Atlanta Environmental Management, Inc.
Environmental Consulting, Engineering, Hydrogeologic Services

400238

SCANNED

March 9, 2018

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SITE ASSESSMENT,
REMEDIATION &
REVITALIZATION

Ms. Jan Trent
Hydrogeologist
State Remediation Section
Site Assessment, Remediation &
Revitalization Division
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: Source Area Focused Feasibility Study Work Plan
Honea Path Plant (BLWM ID# 400238)
415 Brick Mill Road, Honea Path, South Carolina
AEM Project No. 1320-1801

Dear Ms. Trent:

On behalf of Ingersoll Rand, please find enclosed one electronic copy (on computer disc) and one hardcopy of the Source Area Focused Feasibility Study Work Plan located at the former Ingersoll Rand facility in Honea Path, South Carolina.

If you need anything else or have any questions, please call us at 404-329-9006.

Sincerely,

Atlanta Environmental Management, Inc.

Leona Miles, CHMM
Senior Project Manager

Michael Brock
Vice President

/krf

cc: Michael Goldstein (via e-mail)
Janet Hart (AEM)

Enclosures

(38)

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400238

Source Area Focused Feasibility Study Workplan

CD Scanned
PM Copy

Honea Path Plant
Honea Path, South Carolina

AEM Project No. 1320-1801-9

March 9, 2018

Prepared For:

Ingersoll Rand
800-E Beaty Street
Davidson, North Carolina 28036

Prepared By:

ATLANTA ENVIRONMENTAL MANAGEMENT, INC.
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SECTION 1.0
INTRODUCTION

This Focused Feasibility Study Work Plan (FFSWP) has been prepared on behalf of Ingersoll Rand for the former Ingersoll Rand Honea Path Plant (HPP) located at 415 Brickmill Road, Honea Path, Anderson County, South Carolina.

The FFSWP is being prepared in accordance with the South Carolina Department of Health & Environmental Control (DHEC) request dated February 24, 2016, and subsequent requests, to evaluate remedial options to address the source areas and interior of the groundwater plume. Additionally, as requested, the FFSWP is being prepared such that the final FFS will be consistent with the U.S. Environmental Protection Agency's (EPA) *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA,* dated October 1988. The objective of the FFSWP is to provide a framework for conducting a desktop evaluation of remedial alternatives for source area soil and groundwater at the HPP site.

SECTION 2.0
PROJECT BACKGROUND

The HPP is located on approximately 466 acres in a semi-rural area typically composed of woods and farm land at 415 Brick Mill Road, Honea Path, South Carolina (see Figure 1). The facility consists of a main manufacturing building, a smaller storage building to the rear of the plant, and a small wastewater treatment plant located northeast of the main plant building. Topographic features include the gullies and intermittent drainage features located on the northeastern, northern, and northwestern property boundaries (see Figure 2).

Two former trichloroethene (TCE) aboveground storage tanks (ASTs) have been used at the facility. The original TCE AST was located near the northern corner of the main plant building adjacent to a former methanol AST along the back-fence line within an unpaved area (see Figure 2). The TCE and methanol ASTs were removed in 1989. The TCE AST was then moved to the current AST tank farm until TCE was no longer used at the plant in 1992.

In 2006, Sanborn Head & Associates (SHA) collected soil samples as part of a Phase I/II assessment (SHA, 2006). Soil boring locations from this investigation (SH-01, -02, -03, -04, and SB-01 through SB-09) are shown on Figure 3. Three soil borings (SB-04, -05, and -06) were completed near the current AST tank farm. TCE was reported at 93 milligrams per kilogram (mg/kg) in the 10- to 12-foot (ft) sample collected from soil boring SB-05. This concentration exceeds both the EPA Industrial Soil Screening Level (SSL), which is 6.0 mg/kg, and the Maximum Contaminant Level (MCL) risk–based SSL, which is 0.0018 mg/kg. No volatile organic compounds (VOCs) were reported in soil samples collected from SB-04 and SB-06 (see Figure 3).

In October 2016, Atlanta Environmental Management, Inc. (AEM) collected additional soil samples to better assess soil in the upgradient plume areas near the plant (AEM, 2016). Soil boring locations from this investigation (B-01 through B-06) are shown on Figure 3. TCE was reported at concentrations ranging up to 57 mg/kg in the 10-ft sample collected from boring B-01 located 15 ft southwest of SHA boring SB-05 (see Figures 3 and 4).

Based on the results of the 2016 soil investigation, 15 soil samples were collected from 6 soil borings and analyzed for VOCs in July 2017 to assess the lateral and vertical extent of VOCs previously identified in soil borings B-01 and SB-05. No VOCs were identified in these soil samples above laboratory reporting limits.

SECTION 3.0
REMEDIAL ALTERNATIVES EVALUATION

The FFS of potential soil and groundwater remediation strategies will be based on the following criteria:

- Reducing the potential for leaching of source area soil near the current AST tank pad, specifically centered around historical soil sample locations SB-05 and B-01.
- Reducing groundwater halogenated VOC concentrations in source area groundwater defined as those near monitoring well SH-02 and recovery well MW-19A (see Figure 4).

The following subsections discuss select alternatives that will be evaluated to address the impacted media identified above. These alternatives were identified from a list of commonly used and advanced innovative technologies for the treatment of VOCs. This also includes evaluating the ongoing groundwater pump and treat remedial action at HPP.

The primary goal of the remedial action is protection of human health and the environment. The remedial action objectives (RAOs) for source soil and groundwater are focused on:

- Reducing the potential for leaching to groundwater from the vadose zone.
- Reducing source area groundwater impacts to further mitigate/control impacts to downgradient streams.

As part of the FFS, each remedial alternative identified below will be evaluated using EPA's Remedy Technology Screening Matrix (Matrix) (https://frtr.gov/matrix2/top_page.html) to eliminate those alternatives that may not be applicable due to implementation and/or site constraints (i.e., soil types, underground utilities, and piping), short-term and long-term effectiveness, protection of human health and the environment, and/or cost.

3.1 SOURCE AREA SOIL REMEDIAL ALTERNATIVES

Source area soil remedial alternatives will be screened and a limited list evaluated in the FFS as discussed below. The list of alternatives presented below are the alternatives that are expected to be selected for additional screening and evaluation from the broader list of alternatives identified in EPA's Remedy Technology Screening Matrix for the purposes of identifying the most technically appropriate and implementable alternative given the current site operations, infrastructure, and depth of contamination.

3.1.1 No Action

This alternative includes no action for source area soil. An evaluation of the leachability of contaminants in source soil relative to the existing groundwater conditions will also be conducted to determine that "no action" is applicable.

3.1.2 Institutional Controls

Administrative tools for use in limiting the disturbance or source soil. This alternative may be used as a stand-alone remedy or in conjunction with another alternative.

3.1.3 Engineering Controls

Engineered barriers for use in limiting the disturbance or source soil. This alternative may be used as a stand-alone remedy or in conjunction with another alternative.

3.1.4 Excavation

Contaminated material is removed and transported to permitted off-site treatment and/or disposal facilities.

3.1.5 Soil Vapor Extraction

Soil vapor extraction (SVE) is an *in situ* unsaturated (vadose) zone soil remediation technology in which a vacuum is applied to the soil to induce the controlled flow of air and remove volatile and some semi-volatile contaminants from soil.

3.1.6 *In Situ* Chemical Oxidation/Blending

This remedial alternative may include *in situ* blending and/or injections into the source area. Oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.

3.1.7 Electrical Resistivity Heating and SVE

Electrical resistance heating (ERH) uses an electrical current to heat soil so that water and contaminants are vaporized and removed via vacuum extraction. Electrodes are placed in the treatment area and activated so that electrical current passes through the soil, creating a resistance that then heats the soil. The heat created by electrical resistance changes liquids into the vapor state for removal by SVE.

3.2 SOURCE AREA GROUNDWATER REMEDIAL ALTERNATIVES

Source area groundwater remedial alternatives to be evaluated are discussed below.

3.2.1 No Action

This alternative includes no action for source area groundwater, which would entail not pumping groundwater near the plant in the source area.

3.2.2 Monitored Natural Attenuation

Monitoring the progress of natural contaminant degradation in groundwater. This alternative may be used in conjunction with other alternatives as a polishing tool or as the only remediation option if the rate of contaminant degradation is fast enough to reach RAOs.

3.2.3 Institutional Controls

Administrative tools for use in preventing the use of groundwater for drinking water purposes. This alternative may be used as a stand-alone remedy or in conjunction with another alternative.

3.2.4 Continued Pump and Treat

Continue to pump and treat groundwater at the source area. Groundwater is extracted using submersible pumps and treated via an air stripper prior to being discharged to a central sump and then to Broad Mouth Creek via a National Pollutant Discharge Elimination System (NPDES) permit.

3.2.5 Vacuum Enhanced Pump and Treat

This option would require the addition of vacuum enhancement to the existing groundwater pumping wells in the current Pump and Treat system. A vacuum is placed on existing pumping wells to increase the radius of capture for the pumping well.

3.2.6 Extraction and Reinjection

Groundwater is extracted and treated *ex situ* (i.e., air stripping, or granular activated carbon) and the treated groundwater is reinjected into the aquifer at strategic locations upgradient of the soil and groundwater sources. Implementation of this alternative may enhance the flushing through preferential flow paths at the HPP site. The groundwater treatment may also be augmented with chemical oxidants during reinjection.

3.2.7 Air Sparging/Vacuum Extraction

Air is injected into the contaminant plume to promote volatilization of the VOCs present and pushes it upward into the vadose zone and/or ambient air. This technology may be evaluated along with vacuum extraction, where applicable.

3.2.8 *In Situ* Treatment

This remedial alternative may include *in situ* injections in one or more areas upgradient of the source areas near monitoring well SH-02 and recovery well MW-19A. Injections may consist of chemical oxidation or bioremediation.

Chemical oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. Bioremediation uses naturally occurring micro-organisms to degrade the halogenated contaminants.

3.2.9 Permeable Reactive Barrier

This alternative involves the installation of a permeable reactive barrier wall across the flow path of the contaminated groundwater plume, allowing the water portion of the plume to passively move through the wall. These barriers allow the passage of water while prohibiting the movement of contaminants by employing such agents as zero-valent metals, sorbents, microbes, and others. The contaminants will be either degraded or retained in a concentrated form by the barrier material.

SECTION 4.0
TREATABILITY STUDIES

Treatability studies are laboratory or field tests (i.e., pilot test or bench scale test) designed to provide critical data needed to evaluate the implementation of one or more treatment technologies. The results may be quantitative or qualitative, depending on the level of treatability testing conducted.

During the desktop evaluation of selected remedies, treatability studies may be necessary to complete the evaluation of the feasibility of the selected remedial alternative. Treatability studies will be conducted in accordance with EPA's *Guide for Conducting Treatability Studies Under CERCLA,* dated 1992, and *Treatability Studies Under CERCLA: An Overview,* dated 1989. The information obtained from the treatability study will aid in determining whether the remedial alternative will achieve site-specific goals as outlined in Section 3.0, design and operating parameters necessary to ensure performance, and cost to implement. Any treatability study that may be conducted would be to evaluate a selected remedy to determine whether the remedy would be applicable to the site.

SECTION 5.0
SUMMARY

Upon approval of the FFSWP by DHEC, Ingersoll Rand will conduct the potential remedial alternatives screening. If necessary or warranted, pilot test and/or treatability studies may be conducted.

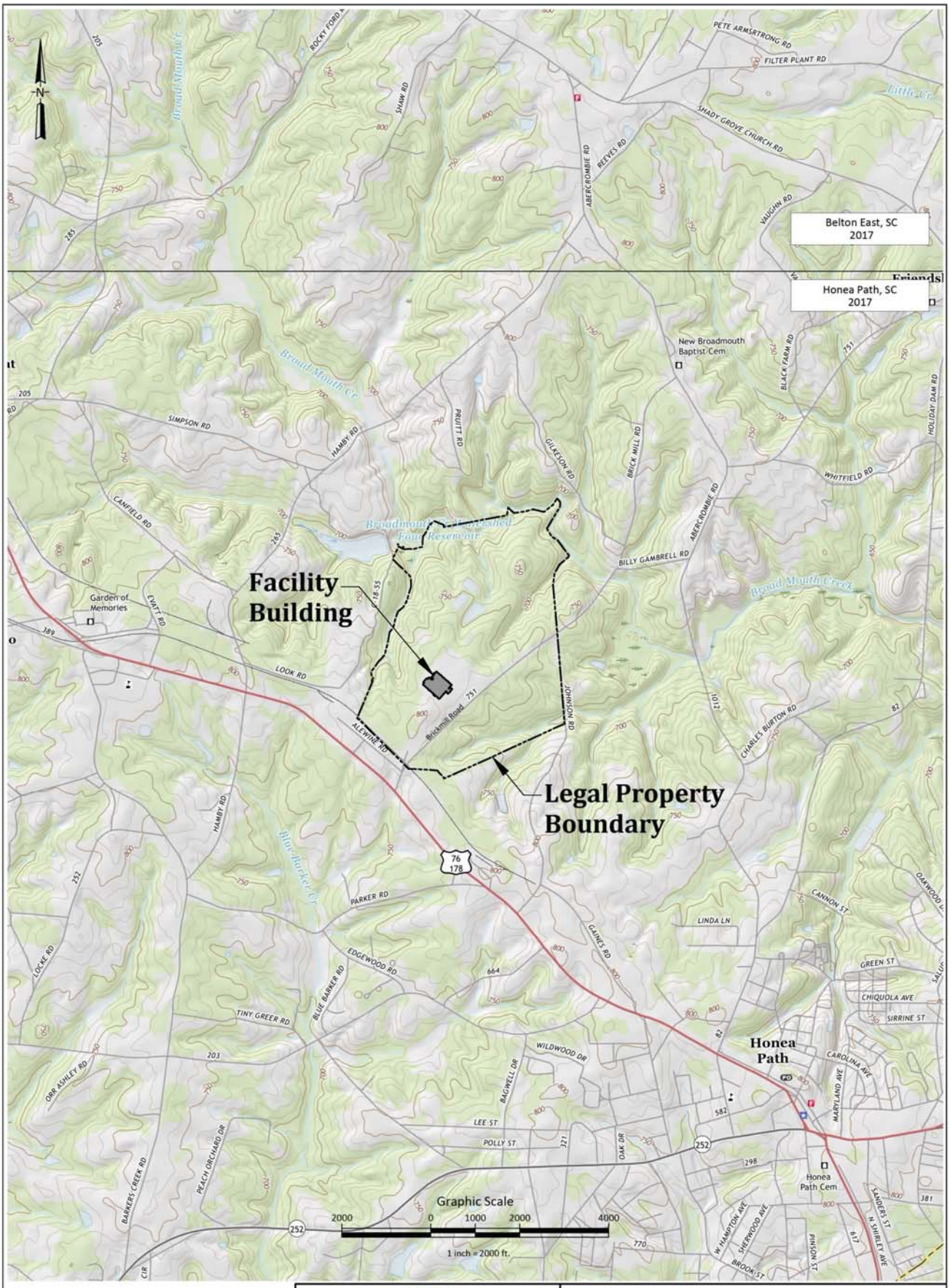
The FFS will be prepared to provide a final recommendation of selected remedial alternatives for both source area media as defined in Section 3.0. Final remedial alternatives for each medium may be a single remedy or a combination of remedial alternatives.

The FFS will include the following tasks:

- Presenting historical sampling results and response actions summary;
- Developing remedial action objectives and/or remediation goals;
- Identifying and screening remedial technologies applicable for each source area;
- Evaluating the remedial action alternatives under CERCLA criteria utilizing a scoring system based on the Matrix, including factors such as protection of human health and the environment; compliance with cleanup standards; short-term and long-term effectiveness; reduction of toxicity, mobility, or volume; implementability; cost; State acceptance; and community acceptance, as applicable;
- Identifying data necessary for implementing selected remedial alternatives, if necessary.

It is anticipated that the FFS will be complete within nine months of approval of the FFSWP by DHEC. This allows for completion of any bench scale or pilot studies needed to complete the FFS evaluation.

FIGURES



AEM
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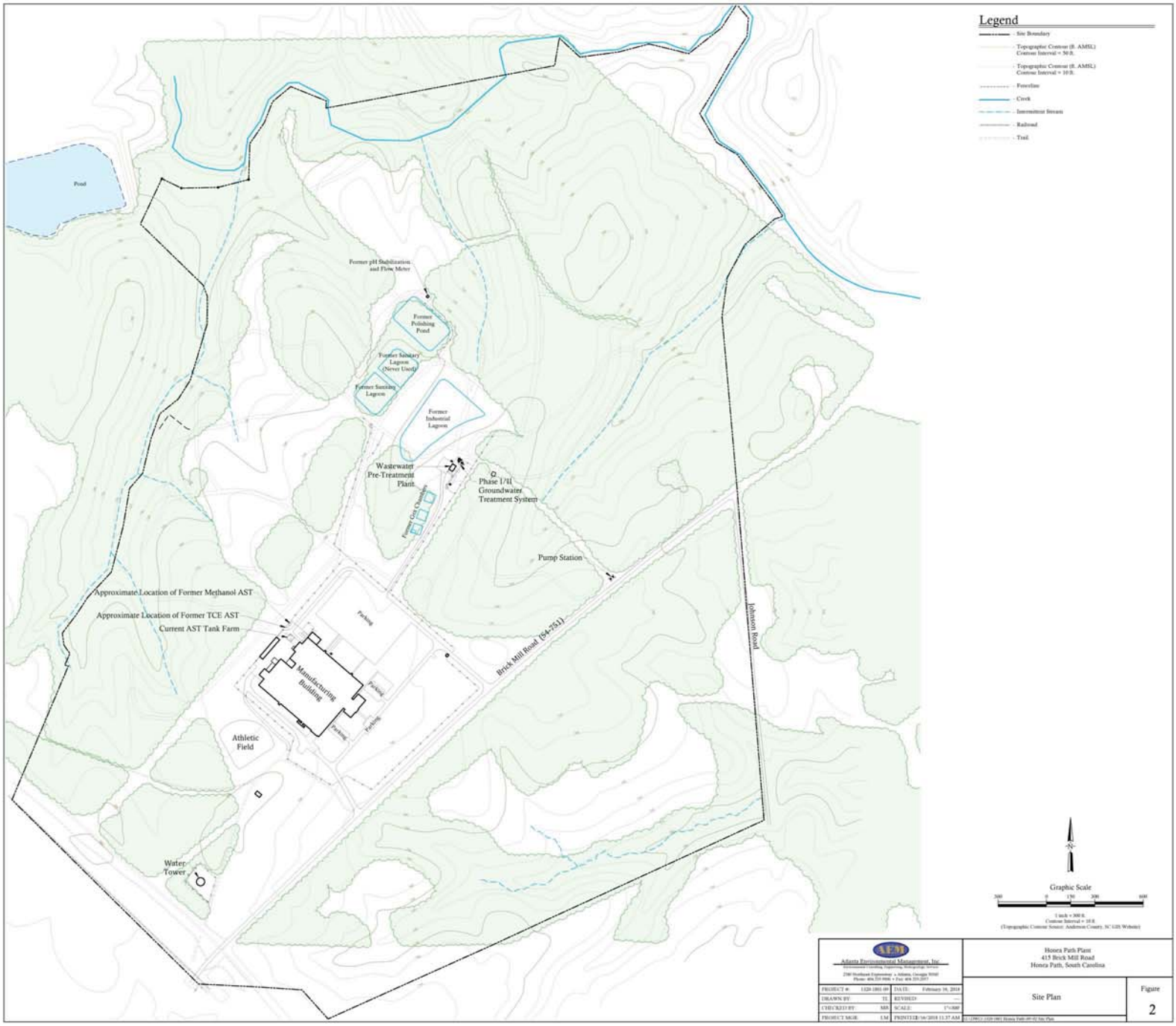
Honea Path Plant
415 Brick Mill Road
Honea Path, South Carolina

PROJECT #:	1320-1801-09	DATE:	February 16, 2018
DRAWN BY:	TL	REVISED:	----
CHECKED BY:	MB	SCALE:	1" = 2000'
PROJECT MGR:	LM	PRINTED:	2/16/2018 2:49 PM

Facility Location

Figure 1

G:\DWG\1320-1801 Honea Path\09\01 Site Location


Legend
Site Boundary
Topographic Contour (ft. AMSL) Contour Interval = 50 ft.
Topographic Contour (ft. AMSL) Contour Interval = 10 ft.
Powerline
Creek
Intermittent Stream
Railroad
Trail
Pond
Former pH Stabilization and Flow Meter
Former Polishing Pond
Former Sanitary Lagoon (Never Used)
Former Sanitary Lagoon
Former Industrial Lagoon
Wastewater Pre-Treatment Plant
Phase I/II Groundwater Treatment System
Pump Station
Approximate Location of Former Methanol AST
Approximate Location of Former TCE AST
Current AST Tank Farm
Manufacturing Building
Parking
Athletic Field
Water Tower
Brick Mill Road [SR-7511]
Johnson Road
N
Graphic Scale
300 0 150 300 600
1 inch = 300 ft.
Contour Interval = 10 ft.
(Topographic Contour Source: Anderson County, SC GIS Website)
Atlanta Environmental Management, Inc.
Honea Path Plant
415 Brick Mill Road
Honea Path, South Carolina
PROJECT #: 1320-1801-09
DATE: February 16, 2018
DRAWN BY: TL
REVISED:
CHECKED BY: MH
SCALE: 1"=300'
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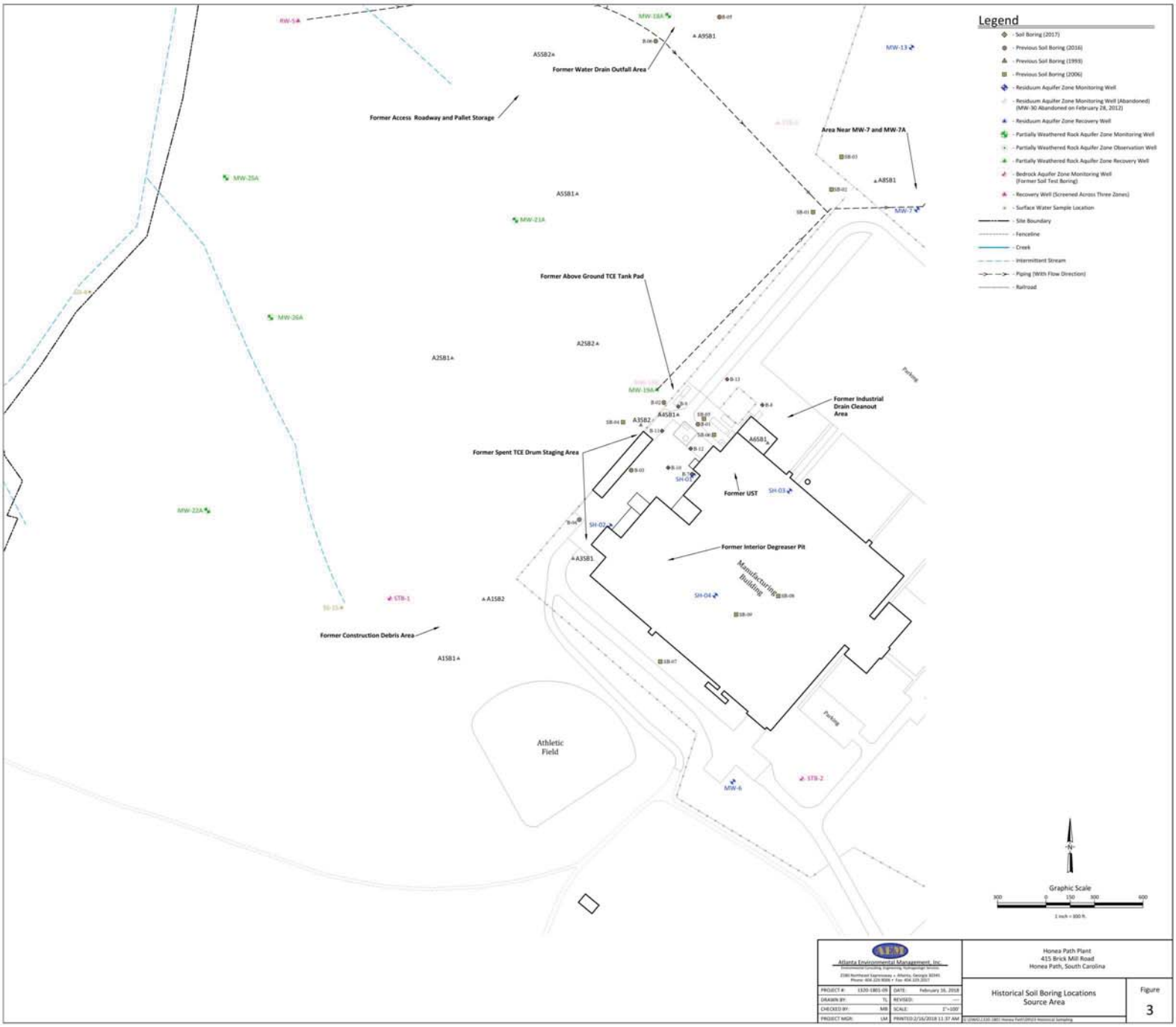
PRINTED: 2/16/2018 11:37 AM
C:\2961\1320-1801 Honea Path\09-02 Site Plan
Site Plan
Figure
2



Atlanta Environmental Management, Inc.		Honea Path Plant 415 Brick Mill Road Honea Path, South Carolina	
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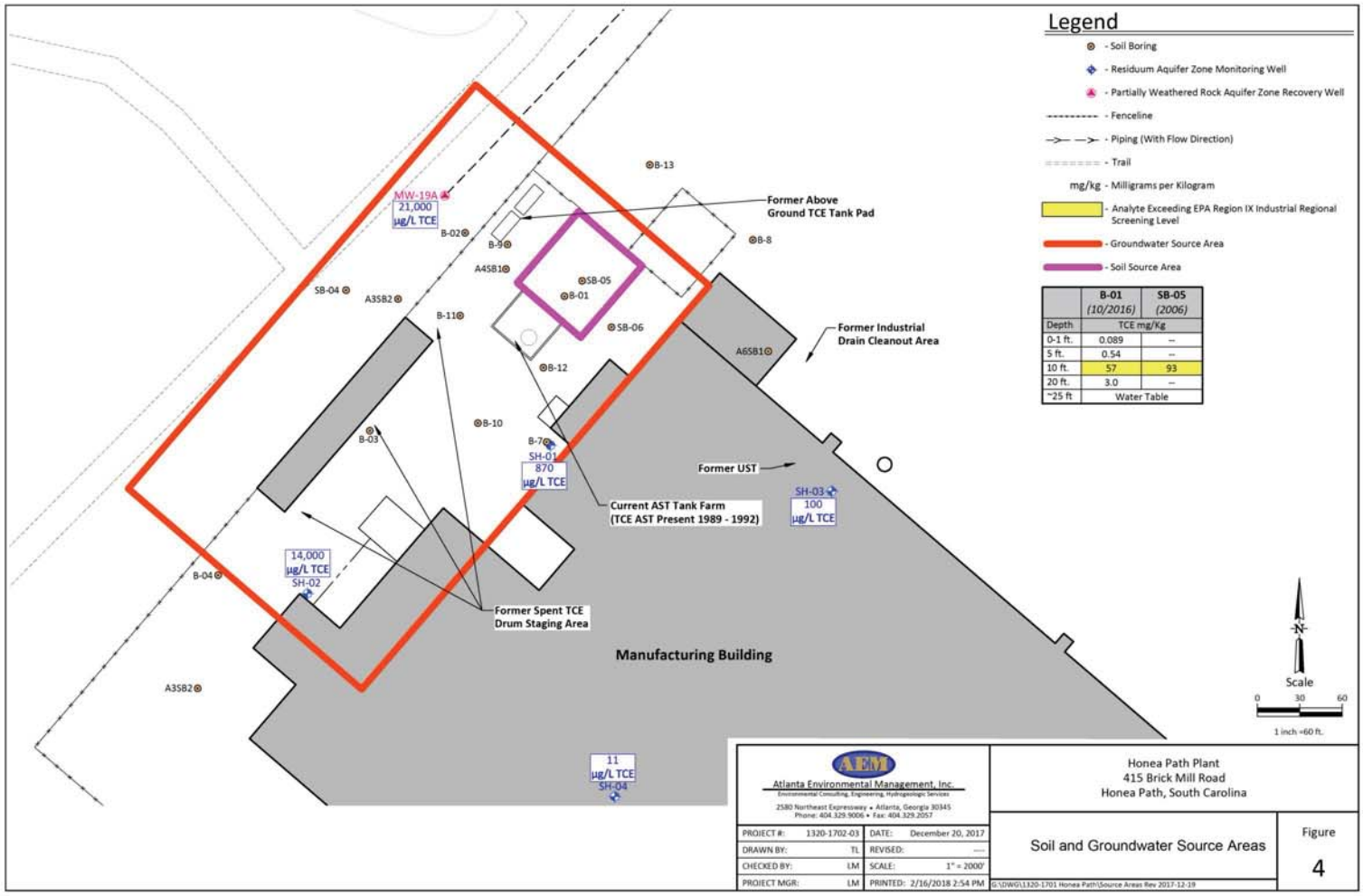
Historical Soil Boring Locations Source Area		Figure	3


Legend
- Soil Boring
- Residuum Aquifer Zone Monitoring Well
- Partially Weathered Rock Aquifer Zone Recovery Well
- Fenceline
- Piping (With Flow Direction)
- Trail
mg/kg - Milligrams per Kilogram
- Analyte Exceeding EPA Region IX Industrial Regional Screening Level
- Groundwater Source Area
- Soil Source Area
B-01 (10/2016) SB-05 (2006)
Depth TCE mg/Kg
0-1 ft. 0.089 --
5 ft. 0.54 --
10 ft. 57 93
20 ft. 3.0 --
~25 ft Water Table
MW-19A 21,000 µg/L TCE
Former Above Ground TCE Tank Pad
Former Industrial Drain Cleanout Area
Former UST
Current AST Tank Farm (TCE AST Present 1989 - 1992)
Former Spent TCE Drum Staging Area
Manufacturing Building
SH-01 870 µg/L TCE
SH-02 14,000 µg/L TCE
SH-03 100 µg/L TCE
SH-04 11 µg/L TCE
B-01 B-02 B-03 B-04 B-7 B-8 B-9 B-10 B-11 B-12 B-13
SB-04 SB-05 SB-06
A3SB2 A4SB1 A5SB1 A6SB1
N
Scale
0 30 60
1 inch =60 ft.
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PROJECT MGR: LM PRINTED: 2/16/2018 2:54 PM
G:\DWG\1320-1701 Honea Path\Source Areas Rev 2017-12-19
Honea Path Plant
415 Brick Mill Road
Honea Path, South Carolina
Soil and Groundwater Source Areas
Figure
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