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: N.E.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 37/60 | 0.0-0.2 | Asphalt | ND | AS | | | |
| | | | 0.2-2' | FM sand and silt, tr. debris, mod. compact, moist, no odor, mod. br. (5YR 4/4). | ND | FI/SM | -21 0915 | 0.5-2' | 8oz. ice |
| | | | 2-3.5' | F-C sand, some f-gravel, tr. silt + clay, moist, compact, no odor, lt. br. (5YR 5/6) | ND | SW | -22 0920 | Dup | 8oz ice |
| | | | 3.5-4' | FM sand, moist, loose, no odor, mod. br. (5YR 4/4). | ND | SP | | | |
| | | | 4-5' | Same as 2-3.5. | ↓ | SW | | | |
| 5' | | 38/48 | 5-5.5' | Same as 3.5-4' | | SP | | | |
| | | | 5.5-6 | Same as 2-3.5' | | SW | | | |
| | | | 6-6.5 | Same as 3.5-4' | | SP | | | |
| | | | 6.5-9' | Same as 2-3.5. | ↓ | SW | | | |
| | | | | Refusal @ 9' on suspected bedrock | | | | | |
| | | | | EOB @ 9' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 9' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
EOB @ 9', Refusal on bedrock

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.2 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 9' | |
| Other | | To | |

# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-116
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 993090782-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 30/60 | 0-0.1 | Asphalt | ND | AS | | | |
| | | | 0.1-1 | F-M sand + gravel, dry, loose, no odor, Dusky br. (5 YR 2/2). | ND | FI | | | |
| | | | 1-2' | F-C sand, some f gravel, tr silt, moist, compact, no odor, lt. br. (5 YR 5/6). | ND | FI/SW | | | |
| | | | 2-3.5' | F sand + silt, tr clay, wet, mod. compact, mod. br. (5 YR 4/4) no odor. | ND | FI/SP | -23 0940 | 2-4' | 4oz ice |
| | | | 3.5-3.7' | F-C sand + debris, tr f gravel, dry, loose, no odor, Dusky red br. (10 YR 2/2) | ND | FI | | | |
| | | | 3.7-5' | F-M sand + silt, ~~little~~ tr. crushed rock, moist, mod. compact, no odor, light br. (5 YR 5/6). | ND | SP | | | |
| 5' | | 14/14 | 5-5.2 | Same as above | ND | SP | -24 1000 | 4-5.2' | 4oz (x3) (MS/MSD) |
| | | | 5.2-6.2 | Weathered rock | ND | ML | | | |

Refusal @ 6.2' on bedrock
Offset boring 3' + retry → Refusal @ 6.2'
EOB @ 6.2'.

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 6.2' |
| | | |
| | | |
| | | |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Refusal at 6.2' on rock. Offset boring 3ft. Refusal at 6.2' on rock. EOB @ 6.2'

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ld) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ld silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.2 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.2 | To 6.2' | |
| Other | | To | |

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# FUSS & O'NEILL
*Disciplines to Deliver*

# BORING LOG

**PROJECT:** Amerbelle

**LOCATION:** Vernon, Connecticut

**SITE ID:** SB117
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: NE
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 37/54" | 0-0.1 | Asphalt | ND | AS | | | |
| | | | 0.1-0.25 | F-M sand, tr brick, moist, loose, no odor, mod. reddish br. (10 R 4/6). trash | ND | FI | 25 1015 | 0.5-2' | VOA-01 NAME-01 4oz(x3) 2oz(1) |
| | | | 0.25-1.75 | F-C sand and debris, no odor, wet, staining, Brownish black (5 YR 2/1). | ND | FI | | | |
| | | | 1.75-3.5' | F-M sand + silt tr. f-m gravel, dry, compact, mod br. (5YR 4/4). | ND | FI | | | |
| | | | 3.5-4.5' | F sand + silt, little debris, tr. brick, dry, v. compact, no odor, light br (5 YR 5/6). | ND | FI | | | |
| | | | | EOB @ 4.5'. Refusal on rock @ 4.5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 4.5' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Refusal on rock at 4.5'. EOB at 4.5'.

Field Decon: (Yes) / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.1 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.1 | To 4.5' | |
| Other | | To | |

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB118
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE:
SAMPLE PREFIX: 9493090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 39/60 | 0 -0.3 | Asphalt | ND | AS | | | |
| | | | 0.3 -2.6' | Fill sand, some f-gravel, tr C-sand, tr silt, tr. debris, coal, moist, compact, no odor, very dusky red (10 R 2/2). tr. mod. yell (5Y 7/6) sand | ↓ | Fl | -26 1040 | 0.5 -2' | VOA DI VOA MeOH 4(5g) ice 2oz ice |
| | | | 2.5 -5' | F-sand, some silt, some staining @ 4', tr. debris, dry, compact, Dk. yell. orange (10YR 6/6). | | Fl | | | |
| | | | | EOB @ 5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | |
| | | |
| | | |
| | | |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**
Asphalt _____ To _____
Bentonite Grout/Chips _____ To _____
Native Material _____ To _____
Other _____ _____ To _____

See Monitoring Well Completion Report

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-119
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: NE
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 18/60 | 0-0.1 | Asphalt | ND | AS | | | |
| | | | 0.1-5' | F-M sand, some silt, tr f gravel, v moist, mod compact, no odor, mod br (5YR 4/4). | ND | SW | -27 1120 | 0.5 -4' | VOA 01 VOA Med ~~8oz~~ (x2) 2oz (x2) |
| | | | | REOB @ 5'. | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 5' |

**REMARKS**
Field Instrument = PID/OVM

If refusal is encountered, describe all efforts used to confirm.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.1 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0.1 | To 5' | |
| Other | | To | |

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-120
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy, 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09
DEPTH TO SATURATED ZONE: NE.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 44/60 | 0-0.1 | Asphalt | ND | AS | | | |
| | | | 0.1-1.75' | F-M sand, some silt, tr crushed rock, moist, loose, no odor, mod. br. (5 YR 4/4). tr. debris/asphalt | ND | FI/SM | -28 1150 | 0.1-2' | 8oz ice |
| | | | 1.75-3' | F-C sand, tr. f-gravel, moist, mod compact, no odor, mod br. (5 YR 4/4). | ND | SW | | | |
| | | | 3-5' | F-M sand & silt + crushed rock (rock tour), moist, mod compact, no odor, mod br (5 YR 4/4) to brownish grey (5 YR 4/1). | ND | ML | | | |
| 5 | | 12/12" | 5-6' | Same as above, wet | ND | ML | | | |
| | | | | Refusal @ 6'. on rock | | | | | |
| | | | | EOB @ 6' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 6' |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Refusal @ 6' on rock. EOB @ 6'.

Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | | To | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 0 | To 6' | |
| Other | | To | |

# BORING LOG

**FUSS & O'NEILL**
*Disciplines to Deliver*

**PROJECT:** Amerbelle
**LOCATION:** Vernon, Connecticut

**SITE ID:** SB-121
**SHEET:** 1 of 1
**PROJECT NO:** 20080371.A20
**WEATHER:** Cloudy 70s

CONTRACTOR: Fuss & O'Neill
OPERATOR: D. Levesque
F&O REPRESENTATIVE: R. McQuiggan
DRILLING METHOD: Direct-push/Geoprobe
SAMPLING METHOD: Macrocore
HAMMER WT: N/A HAMMER FALL (IN) N/A

BORING LOCATION: See map.
DATE STARTED: 7/2/09
DATE & TIME COMPLETED: 7/2/09 1410
DEPTH TO SATURATED ZONE: NE.
SAMPLE PREFIX: 993090702-

| DRILLING DETAILS | | | MATERIAL DESCRIPTION | | | | ANALYTICAL SAMPLES | | |
|---|---|---|---|---|---|---|---|---|---|
| START DEPTH (FT) | BLOWS 6" | REC/ PEN (IN) | DEPTH RANGE (FT) | DESCRIPTION | PID | LITHO-LOGIC CODE | SAMPLE NO. & TIME | DEPTH INTERVAL (FT) | JARS & PRESERV. |
| 0 | | 40 / 24" | 0 – 0.1 | Asphalt | ND | AS | | | |
| | | | 0.1 – 2 | F sand + silt, wet, loose, no odor, mod br (5 YR 4/4). | ND | SP | -29 1330 | 0.1 – 2' | 8 oz ice (x2) |
| | | | 2 – 3.5' | F-M sand, wet, loose, no odor, mod. br. (5 YR 4/4). | ND | SP | | | |
| | | | 3.5 – 4' | F-M sand, some silt little f-m gravel, v. moist compact, no odor, mod br (5YR 3/4). | ND | SW | | | |
| | | | 4 – 4.5' | Crushed, weathered rock | ND | ML | | | |
| | | | | Refusal @ 4.5' on rock | | | | | |
| | | | | Offset boring and retry → refusal at 4.5'. | | | | | |
| | | | | 4 more attempts → refusal between 2 + 4'. | | | | | |
| | | | | EOB @ 4.5' | | | | | |

| BORING DIAMETER | BORING METHOD | BORING DEPTH |
|---|---|---|
| 2" | Geoprobe | 4.5 |
| | | |
| | | |
| | | |

**REMARKS**
Field Instrument = PID/OVM
If refusal is encountered, describe all efforts used to confirm.
Refusal between 2 and 4.5'. 6 attempts. EOB @ 4.5'
Field Decon: Yes / No / Dedicated Device

**PROPORTIONS USED:**
Trace (tr) 0 to 10% Some (sm) 20 to 35%
Little (ltl) 10 to 20% And 35 to 50%

**EXAMPLE DESCRIPTION:**
SAND, F-M; sm f angular gravel; ltl silt; tr clay; (10R 5/4), wet at 7 ft. Loose. No odor.

Reviewed by Staff:

**BACKFILL**

| | | | |
|---|---|---|---|
| Asphalt | 0 | To 0.1 | See Monitoring Well Completion Report |
| Bentonite Grout/Chips | | To | |
| Native Material | 4.5 | To 0.1 | |
| Other | | To | |

# Equipment Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, CT | **PROJECT #: 20080371.A70** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#:** 9413090702-30 | Well ID<br>Equip Blank | |

## Sample Data

Date: 7/2/09 Time: 1440

Sampler: RWM Weather: Cloudy 70s

Blank Water Supplied By: (Lab) / F&O / Other _____

Equipment Used: Bailer / Bladder Pump / (Geoprobe) / Split Spoon / Hand Auger / Shovel / Other _____

Filtered in Field? (No) / @ Vehicle

Method of Filtration: Disposable Filter / Other _____

Pump ID #: _____

Appearance: Clear, no odor

Comments:

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 2 ✓ | HCl |
| VOA | 4 ✓ | ASIS |
| P250 | 1 ✓ | $HNO_3$ |
| P250 | 1 ✓ | $H_2SO_4$ |
| AL | 2 | ice |
| A8oz. | 1 | ice |

* - Organic-free DI water used in these containers.

Comments:

FUSS & O'NEILL

# Appendix C

## Low Flow Groundwater Sampling Data Sheets

FUSS & O'NEILL
*Disciplines to Deliver*

# WATER LEVEL FIELD DATA SHEET

Project Name: **Amerbelle**
Project No.: **20080371.A20**
Location: **Vernon, Connecticut**
Sampler(s): RWM, MSK

Date: 7/13/2009
Weather: Sun, 80s



| Sampling Point | Well Diameter (in) | Water Level Device (M/T) | Corr. Factor | Time | Depth to Water From Top of Steel (show correc.) | Depth to Water From Top of PVC (show correc.) | Measured Well Depth from top of PVC / Steel (show correc.) | Comments |
|---|---|---|---|---|---|---|---|---|
| MW-01 | 2 | Sol.#1 | +0 | 1146 | 5.88 | 5.38 | 49.11 +0.28=49.39' | |
| MW-02 | ↓ | ↓ | ↓ | 0846 | 18.39 | 18.98 | 32.37 +0.28=32.65' | |
| MW-03 | ↓ | ↓ | ↓ | 1344 | 11.49 | 10.72 | 35.98 +0.28=36.26' | |
| W-1 | ↓ | ↓ | ↓ | Could not open → | | | | |
| ME-1 | ↓ | ↓ | ↓ | 0817 | 5.66 | 5.44 | 14.27 +0.28=14.55 | |
| ME-2 | ↓ | ↓ | ↓ | 0919 | 7.13 | 6.92 | 17.74 +0.28=18.02' | Blue dye |
| AM-1 | ↓ | ↓ | ↓ | 1030 | 11.83 | 11.44 | 12.25 +0.28=12.53' | |
| ME-6 | ↓ | ↓ | ↓ | 1116 | 18.83 | 18.51 | 24.83 +0.28=25.11' | |
| AM-5 | ↓ | ↓ | ↓ | 1117 | N/A | 12.27 | 12.41 +0.28=12.69' | |
| AM-7 | ↓ | ↓ | ↓ | 1130 | N/A | 8.30 | 8.89 +0.28=9.17' | |
| | | | | | | | | |
| | | | | | | | | |
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PMB 7/30/09 DMS

# Trip Blank Field Data

| | | |
|---|---|---|
| Client/Project Name: Amerbelle<br>Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | FUSS & O'NEILL<br>*Disciplines to Deliver* |
| **Sample#: 993090713- 01** | Well ID<br>Trip Blank | |

## Sample Data

Date: 7/13/2009 Time: 0835
Sampler: RWM Weather: Sun, 80s

Blank Supplied By: (Lab) / F&O / Other _____

Comments:

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 2 ✓ | HCl |

Comments:

# Monitoring Well Sample Log

Low Flow Sampling

| | | |
|---|---|---|
| Client/Project Name: Amerbelle | | FUSS & O'NEILL *Disciplines to Deliver* |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 | |
| Sample#: 993090713-02 | WELL ID: ME-1 | |

## Purge Data

Date: 7/13/2009

Start time: 0844 Stop time: 0906 Sample time: 0907

Pump Rate: 100 (ml/m) Depth Sampled: ~12.5'

Total time purged: 22 Sampler: RWM / MSK

Volume Purged: 2.200 (ltr)

Purge Device: Dedicated / Nondedicated Weather: Sunny, 80's

Device Type: Bladder / Peristaltic / Submersible

Filtered? N / Y Filter Size: 10u / 0.45u Filtered in: Field / Lab

Appearance: Clear No odor PVC: 5.44

Well Yield: High / Moderate / Low / Dry TPS: 5.010

Well Diameter: 2" DTB: 14.27+0.28=14.55

Comments:

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 4 ✓ | ASIS |
| VOA | 2 ✓ | HCl |
| AL | 2 ✓ | Ice |
| A8oz. | 1 ✓ | Ice |
| P250 | 1 ✓ | $HNO_3$ |
| P250 | 1 ✓ | F/$HNO_3$ |
| P250 | 1 ✓ | $H_2SO_4$ |

## Field Parameter Data

Instrument ID#

Solinst# 4 | 2020# 1 | YSI 600 # Rental

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 5.44 | 0844 | ← BEGIN PURGE | | | | | → |
| 5.85 | 0856 | 6.96 | 1.31 | 6.03 | 21.65 | 3894 | 184.5 |
| 6.03 | 0859 | 8.78 | 1.25 | 5.95 | 21.87 | 3886 | 195.0 |
| 6.13 | 0902 | 2.56 | 1.19 | 5.96 | 21.98 | 3881 | 196.7 |
| 6.21 | 0905 | 0.45 | 1.09 | 5.99 | 22.16 | 3886 | 195.6 |
| ← | | sample | | | | | → |

## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable)

General Condition: Good / Needs Repair

Protective Steel: OK / Cracked / Leaking / Bent / Loose/ None

Well # Visible?: Y / N

Well Cap: Good / Broken / None

Evidence of rain water between steel and PVC?: Y / N

Evidence of ponding around well?: Y / N

Gopher type holes around collar?: Y / N

Is well plumb?: Y / N

Lock: Good / Broken / None

Rust around cap: Y / N

PVC Riser: Good / Damaged / None

Concrete collar: OK / Cracked / Leaking / None

Other evidence of: Rodents / Insects / None

Curb Box: N / Y (key is: Hex / Pent / Other)

Comments: well cover cracked but still effective in keeping debris out of well casing

# Monitoring Well Sample Log

Low Flow Sampling

| | |
|---|---|
| Client/Project Name: Amerbelle | |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 |
| Sample#: 993090713- 03 | WELL ID: MW-02 |

FUSS & O'NEILL
*Disciplines to Deliver*

## Purge Data

Date: 7/13/2009

Start time: 0848 Stop time: 0850 Sample time: 0856

Pump Rate: 1.0 ~~(ml/m)~~ gpm Depth Sampled: 30'

Total time purged: 2 mins Sampler: RWM / MSK

Volume Purged: 2 gal ~~(lit)~~

Purge Device: Dedicated / Nondedicated Bailer Weather: Sun 80s

Device Type: Bladder / Peristaltic / Submersible

Filtered? N / Y Filter Size: 10u / 0.45u Filtered in: Field / Lab

Appearance: Cloudy white no odor PVC: 18.98

Well Yield: High / Moderate / Low / Dry TPS: 19.39

Well Diameter: 2" DTB: 32.37 + 0.28 = 32.65

Comments:

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 4 ✓ | ASIS |
| VOA | 2 ✓ | HCl |
| Air | 2 ✓ | ice |
| ASO2 | 1 ✓ | ice |
| P250 | 1 ✓ | HNO3 |
| P250 | 1 ✓ | F/HNO3 |
| P250 | 1 ✓ | $H_2SO_4$ |

## Field Parameter Data

Instrument ID#

Solinst# 1 | 2020# 1 | YSI 600 # 4

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 18.98 | 0849 | 51.3 | 10.04 | 7.39 | 12.71 | 1373 | 184.5 |
| | Purge 1 gal → DTW (PVC) = 22.76' | | | | | | |
| | Recharge poor. Purge 2 gal then collect grab groundwater sample. | | | | | | |
| ← | 0856 — Sample | | | | | | → |

## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable)

General Condition: Good / Needs Repair
Protective Steel: OK / Cracked / Leaking / Bent / Loose / None
Well # Visible?: Y / N
Well Cap: Good / Broken / None
Evidence of rain water between steel and PVC?: Y / N
Evidence of ponding around well?: Y / N
Gopher type holes around collar?: Y / N
Comments:

Is well plumb?: Y / N
Lock: Good / Broken / None
Rust around cap: Y / N
PVC Riser: Good / Damaged / None
Concrete collar: OK / Cracked / Leaking / None
Other evidence of: Rodents / Insects / None
Curb Box: N / Y (key is: Hex / Pent / Other)

# Monitoring Well Sample Log

Low Flow Sampling

| | |
|---|---|
| Client/Project Name: Amerbelle | |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 |
| Sample#: 993090713- 04 | WELL ID: ME-2 |

FUSS & O'NEILL
*Disciplines to Deliver*

## Purge Data

Date: 7/13/2009
Start time: 0930 Stop time: 1000 Sample time: 1007
Pump Rate: 200 (ml/m) Depth Sampled: 15'
Total time purged: 30 mins Sampler: (RWM) / MSK
Volume Purged: 6.0 (ltr)
Purge Device: (Dedicated) / Nondedicated Weather: Sun, 80s
Device Type: Bladder / (Peristaltic) / Submersible
Filtered? (N) / Y ~~Filter Size: 10u / 0.45u Filtered in:~~ Field / Lab
Appearance: Blue, odor. PVC: 6.92
Well Yield: High / Moderate / (Low) / Dry TPS: 7.13
Well Diameter: 2" DTB: 18.02
Comments:

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 4 ✓ | AsIS |
| VOA | 2 ✓ | HCl |
| Aq | 2 ✓ | Ice |
| Aq 8oz. | 1 ✓ | Ice |
| P250 | 1 ✓ | $HNO_3$ |
| ~~P250~~ | ~~1 ✓~~ | ~~F/$HNO_3$~~ (RWM) |
| P250 | 1 ✓ | $H_2SO_4$ |

## Field Parameter Data

Instrument ID#

Solinst# 1 | 2020# 1 | YSI 600 # 4

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 6.92 | 0930 | — Start | | | | | → |
| 10.52 | 0948 | 6.43 | -0.44 | 7.44 | 17.85 | 6090 | -297.4 |
| 11.70 | 0951 | 5.82 | -0.44 | 7.45 | 18.01 | 6137 | -307.8 |
| 13.22 | 0954 | 3.39 | -0.53 | 7.45 | 17.94 | 6159 | -319.9 |
| 13.92 | 1003 | 3.18 | -0.54 | 7.45 | 17.94 | 6157 | -315.9 |
| 14.16 | 1006 | 2.87 | -0.55 | 7.45 | 17.86 | 6165 | -304.6 |
| ← | 1007 | — Sample | | | | | → |

## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable]

General Condition: (Good) / Needs Repair
Protective Steel: (OK) / Cracked / Leaking / Bent / Loose / None
Well # Visible?: Y / (N)
Well Cap: (Good) / Broken / None
Evidence of rain water between steel and PVC?: Y / (N)
Evidence of ponding around well?: Y / (N)
Gopher type holes around collar?: Y / (N)
Comments:

Is well plumb?: (Y) / N
Lock: (Good) / Broken / None
Rust around cap: Y / (N)
PVC Riser: (Good) / Damaged / None
Concrete collar: (OK) / (Cracked) / Leaking / None
Other evidence of: Rodents / Insects / (None)
Curb Box: N / (Y) (key is: Hex / (Pent) / Other)

# Monitoring Well Sample Log

Low Flow Sampling

| | |
|---|---|
| Client/Project Name: Amerbelle | |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 |
| Sample#: 993090713- 05 | WELL ID: AM - 1 |

FUSS & O'NEILL
*Disciplines to Deliver*

## Purge Data

**Date:** 7/13/2009

**Start time:** 1031 **Stop time:** 1031 **Sample time:** 1031

**Pump Rate:** ~~[illegible]~~ (ml/m) **Depth Sampled:** ~12.5'

**Total time purged:** —

**Volume Purged:** — (ltr) **Sampler:** RWM / (MSK)

**Purge Device:** (Dedicated) / Nondedicated **Weather:** Sunny, 80's

**Device Type:** Bladder / (Peristaltic) / Submersible

**Filtered?** N / Y **Filter Size:** 10u / 0.45u **Filtered in:** Field / Lab

**Appearance:** Slightly Cloudy, Brown Tint No odor **PVC:** 11.44

**Well Yield:** High / Moderate / Low (Dry) **TPS:** 11.83

**Well Diameter:** 2" **DTB:** 12.25+0.28 = 12.53

**Comments:**

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| Voa | 2 ✓ | HCl |
| Voa | 4 ✓ | AsIs |
| A32oz | 2 ✓ | AsIs |
| A8oz | 1 ✓ | AsIs |
| P250 | 1 ✓ | $HNO_3$ |
| P250 | 1 | F/$HNO_3$ |
| P250 | 1 ✓ | $H_2SO_4$ |

## Field Parameter Data

**Instrument ID#**

| Solinst#4 | | 2020# 1 | YSI 600 # Rental | | | | |
|---|---|---|---|---|---|---|---|
| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
| 11.44 | 1031 | BEGIN PURGE → | | | | | |
| | | Water purged directly into sample bottles due to | | | | | |
| | | low yield & recharge - well went dry after sampling | | | | | |
| | | | | | | | |
| Dry | 1053 | N/A | 8.31 | 6.61 | 17.79 | 284 | 195.8 |
| | | | | | | | |
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## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable)

**General Condition:** Good / (Needs Repair)
**Protective Steel:** (OK) / Cracked / Leaking / Bent / Loose/ None
**Well # Visible?:** Y / (N)
**Well Cap:** Good / (Broken) / None
**Evidence of rain water between steel and PVC?:** Y / (N)
**Evidence of ponding around well?:** Y / (N)
**Gopher type holes around collar?:** Y / (N)
**Comments:** Top Half of well cover missing

**Is well plumb?:** (Y) / N
**Lock:** Good / Broken / (None)
**Rust around cap:** Y / (N)
**PVC Riser:** (Good) / Damaged / (None)
**Concrete collar:** (OK) / Cracked / Leaking / None
**Other evidence of:** Rodents / Insects / (None)
**Curb Box:** N / (Y) (key is: Hex / (Pent) / Other)

# Monitoring Well Sample Log

Low Flow Sampling

| | | |
|---|---|---|
| Client/Project Name: Amerbelle | | FUSS & O'NEILL *Disciplines to Deliver* |
| Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** | |
| **Sample#: 993090713-06** -08 (dup) | **WELL ID: ME-6** | |

## Purge Data

**Date: 7/13/2009**

**Start time:** 1124 **Stop time:** 1205 **Sample time:** 1206/1206

**Pump Rate:** 100 (ml/m) **Depth Sampled:** ~23'

**Total time purged:** 41 **Sampler:** RWM / MSK

**Volume Purged:** 4.100 (ltr)

**Purge Device:** Dedicated / Nondedicated **Weather:** Sunny 80's

**Device Type:** Bladder / Peristaltic / Submersible

**Filtered?** N / Y **Filter Size:** 10u / 0.45u **Filtered in:** Field / Lab

**Appearance:** Cloudy, Brown Tint, Some Susp Sediment, No odor **PVC:** 18.51

**Well Yield:** High / Moderate / Low / Dry **TPS:** 18.83

**Well Diameter:** 2" **DTB:** 25.11'

**Comments:**

* pH, ORP are constantly jumping around - possible probe malfunction?

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| Voa | 4 ✓ | AsIs |
| Voa | 2 ✓ | HCl |
| A 32oz | 2 ✓ | AsIs |
| A 8oz | 1 ✓ | AsIs |
| P250 | 1 ✓ | HNO3 |
| P250 | 1 ✓ | F/HNO3 |
| P250 | 1 ✓ | H2SO4 |

## Field Parameter Data

**Instrument ID#**

Solinst# 4 | 2020# 1 | YSI 600 # Rental

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 18.51 | 1124 | ← BEGIN PURGE → | | | | | |
| 18.65 | 1145 | 106.1 | 5.38 | 6.34 | 14.13 | 1004 | 236.6 |
| — | 1148 | — | 5.61 | 6.39 | 14.15 | 1018 | — |
| 18.66 | 1151 | 91.3 | 5.56 | * | 14.24 | 1020 | * |
| 18.67 | 1156 | 46.3 | 5.55 | * | 14.24 | 1013 | * |
| 18.67 | 1159 | 22.5 | 5.46 | * | 14.08 | 1013 | * |
| 18.67 | 1202 | 10.51 | 5.41 | * | 14.09 | 1005 | * |
| 18.67 | 1205 | 9.28 | 5.33 | * | 14.08 | 1000 | * |
| ← Sample → | | | | | | | |

## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable]

**General Condition:** Good / Needs Repair
**Protective Steel:** OK / Cracked / Leaking / Bent / Loose/ None
**Well # Visible?** Y / N
**Well Cap:** Good / Broken / None
**Evidence of rain water between steel and PVC?:** Y / N
**Evidence of ponding around well?:** Y / N
**Gopher type holes around collar?:** Y / N
**Comments:**

**Is well plumb?:** Y / N
**Lock:** Good / Broken / None
**Rust around cap:** Y / N
**PVC Riser:** Good / Damaged / None
**Concrete collar:** OK / Cracked / Leaking / None
**Other evidence of:** Rodents / Insects / None
**Curb Box:** N / Y (key is: Hex / Pent / Other)

# Monitoring Well Sample Log

Low Flow Sampling

| | |
|---|---|
| Client/Project Name: Amerbelle | |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 |
| Sample#: 993090713- 07 | WELL ID: AM-7 |

FUSS & O'NEILL
*Disciplines to Deliver*

## Purge Data

Date: 7/13/2009
Start time: 1132 Stop time: 1132 Sample time: 1132
Pump Rate: _____ (ml/m) Depth Sampled: 9'
Total time purged: N/A Sampler: (RWM) / MSK
Volume Purged: _____ (ltr)
Purge Device: (Dedicated) / Nondedicated Weather: Sun, 80s
Device Type: Bladder / (Peristaltic) / Submersible
Filtered? N / Y Filter Size: 10u / 0.45u Filtered in: Field / Lab
Appearance: PVC: 8.30
Well Yield: High / Moderate / (Low) / Dry TPS: N/A
Well Diameter: 2" DTB: 8.89+0.28=9.17
Comments:

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 4 | ASIS |
| VOA | 2✓ | HCl |
| AL | 2 | ICE |
| ~~ASOZ~~ | 1 | ICE |
| P250 | 1 | HNO3 |
| P250 | 1 | F/HNO3 |
| P250 | 1 | H2SO4 |

## Field Parameter Data

Instrument ID#

| Solinst# 1 | | 2020# 1 | YSI 600 # 4 | | | | |
|---|---|---|---|---|---|---|---|
| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
| 8.30 | 1134 | — Dry, allow to recharge → | | | | | |
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## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable]

General Condition: Good / (Needs Repair)
Protective Steel: OK / Cracked / Leaking / Bent / Loose / (None)
Well # Visible?: Y / (N)
Well Cap: Good / (Broken) / None
Evidence of rain water between steel and PVC?: Y / (N)
Evidence of ponding around well?: Y / (N)
Gopher type holes around collar?: Y / (N)
Comments: No steel cover

Is well plumb?: (Y) / N
Lock: Good / Broken / (None)
Rust around cap: Y / N / (N/A)
PVC Riser: (Good) / Damaged / None
Concrete collar: OK / Cracked / Leaking / (None)
Other evidence of: Rodents / Insects / (None)
Curb Box: N / (Y) key is: Hex / Pent / ~~Other~~

# Monitoring Well Sample Log

Low Flow Sampling

| | | |
|---|---|---|
| Client/Project Name: Amerbelle | | FUSS & O'NEILL *Disciplines to Deliver* |
| Project Location: Vernon, Connecticut | PROJECT #: 20080371.A20 | |
| Sample#: 993090713-09 | WELL ID: MW-01 | |

## Purge Data

**Date:** 7/13/2009
**Start time:** 1206 **Stop time:** 1247 **Sample time:** 1248
**Pump Rate:** 100 (ml/m) **Depth Sampled:** 45'
**Total time purged:** 41 mins **Sampler:** RWM / MSK
**Volume Purged:** 4.1 (ltr)
**Purge Device:** Dedicated / Nondedicated Bladder (RWM)
**Weather:** Sun, 80s
**Device Type:** Bladder / Peristaltic / Submersible
**Filtered?** N / Y ~~Filter Size: 10u / 0.45u~~ **Filtered in:** Field / Lab
**Appearance:** Clear, no odor.
**Well Yield:** High / Moderate / Low / Dry
**Well Diameter:** 2"
**Comments:**

**PVC:** 5.38
**TPS:** 5.88
**DTB:** 49.11 + 0.28 = 49.391

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 4 ✓ | As/S |
| VOA | 2 ✓ | ~~HCl~~ |
| Ar | 2 ✓ | Ice |
| A 8oz. | 1 ✓ | Ice |
| P250 | 1 ✓ | $HNO_3$ |
| ~~P250~~ | ~~1~~ | ~~F/$HNO_3$~~ |
| P250 | 1 ✓ | $H_2SO_4$ |

## Field Parameter Data

**Instrument ID#**

Solinst# 1 | 2020# 1 | YSI 600 # 4

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 5.38 | 1200 | — Start | | | | | → |
| 7.42 | 1214 | 44.0 | 6.02 | 7.37 | 18.25 | 794 | 58.3 |
| 8.23 | 1217 | 66.1 | 7.23 | 7.24 | 17.80 | 780 | 66.8 |
| 8.96 | 1220 | 7.93 | 7.08 | 7.12 | 17.81 | 770 | 70.3 |
| 9.71 | 1223 | 3.42 | 6.24 | 7.07 | 17.80 | 768 | 69.5 |
| 10.16 | 1226 | 1.91 | 5.26 | 6.94 | 17.56 | 747 | 73.0 |
| 10.41 | 1229 | 1.95 | 4.45 | 6.87 | 17.54 | 730 | 73.6 |
| 10.75 | 1232 | 3.13 | 4.14 | 6.85 | 17.57 | 733 | 73.5 |
| 10.89 | 1235 | 2.90 | 3.85 | 6.87 | 17.72 | 728 | 73.1 |
| 11.34 | 1238 | 3.40 | 3.93 | 6.84 | 18.03 | 724 | 72.7 |
| 11.62 | 1241 | 2.85 | 3.45 | 6.81 | 17.77 | 722 | 73.7 |
| 11.98 | 1244 | 1.33 | 3.31 | 6.84 | 17.74 | 736 | 74.2 |
| 12.21 | 1247 | 0.29 | 3.21 | 6.82 | 17.68 | 733 | 75.0 |
| ← | 1248 | — Sample | | | | | → |
| | | | | | | | |
| | | | | | | | |

## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable]

**General Condition:** Good / Needs Repair
**Protective Steel:** OK / Cracked / Leaking / Bent / Loose/ None
**Well # Visible?:** Y / N
**Well Cap** Good / Broken / None
**Evidence of rain water between steel and PVC?:** Y / N
**Evidence of ponding around well?:** Y / N
**Gopher type holes around collar?:** Y / N
**Comments:**

**Is well plumb?:** Y / N
**Lock:** Good / Broken / None
**Rust around cap:** Y / N
**PVC Riser:** Good / Damaged / None
**Concrete collar:** OK / Cracked / Leaking / None
**Other evidence of:** Rodents / Insects / None
**Curb Box:** N / Y (key is: Hex / Pent / Other)

# Monitoring Well Sample Log

Low Flow Sampling

| | |
|---|---|
| Client/Project Name: Amerbelle | |
| Project Location: Vernon, Connecticut | **PROJECT #: 20080371.A20** |
| **Sample#: 993090713-** 10 | **WELL ID:** MW-03 |

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## Purge Data

**Date:** 7/13/2009
**Start time:** 1345 **Stop time:** 1416 **Sample time:** 1417
**Pump Rate:** 200 (ml/m) **Depth Sampled:** 31
**Total time purged:** 31 mins **Sampler:** (RWM) / MSK
**Volume Purged:** 6.2 (ltr)
**Purge Device:** (Dedicated) / Nondedicated **Weather:** Sun, 80s
**Device Type:** Bladder / (Peristaltic) / Submersible
**Filtered?** (N) / Y ~~Filter Size: 10u / 0.45u~~ **Filtered in:** Field / Lab
**Appearance:** Clear no odor.
**Well Yield:** (High) / Moderate / Low / Dry
**Well Diameter:** 2"
**Comments:**

**PVC:** 10.72
**TPS:** 11.49
**DTB:** 36.26

## Sample Data

| Container | Quantity | Preservative |
|---|---|---|
| VOA | 12 ✓ | Asis |
| VOA | 6 ✓ | HCl |
| Ar | 6 ✓ | ice |
| A802. | 3 ✓ | ice |
| P250 | 3 ✓ | $H_2SO_4$ |
| P250 | 3 ✓ | $HNO_3$ |

## Field Parameter Data

**Instrument ID#**

Solinst# 4 | 2020# 1 | YSI 600 # 4

| Water Level (ft) PVC | Time | Turbidity (ntu) | Dissolved Oxygen (mg/L) | pH | Temp. (deg C) | Specific Conductivity (uS) | ORP(mV) |
|---|---|---|---|---|---|---|---|
| 10.72 | 1345 | — Start | | | | | → |
| 10.76 | 1358 | 15.2 | 4.51 | 5.85 | 17.45 | 5879 | 243.6 |
| 10.76 | 1401 | 11.00 | 4.51 | 5.81 | 17.54 | 5912 | 251.3 |
| 10.77 | 1404 | 8.26 | 4.55 | 5.78 | 17.31 | 5882 | 258.6 |
| 10.77 | 1407 | 9.47 | 4.52 | 5.77 | 17.45 | 5877 | 260.7 |
| 10.77 | 1410 | 7.36 | 4.55 | 5.77 | 17.01 | 5787 | 264.5 |
| 10.77 | 1413 | 6.23 | 4.53 | 5.76 | 17.03 | 5780 | 266.7 |
| 10.77 | 1416 | 7.53 | 4.50 | 5.76 | 17.10 | 5768 | 269.2 |
| ← | 1417 | — Sample | | | | | → |
| | | | | | | | |
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## Well Condition Checklist

(circle appropriate item(s), cross out if not applicable]

**General Condition:** (Good) / Needs Repair
**Protective Steel:** (OK) / Cracked / Leaking / Bent / Loose/ None
**Well # Visible?:** (Y) / N
**Well Cap:** (Good) / Broken / None
**Evidence of rain water between steel and PVC?:** Y / (N)
**Evidence of ponding around well?:** Y / (N)
**Gopher type holes around collar?:** Y / (N)
**Comments:**

**Is well plumb?:** (Y) / N
**Lock:** (Good) / Broken / None
**Rust around cap:** Y / (N)
**PVC Riser:** (Good) / Damaged / None
**Concrete collar:** (OK) / Cracked / Leaking / None
**Other evidence of:** Rodents / Insects / (None)
**Curb Box:** N / (Y) (key is: (Hex) / Pent / Other)

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# Appendix D

Soil Analytical Laboratory Reports
(Submitted Electronically via CD)

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# Appendix E

Groundwater Analytical Laboratory Reports
(Submitted Electronically via CD)