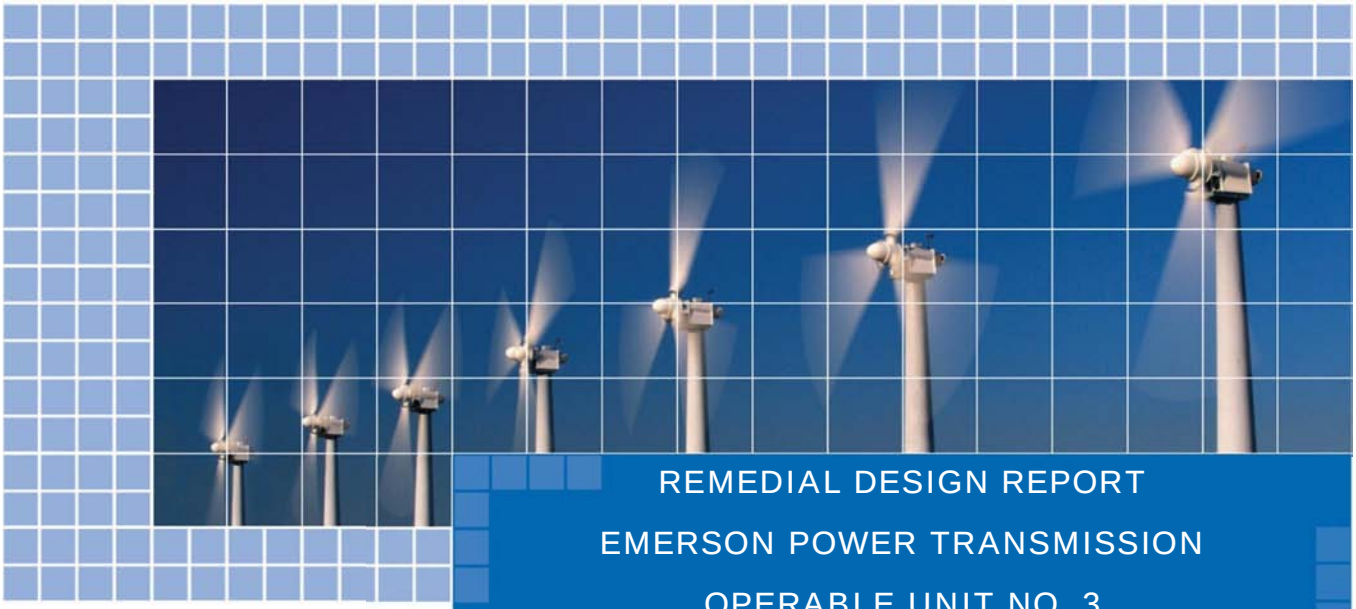

REMEDIAL DESIGN REPORT
EMERSON POWER TRANSMISSION
OPERABLE UNIT NO. 3
ITHACA, NEW YORK
July 12, 2011

90 PERCENT DESIGN

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1 Introduction

On behalf of Emerson and its subsidiary, Emerson Power Transmission Corp. (EPT), WSP Engineering of New York, P.C. (WSP Engineering), has prepared this Remedial Design (RD) Report for Operable Unit (OU) No. 3 of the former Morse Industrial Corporation site (currently Emerson Power Transmission); the East Spencer Street Sewer Line Focused Excavation and Venting. This report details the activities that will be performed to implement the remedy for OU No. 3 as described in the Record of Decision issued by the New York Department of Environmental Conservation (NYSDEC) dated October 2010.

Specifically, the remedy will involve removing and replacing approximately 300 feet of the sanitary sewer line along East Spencer Street beginning at its intersection with Turner Place (Figures 1 and 2). The replacement line will be constructed using air-and water tight joints; the pipe bedding will comprise a highly permeable material to promote venting of soil vapor; and perforated pipe will be installed within the bedding material to collect and vent soil vapors which enter the bedding material. Following remedy construction a monitoring program will be implemented to evaluate and assess the performance of the remedy.

This report was prepared in accordance with an Administrative Order on Consent (Index #A7-0125-87-09) entered into by NYSDEC and EPT on July 13, 1987, and the NYSDEC Record of Decision dated October 2010. The report presents the design, pre-design investigation, the associated permitting, and planning elements required for implementation of the remedy.

1.1 REMEDIAL OBJECTIVES OU NO. 3

The remedial objectives are to address the three pathways identified for the potential migration of vapors associated with historical releases of volatile organic compounds (VOCs) from the sanitary sewer lines servicing the EPT facility. The potential vapor migration pathways include the following: (1) along the sanitary sewer lines; (2) along the residential sanitary sewer laterals; and (3) within the vertical and horizontal planes of porosity (fractured bedrock) surrounding the sewer lines. As detailed in the South Hill Sanitary Sewer Network Alternatives Analysis report dated September 3, 2009, results of investigations conducted showed that the highest concentration of TCE were detected in soil vapor along an approximate 300 foot length of sewer piping extending from the intersection of Turner Place and East Spencer Street at manhole MH-9, down East Spencer Street. This area is also where the highest TCE concentration was detected in sub slab soil vapor samples, and where the highest TCE concentrations were detected in vapor samples collected above two key fracture features that are present between Turner Place and East Spencer Street. This design report provides the following:

1. appropriate engineering design criteria for various remedial components
2. specific design information such as preliminary equipment selection

1.2 REPORT ORGANIZATION

This report has been prepared in accordance with the NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) and is organized into nine sections. Section 1 describes the project, identifies the purpose of this report, and presents the report organization. Section 2 presents a description and history of the EPT facility, followed by a discussion of the site geology, hydrogeology, and an updated conceptual site model (CSM) for soil vapor migration. Section 3 describes the pre-design investigation activities and findings. Section 4 describes the elements to be undertaken related to implementing the remedy. System start-up and operation is described in Section 5. In Section 6, permits and approvals required to construct and operate the remedy in OU No. 3 are identified. Section 7 discusses health and safety during construction and operation of the remedy.

Section 8 presents the proposed schedule for the implementation of the remedy and associated reports.
Section 9 presents the technical references used for this document.

2 Site Background

2.1 SITE LOCATION

The EPT facility occupies approximately 110 acres along South Aurora Street in the South Hill portion of the City of Ithaca, New York (Figure 1). The site elevation ranges from 450 to 720 feet above mean sea level (amsl). The facility consists of three main buildings along the northeast and southwest portions of South Hill which are at an elevation of approximately 600 feet amsl. The main building is flanked by a number of smaller buildings to the southwest and a series of access roads and parking lots for those which terrace the hillside above the plant to the east. Undeveloped woodland borders the site to the southwest along the steep embankments of the hill.

OU No. 3 comprises the South Hill neighborhoods and sewer lines to the north and west of the EPT site (Figure 2). The topography in this area drops off to the north at an approximately 40 percent grade toward Six Mile Creek. Residential structures are generally terraced into the steep hillside with some basements floors constructed directly on bedrock and for others a combination of bedrock and cut and fill. The portion of the South Hill sanitary sewer designated for replacement is approximately 1,250 feet north of the EPT facility at the intersection of Turner Place and East Spencer Street. There are residences along both sides of East Spencer Street. Six Mile Creek is to the north along the base of South Hill and eventually empties into Cayuga Lake approximately 2 miles northwest of OU-3.

2.2 SITE HISTORY

The original building at the EPT site was built in 1906 by Morse Industrial Corporation, which manufactured steel roller chain for the automobile industry. From approximately 1928 to 1983, Borg-Warner Corporation owned the property and manufactured automotive components and power transmission equipment. A more detailed description of the site history and construction dates of the various buildings at the site is detailed in the report entitled *Onsite Assessment of the Former Borg Warner – Morse Chain Facility* (ESC 2005). Up until the late 1970s, Borg-Warner Corporation used trichloroethene (TCE), a widely used solvent at the time, for degreasing metal parts. Solvents appear to have been flushed into the plant's sanitary sewer system which connects to the municipal sewer along Turner Place and Cayuga Street. It is believed that solvents leaked from the sewer system through cracks and joints. In addition, results of soil vapor sampling show that solvent releases have occurred from sewer lines originating at the former NCR facility located at 950 Danby Road (currently owned by South Hill Business Campus, LLC) and Therm, Inc., facility located at 100 Hudson Street Extension. The NCR sewer line extends across the south east portion of the EPT property, then north along South Aurora Street, west along Columbia Street, and connects to the sewer on Turner Place and East Spencer Street. The sewer line originating from the Therm facility connects to the South Aurora/Columbia Street sewer line, which in turn, connects to the sewer line along Turner Place and East Spencer Street.

In 1983, Emerson purchased Morse Industrial Corporation from Borg-Warner Corporation and became known as Emerson Power Transmission. EPT manufactured roller chain, bearings, and clutching for the power transmission industry until December 2010 when operations ceased. TCE was never used by EPT at the facility.

2.3 GEOLOGY AND HYDROGEOLOGY

OU No.3 lies on the northern limits of a dissected hill within the Cayuga Lake basin, which was formed in a former stream valley eroded and enlarged by the advance of glaciers. Underlying OU No. 3 is a thin, discontinuous veneer of glacial till and man-made fill. Soil depths generally increase with decreasing

elevation and eventually merge with glacio-lacustrine silt and clay that line the bottom of the valley floor below South Hill, near East Spencer Street.

Beneath the glacial till and fill material lies bedrock of the Ithaca Siltstone, a member of the Genesee Formation. The bedrock is typically well-cemented with beds ranging in thickness from 0.1 inch to 2.5 feet in thickness. Along Turner Place, the top of bedrock is found at depths of 2 feet to 7 feet below ground surface (bgs).

Groundwater flow within the overburden and underlying fractured bedrock generally mimics surface topography, which slopes to the northwest. Groundwater flow within the siltstone bedrock is significantly affected by the vertical and horizontal distribution of vertical joint sets and horizontal bedding plane fractures within the upper sections of bedrock. In areas where the soil cover is thin (i.e., steep slopes along Turner Place), the overburden or upper portion of fractured bedrock is not saturated. Along the middle section of Turner Place, groundwater is found in the upper section of fractured bedrock at depths between 15 and 21 feet bgs. Along sections of East Spencer and areas immediately north, alluvial deposits are encountered near the ground surface to 9 to 11 feet bgs.

2.4 SOUTH HILL SANITARY SEWER NETWORK - CONCEPTUAL SITE MODEL

This section provides an updated CSM for the South Hill sanitary sewer network. The CSM details the relationship between historical releases of VOCs (solvents) from the sanitary sewer lines on Turner Place, East Spencer Street, and South Cayuga Street and the associated transport pathways.

Two parallel municipal sanitary sewer lines extend north from the EPT site down Turner Place to a manhole near the intersection of Columbia Street. In addition, the sewer lines originating from the former NCR facility and that from the Therm facility connect to the same manhole on Turner Place. From this manhole the sewer lines continue down Turner Place and make a 90 degree turn west to continue along East Spencer Street (Figure 2). A third sewer line extends from the western portion of the EPT property north along South Cayuga Street. According to City utility drawings, the majority of the sanitary sewer lines along Turner Place and South Cayuga Street are trenched directly into the upper section of fractured bedrock and invert elevations range from approximately 5 to 7 feet bgs. In areas where the lines were installed less than 3 feet bgs, flowable fill (concrete) was used to increase the load capacity of the sewer lines.

The sewer lines along Turner Place, East Spencer Street and South Cayuga Street have been identified as historical sources of releases of VOCs to the subsurface. Based on a review of historical information, solvent discharges to the municipal sewers likely occurred over a number of years during Borg Warner's ownership and ceased in the late 1970's. Also, investigations conducted by the NYSDEC suggest that solvents were discharged to the sanitary sewer system of both the former NCR facility and Therm facility. Each of these systems historically discharged in a westerly direction to the Columbia Street sewer line and then to the Turner Place sewer line. The sewer line has since been modified by the City of Ithaca such that only overflow conditions result in discharges into the Columbia Street sewer line. Releases from these sewers can be conceptualized as leaking through cracks and joints of an aging system that migrated and flowed along the surrounding bedding material, where present, or directly into the fractured bedrock (Figure 3). Subsequently, VOC-containing wastewater which seeped into the fractured bedrock continued to migrate into the deeper sediment filled fractures (joints and bedding planes) in bedrock or was held by capillary forces within the pore spaces. VOCs in the sediment filled fractures subsequently volatilize into the gaseous phase and are transported by diffusion both vertically and laterally (based on a pressure differential) through the fractures and along the sewers, eventually reaching the basement of some homes within the South Hill area. VOC vapor migration within identified bedrock features is evident particularly along East Spencer Street where vapors have migrated through vertical bedrock features identified during geophysical testing, into the subsurface beneath some homes as indicated by sub-slab vapor sample results. The results of sub-slab vapor testing for four homes in this area indicated the need

for mandatory mitigation based on the soil vapor/indoor air matrix presented in the New York State Department of Health's (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. In addition, some of the highest levels of TCE in soil gas were detected in samples collected directly above the sanitary sewer line that extends along East Spencer Street.

3 Pre-Design Investigations

A pre-design investigation was conducted to obtain information on the locations of subsurface utilities in the targeted remedy area and the construction of the retaining wall abutting the east side of East Spencer Street. The scope and results of the investigation are discussed below.

3.1 SURVEY

A registered land surveyor was retained to survey the locations of the existing sewer manholes and other landmarks in the vicinity of the project. The survey covered the targeted remedy area at the base of Turner Place and East Spencer Street. Detailed coordinates were gathered for the sections of sewer to be replaced. For the purposes of this design, the sewer segment between manhole MH-9 located on Turner Place and the abandoned manhole MH-18 is referred to as Section 1 while that between the proposed replacement for MH-18 and MH-17 is referred to as Section 2. Based on historic data obtained from the City of Ithaca, the existing manhole MH-18 was partially abandoned by removing the top sections of the structure and restoring the street without an access cover. In order to the accurately measure the location of this manhole, the City of Ithaca inserted a camera through MH-11 and measured the horizontal distance to the abandoned manhole. The survey extended to the residence located on corner of East Spencer Street and Turner Place; the findings confirmed that the sewer line extends on City property parallel to the boundary of the residence. The storm sewer and water lines were located and marked in consultation with the City of Ithaca Department of Public Works (DPW). The gas line was marked in consultation with New York State Electric & Gas (NYSEG).

3.2 VACUUM EXCAVATION ALONG THE EAST SPENCER STREET

On March 15, 2011 vacuum excavations were completed at five (5) locations along East Spencer Street to obtain information in support of the remedial design. Three (3) excavations were completed adjacent to retaining wall on East Spencer Street to ascertain the base material and construction of the footer for the retaining wall and two (2) were along the segment of the sewer to be replaced to document the thickness of overburden. Vacuum excavation was completed using a high vacuum and high pressure air, (air-knifing) system.

The footer and base material of the retaining wall were uncovered at three locations designated FT1, FT2, and FT3. The vacuum excavation locations and the base material encountered in the one foot wide excavations are depicted in Appendix A, Sheet 3. At location FT1, the excavation was completed to a depth of three feet below ground surface and bedrock was not observed. The excavated materials at this location comprised tightly packed soil and stone. At location FT2, six inches of tightly packed soil and rock was between the bottom of the retaining wall footer and the top of the bedrock. At location FT3, the retaining wall footer was poured directly on top of bedrock. The three excavations along the retaining wall were backfilled using the removed soil and were compacted using a hand tamping device.

Two excavations designated TP1 and TP2 were advanced to bedrock on East Spencer Street (Appendix A, Sheet 3). At each location one foot by one foot holes were jackhammered through the asphalt and soils were excavated to the top of bedrock. TP1 was located approximately 6 feet north of the end of Section 2 between the water main and sanitary sewer line. Bedrock was encountered 24-inch below ground surface. The sewer line and water line are present in separate trenches excavated into the bedrock at this location on the southern end of East Spencer Street. TP2 was excavated five feet north of proposed MH-18 (Appendix A, Sheet 3) to a depth of 76-inches where bedrock was encountered. At this location the sewer line was present in a shallow trench cut into the bedrock and the water line was present at the bedrock surface. The excavation points were backfilled with the excavated soil and compacted using a hand tamping device. A layer of Number 2 gravel, approximately 4-inch thick, was

placed over the soils and then capped with an asphalt patch. The Number 2 gravel and asphalt patch were compacted using a pneumatic compacter.

In summary, the key findings of the vacuum excavation are as follows:

- Bedrock was identified at depths ranging from zero to greater than three feet below the retaining wall and at depths ranging from approximately two to six feet beneath East Spencer Street. Based on drawings provided by the City of Ithaca DPW the sanitary sewer pipe is approximately six feet below the surface within a trench that was likely constructed in the bedrock surface. Along Section 2, the sanitary sewer replacement pipe will be will be installed in the trench cut for the existing pipe. The bedrock depth along Section 1 is uncertain. If the existing sewer line is located in a trench cut into the bedrock surface it may be necessary cut a new trench for the replacement line in order to connect it to replacement MH-18, as described in Section 4.4.2.
- The footer of the retaining wall abutting the east side of East Spencer Street is situated close to the bedrock surface along a portion of the sewer line replacement. Based on this finding it is likely that the retaining wall can be structurally supported to allow excavation of the sewer pipe along East Spencer Street. Another option may be to remove and replace the wall, in part or in its entirety, to facilitate trenching immediately adjacent to the wall location.
- The excavation conducted at TP-1 indicates that the waterline is installed in a separate bedrock trench towards the southern end of East Spencer Street.

3.3 UTILITY LOCATIONS

Reconnaissance visits were conducted with representatives of the City of Ithaca DPW and NYSEG to mark-out the natural gas line and water main along East Spencer Street. The location of the sanitary sewer line on East Spencer Street was marked out by Underground Services, Inc. using a fiberglass fish tape equipped with copper wire. A signal was then sent through the copper wire to trace the sewer line and the alignment was subsequently marked out on the ground surface. During the visit, the City DPW marked out the location of the water main along East Spencer Street. Following completion of the surveys the design drawings were updated to reflect actual locations of the sanitary sewer line and water line along East Spencer Street (Appendix A). Initial drawings provided by the City DPW did not correctly depict the layout of these lines. The work conducted to verify the layout of subsurface utilities revealed that the sanitary sewer follows the alignment of the retaining wall and street curb line on East Spencer Street, and is located as close as 18 inches off of the retaining wall. The finding confirmed that the sewer does not extend beneath the retaining wall and that removal is feasible in conjunction with a support system for the retaining wall.

4 Description of Proposed Remedial Design

4.1 DESCRIPTION OF REMEDY

The remedy for OU No.3 will remove potentially impacted bedding material (and sewer pipe material) along an approximate 300-foot section of the sanitary sewer extending from the intersection of Turner Place, MH-9, and along East Spencer Street (Appendix B, Sheet 5). The replacement pipe will be air-tight and bedded with highly permeable granular material. A perforated pipe will be placed in the bedding material to vent to the 300-foot trench to atmosphere via a single exhaust stack equipped with a wind turbine.

4.2 MOBILIZATION

The selected remedial subcontractor will be responsible for mobilizing the necessary resources to the site, including all manpower, equipment, and supplies needed to implement the proposed remedy in accordance with this work plan.

4.3 SITE PRAPARATION

Prior to commencing remedial action activities, site preparation activities will be conducted in accordance with the site-specific Health and Safety Plan (HASP) and Standard Operating Procedures. These activities will include identification of utilities, establishing a support zone, exclusion zone, decontamination area, and staging area. In addition, any necessary erosion, sedimentation, and runoff control measures will be taken within these zones.

4.3.1 Identification of Utilities

Locations of subsurface utilities have been marked and surveyed. Still, before beginning any ground penetrating activities, New York State's Dig Safely New York will be notified to mark underground utilities within the work zone. A private utility locator will be retained as necessary to locate utility connections from residences to the mains along East Spencer within the work areas. The location of the sanitary sewer will be marked using measurements obtained during the activities described in Section 3.3.

4.3.2 Exclusion Zone

An exclusion zone will be established surrounding the work area which unauthorized persons will not be allowed to enter. The work area is directly adjacent to residential housing, so the exclusion zone will not impede residents' access to their homes throughout the construction schedule. The work zone will be delineated with caution tape or temporary snow fence to prevent unnecessary entry. Road and sidewalk closure signs and barricades will be installed to ensure safety (Appendix B, Sheet 4). East Spencer Street will be closed during work hours as the remedy is implemented to ensure vehicle traffic doesn't infringe on the necessary work area. At the end of each work day the excavation will be backfilled with clean soil to approximately two inches below grade and covered with steel plates (see Section 4.4.5) to allow vehicles to access East Spencer Street. During installation of manhole MH-18 access may be restricted overnight due to its location near the centerline of East Spencer Street. Access matters will be coordinated with the City of Ithaca before the start of work.

The exclusion zone will be developed to be at a minimum a 15-foot perimeter (buffer) area surrounding the active work locations. If nearby residents need to enter the exclusion zone to get to their homes during the work day, they will be escorted by WSP Engineering staff or its contractor. Due to inherent nature of excavation activities, the exclusion zone will dynamically change over the course of the project as locations are exposed and then backfilled.

4.3.3 Contamination Reduction Zone

A contamination reduction zone will be established within the exclusion zone specifically for decontamination activities. In this area, a decontamination pad will be established using poly sheeting and berms to prevent runoff of decontamination water, which will be contained and handled according to state and federal regulations. All construction equipment will be decontaminated before leaving the site.

4.3.4 Support Zone

A support zone will be designated in the vicinity of the work area. Administrative tasks will be performed within the support zone. Generally, the support zone will be established adjacent to the active work area and a support vehicle will be parked in this area.

4.3.5 Staging Area

A secure area will be identified at the EPT facility to stage excavated materials generated during the work activities. Temporary staging of roll-off containers, drums, or tanks will be located in the exclusion zone during the work days and transferred to the staging area at EPT facility at the end of each work day.

4.4 REMEDY IMPLEMENTATION

4.4.1 Sanitary Sewer Bypass and Temporary Service Shut-Off

Prior to the start of the remedy work in OU No. 3 the City of Ithaca DPW will construct a bypass system for the sanitary sewer in the work area. The bypass system will pump flow from a sanitary sewer manhole near the base of Turner Place to a manhole that will divert flow away from the remedy area on East Spencer Street. Also, the City DPW will establish temporary sanitary sewer connections to bypass the work zone, and will maintain this system throughout the duration of the remedial work. Flow in the sanitary sewer and laterals to homes will not be restricted during the construction of the new sewer.

As necessary, water and natural gas supply laterals from main supply lines to homes in the work area may be temporarily shut off. Residents will be notified at least 24 hours via written notification prior to any temporary service interruption and such interruptions will be restored at the completion of each work day. The notification will include the date(s) that homes may be affected.

NYSEG will undertake measures to protect utility poles and maintain electricity service to residences in the work area. Preliminary plans for the sewer remedy have been provided to NYSEG and a field reconnaissance was held with NYSEG representatives. Once a firm schedule for the work is established NYSEG will undertake appropriate actions with respect to protecting utility poles and lines.

4.4.2 Removal and Replacement of the Sanitary Sewer

Excavation activities will be performed using an excavator with a boom that can be offset 90 degrees in order to work adjacent to the retaining wall on East Spencer Street. Excavation will start along Section 2 at the lowest point on East Spencer Street at MH-17, approximately 30 feet south of the end of Section 2, and proceed north along East Spencer Street to MH-18. At this point the excavation will proceed to the east along Section 1 toward Turner Place to MH-9. Each day the excavation work will be limited to the length of sewer pipe that can be removed and replaced. Asphalt will be cut, removed, and loaded into a roll-off container. Overburden soil above the sanitary sewer line will be removed and placed in a roll-off. The sanitary sewer and surrounding bedding material will be excavated and staged in a separate roll-off. Once full or at the end of the work day the roll-offs will be staged on the EPT property (management of these materials is discussed in Section 4.4.6). All excavated soil and bedding material will be screened for total volatile organic vapors using photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp. Readings will be recorded in a field log book and the results will be used to ensure that any potentially contaminated material is sampled and managed per Section 4.4.6. If contaminated material is encountered, NYSDEC will be notified immediately.

Along Section 1 on East Spencer Street manhole MH-11 will be removed due it its close proximity to the proposed new manhole (MH-18) at the north limit of Section 1. Removal of MH-11 will allow for installation a continuous sewer pipe between MH-17 and MH-18 (Appendix B, Sheet 5). Manhole MH-18 will be constructed approximately 5 feet northeast of the abandoned MH-18 at the existing intersection of Section 1 and Section 2 (Appendix B, Sheet 6). The proposed location of MH-18 was selected to allow adequate clearance from a nearby utility pole. However, if feasible the utility pole will be relocated to allow for the installation of MH-18 and sewer pipe in their existing locations. The possibility of moving the utility pole has been reviewed with NYSEG and a final determination will be made upon further evaluation by NYSEG. The proposed location of MH-18 will also be in close proximity to the 6-inch water main and if necessary, the water main will be rerouted around MH-18. Any re-routing of the water line will be conducted in accordance with standards discussed in Section 6.3.2. From MH-18, the sewer line along Section 1 will be excavated to approximately three feet west of MH-9 (Appendix B, Sheet 8. MH-9 will not be replaced due to its close proximity to the limit of Turner Place and a NYSEG substation.

The replacement sewer line will be 8-inch diameter SDR35 pipe with gasketed joints and fittings. Sewer line laterals will be replaced with SDR35 sewer pipe with gasket joints and fitting. The two connections to be made at the MH-9 and MH-17 will be completed with compression fitting (Appendix A, Sheet 8). Lateral connections will be installed with a controlled low strength material (CLSM) collar which will serve as a barrier to vapor migration and also segregate the trench from bedding material. As shown in Appendix A, Sheet 8, backfill material around the sewer line exiting MH-9 and the end of Section 2 and MH-17 will consist of four inches of CLSM. CLSM backfill will meet the requirements of New York State Department of Transportation (NYSDOT) Standard Specification Section 204: Controlled Low Strength Material, with 5% bentonite additive (Appendix A, Sheets 7 and 8).

The new sewer pipe will be constructed and tested in accordance with:

- ASCE Manual No. 60 / WPCF Manual FD-5, “Gravity Sanitary Sewer Pipe Design and Construction.”
- The Handbook of PVC Pipe, Design and Installation available from the Uni-Bell PVC Pipe Association.
- ASTM F1417, “Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.”
- UNI-B-6, “Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.”

At the contractor’s discretion, the sewer pipe may be tested in sections prior to backfilling to ensure it is leak tight. Upon completion of sections of sewer pipe between manholes, the pipe will be pressurized and tested in accordance with ASTM F1417. Information on pressure applied to the sewer pipe, duration of the test, and test criteria will be maintained in a field log book.

4.4.3 Venting System

A venting pipe consisting of 4-inch, perforated, high-density polyethylene (HDPE) DriscoPlex® 1900 Series, or similar will be installed in the bedding material above or along the side of the sanitary sewer depending on the space available. Perforations will be at least a 1/4-inch diameter, no more than 18-inches apart with sets of three perforations every 18-inches interval (i.e. 0 degrees, 120 degrees, 240 degrees). A non-perforated 4-inch, HDPE DriscoPlex®, or similar, will be utilized to connect the Section 1 venting pipe to the exhaust stack (Appendix A, Sheet 7).

Bedding material will be Type 1 or Type 1A, open graded, clean aggregate (ASTM D2487), compacted to 95% standard proctor density (Appendix B, Sheet 7). A 45 milometer (mil) ethylene propylene diene monomer (EDPM) rubber will be installed directly on top of the bedding material and approximately 1-inch above the venting pipe. The EPDM rubber will eliminate direct water infiltration into the bedding material and vent pipe.

The perforated venting pipe will be connected to an approximately 5-inch diameter steel pipe which will serve as the exhaust stack (Appendix B, Sheet 7). The stack will be approximately 25 feet above grade. A rubber gasket, or similar, will be installed between the outside of the HDPE pipe and exhaust stack at the top of the exhaust stack foundation (Appendix B, Sheet 7). The stack will be equipped with a sample port to allow for vapor monitoring. The sample port will be lockable to inhibit unauthorized access to the port. The installation of the exhaust stack will also ensure the venting pipe is installed at a lower elevation than the inlet to the bottom of the exhaust stack to ensure air flow can rise freely and condensation in the exhaust stack can drain. A wind turbine will be installed on top of the exhaust stack (Appendix A, Sheet 7). Any tree branches in proximity to the vent stack will be trimmed to ensure there are no obstructions that would interfere with operation of the wind turbine. The foundation of the steel utility pole will be installed to manufacturer specifications. As shown in Appendix A, Sheet 6, bollards will be constructed adjacent to the exhaust stack to prevent damage by vehicles parking on the gravel parking.

Clean fill meeting ASTM 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension.will be placed above the EPDM (Appendix A, Sheets 7 and 8). As show in Appendix A, Sheet 7, the solid HDPE pipe between Section 1 and the exhaust stack will be emplaced in 4 inches of CLSM. Along Section 1 on East Spencer Street, No. 2 Run of Crusher base material will be placed followed by asphalt consisting of Type 3 asphalt binder and Type 6 asphalt. The base materials and asphalt are as specified by the City of Ithaca DPW and construction will be in accordance with NYSDOT's Standard Specifications outlined in Section 201-3.15. The sewer along Section 2 will be backfilled up to approximate grade with clean fill and will then be finished to match existing grade (i.e. gravel, grass, or sidewalk).

It is anticipated that four (4) water supply laterals will be encountered during the sewer replacement work. If necessary, the water line laterals will be removed and replaced in accordance with Section 6.3.2. The water supply laterals will be completed with a CLSM collar that will encompass the new and existing water supply lateral connections (Appendix B, Sheet 7). The CLSM collar will serve as a vapor dam that will segregate the trench from bedding material of the supply lateral pipe.

4.4.4 Stormwater Management

Best management practices will be employed during the sewer excavation and replacement work with respect to stormwater management. Sediment and erosion controls will be utilized to mitigate stormwater impact. Management controls that may be utilized include straw bales, silt fence, and construction entrances. Specific methods and materials for erosion control will conform to the "New York State Standards and Specifications for Erosion and Sediment Control" (NYSDEC, 2005).

A stormwater catch basin within the work area along East Spencer Street will need to be removed during the sewer replacement work. Connecting pipes will be cut back and plugged so that stormwater does not enter. A bypass pump will be available to redirect stormwater drainage to a catch basin further south on East Spencer Street. Run-off water along the street will be diverted around the work area using sandbags.

4.4.5 Site Restoration

At the end of each work day, the work area will restored and covered with steel plates, or similar. Adjacent pavement will be swept to remove dust or soil. The final asphalt pavement placed along East Spencer Street will match the original grade. All sidewalks removed will be restored to City code.

4.4.6 Management of Excavated Materials

PID screening results will be used to segregate clean and potentially impacted excavated overburden and bedding material. Based on the screening results, clean and impacted overburden and bedding material will be placed in separate roll-off containers. Sewer pipe and any debris that is removed will be placed in the roll-off containing potentially impacted bedding material. Roll-offs will be covered and

temporarily staged at the EPT facility at the end of each day. Samples will be collected of potentially impacted overburden and bedding soil as well as the clean overburden and bedding soil stored in the roll-offs and analyzed by a New York State certified laboratory for characterization purposes. The characterization sampling results will be used to determine appropriate offsite disposal of the soils and sewer pipe.

4.5 DECONTAMINATION AND DEMOBILIZATION EQUIPMENT

All equipment and reusable tools and supplies will be cleaned by scraping off bulk residuals. Equipment other than heavy machinery also will be within a temporary decontamination pad that will be constructed at the EPT facility. Wash water will be collected in 55-gallon DOT-approved drums and staged at the EPT facility for subsequent characterization and disposal. Disposable equipment and materials will be collected and disposed of according to state and federal regulations. All construction equipment will be demobilized from the site.

5 Venting System Operation and Performance Monitoring

5.1 SYSTEM OPERATION

The venting system will be operational upon installation of the wind turbine. Following installation, an inspection will be conducted to ensure it is operating in accordance with manufacturer specifications.

5.2 PERFORMANCE MONITORING

Performance monitoring will be conducted monthly for the first three months and then quarterly for the remainder of the first year. Thereafter, performance sampling will be conducted semiannually until all eight (8) constituents of concern for the site are below 1 µg/m^3 or fall below background levels. Performance monitoring data will be submitted to the NYSDEC when it becomes available from the laboratory. The data will subsequently be presented in progress reports as described in Section 5.4. Air samples will be collected from the sampling port on the riser stack using 1-liter Entech canisters, or similar. A background ambient air sample also will be collected during each sampling event at a location upwind and at the same approximate elevation of the venting system riser pipe. A log will be completed during each sampling event that will include information on sample time, sample identification numbers, barometric pressure, temperature, prevailing wind speed and direction, sample designation and notes on the system operation (wind turbine). Chain-of custody will be completed for all samples. Samples will be analyzed for VOCs using U.S. Environmental Protection Agency (EPA) Method TO-15 by a New York State certified laboratory. Any proposed changes to the performance monitoring schedule will be reviewed with NYSDEC.

5.3 INSPECTION AND MAINTENANCE

Inspections will be performed monthly for the first quarter and annually thereafter to ensure that the wind turbine is operating within manufacturer specifications. During the inspections checks will be made to ensure the wind turbine is free of obstructions, dirt, and debris and that it spins freely. Logs will be maintained of each inspection. In the event the turbine is not operating according to manufacturer specifications, it will be repaired or replaced.

5.4 REPORTING

Results of the performance monitoring including background ambient air monitoring and inspections will be summarized in progress reports. The progress report will describe the sampling procedures, sampling results, and inspection findings. Sampling and inspection logs will also be included. The progress reports will be submitted to NYSDEC approximately seven weeks after each sampling event.

5.5 SITE MANAGEMENT PLAN

A Site Management Plan (SMP) will be prepared for Operable Unit No. 3 and submitted to the NYSDEC under separate cover. The SMP for OU No. 3 at a minimum will included the following elements:

- Institution and Engineering Control Plan
- Post-Remediation Monitoring Plan
- Operation and Maintenance Plan

6 Permits and Approvals

All remedial activities will be performed in compliance with federal, state, and local requirements. A summary of applicable requirements is provided below.

6.1 PERMITS

6.1.1 Street Permit

A street permit will be obtained from the City of Ithaca DPW for the sewer replacement work. A copy of this Remedial Design document will be provided to the DPW and schedules for all work activities will be coordinated with the City Of Ithaca.

Sidewalk and street barricades with signage will be installed according to the layout in Appendix A, Sheet 4 at the beginning of the work. Signage will be installed in accordance with the schedule required by the City of Ithaca.

Work hours will be between 7:30 a.m. to 10 p.m. Monday thru Friday per the City of Ithaca requirements. To expedite the work, approval for work on Saturdays may be requested from the Superintendent of the City of Ithaca DPW.

6.1.2 Tree Work Permit

A tree work permit will be obtained to remove one tree on City property. The tree will be replaced in accordance with set forth by the City Forestry Program.

6.1.3 Land Use Easement

An easement will be obtained from the City of Ithaca to install the venting riser pipe on city owned land located at the bottom of Turner Place.

6.2 CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN

A Construction Quality Assurance Project Plan (CQAPP) has been prepared to ensure, with a reasonable degree of certainty, that the remedy will meet all design criteria, plans, and specifications. The CQAPP is included in Appendix E of this report. Details of the CQAPP may be revised upon selection of the Remedial Action Contractor(s).

6.3 STANDARDS APPLIED TO THE SANITARY SEWER INSTALLATION

6.3.1 Sanitary Sewer Standards

The design of sanitary conveyance systems (sewers), in New York is regulated by a set of recommended policies and standards contained in “Recommended Standards for Wastewater Facilities”, 2004 Edition. In addition to the general requirements outlined in Chapter 20 – Plans and Specifications, this design has been prepared in accordance with the following specific requirements:

- Chapter 20, Section 20.2 – Plans of Sewers
- Chapter 30
  - Section 33 – Details of Design and Construction
  - Section 34 – Manholes

- Section 38 – Protection of Water Supplies, and in particular, subsection 38.3, Relation to Watermains

Section 34 provides details on manhole construction including dimensions, and installation and testing criteria. The section also provides a minimum distance of 400 feet between manholes for pipe diameters of 15-inches or less, and is the basis for the removal of MH-11.

Section 38 provides standard offset distances for sewers running in parallel with drinking water mains. In general, the standard recommends a horizontal separation of 10 feet. The standard provides further guidance in cases where this separation is not practical. In these cases, the standard provides for the installation of gravity sewers closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the gravity sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. Based on the existing configuration between the sewer and water main, there is an approximate 6 foot horizontal separation and a 2 foot vertical separation, which is consistent with this provision.

The replacement sewer pipe will be the same size of the existing sewer pipe, thus the flow capacity, slope, minimum flow depths, and alignment will not be changed. The existing downstream manhole (MH 17), is a drop-type manhole with an approximate 3.3-foot drop in elevation occurring immediately outside of the manhole. The design for the replacement sewer line is consistent with the existing system layout and not expected to require any modifications. In the event changes are deemed necessary they will be in accordance with the standards in Chapter 30, Section 34.

6.3.2 Water Supply Standards

New York has established a set of recommended policies and standards for replacing water supply pipes "Recommended Standards for Water Works Facilities", 2007 Edition. The following requirements will be adhered to for water lines:

- Chapter 8 – Distribution System Piping and Appurtenances

Chapter 8 details installation procedures for water mains and will be adhered to as discussed in Section 4.4.2. If removal of water supply laterals is necessary, as discussed in Section 4.4.3, the removal and replacement will also be completed in accordance with Chapter 8 standards.

7 Health and Safety

7.1 SITE HEALTH AND SAFETY PLAN

A Site-specific HASP for the construction activities associated with sanitary sewer replacement is included as Appendix C.

7.2 AIR MONITORING

During the sewer excavation work air monitoring will be conducted for particulates and organic vapors in accordance with the Community Air Monitoring Plan (CAMP) provided in Appendix D. A PID will be used for continuous monitoring of total VOCs. The PID (MiniRae 2000 by RAE Systems, or similar) equipped with a 10.6 ev lamp will detect VOCs at a level well below the VOC action level specified in the CAMP, and be programmed to perform data logging. The PID will be placed at an approximate breath zone height, estimated at 4 feet above ground surface.

Continuous particulate monitoring will be performed using a MIE PDM-3 Minram direct sensing, real-time monitor or equivalent, with data logging capabilities. This device can detect airborne particulate at levels well below the CAMP particulate action level, and be placed at breathing zone height.

8 Schedule

Solicitation of proposals for the procurement of an installation contractor will begin in May 2011. The implementation of the remedy is anticipated to begin on July 25, 2011 and is projected to take three weeks to complete. This schedule is predicated on review and approval of the work plan in early June 2011. The Remedial Action Report will be submitted to the NYSDEC within 8 weeks of completing the system installation and start-up activities. The Site Management Plan will be submitted following completion of the Remedial Action Report. A description of the content to be included in the Site Management Plan and Remedial Action Report are presented below.

8.1 SITE MANAGEMENT PLAN

In accordance with the Record of Decision, a Site Management Plan will be prepared for OU-3. The Plan will include the following:

- An Engineering Control Plan that identifies all engineering controls implemented and details the steps and media-specific requirements necessary to assure the required engineering controls remain in place and are effective.
- A Site Monitoring Plan which outlines the activities necessary to assess the overall performance and effectiveness of the remedy.

8.2 REMEDIAL ACTION REPORT

Upon completion of the field work, a Remedial Action Report will be prepared and will include a certification by a professional engineer licensed in the state of New York. In general, the Remedial Action Report will include the following:

- Site history, background, and description of the nature and extent of contamination.
- Description of the remedy selected including a listing of the remedial action objectives.
- Description of the governing remedial design documents.
- Description of the field work implemented.
- Presentation of the data collected during remedy implementation.

9 References

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Health Research Inc. 2004. Recommended Standards for Wastewater Facilities.

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New York State Department of Health. 2007. Sanitary Code of the New York State Department of Health. October.

WSP Engineering of New York, P.C. 2008. Revised Supplemental Remedial Program/Alternatives Analysis, Emerson Power Transmission, Ithaca, New York. September.

WSP Environmental Strategies. 2008. Supplemental Remedial Investigation Report, Emerson Power Transmission, Ithaca, New York. April.

10 Acronym List

bgs	below ground surface
CLSM	controlled low strength material
CSM	conceptual site model
DPW	Department of Public Works
EPA	U.S. Environmental Protection Agency
EPT	Emerson Power Transmission
eV	electron volt
HASP	Health and Safety Plan
mg/m^3	milligrams per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
TCE	trichloroethene
VOC	volatile organic compounds
RD	Remedial Design
OU	Operable Unit
DER	Division of Environmental Remediation
amsl	above mean sea level
mil	milometer
NYSEG	New York State Electric & Gas
PID	photoionization detector
HDPE	high-density polyethylene
EDPM	ethylene propylene diene monomer
SMP	Site Management Plan
CQAPP	Construction Quality Assurance Project Plan
CAMP	Community Air Monitoring Plan