

Vapor Intrusion Investigation Workplan Borg-Warner, Inc. Facility Water Valley, Mississippi

November 18, 2016

**Prepared by: First Environment, Inc.
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CERTIFICATION STATEMENT

I Bernard T. Delaney, Ph.D., P.E., BCEE certify that I am currently a registered professional engineer in the State of Mississippi and had primary direct responsibility for the preparation of the November 18, 2016 Vapor Intrusion Investigation Workplan. I certify that this Vapor Intrusion Investigation Workplan was completed in conformance with the laws and regulations of the State of Mississippi. I certify that all information and statements in this certification form are true.

11041

Mississippi Professional
Engineer No.

04/13/2017

Date



Signature

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Introduction

First Environment, Inc. (“First Environment”), on behalf of EnPro Industries, Inc., is providing this scope-of-work for the initial investigation of chlorinated solvent related contaminant vapors in the Borg-Warner, Inc. facility located in Water Valley, Mississippi (“the Site”). The following is a phased scope, the first of which includes an initial assessment of vapor concerns and soil/groundwater conditions within the Borg-Warner manufacturing plant (“the Plant”) at the Site. Based upon the results and findings of the Phase I investigations proposed herein, First Environment will devise a detailed scope of the second phase of investigation, which will likely include additional soil, groundwater, and vapor investigations at the Site, as well as off-site properties adjacent and in the proximity of the Site.

This scope-of-work also recognizes the need for potential interim remedial measures (“IRM”) designed to protect workers at the Site through the mitigation of any vapor intrusion contaminants that have impacted the indoor air (i.e., through an established sub-slab soil-gas to indoor air pathway). Such IRMs may include the sealing of any cracks and other openings in the flooring such as pipe conduits, wall and column joints, altering the HVAC system to increase air exchanges with the outdoor air, and additional venting within the building. The IRM may also include, in the worst-case scenario, a mitigation system in terms of sub-slab depressurization to be designed and retro-fitted to the existing structure, as well as source remediation in terms of a feasible in-situ injection technology, such as in-situ chemical oxidation (ISCO) and/or in-situ chemical reduction (ISCR), by injecting oxidants and/or chemical reagents promoting biodegradation/reductive dechlorination processes.

The scope-of-work presented below focuses solely on the vapor investigation of the contaminants of concern (CoCs) currently present in the underlying groundwater plume at the Site that have a potential link to the former operations of Coltec Industries and its predecessors. The CoCs include tetrachloroethene (PCE), trichloroethene (TCE), and their degradation byproducts, cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC) (collectively referred to as the “CoCs”). Other potential contaminants such as petroleum-derived compounds benzene, toluene, ethyl-benzene, and xylene (collectively, “BTEX”), and lighter-end hydrocarbons such as methyl ether ketone and methyl isobutyl ketone, even though volatile, are not specifically addressed herein and the investigation of their presence, concentrations, and source areas is beyond the scope-of-work presented herein and are specifically excluded therefrom.

Notwithstanding the above, First Environment will proceed with the selection of its sub-slab soil gas sampling locations, and any ensuing indoor air sample locations, considering the data that was collected by GSI Environmental in July 2016 and expressed in its July 14, 2016 letter report to Borg-Warner.

Phase I – Initial Vapor Intrusion Characterization

During the initial characterization phase, First Environment will complete the following tasks to be able to better understand the vapor intrusion risks to the human health and the environment based on site-specific and regional environmental conditions of the migrating chlorinated solvent related plume, potentially originating from the manufacturing plant.

For the purposes of the proposed scope-of-work, First Environment reviewed the following applicable guidance documents for conducting vapor intrusion (VI) investigation. It should be noted that among the documents listed below, the Guidance prepared by the State of New

Jersey is the most comprehensive and up-to-date document, which references the others listed below:

1. Vapor Intrusion Technical Guidance, New Jersey Department of Environmental Protection (NJDEP), Site Remediation and Waste Management Program, Version 4, August 2016.
2. Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites, United States Environmental Protection Agency (USEPA), June 2015.
3. Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, USEPA, Office of Solid Waste and Emergency response (OSWER), June 2015.
4. Petroleum Vapor Intrusion Guidance Document, Interstate Technology and Regulatory Council (ITRC), October 2014.
5. Vapor Intrusion Pathway: A Practical Guidance, ITRC, January 2007.

Task 1 –Document Review

In order to better understand the potential areas of concern regarding the source(s) of the underlying contaminant plume, First Environment will review a variety of documents, engineering drawings, operations history of the plant, results, and findings of the environmental investigations conducted to date by various regulatory agencies, such as United States Environmental Protection Agency (USEPA) and Mississippi Department of Environmental Quality (MSDEQ), and other potentially responsible parties (PRPs). Documents to be reviewed may include:

- Review of applicable Federal and State regulations and guidance documents related to vapor intrusion investigations, public notification requirements, and contingency plans.
- Engineering drawings of the facility plans depicting locations and types of operational equipment used at the manufacturing plant.
- Engineering drawings of the drainage system(s), depicting locations and types of sewer pipes, pipes connections, outflows, and receptors.
- Building construction diagrams, including foundation plans.
- Remedial Investigation Report(s) and supplemental addenda summarizing the findings and results of soil, groundwater, and air sampling conducted to date in and around the site, as well as in the regional vicinity of the site.
- Documents related to site operations, standard operational procedures, etc.
- Any another pertinent document not covered above.

A thorough review of these documents is necessary for assessing the potential “hotspot” locations within the manufacturing plant at the site for further investigation. In order to facilitate a complete and accurate vapor intrusion investigation, determining the source location(s) is absolutely necessary. Based on our review, we will be able to pinpoint potential areas of concern to start the initial vapor intrusion characterization after on-site verification as outlined in Task 2.

Task 2 – Site Canvassing

Based on the results of Task 1, First Environment engineers will visit the site to make specific observations for planning an intrusive investigation for vapor intrusion. During this visit, all potential areas of concern (AOCs) will be identified/verified based on the review of documents outlined in Task 1. These areas will include source location(s), sewer pipes and connections, sewer outflow locations, sumps, other underground utilities that might interfere with contaminant plume and/or vapor migration, and construction details of the existing buildings. Based on the findings of site canvassing, First Environment will mark and assess the accessibility of all sampling locations to be utilized in Tasks 3 and 4 given below.

During this task, First Environment will also be collecting information regarding the inventory of potential volatile organic compound (VOC) containing chemical constituents used and/or stored at the Site. This inventory is part of the standard investigative method utilized in vapor intrusion studies and will aid in determination and distinguishing potential indoor air contamination originating from in-house sources not related with vapor intrusion. For this purpose, First Environment engineers will interview personnel knowledgeable about the chemicals and their use at the facility during the site visit.

Task 3 – Vapor Intrusion Screening

During this task, First Environment will conduct a real-time on-site screening of vapor concerns within the manufacturing building to preliminarily assess potential areas of concerns and vapor risk to the employees of the plant. First Environment, based on the results and findings of Tasks 1 and 2, will mobilize to the Site with two hand-held vapor analyzers/photoionization detectors (PID) manufactured by Defiant Technologies. The instrument, FROG-4000TM, is a hand-held micro system for detection of volatile organic compounds (VOCs), including chlorinated solvent related constituents, such as tetrachloroethene (PCE) and trichloroethene (TCE), and their degradation by-products, which are contaminants of concern at the Site.

FROG-4000TM is capable of detecting and identifying VOCs in soil, water, and air and can be used as a portable Gas Chromatograph (GC) PID for real-time environmental testing in the field. The system has a micro pre-concentrator, micro GC column, and a PID all integrated into one portable and versatile unit. It uses ambient air as the carrier gas. It is capable of storing field data onto SD cards. Although this utilizes generally accepted chromatography principles, it is not certified by any regulatory agency; thus, it can only be used as a screening tool. However, once calibrated properly, this instrument produces results that are comparable to conventional laboratory analyses.

During Task 3, First Environment will mobilize to the Site for duration of five days at the manufacturing plant with a FROG-4000TM instrument calibrated for chlorinated VOCs (cVOCs). This instrument will be utilized to screen the indoor air. First Environment field technicians will collect indoor air samples at pre-determined locations of suspected contamination and/or potential source locations. According to the VI Guidance documents cited above, the indoor air screening samples will be collected at the breathing zone (approximately three feet aboveground) and will be analyzed immediately with the FROG-4000TM instrument. The location and concentration of CoCs detected will be logged into the field book for subsequent evaluation while they are recorded onto SD card(s) by the instruments. First Environment will collect and analyze as many samples as feasible within the duration of five days. The entire manufacturing plant and the occupied office spaces will be screened in this Task. In order to assess baseline conditions, First Environment will also screen the ambient air from several locations outside the plant, including upwind and downwind locations.

In the proposed scope of work, First Environment will use a factory calibrated FROG-4000TM Silver Model. During screening of indoor air, the following chemical constituents will be monitored and logged with FRO-4000TM:

- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- cis-1,2-Dichloroethene (cis-DCE)

The next constituent in the degradation chain, vinyl chloride cannot be efficiently detected by this instrument based on factory calibration notes. The practical detection limits for FROG-4000TM Silver Model range between approximately 1 ppbv and 160 ppbv, depending upon the chemicals being tested. This range corresponds approximately to:

PCE: 7 – 1,085 ug/m³

TCE: 5 – 860 ug/m³

cis-1,2-DCE: 4 – 635 ug/m³

At the end of the screening period, First Environment will evaluate the results and depict CoCs concentrations on a site plan to pinpoint potential AOCs. These AOCs will be ranked based on CoCs concentrations and be further tested in the subsequent task.

Task 4 – Vapor Intrusion Sampling

During this task, First Environment will conduct intrusive investigation within the manufacturing plant to preliminarily assess the vapor intrusion concerns due to the underlying chlorinated solvent related plume. In order to facilitate this Task, both sub-slab soil gas and indoor air samples will be collected from the potential AOCs determined and ranked in the preceding task. The USEPA Guidance document does not specify the number of samples to be collected in a VI investigation; however, the New Jersey Guidance document specifically recommends that at least two indoor air samples be collected per 1,500 ft² of an edifice. Based on preliminary estimates, the two main manufacturing plant buildings occupy a space of approximately five acres. With that estimate, it is recommended that at least 16 indoor air and corresponding sub-slab samples be collected. Based on this recommendation and allowing for unknown conditions, First Environment will collect up to a total of 18 pairs of sub-slab and indoor air samples with respect to the potential AOCs determined in Task 3 for expedited analytical laboratory method of USEPA's Toxic Organic analysis (TO-15). First Environment will also collect two ambient air samples to determine the baseline conditions. One air sample will be collected from an upwind location and the other from a downwind condition based on the results of the screening.

As part of the vapor concern assessment (i.e., source characterization), First Environment will collect the vapor intrusion samples using the sampling methodology based on USEPA guidelines, which will include:

- According to the applicable USEPA protocol, First Environment will collect the indoor air samples first by placing laboratory provided 6-liter capacity Summa® canisters under vacuum, which are equipped with flow regulators to have continuous suction of indoor air for exactly 24 hours. The canisters will be placed at the pre-determined

locations (i.e., hotspots), and the sample intake will be placed at breathing zone (i.e., approximately three feet) to continuously collect indoor air.

- Upon completion of the indoor air samples, First Environment personnel will utilize a hand-held electrical machine to drill an approximately one-quarter to three-quarter inch hole through the concrete slab at each sampling location to collect the corresponding sub-slab soil gas sample. If it is determined that the use of hand-held equipment is unfeasible, heavier equipment, such as a direct-push drilling equipment (e.g., Geoprobe®), may be utilized. This determination will be made during site canvassing outlined in Task 2 and by reviewing the engineering drawings of slab construction details. A temporary sampling port will be installed in each sampling location to a depth of approximately six inches below the concrete slab within the underlying aggregate material, which provides a preferential pathway for contaminant vapors and potential for vapor accumulation (i.e., build up). The sampling port will consist of flexible tubing, appropriate wax seal, and a valve. As per USEPA guidelines, the integrity of the seal will be checked with the water dam method to ensure complete sealing and protection of fugitive emissions. After the integrity test, each sampling port will be checked for pressure differential between the subslab and the indoor air via a hand-held magnehelic gauge, and will be then be connected to a 2.7-liter Summa® canister with a flow regulator (regulating intake flow at 200 mL/min or less) to collect a “grab” sample from this location. The sample collection in a 2.7-liter canister may take about 15 minutes to complete.
- Once the sub-slab soil gas samples are collected, the sampling ports will be removed and the holes in the concrete slab will be permanently sealed by cement.
- The canisters of all air samples will be transported to a certified analytical laboratory for USEPA TO-15 analysis and expedited for a three-day turnaround time (TAT) frame.
- During the proposed VI investigation sampling, real-time measurements of indoor air and ambient air pressures will be collected to evaluate pressure differentials, which might affect the migration of contaminant vapor through established VI pathways. In addition, FE will also obtain measurements to determine the pressure differential between the subslab and the indoor air as indicated above.

Task 5 – Assessment of Soil and Groundwater Quality under the Building Footprint

During this task, and concurrent with the mobilization of the previous tasks, First Environment personnel will locate any floor drains and sumps in the building and will collect representative soil/sediment and groundwater samples. If accessible, First Environment will collect up to three discrete sediment and three groundwater samples from the drain/sump locations in the plant. The soil and groundwater samples will be analyzed by USEPA Method 8260 for VOCs by a certified analytical laboratory.

Task 6 – Data Evaluation and Reporting

Upon receiving laboratory results, First Environment will evaluate the data and make a preliminary assessment regarding the source(s) of the migrating plume and vapor intrusion potential. For this purpose, First Environment will also review all available Remedial Investigation Reports and results of all groundwater sampling data prepared and collected to date. The analytical results for the floor drain sediment and groundwater samples will be used to determine whether or not the floor drain contents are contributing to indoor air concentrations

of PCE and TCE. The analytical results of the subslab soil gas and indoor air samples will be compared to available previously obtained results, as well as the site-specific screening levels, which will be computed by the USEPA Vapor Intrusion Screening Level Calculator (VISLC) per USEPA guidelines. A preliminary determination will be made to determine whether vapor intrusion is a concern to human health and the environment.

The results of this assessment, as well as all the details of the field investigations, will be summarized in a Preliminary Investigation Report to be submitted to the Client only (no regulatory submission). This report will also outline the details of contingency plan(s) and the scope of Phase II investigations, and will provide a timeline for completing the remedial investigation for the site.

Phase II – Additional Remedial Investigation

Upon completion of the proposed Phase I tasks, First Environment will devise a scope-of-work and its associated cost to complete an additional Remedial Investigation, which will include additional soil, vapor, and groundwater sampling and analyses based on the findings and results of Phase I investigations outlined above.

Limitations

This scope-of-work was developed based on available information regarding the Site and the specifics of each task. It does not include any regulatory compliance, reporting, permitting, or any other regulatory requirements, whether they are additional investigation or remediation activities, that may be imposed by USEPA, MSDEQ, or other local agencies.