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Transmitted via Overnight Courier

October 20, 2006

Mr. Dean Tagliaferro
EPA Project Coordinator
U.S. Environmental Protection Agency
c/o Weston Solutions, Inc.
10 Lyman Street
Pittsfield, MA 01201

Re: GE-Pittsfield/Housatonic River Site
Groundwater Management Area 3 (GECD330)
Soil Gas Migration Assessment Report

Dear Mr. Tagliaferro:

Enclosed is a document titled *Soil Gas Migration Assessment Report for Groundwater Management Area 3*. This report is a supplement to GE's September 15, 2006 *Soil Gas Investigation Summary Report for Groundwater Management Area 3*, which presented sample results for deep soil gas, light non-aqueous-phase liquid (LNAPL), and groundwater in the vicinity of Buildings 51 and 59 at the GE facility. Since that time, GE has conducted additional investigations, which have involved the sampling of shallow soil gas beneath those buildings and indoor air within those buildings. The enclosed report presents the results of those additional investigations, and it provides an assessment of the overall data from this area to evaluate the potential for the volatilization of constituents from the subsurface LNAPL in the area and the migration of those constituents upward through the underlying soil and, potentially, into the indoor air of the buildings. This report also includes a comparison of the indoor air results to applicable workplace limits, as well as a proposal for further follow-up activities.

Please contact me if you have any questions or comments.

Sincerely,

Richard W. Gates /BB for

Richard W. Gates
Remediation Project Manager

Enclosure
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REPORT

Soil Gas Migration Assessment Report for Groundwater Management Area 3

General Electric Company
Pittsfield, Massachusetts

October 2006

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A Data Validation Report
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1. Background

On September 15, 2006, the General Electric Company (GE) submitted to the United States Environmental Protection Agency (EPA) a document titled *Soil Gas Investigation Summary Report for Groundwater Management Area 3* (Soil Gas Summary Report). The activities described in that report were conducted pursuant to GE's May 31, 2005 *Soil Gas Investigation Work Plan for Groundwater Management Area 3* (Work Plan), as conditionally approved by EPA in a letter dated July 11, 2006. In general, the activities described in the Soil Gas Summary Report, which were conducted in August 2006, included the collection and analysis of samples of soil gas (vapor), light non-aqueous phase liquid (LNAPL), and groundwater. These samples were collected in the vicinity of two buildings, Buildings 51 and 59, located respectively at 151 and 159 Plastics Avenue, which are owned by GE and are used by the Company for Pittsfield-based operations. As discussed in that report, these activities were performed in response to the previous detection of certain constituents in the LNAPL in a monitoring well adjacent to Building 51 (well 51-8) at concentrations that would exceed the Method 1 GW-2 standards set forth in the Massachusetts Contingency Plan (MCP) if those constituents had been found in groundwater at the same concentrations.

Since submittal of the Soil Gas Summary Report, GE has conducted additional investigations and evaluations to further assess the potential for constituents in the LNAPL to volatilize and migrate into Buildings 51 and 59. The Soil Gas Summary Report identified a number of evaluations that GE indicated that it would undertake, including (as appropriate) screening-level comparisons of the soil gas data to certain conservative screening values published by EPA, comparison of the groundwater and LNAPL data to the MCP Method 1 GW-2 standards, and, potentially, modeling of the potential soil gas to indoor air migration pathway. Such evaluations were intended to use the available groundwater, LNAPL, and "deep" soil gas sampling results (all collected from approximately 10 to 12 feet below ground surface). However, subsequent to the submittal of the Soil Gas Summary Report, GE elected instead to perform additional investigations to obtain sampling data from locations immediately below and within Buildings 51 and 59 to confirm its belief that any volatilized constituents would be well below appropriate governmental occupational standards and for comparison to the prior data. Therefore, rather than solely relying on evaluations using data corresponding to subsurface conditions at approximately 10 feet beneath the existing building floor slabs, GE has obtained sub-slab soil gas and indoor air sampling data to support more meaningful comparative and modeling-based evaluations. In addition, as part of these

supplemental investigations, GE conducted sampling as part of an industrial hygiene assessment related to trichloroethene (TCE) in the workplace indoor air of Buildings 51 and 59.

Section 2 of this *Soil Gas Migration Assessment Report for Groundwater Management Area 3* (Migration Assessment Report) summarizes the results of the additional investigations performed by GE since submittal of the Soil Gas Summary Report, involving the sampling and analysis of sub-slab soil gas beneath, and indoor air within, Buildings 51 and 59. Section 3 then provides an assessment of the overall data from both the August 2006 sampling and the more recent sampling to evaluate the potential for the constituents detected in the subsurface LNAPL beneath/near Buildings 51 and 59 to migrate upward and enter into the indoor air within those structures. Section 3 also includes a comparison of the recent indoor air data to applicable occupational standards for workplace exposure, and it identifies GE's proposal for future activities to address the LNAPL in this area.

2. Recent Sub-Slab Soil Gas and Indoor Air Sampling and Analytical Results

2.1 General

On September 28, 2006, GE conducted sub-slab soil gas sampling beneath Buildings 51 and 59 and indoor air sampling within those buildings, using the same sampling method that had previously been used in the August 2006 soil gas sampling event (the SUMMA® canister method). At the same time, GE conducted an industrial hygiene assessment of indoor air in those buildings. The collection of these samples and the analytical results obtained are described below.

2.2 Buildings 51 and 59 Indoor Air and Sub-Slab Soil Gas Assessment (using SUMMA Canister Method)

GE collected and analyzed indoor air samples and sub-slab soil gas samples, using the SUMMA® canister method, to provide further information regarding the potential migration of volatile organic compounds (VOCs) and certain similar semi-volatile organic compounds (SVOCs) from the subsurface LNAPL toward and into Buildings 51 and 59. The indoor air samples were collected to provide data for comparison to the soil gas results and modeled indoor air concentrations. In addition, because VOCs are always present in indoor residential, commercial, and industrial air due to VOCs in ambient air and in numerous commercial products and materials (such as paints, adhesives, carpeting, etc.), sub-slab soil gas samples were collected to provide information to further assess whether, and to what extent, any constituents detected in the indoor air samples may be attributable to the subsurface LNAPL. The locations at which the samples were collected are shown on Figure 1.

2.2.1 Sub-Slab Soil Gas and Indoor Air Sampling and Analysis

The indoor air and sub-slab soil gas samples were generally collected over an approximate 8-hour period (to coincide with normal working hours within each building) using a 6-liter SUMMA® canister with an attached pre-set flow regulator. The laboratory provided batch-certified-clean canisters with an initial vacuum of 26 inches of mercury (in. of Hg) for sample collection. Flow regulators were pre-set by the laboratory to provide uniform sample

collection over the approximate 8-hour sampling period (e.g., flow rate of approximately 12 milliliters per minute [mL/min]). Exceptions were made to the sampling procedure to allow collection of duplicate samples immediately following collection of the initial samples at locations selected for duplicate analyses. Specifically, the duplicate indoor air sample at location # 0189 in Building 59 was collected over a five-hour, rather than eight-hour period, while the duplicate sub-slab sample at location #0061 beneath Building 59 was collected over a much shorter time period (i.e., approximately 15 minutes). As shown by the tables referenced in Section 2.2.2 and as discussed further in Section 3.2.1 below, there was a discrepancy in the analytical results between the initial and duplicate sub-slab soil gas samples at the latter location. The duplicate sample results may not be representative of actual sub-slab conditions, since an increased vacuum was induced to complete the duplicate sub-slab sample collection in an expedited manner. By contrast, the duplicate indoor air sample, which was collected over only a slightly shorter time period than the original air sample at that location, produced results similar to the initial sample.

Indoor air samplers were placed at the approximate height of the breathing zone of the building occupants. The collection of the sub-slab soil gas samples involved the drilling of a small diameter hole through the existing concrete floor slabs (which ranged in thickness from 12 to 16 inches) to allow access for a sampling tube to the underside of the floor slab.

All indoor air and sub-slab soil gas sample analyses were submitted for laboratory analysis in accordance with USEPA Compendium Method TO-15, titled *Compendium of Methods for the Determination of Toxic Organics Compounds in Ambient Air – Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).* The samples were submitted to Lancaster Laboratories, Inc. of Lancaster, Pennsylvania, which has current National Environmental Laboratory Accreditation Program (NELAP) certification and is accredited in the Commonwealth of Massachusetts for conducting analyses in accordance with EPA Compendium Method TO-15. The constituents for which analyses were performed include the same constituents for which analyses were performed on the deep soil gas samples collected in August 2006 – namely, VOCs and certain SVOCs that can be identified during the same analysis (including 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and naphthalene).

2.2.2 Sub-Slab Soil Gas and Indoor Air Analytical Results

The analytical results for the sub-slab soil gas samples collected in September 2006 are presented in Table 2-1 (for samples collected beneath Building 51) and Table 2-2 (for samples collected beneath Building 59). The analytical results for the indoor air samples are presented in Table 2-3 (for samples collected in Building 51) and Table 2-4 (for samples collected in Building 59). An assessment of these results is provided in Section 3 below.

2.3 Buildings 51 and 59 Industrial Hygiene Assessment

In addition to the sampling using the SUMMA® canister method, an industrial hygiene (IH) sampling assessment was conducted in Buildings 51 and 59. Based on review of the August 2006 soil gas data by a Certified Industrial Hygienist (CIH), TCE was selected as the most appropriate constituent to be subject to this sampling. Accordingly, on September 28, 2006, GE collected IH samples from six locations within Buildings 51 and 59 (three samples within each building), as shown on Figure 1, to evaluate the potential exposure of employees in the two buildings to TCE.

2.3.1 Industrial Hygiene Sampling and Analysis

IH sampling was performed by placing air sampling equipment in specific areas in each building at the appropriate height of the breathing zone of the building occupants. The areas sampled were selected by the CIH based on a review of locations of employees within the buildings, building uses, air flow patterns in the area, and the general ventilation of the buildings. The IH samples were collected concurrently with the indoor air Summa canister samples (described above).

IH samples were collected using an activated charcoal tube (SKC 22-01) in accordance with the procedures specified in National Institute for Occupational Safety and Health (NIOSH) Method 1022. TCE sampling was conducted over an approximate 8-hour period, corresponding to normal working hours within each building. The samples were submitted to Galson Laboratories, Inc. of East Syracuse, New York, for analysis of TCE in accordance with NIOSH Method 1022. This method has been validated by NIOSH and was implemented by a laboratory that is fully accredited by the American Industrial Hygiene Association (AIHA).

2.3.2 Industrial Hygiene Analytical Results

The analytical results for the industrial hygiene samples collected in September 2006 are presented in Table 2-5 (for samples collected in Building 51) and Table 2-6 (for samples collected in Building 59). As shown in those tables, no TCE was detected in any of the IH samples collected from either of the two buildings utilizing the sampling and analysis method validated by NIOSH and approved by OSHA for the evaluation of occupational exposure to TCE.

2.4 Data Validation

The indoor air and sub-slab soil gas analytical data collected during this investigation using the SUMMA® canister method have been validated in accordance with the procedures outlined in GE's approved *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP). The results of this review are included in Appendix A. They indicate that 100% of the analytical data are considered usable. Thus, this data set meets the data quality objectives (DQOs) set forth in the FSP/QAPP. The industrial hygiene analytical data were validated by the laboratory and all results met the quality control requirements of AIHA and the National Environmental Laboratory Accreditation Conference (NELAC).

3. Assessment of Results and Future Activities

3.1 General

GE has reviewed the available data set resulting from the deep soil gas, LNAPL, and groundwater sampling activities conducted in August 2006 (as presented in GE's Soil Gas Summary Report) and the more recent sub-slab soil gas and indoor air sampling data conducted in September 2006 (described in Section 2). This review has been conducted to evaluate the overall potential for volatilization of constituents from the subsurface LNAPL in the area of Buildings 51 and 59 and the subsequent migration of those constituents through the underlying soil and into the indoor air of these buildings. The results of that evaluation are summarized in this section. This section also provides a proposal for further follow-up activities.

3.2 Evaluation of Analytical Results

3.2.1 Soil Gas Data

The deep soil gas data presented in the Soil Gas Summary Report and the more recent Building 51 and 59 sub-slab soil gas data summarized in Section 2.2.2 show the presence of a variety of constituents, most of which were not detected in the LNAPL or groundwater. Specifically, a total of 40 individual VOCs and 2 SVOCs were detected in one or more of the deep soil gas samples collected in August 2006, a total of 28 VOCs and 1 SVOC were detected in one or more of the recent sub-slab soil gas samples from Building 51, and a total of 27 VOCs and 1 SVOC were detected in one or more of the recent sub-slab soil gas samples from Building 59. Of these constituents detected in soil gas, only three VOCs (methylene chloride, tetrachloroethene [PCE], and TCE) and one SVOC (1,2,4-trichlorobenzene) were also detected in LNAPL samples, and two of them (PCE and TCE) were only detected in one LNAPL sample (from well 51-8). Further, only one constituent, TCE, was detected in at least one deep soil gas, sub-slab soil gas, LNAPL, and groundwater sample.

As an initial screening step, in accordance with the Work Plan and the Soil Gas Summary Report, the soil gas analytical results were compared to certain soil gas screening values set forth in technical guidance tables contained in a draft EPA guidance document titled *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance),* EPA530-D-02-004, November 2002 (OSWER Vapor Intrusion Guidance). For the present application, use of these guidance

table values is a conservative screening-level approach, because those values were designed for use in residential settings, whereas Buildings 51 and 59 consist of occupational workplaces. The OSWER Vapor Intrusion Guidance explicitly recognizes that "[t]he approaches suggested in this draft guidance are primarily designed to ensure protection of the public in residential settings" (p. 2) and that "EPA does not expect this guidance be used for settings that are primarily occupational" (p. 3). Although GE does not accept many of assumptions that EPA used to develop this Guidance, it has used values from this EPA Guidance solely as an initial screening step.

The specific values used in this screening consist of the values set forth in Table 2b of the Guidance, which are based on a 10^{-5} cancer risk level (or a non-cancer Hazard Quotient of 1 for non-carcinogens), as recommended in the Guidance as a "generally reasonable screening mechanism" (p. 9). The detected constituents from the soil gas samples collected in August 2006 were compared to the values set forth in that table for "Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.01." These values are recommended in the Guidance for soil gas samples taken at depths greater 5 feet below the foundation level (p. 28), such as the August samples. That comparison is shown in Table 3-1. The detected constituents from the sub-slab soil gas samples collected in September 2006 were compared to the values set forth in Table 2b of the Guidance for "Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.1." Those comparisons are shown in Table 3-2 for the data from beneath Building 51 and in Table 3-3 for the data from beneath Building 59.

Collectively, the comparisons presented in Tables 3-1 through 3-3 show only one detected constituent, TCE, with deep or shallow soil gas concentrations greater than the applicable screening values. Specifically, TCE was detected above the screening value in two of the deep soil gas samples, one of the shallow soil gas samples from Building 51, and two of the shallow soil gas samples from Building 59. TCE was also detected in the LNAPL and groundwater from one well (well 51-8). It should be noted that, as the OSWER Vapor Intrusion Guidance recognizes (p. D-2), the soil gas screening levels presented in that document for TCE were based on a draft Cancer Slope Factor (CSF) that EPA has subsequently withdrawn pending a reassessment of the carcinogenicity of this compound. Indeed, there are no current EPA-accepted toxicity data for TCE. In these circumstances, the Guidance states that the screening values presented for this compound should be considered "provisional" values (p. D-2). In any event, as noted above, these EPA screening values are not applicable to occupational settings.

In addition, it should be noted that the highest sub-slab soil gas TCE result from the recent sampling, 470 µg/m^3, came from a grab sample collected over only approximately 15 minutes (as opposed to an 8-hour sampling event) and thus may not be representative of current sub-slab soil gas conditions. Given (a) the methodology used for collecting the sub-slab soil gas samples (i.e., the use of the negative pressure SUMMA canisters to induce a sub-slab vacuum and draw in soil gas, as described in Section 2), and (b) the objective of the sub-slab sampling event (i.e., to collect soil gas samples representative of normal conditions), the collection of a soil gas sample over an extended period (e.g. 8 hours) is preferred, since such sampling involves a relatively lower vacuum pressure and slower soil gas intake rate. As noted in Section 2.2.1, the discrepancy in the analytical results between the initial sample result (TCE not detected at detection limit of 54 µg/m^3) and the "grab" sample result (TCE concentration of 470 µg/m^3) appears to be attributable to the increased vacuum pressure that was induced to complete the duplicate sub-slab sample collection quickly.

3.2.2 LNAPL and Groundwater Data

As shown in Tables 2 and 3 of the Soil Gas Summary Report, the LNAPL and groundwater data collected in August 2006 show a limited number of detected constituents – three VOCs and four SVOCs in the LNAPL samples and five VOCs and three SVOCs in the groundwater samples.

The groundwater and LNAPL results for constituents detected in the groundwater and LNAPL samples have been compared to the MCP Method 1 GW-2 standards for groundwater, as shown in Tables 3-4 and 3-5, respectively. Under the MCP, volatile constituents present within GW-2 groundwater represent a potential source of organic vapors to the indoor air of the overlying or nearby occupied structures. Although the GW-2 standards do not directly apply to LNAPL, the LNAPL analytical data were compared to those standards to provide a frame of reference to assist in assessing the potential for constituents in LNAPL to volatize and migrate to the indoor air of the building.

None of the constituents in the three groundwater samples collected in August 2006 was detected at a level above the MCP GW-2 standards (Table 3-4). The three LNAPL samples collected in August 2006 show concentrations of a few constituents that would exceed the MCP Method 1 GW-2 standards if they were present in groundwater (Table 3-5). Specifically, concentrations of four constituents – PCE, TCE, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene – in the LNAPL from well 51-8 were higher than the GW-2 standards, while the concentrations of 1,4-dichlorobenzene at well GMA3-10 and 1,2,4-trichlorobenzene at piezometer UB-PZ-3

exceeded the GW-2 standards. Of these constituents, one (1,4-dichlorobenzene) was not detected in any soil gas samples, one (1,2,4-trichlorobenzene) was not detected in deep soil gas but was detected in shallow soil gas below Buildings 51 and 59 at concentrations below the soil gas screening level, and one (PCE) was not detected in shallow soil gas and was detected in deep soil gas at a concentration below the soil gas screening level. Further, of the four constituents detected in LNAPL at levels above the GW-2 standards, three (TCE, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene) were also observed in groundwater but at levels below the applicable GW-2 standards, and the fourth such constituent (PCE) was not detected in the groundwater samples.

In addition, another constituent (naphthalene) that had been detected in LNAPL at concentrations above the GW-2 standard during a prior sampling event in Spring 2005 was detected in only one LNAPL sample during the August 2006 investigation (at an estimated concentration below the GW-2 standard), and was not detected in the soil gas samples.

In summary, there was only one constituent, TCE, detected in an LNAPL sample near these buildings that was also detected in soil gas at concentrations greater than the conservative soil gas screening values based on residential exposure.

3.2.3 Indoor Air Data

The indoor air data from both Building 51 and Building 59, presented in Tables 2-3 and 2-4, show a variety of detected constituents, most of which were not detected in the LNAPL or groundwater. There were 19 detected constituents (all VOCs) in Building 51 and 27 detected constituents (26 VOCs and 1 SVOC) in Building 59. The detection of constituents at these frequencies in the indoor air of buildings is expected and routine. For example, Girman et al. (1999) reported that, in an EPA study conducted from the summer of 1995 through the winter of 1997-98 in 56 randomly selected public and private office buildings across the U.S., 48 VOCs were found indoors at quantifiable concentrations, with 8 VOCs found in all samples and an additional 26 VOCs found in 81-99% of the samples.[1] Moreover, an EPA publication titled *An Introduction to Indoor Air Quality* (found on the EPA website) notes that "[c]oncentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors," and that: "VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building

materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions."

The indoor air concentrations found in both buildings are all far below the limits applicable to occupational settings such as Buildings 51 and 59 – namely, the workplace exposure standards established by the U.S. Occupational Safety and Health Administration (OSHA) and the guidelines established by NIOSH. This is shown in Tables 3-6 and 3-7 for Buildings 51 and 59, respectively. [Note that, in these tables, the concentrations have been converted from micrograms per cubic meter to parts per million (ppm), since the OSHA standards and NIOSH guidelines are expressed in ppm.] Review of these tables indicates that all indoor air concentrations are at least an order of magnitude below the OSHA standards and NIOSH guidelines, and that nearly all of the detected constituent concentrations are two to three orders of magnitude lower than those limits.

As noted above, there are many potential sources of VOCs in the indoor air in buildings. In this case, there is no clear relationship between the indoor air concentrations and the concentrations found in the LNAPL or groundwater, raising substantial uncertainties as to the extent, if any, to which those indoor air concentrations are related to or derived from the LNAPL or groundwater. This is evidenced by the following factors:

First, the majority of constituents detected in the indoor air samples (in either building) were not detected in the underlying LNAPL or groundwater samples. The only constituents detected in the indoor air of either building that were also detected in the LNAPL were methylene chloride (below GW-2 standards in LNAPL) and TCE. The only constituents detected in indoor air of either building that were also detected in groundwater were 2-butanone, acetone, toluene, and TCE; however, the concentrations of these constituents in groundwater were all below the MCP GW-2 standards.

Second, for many of the constituents detected in the indoor air samples, the highest indoor air concentrations were higher than any concentrations found in the shallow soil gas, suggesting that the indoor air concentrations of such constituents did not derive from the subsurface. These include, for example, 2-butanone, acetone, benzene, carbon disulfide, hexane, heptane, methylene chloride, xylenes, and toluene. Indeed, as noted above, all constituent concentrations in soil gas, except for TCE, were below the conservative EPA screening values.

[1] Girman, J.R., G.E. Hadwen, L.E. Burton, S.E. Womble, and J.F. McCarthy. 1999. "Individual Volatile Organic Compound Prevalence and Concentrations in 56 Building of the Building Assessment Survey and Evaluation (BASE) Study." In: *Proceedings of Indoor Air 1999, II*, pp. 460-465.

Third, there is no discernible or consistent pattern between the sub-slab soil gas and indoor air data for those constituents detected in both media. EPA's OSWER Vapor Intrusion Guidance states that "[i]f there is more than one potential constituent of concern, we recommend that ratios of potential constituents be used to distinguish subsurface-derived VOCs from those contributed by other non-subsurface-related sources (i.e., indoor air and/or ambient (outdoor) air emission sources)" (p. I-1). Tables 3-8 and 3-9 present (for Buildings 51 and 59, respectively) the ratios of the average concentrations of the detected constituents in the sub-slab soil gas samples to the average constituent concentrations in indoor air within the buildings. As shown in Table 3-8, for Building 51, not only are the vast majority of the average indoor air concentrations higher than the sub-slab soil gas concentrations, but a constituent-by-constituent comparison indicates a wide range of ratios between the average sub-slab and average indoor air results. A similarly wide range of ratios exists for the Building 59 data comparison (Table 3-9). If a migration pathway were present from the subsurface to the indoor air, one would expect a more closely grouped set of constituent ratios. The absence of such consistent ratios indicates that there is no clear link from sub-slab soil gas to indoor air.

Fourth, comparison of the deep soil gas data collected in August 2006 to the sub-slab soil gas data collected in September 2006 shows a general pattern of lower concentrations in the shallow soil gas samples, indicating that attenuation is occurring as vapors move up from the LNAPL through the soil. This is evident, for example, from a comparison of the deep soil data collected near Building 51 (Table 3-1) to the sub-slab soil gas data collected from beneath that building (Table 3-2).

Fifth, since TCE was the only constituent that was (a) detected in LNAPL above GW-2 standards, (b) detected in soil gas at concentrations exceeding the EPA conservative (residential) soil gas screening values, and (c) also detected in some indoor air samples, GE conducted modeling of TCE for both buildings to provide information regarding the potential origin of the TCE in indoor air. This modeling applied the EPA version of the Johnson and Ettinger (J&E) model (Version 3.1, dated February 2004) to each building. The J&E model is a widely used modeling tool to assess the potential for constituent migration from the subsurface beneath a building into indoor air. For this application, the sub-slab soil gas TCE data were incorporated into the model. To be conservative, the modeling was based on the highest sub-slab soil gas result for each building – i.e., 58 $\mu g/m^3$ for Building 51 and 470 $\mu g/m^3$ for Building 59 (despite the fact that, as noted above, the latter result appears to be anomalous). The modeling used as much building-specific and site-specific information as was available, along with default values where site-specific information was not available. This modeling is described in Appendix B. It included a base case (utilizing a typical office space air exchange rate of one exchange per

hour), along with a sensitivity run for each building using a more conservative assumed air exchange rate of 0.25 exchange per hour (which is the default assumption utilized in the J&E model for a residential scenario).

For the base case, the results of this modeling predicted indoor air TCE concentrations of 0.0006 µg/m^3 for Building 51 and 0.0029 µg/m^3 for Building 59. The sensitivity runs showed predicted indoor air concentrations of 0.0024 µg/m^3 for Building 51 and 0.0116 µg/m^3 for Building 59. These predicted concentrations are far below the actual indoor air concentrations measured in the samples from these buildings in which TCE was detected. This modeling provides an indication that the indoor air concentrations of TCE did not derive from subsurface environmental media.

That implication is further supported by the fact that, apart from the anomalous sub-slab soil gas grab sample result from beneath Building 59, the detected TCE concentrations in the shallow soil gas samples (58 µg/m^3 at Building 51 and 5.3 µg/m^3 at Building 59) are lower than the detected TCE concentrations in the deep soil gas (82 and 910 µg/m^3), indicating that concentrations are reduced as they migrate upward. Moreover, substantial additional reduction would be expected before such concentrations reach the indoor air due to the thickness of the building slabs (approximately one foot thick in each building, with some locations at 16 inches thick).

3.3 Overall Assessment of Results and Future Activities

The analytical data from the sampling of groundwater, LNAPL, deep soil gas, shallow soil gas, and indoor air in each building do not provide consistent results. Each set of sampling results shows the presence of various constituents in each medium, but there is no clear link from the LNAPL or groundwater to the soil gas to the indoor air. For example, as noted above, there is very little overlap between the constituents detected in LNAPL and those detected in indoor air of either building.

The constituents detected in the indoor air in each building were all found at concentrations far below the limits applicable to workplace exposures. The source of these constituents is unknown. As discussed above, several factors, including modeling of TCE, indicate considerable doubt regarding the extent, if any, to which the indoor air concentrations derive from the subsurface LNAPL.

Nevertheless, GE is currently considering appropriate future activities to enhance the recovery of the subsurface LNAPL to minimize the potential that LNAPL may act as a contributing source of constituents within indoor air in this area. Currently, GE's ongoing activities to address LNAPL in this area include the operation of an automated LNAPL recovery system at well 51-21, the routine measurement of groundwater elevations and NAPL thickness (if present) at over 20 wells in the vicinity of Buildings 51 and 59 on a semi-annual, quarterly, monthly, and/or weekly basis, and the manual removal of NAPL if sufficient thickness is present. GE will review the data obtained during these activities, evaluate the potential for enhancing these recovery operations, and make a proposal on this subject in its next interim report on Groundwater Management Area 3, due to EPA in February 2007.

Tables

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TABLE 2-1
SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Chiller Room - Sub Slab Summa Canister #0324 09/28/06	Power Systems - Sub Slab Summa Canister #0066 09/28/06
Volatile Organics		
1,1,1,2-Tetrachloroethane	ND(6.9)	ND(6.9)
1,1,1-Trichloroethane	**2.9 J**	ND(5.5)
1,1,2,2-Tetrachloroethane	ND(6.9)	ND(6.9)
1,1,2-trichloro-1,2,2-trifluoroethane	**51**	ND(7.7)
1,1,2-Trichloroethane	ND(5.5)	ND(5.5)
1,1-Dichloroethane	ND(4.0)	ND(4.0)
1,1-Dichloroethene	ND(4.0)	ND(4.0)
1,2,3-Trichloropropane	ND(6.0)	ND(6.0)
1,2,4-Trimethylbenzene	**15**	**11**
1,2-Dibromoethane	ND(7.7)	ND(7.7)
1,2-Dichloroethane	ND(4.0)	ND(4.0)
1,2-Dichloropropane	ND(4.6)	ND(4.6)
1,3,5-Trimethylbenzene	**9.0**	ND(4.9)
1,3-butadiene	ND(4.4)	ND(4.4)
1,4-Dioxane	ND(3.6)	ND(3.6)
2-Butanone	**55**	**46**
2-Hexanone	ND(8.2)	ND(8.2)
3-Chloropropene	ND(3.1)	ND(3.1)
4-Ethyltoluene	**15**	ND(4.9)
4-Methyl-2-pentanone	ND(8.2)	ND(8.2)
Acetone	**140**	**54**
Acetonitrile	ND(3.4)	**8.0**
Acrolein	ND(4.6)	ND(4.6)
Acrylonitrile	ND(4.3)	ND(4.3)
Alpha Methyl Styrene	ND(4.8)	ND(4.8)
Benzene	**0.86 J**	**1.3 J**
Bromobenzene	ND(6.4)	ND(6.4)
Bromodichloromethane	ND(6.7)	ND(6.7)
Bromoform	ND(10)	ND(10)
Bromomethane	ND(3.9)	ND(3.9)
Carbon Disulfide	ND(3.1)	ND(3.1)
Carbon Tetrachloride	ND(6.3)	ND(6.3)
Chlorobenzene	ND(4.6)	ND(4.6)
Chlorodifluoromethane	**63**	**46**
Chloroethane	ND(2.6)	ND(2.6)
Chloroform	**1.1 J**	ND(4.9)
Chloromethane	ND(2.1)	ND(2.1)
cis-1,2-Dichloroethene	ND(4.0)	ND(4.0)
cis-1,3-Dichloropropene	ND(4.5)	ND(4.5)
Cumene	**1.2 J**	**0.98 J**
Dibromochloromethane	ND(8.5)	ND(8.5)
Dibromomethane	ND(7.1)	ND(7.1)
Dichlorodifluoromethane	**3.4 J**	**3.0 J**
Dichlorofluoromethane	ND(4.2)	ND(4.2)
Ethyl Acetate	ND(3.6)	ND(3.6)
Ethyl Acrylate	ND(4.1)	ND(4.1)
Ethyl Methacrylate	ND(4.7)	ND(4.7)
Ethylbenzene	**6.7**	**8.0**
Freon 114	ND(7.0)	ND(7.0)
Heptane	ND(4.1)	**8.7**
Hexane	**14**	**13**
Iodomethane	ND(5.8)	ND(5.8)
Isooctane	**2.2 J**	**2.8 J**
m&p-Xylene	**12**	**16**
Methyl Acrylate	ND(3.5)	ND(3.5)

TABLE 2-1
SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter	Sample Location: / Sample ID: / Date Collected:	Chiller Room - Sub Slab Summa Canister #0324 09/28/06	Power Systems - Sub Slab Summa Canister #0066 09/28/06
Volatile Organics (continued)			
Methyl Methacrylate		ND(4.1)	ND(4.1)
Methyl tert-butyl ether		**160**	**67**
Methylene Chloride		**2.5 J**	**18**
Octane		**1.4 J**	**2.2 J**
o-Xylene		**5.5**	**7.9**
Pentane		**5.5**	**7.3**
Propene		**11**	ND(1.7)
Styrene		ND(4.3)	ND(4.3)
tert-Butyl Alcohol		ND(3.0)	ND(3.0)
Tetrachloroethene		ND(6.8)	ND(6.8)
Toluene		**19**	**59**
trans-1,2-Dichloroethene		ND(4.0)	ND(4.0)
trans-1,3-Dichloropropene		ND(4.5)	ND(4.5)
Trichloroethene		**58**	ND(5.4)
Trichlorofluoromethane		**5.5 J**	**4.0 J**
Vinyl Acetate		ND(3.5)	ND(3.5)
Vinyl Chloride		**0.74 J**	**1.2 J**
Semivolatile Organics			
1,2,4-Trichlorobenzene		**9.9 J**	ND(15)
1,2-Dichlorobenzene		ND(6.0)	ND(6.0)
1,3-Dichlorobenzene		ND(6.0)	ND(6.0)
1,4-Dichlorobenzene		ND(6.0)	ND(6.0)
Hexachlorobutadiene		ND(21)	ND(21)
Hexachloroethane		ND(9.7)	ND(9.7)
Naphthalene		ND(5.2)	ND(5.2)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
4. Detected analytes are presented in **bold** font.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 2-2
SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Lobby Area - Sub Slab Summa Canister #0511 09/28/06	Lobby Area - Sub Slab Summa Canister #0061(Duplicate) 09/28/06	Facility Area - Sub Slab Summa Canister #0073 09/28/06
Volatile Organics			
1,1,1,2-Tetrachloroethane	ND(69)	ND(6.9)	ND(6.9)
1,1,1-Trichloroethane	ND(55)	**1.4 J**	ND(5.5)
1,1,2,2-Tetrachloroethane	ND(69)	ND(6.9)	ND(6.9)
1,1,2-trichloro-1,2,2-trifluoroethane	ND(77)	ND(7.7)	ND(7.7)
1,1,2-Trichloroethane	ND(55)	ND(5.5)	ND(5.5)
1,1-Dichloroethane	ND(40)	ND(4.0)	ND(4.0)
1,1-Dichloroethene	ND(40)	ND(4.0)	ND(4.0)
1,2,3-Trichloropropane	ND(60)	ND(6.0)	ND(6.0)
1,2,4-Trimethylbenzene	ND(49)	**4.1 J**	**8.8**
1,2-Dibromoethane	ND(77)	ND(7.7)	ND(7.7)
1,2-Dichloroethane	ND(40)	ND(4.0)	ND(4.0)
1,2-Dichloropropane	ND(46)	ND(4.6)	ND(4.6)
1,3,5-Trimethylbenzene	ND(49)	**8.7**	ND(4.9)
1,3-butadiene	ND(44)	ND(4.4)	ND(4.4)
1,4-Dioxane	ND(36)	ND(3.6)	ND(3.6)
2-Butanone	**50 J**	ND(5.9)	**47**
2-Hexanone	ND(82)	ND(8.2)	ND(8.2)
3-Chloropropene	ND(31)	ND(3.1)	ND(3.1)
4-Ethyltoluene	ND(49)	**3.7 J**	ND(4.9)
4-Methyl-2-pentanone	ND(82)	ND(8.2)	ND(8.2)
Acetone	**200**	**210**	**53**
Acetonitrile	**58**	ND(3.4)	ND(3.4)
Acrolein	ND(46)	ND(4.6)	ND(4.6)
Acrylonitrile	ND(43)	ND(4.3)	ND(4.3)
Alpha Methyl Styrene	ND(48)	ND(4.8)	ND(4.8)
Benzene	ND(32)	**0.77 J**	**0.73 J**
Bromobenzene	ND(64)	ND(6.4)	ND(6.4)
Bromodichloromethane	ND(67)	ND(6.7)	ND(6.7)
Bromoform	ND(100)	ND(10)	ND(10)
Bromomethane	ND(39)	ND(3.9)	ND(3.9)
Carbon Disulfide	**93**	ND(3.1)	ND(3.1)
Carbon Tetrachloride	ND(63)	**4.7 J**	ND(6.3)
Chlorobenzene	ND(46)	ND(4.6)	ND(4.6)
Chlorodifluoromethane	**20 J**	ND(3.5)	**0.99 J**
Chloroethane	**65**	ND(2.6)	ND(2.6)
Chloroform	ND(49)	**2.1 J**	ND(4.9)
Chloromethane	ND(21)	ND(2.1)	ND(2.1)
cis-1,2-Dichloroethene	ND(40)	ND(4.0)	ND(4.0)
cis-1,3-Dichloropropene	ND(45)	ND(4.5)	ND(4.5)
Cumene	ND(49)	ND(4.9)	ND(4.9)
Dibromochloromethane	ND(85)	ND(8.5)	ND(8.5)
Dibromomethane	ND(71)	ND(7.1)	ND(7.1)
Dichlorodifluoromethane	**11 J**	**6.1**	**1.7 J**
Dichlorofluoromethane	ND(42)	ND(4.2)	ND(4.2)
Ethyl Acetate	ND(36)	ND(3.6)	ND(3.6)
Ethyl Acrylate	ND(41)	ND(4.1)	ND(4.1)
Ethyl Methacrylate	ND(47)	ND(4.7)	ND(4.7)
Ethylbenzene	ND(43)	**1.3 J**	**3.1 J**
Freon 114	ND(70)	ND(7.0)	ND(7.0)
Heptane	**23 J**	**1.0 J**	**1.4 J**
Hexane	**85**	**9.6**	**62**
Iodomethane	ND(58)	ND(5.8)	ND(5.8)
Isooctane	ND(47)	ND(4.7)	**1.8 J**
m&p-Xylene	ND(43)	**2.7 J**	**5.2**
Methyl Acrylate	ND(35)	ND(3.5)	ND(3.5)

TABLE 2-2
SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Lobby Area - Sub Slab Summa Canister #0511 09/28/06	Lobby Area - Sub Slab Summa Canister #0061(Duplicate) 09/28/06	Facility Area - Sub Slab Summa Canister #0073 09/28/06
Volatile Organics (continued)			
Methyl Methacrylate	ND(41)	ND(4.1)	ND(4.1)
Methyl tert-butyl ether	**62**	**12**	**260**
Methylene Chloride	**58**	ND(3.5)	**3.3 J**
Octane	ND(47)	ND(4.7)	ND(4.7)
o-Xylene	ND(43)	**1.3 J**	**2.5 J**
Pentane	**27 J**	ND(3.0)	**1.9 J**
Propene	ND(17)	ND(1.7)	ND(1.7)
Styrene	ND(43)	ND(4.3)	ND(4.3)
tert-Butyl Alcohol	ND(30)	**0.67 J**	ND(3.0)
Tetrachloroethene	ND(68)	ND(6.8)	ND(6.8)
Toluene	**64**	**8.5**	**8.4**
trans-1,2-Dichloroethene	ND(40)	ND(4.0)	ND(4.0)
trans-1,3-Dichloropropene	ND(45)	ND(4.5)	ND(4.5)
Trichloroethene	ND(54)	**470**	**5.3 J**
Trichlorofluoromethane	**44 J**	**37**	**15**
Vinyl Acetate	ND(35)	ND(3.5)	ND(3.5)
Vinyl Chloride	ND(26)	ND(2.6)	ND(2.6)
Semivolatile Organics			
1,2,4-Trichlorobenzene	ND(150)	**6.4 J**	**8.8 J**
1,2-Dichlorobenzene	ND(60)	ND(6.0)	ND(6.0)
1,3-Dichlorobenzene	ND(60)	ND(6.0)	ND(6.0)
1,4-Dichlorobenzene	ND(60)	ND(6.0)	ND(6.0)
Hexachlorobutadiene	ND(210)	ND(21)	ND(21)
Hexachloroethane	ND(97)	ND(9.7)	ND(9.7)
Naphthalene	ND(5.2)	ND(5.2)	ND(5.2)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
4. Detected analytes are presented in **bold** font.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 2-3
SEPTEMBER 2006 INDOOR AIR RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Lobby Area - Indoor Air Summa Canister #0337 09/28/06	Power Systems - Indoor Air Summa Canister #0075 09/28/06	Data Research - Indoor Air Summa Canister #0197 09/28/06
Volatile Organics			
1,1,1,2-Tetrachloroethane	ND(6.9)	ND(69)	ND(6.9)
1,1,1-Trichloroethane	ND(5.5)	ND(55)	ND(5.5)
1,1,2,2-Tetrachloroethane	ND(6.9)	ND(69)	ND(6.9)
1,1,2-trichloro-1,2,2-trifluoroethane	ND(7.7)	ND(77)	ND(7.7)
1,1,2-Trichloroethane	ND(5.5)	ND(55)	ND(5.5)
1,1-Dichloroethane	ND(4.0)	ND(40)	ND(4.0)
1,1-Dichloroethene	ND(4.0)	ND(40)	ND(4.0)
1,2,3-Trichloropropane	ND(6.0)	ND(60)	ND(6.0)
1,2,4-Trimethylbenzene	ND(4.9)	ND(49)	ND(4.9)
1,2-Dibromoethane	ND(7.7)	ND(77)	ND(7.7)
1,2-Dichloroethane	ND(4.0)	ND(40)	ND(4.0)
1,2-Dichloropropane	ND(4.6)	ND(46)	ND(4.6)
1,3,5-Trimethylbenzene	ND(4.9)	ND(49)	ND(4.9)
1,3-butadiene	ND(4.4)	ND(44)	ND(4.4)
1,4-Dioxane	ND(3.6)	ND(36)	ND(3.6)
2-Butanone	**4.1 J**	**550**	**30**
2-Hexanone	ND(8.2)	ND(82)	ND(8.2)
3-Chloropropene	ND(3.1)	ND(31)	ND(3.1)
4-Ethyltoluene	ND(4.9)	ND(49)	ND(4.9)
4-Methyl-2-pentanone	ND(8.2)	ND(82)	ND(8.2)
Acetone	**21**	**340**	**23**
Acetonitrile	ND(3.4)	**73**	ND(3.4)
Acrolein	ND(4.6)	ND(46)	ND(4.6)
Acrylonitrile	ND(4.3)	ND(43)	ND(4.3)
Alpha Methyl Styrene	ND(4.8)	ND(48)	ND(4.8)
Benzene	ND(3.2)	ND(32)	ND(3.2)
Bromobenzene	ND(6.4)	ND(64)	ND(6.4)
Bromodichloromethane	ND(6.7)	ND(67)	ND(6.7)
Bromoform	ND(10)	ND(100)	ND(10)
Bromomethane	ND(3.9)	ND(39)	ND(3.9)
Carbon Disulfide	ND(3.1)	**160**	ND(3.1)
Carbon Tetrachloride	ND(6.3)	ND(63)	ND(6.3)
Chlorobenzene	ND(4.6)	ND(46)	ND(4.6)
Chlorodifluoromethane	**650**	**500**	**590**
Chloroethane	ND(2.6)	**74**	ND(2.6)
Chloroform	ND(4.9)	ND(49)	ND(4.9)
Chloromethane	ND(2.1)	ND(21)	ND(2.1)
cis-1,2-Dichloroethene	ND(4.0)	ND(40)	ND(4.0)
cis-1,3-Dichloropropene	ND(4.5)	ND(45)	ND(4.5)
Cumene	ND(4.9)	ND(49)	ND(4.9)
Dibromochloromethane	ND(8.5)	ND(85)	ND(8.5)
Dibromomethane	ND(7.1)	ND(71)	ND(7.1)
Dichlorodifluoromethane	**8.7**	**13 J**	**7.8**
Dichlorofluoromethane	ND(4.2)	ND(42)	ND(4.2)
Ethyl Acetate	ND(3.6)	ND(36)	ND(3.6)
Ethyl Acrylate	ND(4.1)	ND(41)	ND(4.1)
Ethyl Methacrylate	ND(4.7)	ND(47)	ND(4.7)
Ethylbenzene	ND(4.3)	**11 J**	ND(4.3)
Freon 114	ND(7.0)	ND(70)	ND(7.0)
Heptane	ND(4.1)	**280**	**14**
Hexane	ND(3.5)	**31 J**	**1.1 J**
Iodomethane	ND(5.8)	ND(58)	ND(5.8)
Isooctane	ND(4.7)	ND(47)	ND(4.7)
m&p-Xylene	ND(4.3)	**18 J**	**0.96 J**
Methyl Acrylate	ND(3.5)	ND(35)	ND(3.5)

TABLE 2-3
SEPTEMBER 2006 INDOOR AIR RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter	Sample Location: / Sample ID: / Date Collected:	Lobby Area - Indoor Air Summa Canister #0337 09/28/06	Power Systems - Indoor Air Summa Canister #0075 09/28/06	Data Research - Indoor Air Summa Canister #0197 09/28/06
Volatile Organics (continued)				
Methyl Methacrylate		ND(4.1)	ND(41)	ND(4.1)
Methyl tert-butyl ether		ND(3.6)	**44**	ND(3.6)
Methylene Chloride		**2.8 J**	**59**	**3.0 J**
Octane		ND(4.7)	ND(47)	ND(4.7)
o-Xylene		ND(4.3)	ND(43)	ND(4.3)
Pentane		**0.86 J**	**54**	**1.4 J**
Propene		**1.4 J**	ND(17)	ND(1.7)
Styrene		ND(4.3)	**9.4 J**	ND(4.3)
tert-Butyl Alcohol		ND(3.0)	ND(30)	ND(3.0)
Tetrachloroethene		ND(6.8)	ND(68)	ND(6.8)
Toluene		**9.6**	**1,900**	**150**
trans-1,2-Dichloroethene		ND(4.0)	ND(40)	ND(4.0)
trans-1,3-Dichloropropene		ND(4.5)	ND(45)	ND(4.5)
Trichloroethene		ND(5.4)	**23 J**	**1.2 J**
Trichlorofluoromethane		**1.5 J**	**19 J**	**2.5 J**
Vinyl Acetate		ND(3.5)	ND(35)	ND(3.5)
Vinyl Chloride		ND(2.6)	ND(26)	ND(2.6)
Semivolatile Organics				
1,2,4-Trichlorobenzene		ND(15)	ND(150)	ND(15)
1,2-Dichlorobenzene		ND(6.0)	ND(60)	ND(6.0)
1,3-Dichlorobenzene		ND(6.0)	ND(60)	ND(6.0)
1,4-Dichlorobenzene		ND(6.0)	ND(60)	ND(6.0)
Hexachlorobutadiene		ND(21)	ND(210)	ND(21)
Hexachloroethane		ND(9.7)	ND(97)	ND(9.7)
Naphthalene		ND(5.2)	ND(5.2)	ND(5.2)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
4. Detected analytes are presented in **bold** font.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 2-4
SEPTEMBER 2006 INDOOR AIR RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Sample Location:	Lobby Area - Indoor Air	Lobby Area - Indoor Air	Facility Area - Indoor Air	Library Area - Indoor Air
Sample ID:	Summa Canister #0200	Summa Canister #0189 (Duplicate)	Summa Canister #0110	Summa Canister #0174
Parameter / Date Collected:	09/28/06	09/28/06	09/28/06	09/28/06
Volatile Organics				
1,1,1,2-Tetrachloroethane	ND(6.9)	ND(6.9)	ND(6.9)	ND(6.9)
1,1,1-Trichloroethane	ND(5.5)	ND(5.5)	ND(5.5)	**1.5 J**
1,1,2,2-Tetrachloroethane	ND(6.9)	ND(6.9)	ND(6.9)	ND(6.9)
1,1,2-trichloro-1,2,2-trifluoroethane	ND(7.7)	ND(7.7)	ND(7.7)	ND(7.7)
1,1,2-Trichloroethane	ND(5.5)	ND(5.5)	ND(5.5)	ND(5.5)
1,1-Dichloroethane	ND(4.0)	ND(4.0)	ND(4.0)	ND(4.0)
1,1-Dichloroethene	ND(4.0)	ND(4.0)	ND(4.0)	ND(4.0)
1,2,3-Trichloropropane	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)
1,2,4-Trimethylbenzene	**1.4 J**	ND(4.9)	ND(4.9)	**1.9 J**
1,2-Dibromoethane	ND(7.7)	ND(7.7)	ND(7.7)	ND(7.7)
1,2-Dichloroethane	ND(4.0)	ND(4.0)	ND(4.0)	ND(4.0)
1,2-Dichloropropane	ND(4.6)	ND(4.6)	ND(4.6)	ND(4.6)
1,3,5-Trimethylbenzene	ND(4.9)	**2.0 J**	ND(4.9)	ND(4.9)
1,3-butadiene	ND(4.4)	ND(4.4)	ND(4.4)	ND(4.4)
1,4-Dioxane	ND(3.6)	ND(3.6)	ND(3.6)	ND(3.6)
2-Butanone	**2.1 J**	ND(5.9)	**1.8 J**	**4.8 J**
2-Hexanone	ND(8.2)	ND(8.2)	ND(8.2)	ND(8.2)
3-Chloropropene	ND(3.1)	ND(3.1)	ND(3.1)	ND(3.1)
4-Ethyltoluene	ND(4.9)	ND(4.9)	**1.1 J**	**2.0 J**
4-Methyl-2-pentanone	ND(8.2)	ND(8.2)	ND(8.2)	ND(8.2)
Acetone	**29**	**29**	**26**	**100**
Acetonitrile	ND(3.4)	ND(3.4)	ND(3.4)	ND(3.4)
Acrolein	ND(4.6)	ND(4.6)	ND(4.6)	ND(4.6)
Acrylonitrile	ND(4.3)	ND(4.3)	ND(4.3)	ND(4.3)
Alpha Methyl Styrene	ND(4.8)	ND(4.8)	ND(4.8)	ND(4.8)
Benzene	**1.5 J**	**0.67 J**	ND(3.2)	**4.6**
Bromobenzene	ND(6.4)	ND(6.4)	ND(6.4)	ND(6.4)
Bromodichloromethane	ND(6.7)	ND(6.7)	ND(6.7)	ND(6.7)
Bromoform	ND(10)	ND(10)	ND(10)	ND(10)
Bromomethane	ND(3.9)	ND(3.9)	ND(3.9)	ND(3.9)
Carbon Disulfide	ND(3.1)	ND(3.1)	ND(3.1)	ND(3.1)
Carbon Tetrachloride	ND(6.3)	ND(6.3)	ND(6.3)	ND(6.3)
Chlorobenzene	ND(4.6)	ND(4.6)	ND(4.6)	ND(4.6)
Chlorodifluoromethane	**4.9**	**2.5 J**	**2.0 J**	**6.0**
Chloroethane	ND(2.6)	ND(2.6)	ND(2.6)	ND(2.6)
Chloroform	ND(4.9)	ND(4.9)	ND(4.9)	**1.2 J**
Chloromethane	**0.78 J**	**0.89 J**	**0.78 J**	**1.2 J**
cis-1,2-Dichloroethene	ND(4.0)	ND(4.0)	ND(4.0)	ND(4.0)
cis-1,3-Dichloropropene	ND(4.5)	ND(4.5)	ND(4.5)	ND(4.5)
Cumene	ND(4.9)	ND(4.9)	ND(4.9)	ND(4.9)
Dibromochloromethane	ND(8.5)	ND(8.5)	ND(8.5)	ND(8.5)
Dibromomethane	ND(7.1)	ND(7.1)	ND(7.1)	ND(7.1)
Dichlorodifluoromethane	**2.7 J**	**2.4 J**	**1.9 J**	**3.2 J**
Dichlorofluoromethane	ND(4.2)	ND(4.2)	ND(4.2)	ND(4.2)
Ethyl Acetate	ND(3.6)	ND(3.6)	ND(3.6)	ND(3.6)
Ethyl Acrylate	ND(4.1)	ND(4.1)	ND(4.1)	ND(4.1)
Ethyl Methacrylate	ND(4.7)	ND(4.7)	ND(4.7)	ND(4.7)
Ethylbenzene	**0.87 J**	ND(4.3)	ND(4.3)	**8.3**
Freon 114	ND(7.0)	ND(7.0)	ND(7.0)	ND(7.0)
Heptane	**1.7 J**	ND(4.1)	**1.2 J**	**3.0 J**
Hexane	**230**	**60**	**91**	**470**
Iodomethane	ND(5.8)	ND(5.8)	ND(5.8)	ND(5.8)
Isooctane	**1.4 J**	**1.1 J**	**0.98 J**	**2.3 J**
m&p-Xylene	**2.2 J**	**0.96 J**	**3.9 J**	**20**

TABLE 2-4
SEPTEMBER 2006 INDOOR AIR RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Sample Location:	Lobby Area - Indoor Air	Lobby Area - Indoor Air	Facility Area - Indoor Air	Library Area - Indoor Air
Sample ID:	Summa Canister #0200	Summa Canister #0189 (Duplicate)	Summa Canister #0110	Summa Canister #0174
Parameter / Date Collected:	09/28/06	09/28/06	09/28/06	09/28/06
Volatile Organics (continued)				
Methyl Acrylate	ND(3.5)	ND(3.5)	ND(3.5)	ND(3.5)
Methyl Methacrylate	ND(4.1)	ND(4.1)	ND(4.1)	ND(4.1)
Methyl tert-butyl ether	ND(3.6)	ND(3.6)	ND(3.6)	**1.8 J**
Methylene Chloride	**2.7 J**	**6.6**	**3.1 J**	**4.5**
Octane	ND(4.7)	ND(4.7)	ND(4.7)	**2.3 J**
o-Xylene	ND(4.3)	ND(4.3)	**1.5 J**	**11**
Pentane	**3.5**	**1.8 J**	**1.7 J**	**5.7**
Propene	**11**	**5.5**	ND(1.7)	ND(1.7)
Styrene	**15**	ND(4.3)	ND(4.3)	ND(4.3)
tert-Butyl Alcohol	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)
Tetrachloroethene	ND(6.8)	ND(6.8)	ND(6.8)	ND(6.8)
Toluene	**7.1**	**8.2**	**3.1 J**	**16**
trans-1,2-Dichloroethene	ND(4.0)	ND(4.0)	ND(4.0)	ND(4.0)
trans-1,3-Dichloropropene	ND(4.5)	ND(4.5)	ND(4.5)	ND(4.5)
Trichloroethene	**9.1**	**5.5**	**5.7**	**41**
Trichlorofluoromethane	**73**	**51**	**31**	**210**
Vinyl Acetate	ND(3.5)	ND(3.5)	ND(3.5)	ND(3.5)
Vinyl Chloride	ND(2.6)	ND(2.6)	ND(2.6)	ND(2.6)
Semivolatile Organics				
1,2,4-Trichlorobenzene	ND(15)	ND(15)	ND(15)	ND(15)
1,2-Dichlorobenzene	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)
1,3-Dichlorobenzene	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)
1,4-Dichlorobenzene	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)
Hexachlorobutadiene	**12 J**	ND(21)	ND(21)	ND(21)
Hexachloroethane	ND(9.7)	ND(9.7)	ND(9.7)	ND(9.7)
Naphthalene	ND(5.2)	ND(5.2)	ND(5.2)	ND(5.2)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
4. Detected analytes are presented in **bold** font.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 2-5
SEPTEMBER 2006 INDUSTRIAL HYGIENE INDOOR AIR RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ppm)

Sample Location: / Sample ID: / Parameter / Date Collected:	Power Systems Area Industrial Hygiene Sample #5101 09/28/06	Data Research Area Industrial Hygiene Sample #5102 09/28/06	Lobby Area Industrial Hygiene Sample #5103 09/28/06
Trichloroethene	ND(69)	ND(62)	ND(66)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Galson Laboratories for analysis of trichloroethene (TCE).
2. All results meet the quality control requirements of the American Industrial Hygienists Association (AIHA) and the National Environmental Laboratory Accreditation Conference (NELAC).
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

TABLE 2-6
SEPTEMBER 2006 INDUSTRIAL HYGIENE INDOOR AIR RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ppm)

Sample Location: / Sample ID: / Parameter / Date Collected:	Lobby Area Industrial Hygiene Sample #5901 09/28/06	Library Area Industrial Hygiene Sample #5902 09/28/06	Facility Area Industrial Hygiene Sample #5903 09/28/06
Trichloroethene	ND(51)	ND(58)	ND(59)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Galson Laboratories for analysis of trichloroethene (TCE).
2. All results meet the quality control requirements of the American Industrial Hygienists Association (AIHA) and the National Environmental Laboratory Accreditation Conference (NELAC).
3. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

TABLE 3-1
COMPARISON OF AUGUST 2006 DEEP SOIL GAS RESULTS TO EPA SCREENING LEVELS

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample ID: / Date Collected:	Deep Soil Gas Screening Concentration (ug/m^3) (4)	SG-51E 08/07/06	SG-51S 08/07/06	SG-51W 08/07/06
Volatile Organics				
1,1,1-Trichloroethane	220,000	25	ND(55) [ND(55)]	ND(5.5)
1,1,2-trichloro-1,2,2-trifluoroethane	3,000,000	33	ND(77) [45 J]	ND(7.7)
1,1-Dichloroethane	50,000	2.3 J	ND(40) [ND(40)]	ND(4.0)
1,2,4-Trimethylbenzene	600	24	24 J [25 J]	240
1,2-Dichloroethane	94.0	ND(4.0)	ND(40) [11 J]	ND(4.0)
1,3,5-Trimethylbenzene	600	6.9	9.8 J [12 J]	57
1,3-butadiene	8.7	2.5 J	ND(44) [ND(44)]	3.3 J
2-Butanone (methylethylketone)	100,000	130	870 [770]	380
2-Hexanone	Not Listed	ND(8.2)	35 J [ND(82)]	ND(8.2)
4-Ethyltoluene	Not Listed	19	29 J [26 J]	110
4-Methyl-2-pentanone	8,000	4.4 J	ND(82) [ND(82)]	21
Acetone	35,000	270	3300 [3900]	480
Acetonitrile	6,000	ND(3.4)	48 [68]	ND(3.4)
Benzene	300	3.5	9.9 J [12 J]	4.2
Carbon Disulfide	70,000	3.0 J	130 [140]	ND(3.1)
Carbon Tetrachloride	160	8.0	ND(63) [ND(63)]	ND(6.3)
Chlorodifluoromethane	5,000,000	ND(3.5)	ND(35) [59]	ND(3.5)
Chloroform	110	62	31 J [32 J]	1.5 J
cis-1,2-Dichloroethene	3,500	14	ND(40) [ND(40)]	ND(4.0)
Cumene	40,000	1.6 J	ND(49) [ND(49)]	6.9
Dichlorodifluoromethane	20,000	1.9 J	ND(49) [ND(49)]	ND(4.9)
Ethyl Acetate	320,000	ND(3.6)	49 [54]	9.2
Ethylbenzene	2,200	13	380 [360]	67
Heptane	Not Listed	9.4	44 [39 J]	11
Hexane	20,000	10	40 [50]	15
Isooctane	Not Listed	ND(4.7)	28 J [47]	2.0 J
m&p-Xylene	700,000	29	710 [670]	110
Methyl Methacrylate	70,000	ND(4.1)	ND(41) [89]	ND(4.1)
Methyl tert-butyl ether	300,000	2.1 J	49 [45]	13
Methylene Chloride	5,200	ND(3.5)	73 J [190 J]	ND(3.5)
Octane	Not Listed	3.7 J	1200 [1100]	5.6
o-Xylene	700,000	12	160 [160]	58
Pentane	Not Listed	28	220 [220]	71
Propene	Not Listed	180	170 [170]	380
Styrene	100,000	1.7 J	17 J [16 J]	7.4
tert-Butyl Alcohol	Not Listed	1.4 J	ND(30) [ND(30)]	ND(3.0)
Tetrachloroethene	810	61	ND(68) [ND(68)]	ND(6.8)
Toluene	40,000	8.4	5700 [6000]	40
Trichloroethene	22.0	910	82 [81]	ND(5.4)
Trichlorofluoromethane	70,000	12	ND(56) [19 J]	21
Semivolatile Organics				
1,3-Dichlorobenzene	11,000	5.1 J	ND(60) [ND(60)]	11
Naphthalene	300	9.6	17 [17]	21

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. Only those constituents detected in one or more samples are summarized.
4. This column lists the applicable soil gas values set forth in Table 2.b of EPA's November 2002 *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* for "Target Deep Soil Gas Concentration to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.01."
5. Shading indicates that the analytical result exceeds the deep soil gas screening concentration.
6. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
7. Field duplicate sample results are presented in brackets

Data Qualifiers:

Organics (volatiles, semivolatiles)
J - Indicates that the associated numerical value is an estimated concentration.

TABLE 3-2
COMPARISON OF SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS TO EPA SCREENING LEVELS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Shallow Soil Gas Screening Concentration (ug/m^3) (4)	Chiller Room - Sub Slab Summa Canister #0324 09/28/06	Power Systems - Sub Slab Summa Canister #0066 09/28/06
Volatile Organics			
1,1,1-Trichloroethane	22,000	2.9 J	ND(5.5)
1,1,2-trichloro-1,2,2-trifluoroethane	300,000	51	ND(7.7)
1,2,4-Trimethylbenzene	60	15	11
1,3,5-Trimethylbenzene	60	9.0	ND(4.9)
2-Butanone	10,000	55	46
4-Ethyltoluene	--	15	ND(4.9)
Acetone	3,500	140	54
Acetonitrile	600	ND(3.4)	8.0
Benzene	31	0.86 J	1.3 J
Chlorodifluoromethane	500,000	63	46
Chloroform	11	1.1 J	ND(4.9)
Cumene	4,000	1.2 J	0.98 J
Dichlorodifluoromethane	2,000	3.4 J	3.0 J
Ethylbenzene	220	6.7	8.0
Heptane	--	ND(4.1)	8.7
Hexane	2,000	14	13
Isooctane	--	2.2 J	2.8 J
m&p-Xylene	70,000	12	16
Methyl tert-butyl ether	30,000	160	67
Methylene Chloride	520	2.5 J	18
Octane	--	1.4 J	2.2 J
o-Xylene	70,000	5.5	7.9
Pentane	--	5.5	7.3
Propene	--	11	ND(1.7)
Toluene	4,000	19	59
Trichloroethene	2.2	58	ND(5.4)
Trichlorofluoromethane	7,000	5.5 J	4.0 J
Vinyl Chloride	28	0.74 J	1.2 J
Semivolatile Organics			
1,2,4-Trichlorobenzene	2,000	9.9 J	ND(15)

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. Only those constituents detected in one or more samples are summarized.
4. This column lists the applicable soil gas values set forth in Table 2.b of EPA's November 2002 *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* for "Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.1."
5. Shading indicates that the analytical result exceeds the shallow soil gas screening concentration.
6. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 3-3
COMPARISON OF SEPTEMBER 2006 SUB-SLAB SOIL GAS RESULTS TO EPA SCREENING LEVELS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter / Sample Location: / Sample ID: / Date Collected:	Shallow Soil Gas Screening Concentration (ug/m^3) (4)	Lobby Area - Sub Slab Summa Canister #0511 09/28/06	Lobby Area - Sub Slab Summa Canister #0061 (Duplicate) 09/28/06	Facility Area - Sub Slab Summa Canister #0073 09/28/06
Volatile Organics				
1,1,1-Trichloroethane	22,000	ND(55)	1.4 J	ND(5.5)
1,2,4-Trimethylbenzene	60	ND(49)	4.1 J	8.8
1,3,5-Trimethylbenzene	60	ND(49)	8.7	ND(4.9)
2-Butanone	10,000	50 J	ND(5.9)	47
4-Ethyltoluene	--	ND(49)	3.7 J	ND(4.9)
Acetone	3,500	200	210	53
Acetonitrile	600	58	ND(3.4)	ND(3.4)
Benzene	31	ND(32)	0.77 J	0.73 J
Carbon Disulfide	7,000	93	ND(3.1)	ND(3.1)
Carbon Tetrachloride	16	ND(63)	4.7 J	ND(6.3)
Chlorodifluoromethane	500,000	20 J	ND(3.5)	0.99 J
Chloroethane	100,000	65	ND(2.6)	ND(2.6)
Chloroform	11	ND(49)	2.1 J	ND(4.9)
Dichlorodifluoromethane	2,000	11 J	6.1	1.7 J
Ethylbenzene	220	ND(43)	1.3 J	3.1 J
Heptane	--	23 J	1.0 J	1.4 J
Hexane	2,000	85	9.6	62
Isooctane	--	ND(47)	ND(4.7)	1.8 J
m&p-Xylene	70,000	ND(43)	2.7 J	5.2
Methyl tert-butyl ether	30,000	62	12	260
Methylene Chloride	520	58	ND(3.5)	3.3 J
o-Xylene	70,000	ND(43)	1.3 J	2.5 J
Pentane	--	27 J	ND(3.0)	1.9 J
tert-Butyl Alcohol	--	ND(30)	0.67 J	ND(3.0)
Toluene	4,000	64	8.5	8.4
Trichloroethene	2.2	ND(54)	470	5.3 J
Trichlorofluoromethane	7,000	44 J	37	15
Semivolatile Organics				
1,2,4-Trichlorobenzene	2,000	ND(150)	6.4 J	8.8 J

Notes:

1. Samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004
3. Only those constituents detected in one or more samples are summarized.
4. This column lists the applicable soil gas values set forth in Table 2.b of EPA's November 2002 *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* for "Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.1."
5. Shading indicates that the analytical result exceeds the shallow soil gas screening concentration.
6. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 3-4
COMPARISON OF AUGUST 2006 GROUNDWATER RESULTS TO MCP METHOD 1 GW-2 STANDARDS

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in parts per million, ppm)

Parameter / Sample ID: / Date Collected:	MCP Method 1 GW-2 Standards[4]	51-8 08/08/06	GMA3-10 08/08/06	UB-PZ-3 08/08/06
Volatile Organics				
2-Butanone	50	0.0056 J [0.0058 J]	0.0042 J	0.0042 J
Acetone	50	0.017 J [0.018 J]	0.011 J	0.014 J
Toluene	8	0.00021 J [ND(0.0010)]	ND(0.0010)	ND(0.0010)
Trichloroethene	0.03	0.00096 J [0.0010]	ND(0.0010)	0.00027 J
Vinyl Chloride	0.002	0.0013 [0.0015]	ND(0.0010)	ND(0.0010)
Semivolatile Organics				
1,2,4-Trichlorobenzene	2	0.0014 [0.0012]	ND(0.0010)	0.0015
1,3-Dichlorobenzene	2	0.00048 J [0.00052 J]	ND(0.0010)	0.00030 J
1,4-Dichlorobenzene	0.2	0.0024 [0.0025]	0.00026 J	ND(0.0010)

Notes:

1. Samples were collected BBL, an ARCADIS company (BBL), and submitted to SGS Environmental Services, Inc. for analysis of volatiles and selected semivolatiles.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. Only those constituents detected in one or more samples are summarized.
4. The Massachusetts Contingency Plan (MCP) Method 1 Groundwater Standard (GW-2) as per 310 CMR 40.0974(2) effective April 3, 2006.
5. ND - Analyte was not detected. The number in parenthesis is the associated detection limit.
6. Field duplicate sample results are presented in brackets.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 3-5
COMPARISON OF AUGUST 2006 LNAPL RESULTS TO MCP METHOD 1 GW-2 STANDARDS

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in parts per million, ppm)

Parameter / Sample ID: / Date Collected:	MCP Method 1 GW-2 Groundwater Standards[4]	51-8 08/08/06	GMA3-10 08/08/06	UB-PZ-3 08/08/06
Volatile Organics				
Methylene Chloride	10	0.90 J [0.67 J]	0.77 J	0.73 J
Tetrachloroethene	0.05	0.55 J [0.47 J]	ND(1.0)	ND(1.0)
Trichloroethene	0.03	0.65 J [0.34 J]	ND(1.0)	ND(1.0)
Semivolatile Organics				
1,2,4-Trichlorobenzene	2	7.7 [8.1]	0.89 J	7.9
1,3-Dichlorobenzene	2	1.5 [1.5]	ND(1.0)	1.2
1,4-Dichlorobenzene	0.2	4.2 [4.0]	0.22 J	ND(1.0)
Naphthalene	1	ND(1.0) [0.29 J]	ND(1.0)	ND(1.0)

Notes:

1. Samples were collected BBL, an ARCADIS company (BBL), and submitted to SGS Environmental Services, Inc. for analysis of volatiles and selected semivolatiles.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19,
3. Only those constituents detected in one or more samples are summarized.
4. The Massachusetts Contingency Plan (MCP) Method 1 Groundwater Standard (GW-2) as per 310 CMR 40.0974(2) effective April 3, 2006. These standards are applicable to groundwater only and are only presented for comparison purposes to the LNAPL analytical results summarized on this table.
5. Shading indicates that the analytical result exceeds the MCP Method 1 GW-2 Standard for groundwater.
6. ND - Analyte was not detected. The number in parenthesis is the associated detection limit.
7. Field duplicate sample results are presented in brackets.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates that the associated numerical value is an estimated concentration.

TABLE 3-6
COMPARISON OF SEPTEMBER 2006 INDOOR AIR RESULTS TO OCCUPATIONAL EXPOSURE LIMITS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ppm)

Parameter / Sample Location: / Sample ID: / Date Collected:	OSHA PEL[5]	NIOSH REL[6]	Lobby Area - Indoor Air Summa Canister #0337 09/28/06	Power Systems - Indoor Air Summa Canister #0075 09/28/06	Data Research Area - Indoor Air Summa Canister #0197 09/28/06
Volatile Organics					
2-Butanone	200	200	0.00139	0.19	0.0107
Acetone	1,000	250	0.00884	0.14	0.00968
Acetonitrile	40	20	ND(0.00203)	0.04348	ND(0.00203)
Carbon Disulfide	20	1	ND(0.0031)	0.05138	ND(0.0031)
Chlorodifluoromethane	1,000	1,000	0.18	0.14	0.17
Chloroethane	1,000	--	ND(0.00099)	0.02804	ND(0.00099)
Dichlorodifluoromethane	1,000	1,000	0.00176	0.00263	0.00158
Ethylbenzene	100	100	ND(0.00099)	0.00253	ND(0.00099)
Heptane	500	85	ND(0.00102)	0.06972	0.00349
Hexane	500	50	ND(0.00102)	0.00901	0.00032
m&p-Xylene	100	100	ND(0.00099)	0.000415	0.00022
Methyl tert-butyl ether	200	--	ND(0.001)	0.0122	ND(0.001)
Methylene Chloride	25	--	0.00081	0.01699	0.00086
Pentane	1,000	120	0.00029	0.0183	0.00047
Propene	3	--	0.00081	ND(0.00988)	ND(0.00099)
Styrene	100	50	ND(0.00101)	0.00221	ND(0.00101)
Toluene	200	100	0.00255	0.50	0.03981
Trichloroethene	100	25	ND(0.001)	0.00428	0.00022
Trichlorofluoromethane	1,000	1,000	0.00027	0.00338	0.00044

Notes:

1. Summa canister samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs using United States Environmental Protection Agency (EPA) Compendium Method TO-15.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. Only those constituents detected in one or more indoor air samples are summarized.
4. Concentrations have been converted from micrograms per cubic meter (ug/m3) to parts per million (ppm), since the OSHA standards and NIOSH guidelines are expressed in ppm.
5. The United States Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) for indoor air in an occupational setting for an 8-hour workday and a 40-hour workweek.
6. The National institute for Occupational Safety and Health (NIOSH) recommended exposure levels (RELs) for up to a 10-hour workday over a 40-hour workweek.
7. -- - Occupational exposure limit not available.
8. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 3-7
COMPARISON OF SEPTEMBER 2006 INDOOR AIR RESULTS TO OCCUPATIONAL EXPOSURE LIMITS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ppm)

Parameter / Sample Location: / Sample ID: / Date Collected:	OSHA PEL[5]	NIOSH REL[6]	Lobby Area - Indoor Air Summa Canister #0200 09/28/06	Lobby Area - Indoor Air Summa Canister #0189 (Duplicate) 09/28/06	Facility Area - Indoor Air Summa Canister #0110 09/28/06	Library Area - Indoor Air Summa Canister #0174 09/28/06
Volatile Organics						
1,1,1-Trichloroethane	350	350	ND(0.00101)	ND(0.00101)	ND(0.00101)	0.00027
1,2,4-Trimethylbenzene	--	25	0.00028	ND(0.001)	ND(0.001)	0.00039
1,3,5-Trimethylbenzene	--	25	ND(0.001)	0.00041	ND(0.001)	ND(0.001)
2-Butanone	200	200	0.00071	ND(0.002)	0.00061	0.00163
4-Ethyltoluene	--	--	ND(0.001)	ND(0.001)	0.00022	0.00041
Acetone	1,000	250	0.01221	0.01221	0.01095	0.0421
Benzene	1	0.1	0.00047	0.00021	ND(0.001)	0.00144
Chlorodifluoromethane	1,000	1,000	0.00139	0.00071	0.00057	0.0017
Chloroform	50	2	ND(0.001)	ND(0.001)	ND(0.001)	0.00025
Chloromethane	100	--	0.00038	0.00043	0.00038	0.00058
Dichlorodifluoromethane	1,000	1,000	0.00055	0.00049	0.00038	0.00065
Ethylbenzene	100	100	0.0002	ND(0.00099)	ND(0.00099)	0.00191
Heptane	500	85	0.00042	ND(0.00102)	0.0003	0.00075
Hexane	500	50	0.06682	0.1743	0.02644	0.14
Isooctane	500	75	0.0003	0.00024	0.00021	0.00049
m&p-Xylene	100	100	0.00051	0.00022	0.0009	0.00461
Methyl tert-butyl ether	--	--	ND(0.001)	ND(0.001)	ND(0.001)	0.0005
Methylene Chloride	25	--	0.00078	0.0019	0.00089	0.0013
Octane	500	75	ND(0.00101)	ND(0.00101)	ND(0.00101)	0.00049
o-Xylene	100	100	ND(0.00099)	ND(0.00099)	0.00035	0.00253
Pentane	1,000	120	0.00119	0.00061	0.00058	0.00193
Propene	--	--	0.00639	0.0032	ND(0.00099)	ND(0.00099)
Styrene	100	50	0.00352	ND(0.00101)	ND(0.00101)	ND(0.00101)
Toluene	200	100	0.00188	0.00218	0.00082	0.00425
Trichloroethene	100	25	0.00169	0.00102	0.00106	0.00763
Trichlorofluoromethane	1,000	1,000	0.1299	0.00908	0.00552	0.03738
Semivolatile Organics						
Hexachlorobutadiene	0.02	0.02	0.00113	ND(0.00197)	ND(0.00197)	ND(0.00197)

Notes:

1. Summa canister samples were collected by BBL, an ARCADIS company (BBL), and submitted to Lancaster Laboratories for analysis of VOCs and selected SVOCs using United States Environmental Protection Agency (EPA) Compendium Method TO-15.
2. Samples have been validated as per Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), General Electric Company, Pittsfield, Massachusetts, Blasland Bouck & Lee, Inc. (approved May 29, 2004 and resubmitted June 19, 2004).
3. Only those constituents detected in one or more indoor air samples are summarized.
4. Concentrations have been converted from micrograms per cubic meter (ug/m3) to parts per million (ppm), since the OSHA standards and NIOSH guidelines are expressed in ppm.
5. The United States Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) for indoor air in an occupational setting for an 8-hour workday and a 40-hour workweek.
6. The National institute for Occupational Safety and Health (NIOSH) recommended exposure levels (RELs) for up to a 10-hour workday over a 40-hour workweek.
7. -- - Occupational exposure limit not available.
8. ND - Analyte was not detected. The number in parentheses is the associated detection limit.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

TABLE 3-8
COMPARISON OF SUB-SLAB SOIL GAS RESULTS TO INDOOR AIR RESULTS - BUILDING 51

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter	Average Sub-Slab Soil Gas Result	Average Indoor Air Result	Ratio of Sub-Slab Soil Gas to Indoor Air
Volatile Organics			
2-Butanone	50.5	194.7	1 : 3.9
Acetone	97	128	1 : 1.3
Acetonitrile	4.85	25.47	1 : 5.3
Chlorodifluoromethane	54.5	580	1 : 10.6
Dichlorodifluoromethane	3.2	9.83	1 : 3.1
Ethylbenzene	7.35	5.1	1.4 : 1
Heptane	5.38	98.68	1 : 18.3
Hexane	13.5	11.28	1.2 : 1
m&p-Xylene	14	7.04	2.0 : 1
Methyl tert-butyl ether	113.5	15.87	7.2 : 1
Methylene Chloride	10.25	21.6	1 : 2.1
Pentane	6.4	18.75	1 : 2.9
Propene	5.93	3.58	1.7 : 1
Styrene	2.15	4.57	1 : 2.1
Toluene	39	686.53	1 : 17.6
Trichloroethene	30.35	8.97	3.4 : 1
Trichlorofluoromethane	4.75	7.67	1 : 1.6

Notes:
1. Average concentrations calculated from September 2006 sub-slab soil gas and indoor air results presented in Tables 2-1 and 2-2, respectively.
2. Non-detect sample results included as half the detection limit in the calculation of the average result.
3. Only those constituents detected in both sub-slab soil gas and indoor air samples are summarized.

TABLE 3-9
COMPARISON OF SUB-SLAB SOIL GAS RESULTS TO INDOOR AIR RESULTS - BUILDING 59

SOIL GAS MIGRATION ASSESSMENT REPORT
GROUNDWATER MANAGEMENT AREA 3
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in ug/m^3)

Parameter	Average Sub-Slab Soil Gas Result	Average Indoor Air Result	Ratio of Sub-Slab Soil Gas to Indoor Air
Volatile Organics			
1,1,1-Trichloroethane	10.55	2.44	4.3 : 1
1,2,4-Trimethylbenzene	12.47	2.05	6.1 : 1
1,3,5-Trimethylbenzene	11.88	2.34	5.1 : 1
2-Butanone	33.32	2.91	11.4 : 1
4-Ethyltoluene	10.22	2	5.1 : 1
Acetone	154.33	46	3.4 : 1
Benzene	5.83	2.09	2.8 : 1
Chlorodifluoromethane	7.58	3.85	2.0 : 1
Chloroform	9.68	2.14	4.5 : 1
Dichlorodifluoromethane	6.27	2.55	2.5 : 1
Ethylbenzene	8.63	3.37	2.6 : 1
Heptane	8.47	1.99	4.3 : 1
Hexane	52.2	212.75	1 : 4.1
Isooctane	9.22	1.45	6.4 : 1
m&p-Xylene	9.8	6.77	1.4 : 1
Methyl tert-butyl ether	111.33	1.8	61.9 : 1
Methylene Chloride	21.02	4.23	5.0 : 1
o-Xylene	8.43	4.2	2.0 : 1
Pentane	10.13	3.18	3.2 : 1
Toluene	26.97	8.6	3.1 : 1
Trichloroethene	16.15	15.33	1.1 : 1
Trichlorofluoromethane	32	91.25	1 : 2.9

Notes:
1. Average concentrations calculated from September 2006 sub-slab soil gas and indoor air results presented in Tables 2-2 and 2-4, respectively.
2. Non-detect sample results included as half the detection limit in the calculation of the average result.
3. Only those constituents detected in both sub-slab soil gas and indoor air samples are summarized.

Figure

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LEGEND:

- SG-51E — AUGUST 2006 DEEP SOIL GAS SAMPLE LOCATION
- 51-8 — AUGUST 2006 GROUNDWATER / LNAPL SAMPLE LOCATION
- # 0511 — SUB-SLAB SOIL GAS SAMPLE LOCATION
- # 0200 — SUMMA CANISTER INDOOR AIR SAMPLE LOCATION
- # 5902 — INDUSTRIAL HYGIENE INDOOR AIR SAMPLE LOCATION

NOTES:

1. FIGURE IS BASED ON PHOTOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC.–FLOWN IN APRIL 1990 AND DATA PROVIDED BY GENERAL ELECTRIC COMPANY.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES, SAMPLE AND BUILDING LOCATIONS ARE APPROXIMATE.

0 100' 200'

GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

SOIL GAS MIGRATION ASSESSMENT REPORT FOR GROUNDWATER MANAGEMENT AREA 3

SITE PLAN

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FIGURE 1

SYR-85-LAF RCB_LAF LAYER: ON=*, OFF=*REF*
G:\GE_ACTIVE\N\20186003\BUILDING\20186G06.DWG SAVED:10/20/2006 12:08 PM LAYOUT:Layout1 PAGESETUP:BL-PDF
PENTABLE:PLTFULL.CTB PRINTED:10/20/2006 12:08 PM BY:LFORAKER
PROJECTNAME:----
XREFS: IMAGES:
20186X01

Appendices

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Appendix A

Data Validation Report

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APPENDIX A
DATA VALIDATION REPORT

SOIL GAS MIGRATION ASSESSMENT REPORT
FOR GROUNDWATER MANAGEMENT AREA 3

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

1.0 General

This attachment summarizes the Tier I and Tier II data reviews performed for soil gas and indoor air samples collected from Buildings 51 and 59 within Groundwater Management Area 3 at the General Electric Company facility located in Pittsfield, Massachusetts. The samples were analyzed in accordance with EPA Compendium Method TO-15 for volatile organic compounds (VOCs), as well as certain semi-volatile organic compounds (SVOCs) that can also be identified during the analyses, which were conducted by Lancaster Laboratories, Inc of Lancaster, Pennsylvania. Data validation was performed for 14 VOC samples.

2.0 Data Evaluation Procedures

This attachment outlines the applicable quality control criteria utilized during the data review process and any deviations from those criteria. The data review was conducted in accordance with the following documents:

- *Field Sampling Plan/Quality Assurance Project Plan, General Electric Company, Pittsfield, Massachusetts*, Blasland, Bouck & Lee, Inc. (BBL; FSP/QAPP, approved May 25, 2004 and resubmitted June 15, 2004);

- *Region I Tiered Organic and Inorganic Data Validation Guidelines*, USEPA Region I (July 1, 1993);

- *Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, USEPA Region I (February 1, 1988) (Modified November 1, 1988); and

- *Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, USEPA Region I (Draft, December 1996).

A tabulated summary of the Tier I and Tier II data evaluations is presented in Table A-1. Each sample subjected to evaluation is listed in Table A-1 to document that data review was performed, as well as present the highest level of data validation (Tier I or Tier II) that was applied. Samples that required data qualification are listed separately for each parameter (compound or analyte) that required qualification.

The following data qualifiers were used in this data evaluation.

J The compound was positively identified, but the associated numerical value is an estimated concentration. This qualifier is used when the data evaluation procedure identifies a deficiency in the data generation process. This qualifier is also used when a compound is detected at an estimated concentration less than the corresponding practical quantitation limit (PQL).

U The compound was analyzed for, but was not detected. The sample quantitation limit is presented and adjusted for dilution and (for solid samples only) percent moisture. Non-detect sample results are presented as ND(PQL) within this report and in Table A-1 for consistency with documents previously prepared for investigations conducted at this site.

UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is estimated and may or may not represent the actual level of quantitation. Non-detect sample results that required qualification are presented as ND(PQL) J within this report and in Table A-1 for consistency with documents previously prepared for this investigation.

R Indicates that the previously reported detection limit or sample result has been rejected due to a major deficiency in the data generation procedure. The data should not be used for any qualitative or quantitative purpose.

3.0 Data Validation Procedures

The FSP/QAPP provides (in Section 7.5) that all analytical data will be validated to a Tier I level following the procedures presented in the *Region I Tiered Organic and Inorganic Data Validation Guidelines* (USEPA guidelines). Accordingly, 100% of the analytical data for these investigations were subjected to Tier I review. The Tier I review consisted of a completeness evidence audit, as outlined in the *USEPA Region I CSF Completeness Evidence Audit Program* (USEPA Region I, 7/31/91), to ensure that all laboratory data and documentation were present. In the event data packages were determined to be incomplete, the missing information was requested from the laboratory. Upon completion of the Tier I review, the data packages complied with the USEPA Region I Tier I data completeness requirements.

As specified in the FSP/QAPP, the laboratory sample delivery group package was randomly chosen to be subjected to Tier II review. A Tier II review was also performed to resolve data usability limitations identified from laboratory qualification of the data during the Tier I data review. The Tier II data review consisted of a review of all data package summary forms for identification of quality assurance/quality control (QA/QC) deviations and qualification of the data according to the Region I Data Validation Functional Guidelines. The Tier II review resulted in the qualification of data for several samples due to minor QA/QC deficiencies. Additionally, all field duplicates were examined for relative percent difference (RPD) compliance with the criteria specified in the FSP/QAPP. A tabulated summary of the samples subjected to Tier I and Tier II data evaluation is presented in the following table.

Summary of Samples Subjected to Tier I and Tier II Data Validation

Parameter	Tier I Only			Tier I &Tier II			Total
	Samples	Duplicates	Blanks	Samples	Duplicates	Blanks	
EPA TO-15	0	0	0	12	0	0	12
Total	**0**	**0**	**0**	**12**	**0**	**0**	**12**

When qualification of the sample data was required, the sample results associated with a QA/QC parameter deviation were qualified in accordance with the procedures outlined in USEPA Region I data validation guidance documents. When the data validation process identified several quality control deficiencies, the cumulative effect of the various deficiencies was employed in assigning the final data qualifier. A summary of the QA/QC parameter deviations that resulted in data qualification is presented below for each analytical method.

4.0 Data Review

The qualitative identification of each compound as determined by VOC GC/MS methods TO-15 and SW-846 8260B is determined by the retention time and comparison of the reference mass spectrum versus the sample mass spectrum. The compounds that did not meet qualitative identification criteria and the number of samples qualified due to those deviations are presented in the following table.

Compounds Qualified Due to Identification Criteria Deviations

Analysis	Compound	Number of Affected Samples	Qualification
EPA TO-15	Acrolein	1	U
	Styrene	1	U

5.0 Overall Data Usability

This section summarizes the analytical data in terms of its completeness and usability for site characterization purposes. Data completeness is defined as the percentage of sample results that have been determined to be usable during the data validation process. The percent usability calculation included analyses evaluated under both the Tier I and Tier II data validation reviews. Data completeness with respect to usability was calculated separately for inorganic and each of the organic analysis. The percent usability calculation also includes quality control samples collected to aid in the evaluation of data usability. Therefore, field/equipment blank, trip blank, and field duplicate data determined to be unusable as a result of the validation process are represented in the percent usability value tabulated in the following table.

Data Usability

Parameter	Percent Usability	Rejected Data
EPA TO-15	100	None

The data package completeness, as determined from the Tier I data review, was used in combination with the data quality deviations identified during the Tier II data review to determine overall data quality. As specified in the FSP/QAPP, the overall precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters determined from the Tier I and Tier II data reviews were used as indicators of overall data quality. These parameters were assessed through an evaluation of the results of the field and laboratory QA/QC sample analyses to provide a measure of compliance of the analytical data with the Data Quality Objectives (DQOs) specified in the FSP/QAPP. Therefore, the following sections present summaries of the PARCC parameters assessment with regard to the DQOs specified in the FSP/QAPP.

5.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. For this investigation, precision was defined as the RPD between duplicate sample results. The duplicate samples used to evaluate precision included field duplicates and MS/MSD samples. For this analytical program, 0.2% of the data required qualification due to field duplicate deviations. None of the data required qualification due to MS/MSD RPD deviations.

5.2 Accuracy

Accuracy measures the bias in an analytical system or the degree of agreement of a measurement with a known reference value. For this investigation, accuracy was defined as the percent recovery of QA/QC samples that were spiked with a known concentration of an analyte or compound of interest. The QA/QC samples used to evaluate analytical accuracy included instrument calibration, internal standards, Laboratory Control Standards (LCSs), MS/MSD samples, and surrogate compound recoveries. For this analytical program, none of the data required qualification due to instrument calibration, internal standards, LCS recovery, MS/MSD recovery or surrogate compound recovery deviations.

5.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program. The representativeness criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected. This parameter has been addressed by collecting samples at locations specified in MDEP-approved work plans, and by following the procedures for sample collection/analyses that were described in the FSP/QAPP. Additionally, the analytical program used procedures consistent with USEPA-approved analytical methodology. A QA/QC parameter that is an indicator of the representativeness of a sample is holding time. Holding time criteria are established to maintain the samples in a state that is representative of the in-situ field conditions before analysis. None of the data required qualification due to holding time deviations.

5.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal was achieved through the use of the standardized techniques for sample collection and analysis presented in the FSP/QAPP. The USEPA SW-846[1] analytical methods presented in the FSP/QAPP are updated on occasion by the USEPA to benefit from recent technological advancements in analytical chemistry and instrumentation. In most cases, the method upgrades include the incorporation of new technology that improves the sensitivity and stability of the instrumentation or allows the laboratory to increase throughput without hindering accuracy and precision. Overall, the analytical methods for this investigation have remained consistent in their general approach through continued use of the basic analytical techniques (e.g., sample extraction/preparation, instrument calibration, QA/QC procedures). Through this use of consistent base analytical procedures and by requiring that updated procedures meet the QA/QC criteria specified in the FSP/QAPP, the analytical data from past, present, and future sampling events will be comparable to allow for qualitative and quantitative assessment of site conditions.

5.5 Completeness

Completeness is defined as the percentage of measurements that are judged to be valid or usable to meet the prescribed DQOs. The completeness criterion is essentially the same for all data uses -- the generation of a sufficient amount of valid data. This analytical data set had an overall usability of 100%.

[1] Test Methods for evaluating Solid Waste, SW-846, USEPA, Final Update III, December 1996.

TABLE A - 1
ANALYTICAL DATA VALIDATION SUMMARY
SOIL GAS MIGRATION ASSESSMENT REPORT FOR GROUNDWATER MANAGEMENT AREA 3

GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in parts per million, ppm)

Sample Delivery Group No.	Sample ID	Date Collected	Matrix	Validation Level	Qualification	Compound	QA/QC Parameter	Value	Control Limits	Qualified Result	Notes
EPA TO-15											
PTF02	Summa Canister #0061	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0066	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0073	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0075	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0110	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0174	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0189	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0197	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0200	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0324	9/28/2006	Air	Tier II	Yes	Acrolein	Identification Criteria	4.2 J	-	ND (4.6)	
						Styrene	Identification Criteria	0.89 J	-	ND (4.3)	
PTF02	Summa Canister #0337	9/28/2006	Air	Tier II	No						
PTF02	Summa Canister #0511	9/28/2006	Air	Tier II	No						

Appendix B

Estimation of Indoor Air Concentrations Using Vapor Intrusion Modeling

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APPENDIX B
ESTIMATION OF INDOOR AIR CONCENTRATIONS USING VAPOR INTRUSION MODELING
GE-PITTSFIELD/HOUSATONIC SITE
GROUNDWATER MANAGEMENT AREA 3

B.1 Introduction

In support of the soil vapor assessment of light non-aqueous-phase liquids (LNAPL) underlying Buildings 51 and 59, AMEC has applied EPA's version of the Johnson and Ettinger Soil Vapor Intrusion Model (J&E Model) to the recently collected soil vapor results for Trichloroethylene (TCE). The primary objective of this assessment is to estimate the indoor air concentrations for TCE in Buildings 51 and 59 that could be associated with the LNAPL source.

As discussed in the foregoing *Soil Gas Migration Assessment Report for Groundwater Management Area 3* (Migration Assessment Report), soil vapor data from deep samples (collected approximately 1 foot above the groundwater table) were initially collected outside of the footprints of Buildings 51 and 59. Subsequently, sub-slab soil vapor samples were collected from two locations under the two buildings. The soil vapor samples were collected into Summa®-type stainless steel canisters, and the soil vapor concentrations were determined using EPA Method TO-14 (USEPA, 1999). The analytical results for detected constituents are presented in tables in the Migration Assessment Report.

B.2 Methodology

USEPA's version of the J&E Model was originally developed for use as a screening level model. Briefly, the model incorporates both convective and diffusive mechanisms for estimating the transport of vapors originating from either subsurface soils or groundwater into indoor spaces located directly above the chemical source. Inputs to the model include the chemical concentrations in the source media, the physico-chemical properties of the chemical constituent being evaluated, properties of the saturated and unsaturated zone soils, and structural features of the building. While the default model includes a number of simplifying assumptions regarding contaminant distribution and occurrence, subsurface characteristics, transport mechanisms, and building construction, it also allows for many of these parameters to be modified based on site-specific considerations (USEPA, 2003)

Three J&E models have been developed to evaluate 1) soil as the source, 2) groundwater as the source, or 3) soil vapor as the source.[1] Since soil vapor data are available, the "SG-ADV" model (version 3.1, dated February 2004) has been used for this assessment. Tables B-1 and B-2 present the site-specific inputs to the J&E Model for Buildings 51 and 59, respectively. Default J&E model assumptions were used if site-specific information was not available. The model assumptions that differ from the default model assumptions are discussed below.

[1] The J&E models are available from the following URL:
http://www.epa.gov/oswer/riskassessment/airmodel/zip/excel.zip

Building Dimensions

The dimensions (lengths and widths) of Buildings 51 and 59 have been estimated from the plan view drawings. Although the ceiling heights vary from room to room, an average height of 9-ft has been assumed for this assessment. Rooms in the buildings that have higher ceiling heights will have lower indoor air concentrations than are estimated in this model, due to the fact there will be greater dilution of emitted soil vapors into larger room volumes.

Soil Gas Sampling Depths

The thickness of the floor slabs is approximately 1 foot (30.48 cm) in both buildings. Since soil vapor samples were collected immediately below the building slabs, the soil gas sampling depth is also assumed to be 30.48 cm.

Air Exchange Rates

The default assumption for evaluating residential exposures using the J&E model is 0.25 exchange per hour. However, industrial facilities generally have higher air exchange rates (ITRC, 2003). For example, the Workplace Guideline from Germany requires an air exchange rate between 4 and 10 exchanges per hour based on the physical labor performed by employees in the building (ITRC, 2003). In older or less airtight buildings where there is natural ventilation with open windows, the air exchange rates can be as high as 20 exchanges per hour (Li and Chen, 2003). For this assessment, an air exchange rate of 1 exchange per hour has been assumed. This value is consistent with an exchange rate of 1 to 2 exchanges per hour measured in a "tight" office space (e.g., Womble et al., 1995; ANL, 2002). However, although lower exchange rates are likely to be less representative in Buildings 51 and 59, the effect of using a lower exchange rate (i.e., 0.25 exchange per hour – the default assumption for residences in the model) on the predicted indoor air concentration is also examined as a sensitivity analysis.

Soil Lithology

The soil underlying the slabs in both buildings is assumed to be silty loam (Soil Conservation Service Soil Type "SL"). This assumption is based on observations of soil type during the collection of deep soil vapor samples outside of the building footprints. Consequently, the corresponding default soil characteristics (e.g., dry bulk density) provided in the J&E model for this soil type were used. Soil lithology can influence the transit time of soil vapor originating from depth but is a less critical parameter for this assessment since the analysis is based on sub-slab soil vapor sample results.

Soil Temperature

A soil temperature of 12.7^{o}C has been assumed for this assessment, based on field measurements.

Measured Soil Vapor Concentrations

To be conservative, the maximum observed soil vapor concentrations for TCE measured under Buildings 51 and 59 have been used for this assessment. The maximum TCE concentration under Building 51 was 58 µg/m^3, which was from an approximate 8-hour integrated sample.

The maximum TCE concentration beneath Building 59 was 490 µg/m^3. This was a 15-minute grab sample of soil vapor collected after the approximate 8-hour integrated sample, which had no detectable TCE (detection limit of 54 µg/m^3). As discussed in the Migration Assessment Report, this result may not be representative of the sub-slab soil gas conditions. However, it was used in this modeling assessment to be conservative.

B.3 Results and Discussion

The predicted indoor air concentrations of TCE in Buildings 51 and 59, based on the maximum observed sub-slab soil vapor concentrations and assumptions presented in Tables B-1 and B-2, are summarized in the table below.

Predicted Indoor Air Concentrations (µg/m^3) using Air Exchange Rate of 1 change per hour

Chemical	Building 51	Building 59
TCE	6.1E-04	2.9E-03

The predicted indoor air concentrations are inversely related to the exchange rate (i.e., as the exchange rate increases, the indoor air concentrations decrease). Consequently, a sensitivity analysis of these results has been performed by evaluating the influence of differing assumptions about air exchange rates on the predicted indoor air concentrations. The modeled air exchange rate was 1 exchange per hour, which is typical for an office space. Reducing the air exchange rate to 0.25 exchanges per hour, which is the default residential assumption in the J&E model, increases the estimated indoor air concentration by a factor of four, as summarized in the table below.

Sensitivity Analysis - Predicted Indoor Air Concentrations (µg/m^3) using Air Exchange Rate of 0.25 change per hour

Chemical	Building 51	Building 59
TCE	2.4E-03	1.2E-02

The results from this assessment have been used in the Migration Assessment Report to evaluate potential sources of TCE to indoor air.

B.4 References

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Table B-1. Soil Vapor Intrusion Model Input Parameters for Building 51

Model Inputs	Units	Bldg 51 Values	Comments
Building Construction	---	Slab-on-grade	Reported construction type.
Building/Room Dimensions and Features			
Enclosed space floor length (L_B)	cm	14,630	480-ft; site-specific value.
Enclosed space floor width (W_B)	cm	7,071	232-ft; site-specific value.
Enclosed space height (H_B)	cm	274	9-ft; site-specific value.
Enclosed space floor thickness (L_{crack})	cm	30.48	1-ft; site-specific value.
Depth below grade to bottom of enclosed space floor (L_F)	cm	30.48	Samples were collected from just below the floor slab.
Widths of cracks/fissures	cm	0.1	Model default used.
Air Exchange Rate (AER)	1/h	1	Base case, typical of office spaces.
		0.25	Default for residence (sensitivity analysis).
Soil Vapor Collection Parameters			
Measued Soil Vapor Conc	$\mu g/m^3$	58	Maximum observed of 2 samples.
Average soil temperature	deg Celsius	12.7	Site-specific.
Soil gas sampling depth below grade (L_s)	cm	30.48	1-ft; site-specific value.
Thickness of soil stratum A (h_A)	cm	30.48	1-ft; same value as the soil vapor collection depth.
Stratum A SCS soil type	---	SL	Based on field observations during sampling.
Stratum A soil dry bulk density (ρ_b^A)	g/cm^3	1.62	Model lookup based on SCS soil type.
Stratum A soil total porosity (n^A)	unitless	0.387	Model lookup based on SCS soil type.
Stratum A soil water-filled porosity (θ_x^A)	cm^3/cm^3	0.103	Model lookup based on SCS soil type.
Soil-bldg pressure differential (ΔP)	$g/cm\text{-}s^2$	40	Model default used.
Average vapor flow rate into bldg (Q_{soil})	L/m	5	Model default used.

Table B-2. Soil Vapor Intrusion Model Input Parameters for Building 59

Model Inputs	Units	Bldg 59 Values	Comments
Building Construction	---	Slab-on-grade	Reported construction type.
Building/Room Dimensions and Features			
Enclosed space floor length (L_B)	cm	17,678	580-ft; site-specific value.
Enclosed space floor width (W_B)	cm	10,058	330-ft; site-specific value.
Enclosed space height (H_B)	cm	274	9-ft; site-specific value.
Enclosed space floor thickness (L_{crack})	cm	30.48	1-ft; site-specific value.
Depth below grade to bottom of enclosed space floor (L_F)	cm	30.48	Samples were collected from just below the floor slab.
Widths of cracks/fissures	cm	0.1	Model default used.
Air Exchange Rate (AER)	1/h	1	Base case, typical of office spaces.
		0.25	Default for residence (sensitivity analysis).
Soil Vapor Collection Parameters			
Measued Soil Vapor Conc	$\mu g/m^3$	470	Maximum observed of 2 samples (plus a duplicate)
Average soil temperature	deg Celsius	12.7	Site-specific
Soil gas sampling depth below grade (L_s)	cm	30.48	1-ft; site-specific value
Thickness of soil stratum A (h_A)	cm	30.48	1-ft; same value as the soil vapor collection depth
Stratum A SCS soil type	---	SL	Based on field observations during sampling.
Stratum A soil dry bulk density (ρ_b^A)	g/cm^3	1.62	Model lookup based on SCS soil type.
Stratum A soil total porosity (n^A)	unitless	0.387	Model lookup based on SCS soil type.
Stratum A soil water-filled porosity (θ_x^A)	cm^3/cm^3	0.103	Model lookup based on SCS soil type.
Soil-bldg pressure differential (ΔP)	$g/cm\text{-}s^2$	40	Model default used.
Average vapor flow rate into bldg (Q_{soil})	L/m	5	Model default used.