From: Johnstone, Paul S <paul.johnstone@woodplc.com>
Sent: Friday, August 17, 2018 11:31 AM
To: Rahn, Regan D. <RAHNRD@dhec.sc.gov>
Subject: Field Sampling and Analysis Plan - Former Vermont Bosch Site

Regan,

Attached please find the Field Sampling and Analysis Plan (FSAP) for the requested site-wide groundwater sampling event at the Former Vermont Bosch Site in Fountain Inn, South Carolina. Upon your approval of the FSAP, we will schedule the sampling event. Please don't hesitate to give me a call if you have any questions or wish to discuss the FSAP.

Paul S. Johnstone, P.G. Principal Geologist/Client Account Manager Environment & Infrastructure Solutions 400 Executive Center Drive, Suite 310 Greenville, SC 29615 Direct: +01.864.458.3707 Mobile: +01.864.616.4176 [www.woodplc.com]www.woodplc.com



	RECEIVED Sa309
Wood Environment & Infrastructure Solutions, Inc. 400 Executive Center Dr., Suite 300 Greenville, South Carolina 29615 Phone: (864) 458-3600 Fax: (864) 458-3700	AUG 3 1 2018 WOOD. SITE ASSESSMENT, REMEDIATION & BEVITALIZATION
LETTER	OF TRANSMITTAL SCANNED
TO: Ms. Regan Rahn SCDHEC 2600 Bull Street Columbia, South Carolina 29201	DATE: August 30, 2018 PROJECT NO.: 6251161022.03 PROJ. NAME: Former Vermont Bosch Site SUBJECT: Field Sampling and Analysis Plan
WE TRANSMIT TO YOU: HEREW	
SUBJECT: ACTION: DRAWINGS FOR YOUR INFORM SPECIFICATIONS FOR YOUR COMME CALCULATIONS RETURNED FOR CO REPORT APPROVED AS NOT COST ESTIMATE AS REQUESTED AS NOTED AS NOTED	SENT BY: MATION MAIL ENT OR APPROVAL CERTIFIED DRRECTION: RESUBMIT EXPRESS FedEx TED HAND DELIVERED E-MAIL FACSIMILE: pages (including transmittal sheet)
COPIES DATE DESCRIPTION	
1 8/17/18 Field Sampling and Ana	alysis Plan
REMARKS:	
CC.	By: Pers. Ja
File (1)	Paul S. Johnstone, P.G. Principal Geologist Direct Phone: (864) 458-3707 Direct Fax: (864) 458-3700
CONFIDENTIALITY NOTICE : This message is intended only for that is privileged, confidential, and exempt from disclosure under a or agent responsible for delivering the message to the intended communication is strictly prohibited. If you have received this co	r the use of the individual or entity to which it is addressed, and may contain information applicable law. If the reader of this message is not the intended recipient, or the employee recipient, you are hereby notified that any dissemination, distribution, or copying of this communication in error, please notify us immediately by telephone and return the original
message to us at the above address via the U.S. Postal Service. If transmission is not received in ge Document5	Thank you. bod order, please call Paul S. Johnstone at (864) 458-3707 Form Revised 3/16/12





AUG 3 1 2018

SITE ASSESSMENT, REMEDIATION & REVITALIZATION Wood Environment & Infrastructure Solutions 400 Executive Center Drive, Suite 310 Greenville, South Carolina 29615 T: 864.458.3600 www.woodplc.com

FIELD SAMPLING AND ANALYSIS PLAN FORMER VERMONT BOSCH SITE FOUNTAIN INN, SOUTH CAROLINA

Prepared For:

SCDHEC SITE ID #52309

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management 2600 Bull Street Columbia, South Carolina 29201

Prepared By:

Wood Environment & Infrastructure Solutions, Inc. 400 Executive Center Drive, Suite 310 Greenville, South Carolina 29615 Wood Project 6800079612.02

On Behalf Of:

Robert Bosch Tool Corporation 1800 West Central Road Mount Prospect, Illinois 60056

August 17, 2018





Wood Environment & Infrastructure Solutions 400 Executive Center Drive, Suite 310 Greenville, South Carolina 29615 T: 864.458.3600 www.woodplc.com

August 17, 2018

Ms. Regan Rahn, Project Manager Bureau of Land and Waste Management South Carolina Department of Health and Environmental Control 2600 Bull Street Columbia, South Carolina 29201

Subject: Field Sampling and Analysis Plan Former Vermont Bosch Site Fountain Inn, South Carolina SCDHEC Site ID #52309 Wood Project 6251161022.03

Dear Ms. Rahn:

Wood Environment & Infrastructure Solutions, Inc. (Wood), formerly Amec Foster Wheeler Environment & Infrastructure, Inc., has prepared this Field Sampling and Analysis Plan (FSAP) for site-wide groundwater sampling pursuant to your letter dated June 11, 2018. Upon approval of the FSAP by the South Carolina Department of Health and Environmental Control, Wood will implement the site-wide groundwater sampling event.

Should you have any questions or wish to discuss the contents of the plan, please don't hesitate to contact us

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.

Zachery J. Downes, G.I.T. Staff Geologist

051

Paul S. Johnstone, P.G. Principal Geologist Registered, SC #2134

Cc: Mr. Scott Pihlaja – Robert Bosch Tool Corporation, Mount Prospect, IL Ms. Rachael Remmers – Robert Bosch, LLC, Farmington Hills, MI





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Table 1Summary of Monitoring Well Construction Data

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- Figure 1 Site Location Map
- Figure 2 Monitoring Well Location Map





LIST OF ACRONYMS

AOC	Area of concern
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DO	Dissolved Oxygen
DPT	Direct Push Technology
FB	Field Blank
FSAP	Field Sampling and Analysis Plan
ID	Inside diameter
IDW	Investigative Derived Waste
ORP	Oxidation Reduction Potential
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RB	Rinse Blank
RBTC	Robert Bosch Tool Corporation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study Work Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SESD	Science and Ecosystem Support Division
SPGS	Screen Point Groundwater Sampler
ТВ	Trip Blank
USEPA	United States Environmental Protection Agency
VCC	Voluntary Cleanup Contract
VOCs	volatile organic compounds





1.0 INTRODUCTION

This Field Sampling and Analysis Plan (FSAP) for site-wide groundwater sampling has been prepared at the request of the South Carolina Department of Health and Environmental Control (SCDHEC) in their letter dated June 11, 2018. The SCDHEC letter approved the December 8, 2017 Groundwater Sampling Report and additionally approved the Remedial Investigation (RI) Report Addendum for the Vermont Bosch Site (site) located in Fountain Inn, South Carolina (**Figure 1**). With the completion of the RI, SCDHEC requested that a comprehensive groundwater sampling event be conducted prior to moving forward with the Feasibility Study (FS).

The FSAP has been prepared by Wood Environment & Infrastructure Solutions, Inc. (Wood), formerly Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), AMEC Environment & Infrastructure, Inc. (AMEC), and MACTEC Engineering and Consulting, Inc. (MACTEC), on behalf of Robert Bosch Tool Corporation (RBTC), in accordance with Voluntary Cleanup Contract (VCC) #05-5613-RP, executed on August 29, 2005, and the United States Environmental Protection Agency (USEPA) "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (USEPA, 1988).

This FSAP for site-wide groundwater sampling presents the details associated with the SCDHECrequested groundwater sampling activities. The following sections describe the proposed sampling program including sampling rationale, the locations, number and types of samples to be collected, and the analyses that will be performed. The general procedures for field sample collection and analysis, field documentation, sample labeling, sample custody and data management are described in the project Quality Assurance Project Plan (QAPP) which is contained as Appendix B in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan (AMEC, 2012). When procedural information is provided in the FSAP, its inclusion is intended as a sitespecific supplement to QAPP procedure. If site-specific sample collection requirements described in the FSAP conflict with the general requirements in the QAPP, the site-specific FSAP procedure will supersede the QAPP requirement for that activity.





2.0 SAMPLING OBJECTIVES

To date, 32 monitoring wells have been installed at the site at the locations shown on **Figure 2**. The monitoring well network consists of 20 shallow wells (near water table surface), four intermediate wells, four deep wells (top of rock), and four bedrock wells. Monitoring well construction information is provided in **Table 1**. Groundwater samples will be collected from each of the permanent monitoring wells for laboratory analysis.

Volatile organic compounds (VOCs) were detected in groundwater samples collected immediately downgradient from Area of Concern (AOC) # 9 (Former Hazardous Waste Accumulation Building) and on the adjacent Fort Dearborn (former Sherwin-Williams) property, which is also downgradient from AOC #9. Of the 32 monitoring wells installed at the site, 22 monitoring wells are installed downgradient of AOC #9.

The purpose of the proposed site-wide groundwater sampling activities described in this FSAP is to provide a current view of site groundwater conditions before evaluating remedial alternatives for the site.





3.0 SAMPLING RATIONALE AND LOCATIONS

This section describes the sampling of site groundwater to provide a current view of site groundwater conditions before evaluating remedial alternatives for the site. These activities will be performed in accordance with the RI/FS Work Plan (AMEC, 2012).

The field activities will include the collection of groundwater samples from permanent monitoring wells installed at the site (**Figure 2**). Groundwater sampling procedures are described in Section B2 (pages B-13 to B-16) of the QAPP. For informational purposes, field measurements of pH, conductivity, temperature, dissolved oxygen (DO), and oxidation reduction potential (ORP) will be collected from each monitoring well.





4.0 SAMPLE EQUIPMENT AND HANDLING PROCEDURES

The sampling will be performed in accordance with procedures described in the QAPP and in general conformance with the USEPA Region IV, Science and Ecosystem Support Division (SESD), *Field Branches Quality System and Technical Procedures*.

The QAPP contains specific procedures and requirements for data management which includes a format for unique sample identification numbers, initiating the sample custody process, and preparing field documentation on each sample collected. The field documentation includes use of field logbooks to describe and document the sequence of daily activities on-site and field data records to record observations and field measurements for each sample collected. These procedures, as well as data quality objectives, and details concerning the analytical program, including quality assurance/quality control (QA/QC) sample requirements are described in Section A7 (pages A-20 to A-26) of the QAPP.

Sampling related procedures contained in this FSAP are in addition to those contained in the QAPP.

4.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples will be collected in accordance with procedures described in Section B2 (pages B-13 to B-16) of the QAPP. The analytical methods, the sample bottle, sample preservation and sample hold time requirements are specified in Table B-2 of the QAPP.

4.2 FIELD DOCUMENTATION AND SAMPLE NUMBERING

During sampling activities, field data will be documented in a field logbook and a field data record form. The use and content of the field logbook is described in Section A9 (pages A-27 to A-28) and Section B3 (pages B-21 to B-22) of the QAPP. The field data records are described in Section A9 (pages A-27 to A-28) of the QAPP.

Field monitoring equipment will be calibrated in accordance with manufacturer's procedures and the calibration results will be documented in a field data record.

A unique sample number will be used for each sample collected. The sample number system is described in Section B3 (pages B-20 to B-21) of the QAPP. This system includes identification of field samples and QA/QC samples.





Sample labels will be prepared for each sample, which will include the sample number, the sample bottle and preservation requirements, analytical method(s), sample date, time, and sampler initials. Sample chain of custody procedures are described in Section B3 (page B-21 through B-23) of the QAPP.



5.0 SAMPLE PRESERVATION AND ANALYSIS

Based on previous data and the nature of the site activities, the sampling plan will focus on VOCs.

5.1 SAMPLE ANALYSIS

Sample containers will be prepared and provided by the laboratory. Table A-4 of the QAPP presents a summary of practical quantitation limit (PQL) and regulatory standards associated with each respective compound for Method 8260B (VOCs). The sample container and preservation requirements are provided in Table B-3 of the QAPP.

5.2 GROUNDWATER SAMPLE ANALYTICAL PROCEDURE

Groundwater will be analyzed in accordance with USEPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Groundwater samples will be prepared and analyzed following USEPA Method 8260B for VOCs.

5.3 FIELD QUALITY ASSURANCE AND QUALITY CONTROL SAMPLES

Specific details of the project QA/QC are presented in the QAPP. The QC checks include the introduction of control samples into the sample analysis process in an effort to evaluate the accuracy and precision of the sampling and analysis program. QA/QC samples will be collected in accordance with procedures described in Section A7 (pages A-20 through A-26) and Section B5 (pages B-28 through B-29) of the QAPP

Field Blanks. One field blank (FB) sample will be collected per sampling day.

<u>Rinsate Blanks</u>. One rinsate blank (RB) sample will be collected per each type of media-specific sampling equipment used during a sampling event when such sampling equipment is cleaned in the field.

<u>Trip Blanks</u>. Trip blanks (TB) will be shipped with each cooler containing field samples collected for VOC analysis.

<u>Field Duplicate Samples</u>. Field duplicate samples will be collected at a frequency of ten percent for each media sampled.





6.0 DECONTAMINATION PROCEDURES

Groundwater sampling equipment will be decontaminated prior to the start of sampling and between each monitoring well. Equipment will be decontaminated in accordance with the procedures described in Section B2 (pages B-17 to B-19) of the QAPP. Equipment will be decontaminated as follows:

- Clean with tap water and soap using a brush if necessary to remove particulate matter and surface films. Equipment may be steam cleaned (soap and high pressure hot water) as an alternative to brushing. Sampling equipment that is steam cleaned will be placed on racks or saw horses at least two feet above the floor of the decontamination pad. Polyvinyl chloride (PVC) or plastic items will not be steam cleaned.
- Rinse thoroughly with tap water.
- Rinse thoroughly with analyte free water.
- Rinse thoroughly with solvent (e.g., pesticide-grade isopropanol). PVC or plastic items will not be rinsed with solvent.
- Rinse thoroughly with organic/analyte free water. If organic/analyte free water is not available, equipment will be allowed to completely dry. A final rinse will not be applied with analyte water.
- Remove the equipment from the decontamination area and cover with plastic. Equipment stored overnight will be wrapped in aluminum foil and covered with clean, unused plastic.





7.0 POST-SAMPLING ACTIVITIES

During the field activities, investigative derived wastes (IDW) are expected to be generated that will consist of purge water generated during sampling of the monitoring wells. The IDW will be containerized in 55-gallon drums, sealed with the drum cover and cover ring, and stored within the security fence of the site. The nut on the cover ring will be tightened to the extent possible using a ratchet and socket or other similar hand tool. The drums will be labeled with an identification number, date, contents, and associated sampling locations pending the results of the laboratory analyses, at which time the drums will be scheduled for removal and proper disposal. The laboratory analytical results from the groundwater sampling will be used for waste characterization purposes to determine proper disposal of the IDW. Transportation manifests and certificates of disposal will be obtained. The IDW drum inventory will be maintained by the Field Operations Leader.



8.0 REFERENCES

- Amec Foster Wheeler, 2017. Groundwater Sampling Report, Former Vermont Bosch Site, Fountain Inn, South Carolina, SCDHEC Site ID #52309, Amec Foster Wheeler Project 6251161022.02.03, Greenville, South Carolina.
- Amec Foster Wheeler, 2017. Remedial Investigation Report Addendum, Former Vermont Bosch Site, Fountain Inn, South Carolina, SCDHEC Site ID #52309, Amec Foster Wheeler Project 6251161022.02.03, Greenville, South Carolina.
- Amec Foster Wheeler, 2016. Remedial Investigation Report, Former Vermont Bosch Site, Fountain Inn, South Carolina, SCDHEC Site ID #52309, Amec Foster Wheeler Project 6251121007.03.01, Greenville, South Carolina.
- AMEC, 2012. Remedial Investigation / Feasibility Study Work Plan, Revision 4.0, Former Vermont Bosch Site, Fountain Inn, South Carolina, AMEC Project 6251121007.01.01, Greenville, South Carolina.
- United States Environmental Protection Agency, 1988, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," Office of Solid Waste and Emergency Response, OSWER Directive 9355.3-01 EPA/540/G-89/004.
- United States Environmental Protection Agency, Region IV Science and Ecosystem Support Division, various dates, "Field Branches Quality System and Technical Procedures."



TABLE

TABLE 1

Summary of Monitoring Well Construction Information Former Vermont Bosch Site Fountain Inn, South Carolina Wood Project 6251161022.03

Monitoring Well	Date Installed	Northing	Easting	Ground Elevation (ft, msl)	TOC Elevation (ft, msl)	Boring Depth (ft, bgs)	Casing Depth (ft, bgs)	Well Depth (ft, bgs)	Screened Interval (ft, bgs)	Screen Length (ft)	Top of Sand (ft, bgs)	Top of Bentonite (ft, bqs)	Zone
B-1	4/23/1985	1040043.7640	1639622.5660	834.83	834.59	21.00	NA	20.40	10.40 - 20.40	10.00	9.00	8.00	Shallow
MW-08-01	8/30/2002	1039825.6220	1639518.2470	833.81	833.58	24.00	NA	24.00	14.00 - 24.00	10.00	NM	NM	Shallow
MW-08-2D	12/3/2014	1039818.7168	1639511.8542	834.06	833.80	82.00	63.00	82.00	76.00 - 81.00	5.00	74.00	70.00	Bedrock
MW-08-03	11/12/2014	1039759.7352	1639474.9823	834.02	833.56	20.25	NA	20.25	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-08-04	11/13/2014	1039728.9413	1639555.5862	829.01	828.78	19.75	NA	19.75	9.50 - 19.50	10.00	7.50	5.50	Shallow
MW-08-05	11/12/2014	1039793.8660	1639602.9207	831.65	831.35	20.25	NA	20.25	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-09-06	11/12/2014	1039456.7701	1639115.7991	822.46	822.13	20.25	NA	20.25	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-09-07	7/17/2015	1039581.9240	1639063.2460	829.14	828.88	25.25	NA	25.25	15.00 - 25.00	10.00	13.00	11.00	Shallow
MW-09-08D	7/17/2015	1039585.6570	1639058.7090	828.98	828.72	92.25	78.00	92.25	87.00 - 92.00	5.00	82.00	74.00	Bedrock
MW-09-09	11/10/2014	1039652.8179	1639080.8861	831.12	830.93	25.25	NA	25.25	15.25 - 25.25	10.00	13.00	10.00	Shallow
MW-09-10	11/13/2014	1039555.6434	1638909.2130	818.55	818.00	19.25	NA	19.25	9.00 - 19.00	10.00	7.00	5.00	Shallow
MW-09-11	11/13/2014	1039386.6393	1638955.6618	818.39	818.14	20.25	NA	20.00	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-09-12D	11/20/2014	1039392.0883	1638957.3280	818.29	818.18	74.00	54.00	74.00	69.00 - 74.00	5.00	67.00	64.00	Bedrock
MW-09-13	11/14/2014	1039285.2089	1639020.2683	815.95	815.59	20.25	NA	20.25	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-09-14	11/18/2014	1039303.4034	1638867.7271	814.71	814.55	19.75	NA	19.75	9.50 - 19.50	10.00	7.00	5.00	Shallow
MW-09-15	11/14/2014	1039242.2453	1638948.7488	815.05	814.76	20.25	NA	20.25	10.00 - 20.00	10.00	8.00	6.00	Shallow
MW-09-16D	11/21/2014	1039244.1948	1638952.9302	814.97	814.83	72.00	53.00	72.00	67.00 - 72.00	5.00	64.00	51.00	Deep
MW-09-17	11/18/2014	1039127.9002	1638846.3974	814.12	813.84	19.25	NA	19.25	9.00 - 19.00	10.00	7.00	5.00	Shallow
MW-09-18D	11/24/2014	1039122.2100	1638842.1298	813.91	813.76	88.00	68.00	88.00	78.00 - 88.00	10.00	75.00	67.00	Bedrock
MW-09-19D	11/25/2014	1039534.1427	1639075.8665	828.15	828.02	83.00	71.00	81.00	76.00 - 81.00	5.00	74.00	70.00	Bedrock
MW-03-20	11/11/2014	1039926.7539	1639185.7182	834.20	833.81	27.25	NA	27.25	17.00 - 27.00	10.00	15.00	13.00	Shallow
MW-03-21	11/11/2014	1039907.5862	1639187.8169	834.30	834.08	27.25	NA	27.25	17.00 - 27.00	10.00	15.00	13.00	Shallow
MW-04-22	11/10/2014	1039582.7906	1639157.3514	828.05	827.71	25.25	NA	25.25	15.00 - 25.00	10.00	13.00	11.00	Shallow
MW-04-23	11/10/2014	1039562.3922	1639179.0462	826.55	826.27	25.25	NA	25.25	15.00 - 25.00	10.00	13.00	11.00	Shallow
MW-02-24	11/11/2014	1039843.8490	1639083.9636	834.24	833.76	25.25	NA	25.25	15.00 - 25.00	10.00	13.00	11.00	Shallow
MW-09-25	7/13/2015	1039083.6100	1638635.6690	801.84	801.71	20.25	NA	20.25	10.00 - 20.00	10.00	6.90	4.70	Shallow
MW-09-26	2/8/2017	1039384.4120	1638960.5490	818.20	817.91	53.25	35.00	53.25	43.00 - 53.00	10.00	40.90	38.10	Deep
MW-09-27	2/8/2017	1039240.4790	1638944.4180	814.93	814.39	53.25	35.00	53.25	43.00 - 53.00	10.00	40.50	37.20	Deep
MW-09-28	2/7/2017	1039239.5610	1638941.6660	815.10	814.84	35.25	NA	35.25	25.00 - 35.00	10.00	22.00	19.50	Intermediate A
MW-09-29	2/7/2017	1039308.4510	1638881.4750	815.45	815.29	40.25	NA	40.25	25.00 - 40.00	15.00	22.75	20.25	Intermediate A/B
MW-09-30	2/7/2017	1039316.6710	1639025.4790	817.04	816.83	39.50	NA	39.50	24.25 - 39.25	15.00	22.00	19.40	Intermediate A/B
MW-09-31	2/10/2017	1039553.3800	1639047.8700	828.49	828.20	75.25	50.00	75.25	65.00 - 75.00	10.00	62.90	60.60	Deep
MW-09-32	2/10/2017	1039557.8300	1639046.7600	828.38	828.22	45.25	NA	45.25	35.00 - 45.00	10.00	33.00	31.00	Intermediate B

Notes:

Elevations surveyed by Freeland and Associates, Inc., of Greenville, South Carolina.

Elevations expressed in feet above North American Vertical Datum 1988.

TOC = top of casing

ft = feet

msl = mean sea level

bgs = below ground surface

NA = Not available. No casing was constructed during the well installation process.

FIGURES



