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**VENT SAMPLING AND ANALYSIS WORK PLAN**  
**EMERSON POWER TRANSMISSION FACILITY**  
**620 AURORA STREET**  
**ITHACA, NEW YORK**  
**SITE NO. 7-55-010**

**PREPARED**

**BY**

**WSP ENVIRONMENTAL STRATEGIES LLC**

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## 1.0 Introduction

WSP Environmental Strategies LLC, on behalf of Emerson and Emerson Power Transmission (EPT), has prepared this work plan describing the procedures for collecting gas samples from exhaust vents of subslab depressurization systems (mitigation systems) installed in structures in the South Hill neighborhood to the north of the EPT facility in Ithaca, New York. Emerson and EPT agreed with the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) to conduct the vent sampling for purposes of evaluating emission concentrations and mass emission rates of chlorinated volatile organic compounds (VOCs) that may be present in the exhaust gas stream. The data will be used to assess the potential for ambient air impacts associated with operation of vapor mitigation systems installed in structures in the South Hill neighborhood. This work plan was prepared in accordance with requirements outlined in the July 13, 1987 Consent Order (Index # A7-0125-87-09) entered into by the NYSDEC and EPT.

The following sections of the work plan comprise background information in Section 2, which includes a description of the site location, an overview of the indoor air sampling and subslab mitigation conducted in the South Hill community, and identifies the objectives of the vent sampling. Section 3 describes the vent sampling program. This is followed in Section 4 by a discussion of the sampling and analytical methods to be utilized. Quality Assurance/Quality Control Procedures are detailed in Section 5 and reporting is discussed in Section 6.

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## 2.0 Background

### 2.1 Site Location

The EPT facility is located at 620 South Aurora Street in Ithaca, New York. The facility comprises approximately 110 acres within the City of Ithaca and the Town of Ithaca in Tompkins County. There are over 30 buildings and structures on the site that encompass approximately 800,000 square feet. The area surrounding the facility is mostly residential. The South Hill community is to the north-northwest of the EPT site and is bordered on the north and west by Six Mile Creek, to the south by the EPT facility, and to the east by Aurora Street.

### 2.2 Overview of Indoor Air Sampling and Sub-Slab Mitigation

Since 2004, Emerson and EPT have conducted an extensive sampling program to evaluate and address the potential for intrusion of VOC vapors to indoor air in the South Hill community. To date, sampling has been conducted in 104 structures and has involved concurrent sampling of indoor air on the first floor and basement level and collecting a soil gas sample below the basement slab of structures. In addition, outdoor (ambient) air samples were collected in the vicinity of homes being sampled on a particular day to establish ambient conditions. All sampling activities were conducted in accordance with the approved work plan for Phase V Indoor Air Sampling, dated October 26, 2006, the approved general work plan for indoor air sampling, dated September 23, 2005, and the NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. In accordance with NYSDOH guidance, two rounds of sampling have been completed in the majority of the 104 structures within the study area. All sampling results have been evaluated based on the NYSDOH Soil Vapor/Indoor Air Matrix.

In March 2006, EPT and Emerson informed residents of the South Hill community of its voluntary offer to mitigate homes in which TCE was detected in the basement or first floor indoor air samples at or above a concentration of 0.8 microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ) in at least one sampling event. This threshold is substantially below the state guidance level of  $5.0 \mu\text{g}/\text{m}^3$ . Mitigation involves installing one or more extraction points beneath a structure from which soil vapor is withdrawn and released to the atmosphere through a vent stack. Each mitigation system is engineered specific to a structure so that a negative pressure is developed

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below the slab relative to interior of the structure. Following installation, testing was performed to verify that the mitigation systems are operating as designed. As of the end of 2007, mitigation systems have been installed in over 30 structures in the South Hill community.

### **2.3 Vent Sampling Objectives**

Vent sampling will be conducted to assess the actual mass emission rates of potentially site-related VOCs (1,1,1-trichloroethane, 1,2-dichloroethane, cis-1,2-dichloroethene, methylene chloride, tetrachloroethylene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride). This subset of total VOCs was selected as they represent compounds that have a higher likelihood of being present in the emission gas stream. The objectives of the sampling are to quantify actual emission rates of these VOCs and evaluate the potential for ambient air impacts associated with operation of vapor mitigation systems installed in the South Hill community.

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### **3.0 Sampling Program**

#### **3.1 Sample Locations**

Samples will be collected at two properties designated by the NYSDEC, which include properties 66 and 87. These properties were selected to provide a representative range of potential emission rates from mitigation systems.

#### **3.2 Sample Quantities and Duration**

For the two properties to be tested, each vent will be sampled in replicate (two samples per vent). The samples will be collected over a 60-minute period. Each replicate sample will be collected sequentially during the same day. The two properties can be sampled simultaneously using two field sampling crews (one crew per property), if required.

#### **3.3 Ventilation System Operation**

The operation of mitigation systems is conducted in accordance with engineering protocols established in the draft Operation, Maintenance, and Monitoring Plan (May 2007). Upon installation of mitigation systems, the effectiveness and proper operation are confirmed. Smoke tubes are used to identify any leaks through the concrete floor, floor joints, and at the suction point. Identified leaks are repaired. Each home is tested for backdrafting while the system is operating. Any backdrafting conditions identified are corrected before the mitigation system is placed into operation.

Post-system installation communication testing, or pressure field extension testing, is conducted on each system to demonstrate that a vacuum is being induced beneath the entire slab. The test is conducted by drilling 3/8-inch-diameter holes through the slab and measuring the vacuum using a digital manometer. After completing the test, each hole is sealed with elastomeric joint sealant.

Following at least 3 months of operation, indoor air basement and first floor samples are collected from within the homes and an ambient air sample is collected in the vicinity of the homes. Testing and sampling procedures follow those outlined in the approved original work plan for the indoor air program; however, because no drilling is conducted through the concrete slab which may cause organic fumes to enter the basement, testing procedures are initiated on the

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same day as the inventory is completed. All post mitigation testing results are documented and reported to the NYSDEC, the NYSDOH, and each property owner in accordance with the NYSDOH Guidance (October 2006). On an annual basis, each vapor mitigation system is inspected and maintenance will be performed, as appropriate, to ensure the system is operating satisfactorily in accordance with the Operation, Maintenance, and Monitoring Plan.

Prior to the proposed vent sampling, the mitigation system will be inspected. The vacuum at each subslab and submembrane suction point will be checked and recorded. If the vacuum of each suction point is not within  $\pm 0.25$ " H<sub>2</sub>O of the commissioned values, then this condition will be corrected before sampling commences.

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## 4.0 Sampling and Analytical Procedures

This section describes the sampling and analysis methods for measuring emission concentrations and mass emission rates of the target compounds identified in Section 2.3.

### 4.1 Sampling Site Description and Sampling Locations

Samples will be collected from the vent stacks of each selected ventilation system. The actual flow rate through the vent stacks will also be measured. Each vent stack has a 4-inch inside diameter. The exhaust gas temperature is expected to be less than ambient (55 to 75°F). The static pressure should be slightly positive (downstream of the fan).

One test port will be installed (drilled) into each stack at least 32 inches (8 diameters) downstream of the fan. The downstream distance from the test port to the nearest flow disturbance will be greater than two diameters in all cases. Flow rate measurements and sample collection will take place from the test port. Velocity measurements will be recorded at eight points across a single traverse or recorded as 90 percent of the centroid value. Samples will be collected at one point near the centroid of the stack. Velocity measurements will be recorded just prior to and after sample collection (not simultaneously).

### 4.2 Volumetric Flow Rate Measurements

The flow rate of exhaust gas through the vents will be measured with a hot wire anemometer rather than a standard pitot because the minimum diameter of a test port to accommodate a standard pitot would be 1 inch, which would compromise the sampling as well as the structural integrity of the stack. The anemometer will be calibrated by the manufacturer within 12 months prior to the sampling. Calibration records will be requested to confirm the actual date.

Dry bulb and wet bulb temperatures will be measured with a thermocouple immediately after each set of velocity measurements. Moisture content of the exhaust gas will be determined from a psychometric chart.

These measurements will be used to derive volumetric flow rates of the exhaust gas on a dry standard basis.

### 4.3 VOC Sampling and Analysis

Air samples will be collected from the vent stacks in certified 6-liter SUMMA® canisters (or equivalent) using certified sample trains. Sample gas will be extracted through a short segment of new Teflon tubing connected to a dedicated single use certified flow regulator, which will regulate the sampling flow rate so that each sample is collected over a one-hour period. The tubing and regulator will be purged with sample gas before the sample collection is initiated.

The sampling flow rate will be calibrated to achieve a slight vacuum in the canister at the end of the sampling period. The initial and final vacuums must be greater than 25 inches of mercury (in. Hg) and 1 in. Hg, respectively, and will be recorded for each sample.

The canisters will be delivered to an approved laboratory for analysis via EPA Method TO-15 using selective ion monitoring mode (SIM) for the seven target compounds. The SIM mode was selected over the SCAN mode because it provides better resolution and sensitivity. The detection limits for these compounds will be approximately  $0.2 \mu\text{g}/\text{m}^3$ . The sample hold time for Method TO-15 is 30 days, however the samples are typically analyzed within 14 days.

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## 5.0 Quality Assurance/Quality Control

### 5.1 Sample Collection

Each sample will be collected over a 60-minute time period. The samples will be analyzed for VOCs by EPA Method TO-15. One field duplicate and one matrix spike/matrix spike duplicate will be collected as part of the sampling activities. The duplicate samples will be collected by splitting the tubing with a “T-connector” to allow the sample to simultaneously flow directly into separate canisters. The duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected from different residences during the sampling event.

### 5.2 Sample Analysis

All canisters and regulators used for the vent sampling will be certified clean by the analytical laboratory. The laboratory will analyze air in a sample inside a clean canister by EPA Method TO-15. If target compounds are not detected above the method reporting limits, then the canister will be evacuated again and available for sampling.

The laboratory will provide an Analytical Services Protocol “Category-B” or equivalent data package. The laboratory data package will include sample results in  $\mu\text{g}/\text{m}^3$ , sample chromatograms, surrogate recovery forms, matrix spike/ matrix spike duplicate recovery forms, method blank data, internal standard recovery forms, initial calibration and continuing calibration data, and a case narrative.

### 5.3 Chain-of-Custody Documentation

Chain-of-custody forms will be completed, with copies filed by the field crews and the laboratory. The canisters and regulators will be identified on the chain-of-custody form. Copies of the completed chain-of-custody forms will be included with the laboratory reports.

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#### 5.4 Data Validation

Data validation is a systematic process for reviewing a body of data against a set of criteria to provide assurance that the data are adequate for their intended use. Data validation includes reviewing, accepting, rejecting, or qualifying data on the basis of established criteria. Validation review will be conducted on 100 percent of the data associated with this project. The validation of VOC data analyzed by gas chromatography-mass spectrometry (GC/MS) methods is based on the following criteria:

- holding times
- GC/MS instrument performance check
- initial calibration
- continuing calibration
- laboratory blank sample results
- trip blank sample results
- surrogate recoveries
- MS/MSD sample results
- internal standards
- target compound identification
- compound quantitation and reporting limits
- system performance
- overall assessment

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## 6.0 Reporting

A report will be submitted to NYSDEC following completion of the fieldwork. The report will include a summary of the sampling program, describe the sampling and analytical procedures and the results and evaluate emission concentrations and mass emission rates. The mass emission rate estimates will be compared to the 1.0 pound per hour control requirements of 6NYCRR Part 212. Information related to operating data for the mitigation system, raw field data sheets, sample analysis reports, and equipment calibration data will be provided as appendices.