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May 8, 2009

Mr. Larry A. Rosenmann
New York State Department of Environmental Conservation
Bureau of Hazardous Waste & Radiation Management
Division of Solid & Hazardous Materials
625 Broadway
Albany, New York 12233-7528

**Re: Carrier Corporation, Thompson Road Facility, Syracuse, New York
Corrective Action Order – Index CO 7-20051118-4
CO Update 2008 – Soil Vapor Intrusion Work Plan (rev. 2) and Response to Comments**

Dear Mr. Rosenmann:

EnSafe Inc., on behalf of United Technologies Corporation is submitting one hard copy of the following:

- A *Response to Comments* made by the New York State Department of Environment and Conservation (NYSDEC, March 10, 2009) on the *Soil Vapor Intrusion Work Plan* dated August 2008.
- A revised *Soil Vapor Intrusion Work Plan* that incorporates comments made in your March 10th letter.

Please call me if you have any questions at (615) 255-9300.

Sincerely,

EnSafe Inc.

By: May Heflin, PE

Encl. Response to Comments
Soil Vapor Intrusion Work Plan (rev. 2)

cc: Mr. Tim DiGulio — NYSDEC, Region 7
Mr. James Gruppe — NYSDEC, Bureau of HW & Radiation Management
Mr. Samuel Ezekwo — USEPA, Region 2
Mr. William Penn — UTC

Response to Comments
NYSDEC Comments on SVI CMS Work Plan — March 10, 2009
Carrier Corporation, Syracuse, New York
May 9, 2009

Comment 1: *Section 5.2, Inline Vapor Sample Collection is unclear whether it is calling for sampling within the manhole, the storm line and the bedding, or a sub-set of these. When the construction details are known and specific sampling points are proposed, all three should be considered to be potential monitoring points.*

Response 1: Carrier agrees that when construction details are known, the vapor collection points may be advisable in the manholes, storm lines, and in the bedding material underlying the storm lines. Vapor sampling in the manholes and storm lines appears straightforward (much like indoor air samples are collected), with the exception that placement of a Summa canister and follow-up readings in storm lines (not manholes) would require confined space entry. The value added by obtaining data within the storm line will be assessed once manhole vapor samples and bedding material samples are reviewed.

The ability to collect a vapor sample in the bedding material underlying the storm line will be determined by the construction characteristics of the storm line (i.e. was the line placed on gravel, sand, or directly on compacted earthen material) and the depth to groundwater in relation to the depth of the storm line. Historic groundwater sampling shows the seasonal groundwater table to range from 6 to 13 feet below ground surface, and many portions of the storm line throughout the site are partially or completely below the groundwater table for at least part of the year, making soil vapor probe sampling infeasible.

Section 5.4 (formerly Section 5.2) of the work plan has been modified to reflect the potential for additional monitoring locations. Reference to obtaining a sample from the storm line itself, has been removed, but will be evaluated once manhole vapor samples and soil vapor probe samples have been reviewed.

Comment 2: *The Work Plan frequently refers to a "NYSDOH action level" of 5 µg/m³ for trichloroethene (TCE) in indoor air. This number is not an action level. It is the NYSDOH air guideline for TCE in indoor air. The number should be referred to in this manner in all future documents.*

Response 2: References to a 5 µg/m³ *action level* have been changed to *air guideline* in the revised work plan. The NYSDOH air guideline for TCE in indoor air will be referred to as such in all future documents.

Comment 3: *The study must evaluate additional steps that can be taken in the impacted buildings, like sealing cracks or changing air handling processes, which may add an additional level of protection against soil vapor intrusion. If these are identified, they should be implemented.*

Response 3: The study proposed in the work plan will include additional steps that can be taken in the impacted buildings. A description of the additional steps has been added in Section 5.2 (Sealing of Infiltration Points) and 5.3 (HVAC Modifications) of the revised work plan.

Comment 4: *The Agencies concur with the idea of postponing further SVI sampling in the impacted area until the proposed work can be completed and evaluated. However, because soil vapor migration can be enhanced by storm sewers, which are ubiquitous on the site, we are not convinced that current sampling has defined the full extent of the potentially impacted area. As this study proceeds, and the impact of storm sewers on soil vapor migration is better understood, it may be necessary to extend the soil vapor monitoring program beyond the currently known impacted area.*

In the interim, if any untested buildings are currently being used for non-manufacturing purposes, or are proposed for such use, they must be tested to ensure SVI does not present a potential health risk.

Response 4: Carrier agrees that as the study proceeds, it may become necessary to expand the soil vapor monitoring program.

Carrier has implemented and completed a soil vapor monitoring program in the following buildings:

- TR-1 (north and south ends of building) — building is unoccupied with the exception of some storage areas on the southern end that are periodically accessed.
- TR-2 (four locations in and around office space in center of building) — the remaining portions of this building are used as a storage warehouse. Employees may enter and leave this area throughout the day.
- TR-3 (southwest corner in office area) — this is the only portion of this building that is regularly occupied. The remaining portions of the building are empty warehouse area that remains unoccupied.
- TR-4 (north and south ends in office and/or lab areas)
- TR-6 (routinely occupied by employees)
- TR-18 (routinely occupied by employees)
- TR-18S (routinely occupied by employees)

The August 2008 work plan proposed to expand the soil vapor monitoring program to buildings the northern end of Building 5, due to its proximity to the former degreaser area in Building TR-3. While other buildings onsite are being

used for non-manufacturing purposes, their distance from any known VOC vapor sources does not indicate the need for indoor air sampling at this time. If the planned use in one of the buildings in close proximity to a known vapor source changes, that building will be tested to ensure SVI does not present a potential health risk.

Comment 5: *Much of the proposed work will gather additional data that will be used to identify additional sampling locations. When the additional data is gathered, Carrier should submit a report and revised sampling proposal for Department approval before the proposed samples are taken.*

Response 5: Carrier will submit a report and revised sampling proposal for Department approval upon completing the work proposed in the attached revised work plan, and prior to implementing the soil vapor monitoring program.

**CORRECTIVE MEASURES STUDY WORK PLAN
SOIL VAPOR INTRUSION
(Amended per NYSDEC Comments dated 2/24/09)**

Revision No.: 2

**United Technologies/Carrier
Thompson Road Facility
Syracuse, New York**



EnSafe Project No.: 0888806464

Prepared for:

**United Technologies Corporation
UTC Shared Remediation Services
United Technologies Building
Hartford, Connecticut 06010**

Prepared by:

ENSAFE

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220 Athens Way, Suite 410
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May 2009

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INTRODUCTION

Carrier Corporation (Carrier), a wholly-owned subsidiary of United Technologies Corporation (UTC) has prepared this abbreviated Corrective Measures Study (CMS) in response to the requests outlined in the New York State Department of Environmental Conservation's (NYSDEC) letter dated May 23, 2008. In this letter, NYSDEC raised several environmental concerns related to the investigation(s) and subsequent findings related to Corrective Action Order — Index CO 7-20051118-4 (order) dated February 13, 2006. The three primary environmental concerns deal with:

- Soil vapor intrusion to buildings on the Carrier campus
- Adequacy of Carrier's groundwater monitoring program at Building TR-3 and in deep groundwater
- Polychlorinated biphenyl (PCB) contamination in sediments of Sanders Creek

On July 2, 2008, UTC and Carrier personnel met with NYSDEC representatives to discuss the requests made in the referenced letter. Meeting minutes were submitted to NYSDEC by Mr. William Penn on July 14, 2008, via email. A summary of the minutes is provided below:

Soil Vapor Intrusion

- The vapor migration pathway appears to be related to the storm water lines that emanate from the Solid Waste Management Units 1 through 4 source area. In lieu of continued indoor air and sub-slab vapor investigations, Carrier proposes to perform mitigation at some of the locations.
- In addition Carrier will evaluate information on historical manufacturing operations that used chlorinated solvents and propose additional soil vapor, indoor air sampling if warranted.

The work plan presented below discusses Carrier's approach to addressing these items.

Groundwater Monitoring

The remedial approach for site-wide groundwater involves the containment of waters at the site boundary. Shallow groundwater flow is toward the storm water system and is being collected by the storm water system and the bedding material collection system. Deep groundwater, except for one event, has been demonstrated to flow to the north-northwest. Prior Hydro-punch sampling in the deep horizon did not detect contaminants to the east of the current boundary deep wells.

- Carrier will abandon MW-13D and install a replacement well, install a new shallow well at TR-3, and perform annual groundwater monitoring.
- Carrier will submit an abbreviated CMS for TR-3 area groundwater.

Carrier will submit a Groundwater Monitoring Work Plan on August 25, 2008, and a focused CMS for TR-3 on September 22, 2008 to NYSDEC.

Sanders Creek

PCB detections in the creek appear to be associated with the releases through the facility's storm water system. A rigorous monitoring program, being performed in compliance with the site's State Pollutant Discharge Elimination System permit, has detected PCBs in the storm water. Based on the data to date, it is expected that a treatment system will be installed sometime in 2010 to address PCBs in storm water above the permit requirements.

- A future remedial action in Sanders Creek will address PCBs in sediments.
- Additional sampling may be needed to support the remedial measure.

Carrier will submit to NYSDEC a focused CMS for Sanders Creek on September 5, 2008.

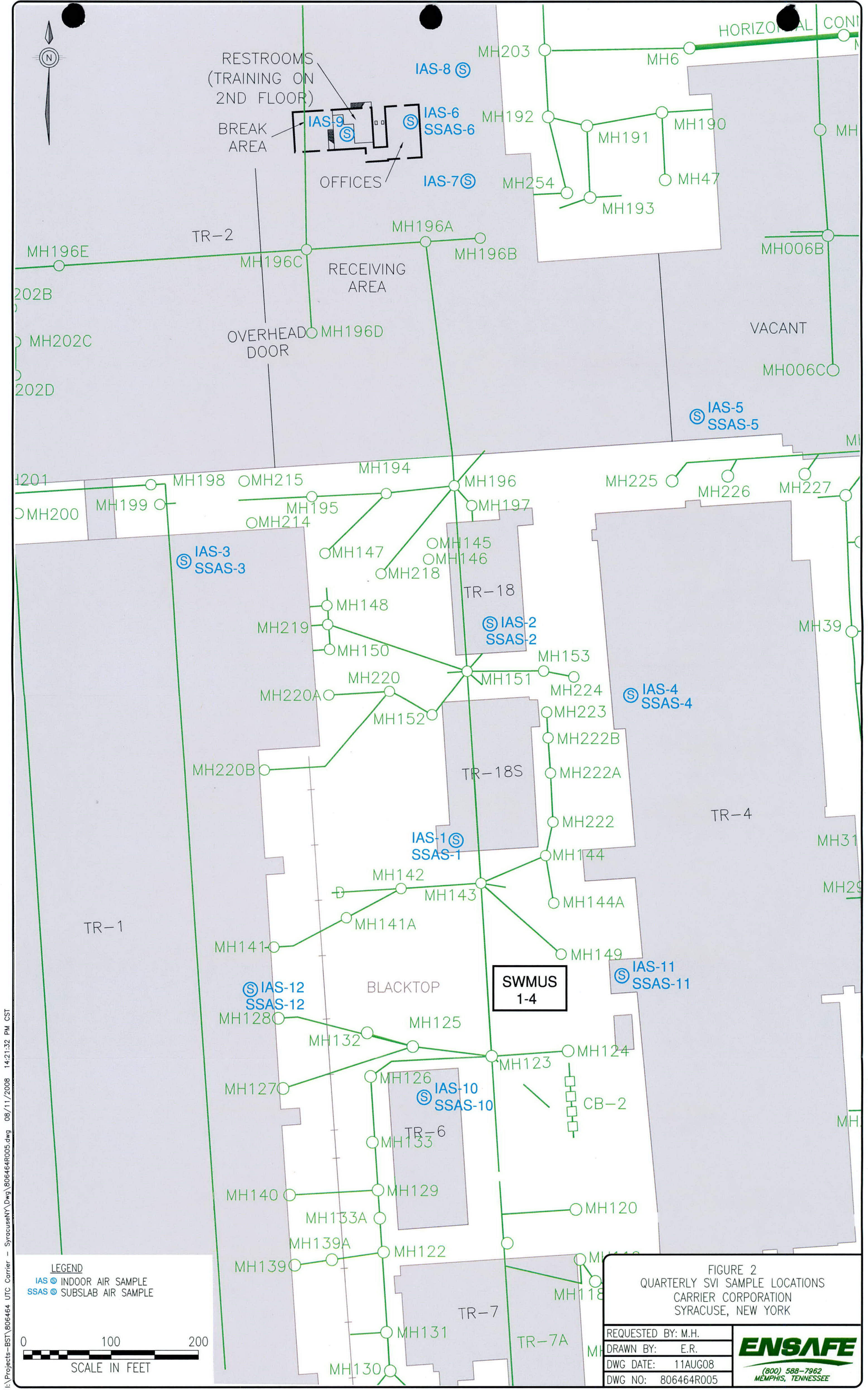
1.0 SOIL VAPOR INTRUSION

1.1 Background

Carrier conducted several subsurface investigations at the facility in the late 1980s and 1990s. The conclusion of these investigations was that volatile organic compounds (VOCs) are present in groundwater at the central facility area and are attributed to releases from the former tanks associated with Solid Waste Management Units (SWMUs) 1 through 4. These VOCs were detected in shallow monitoring wells (approximately 15 feet deep) in the area of SWMUs 1 through 4 (**Figure 1 - TCE Groundwater Concentrations, August 2007**).

Indoor air sampling on June 25, 2002, found low levels of VOCs commonly present in site groundwater. Trichloroethene (TCE) was found at 1.8 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) in the indoor air sample from the Building TR-18S and $1 \mu\text{g}/\text{m}^3$ in building TR-18. These levels are at, or slightly above, typical background levels found throughout the state by the New York State Department of Health (NYSDOH) and below recent residential criteria cited by the NYSDOH.

As required by the February 2006 order, Carrier implemented a quarterly soil vapor intrusion monitoring program beginning December 2006 through December 2007, which addressed indoor air and sub-slab vapors in seven buildings surrounding SWMUs 1 through 4, outdoor air in the vicinity of SWMUs 1 through 4, and soil vapor at the property boundary along Kinne Street. Quarterly reports summarizing the results of the monitoring program were submitted to New York State Department of Environmental Conservation (NYSDEC), with the last report submitted in February 2008 (see Section 9.0 References). **Figure 2 — Quarterly SVI Sampling Locations** presents the sampling locations covered during this monitoring period. **Table 1** summarizes the data obtained at these sampling locations.



I:\Projects-BST\806464 UTC Carrier - Syracuse\DWG\806464R005.dwg 08/11/2008 14:21:32 PM CST

LEGEND
IAS (S) INDOOR AIR SAMPLE
SSAS (S) SUBSLAB AIR SAMPLE

0 100 200
SCALE IN FEET

FIGURE 2
QUARTERLY SVI SAMPLE LOCATIONS
CARRIER CORPORATION
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	11AUG08
DWG NO:	806464R005

ENSAFE
(800) 588-7962
MEMPHIS, TENNESSEE

Figure 2 Quarterly SVI Sampling Locations

[illegible]

1
Sub-Slab, Indoor, and Outdoor Air Sample Results
4th Quarter 2006 and 1st thru 3rd Quarters 2007
Carrier Corporation, Thompson Road Facility
Syracuse, New York

ID/Location	Date	TCE	1,1-DCE	cis- 1,2-DCE	trans 1,2-DCE	1,1-DCA	Vinyl Chloride	Benzene	Toluene	Ethyl Benzene	m,p- Xylene	o- Xylene
	2/15/2007	0.28	ND	ND	ND	ND	ND	0.99	2.4	ND	0.93	ND
	5/9/2007	0.59	ND	ND	ND	ND	ND	1	3.2	ND	1.7	ND
	8/23/2007	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
SSAS-4 (TR-4)	12/13/2006	23	ND	1.4	ND	ND	ND	9.1	60	16	63	24
	2/15/2007	13	ND	ND	ND	ND	ND	0.82	0.74	ND	ND	ND
	5/9/2007	14	ND	0.96	ND	ND	ND	ND	2.8	ND	ND	ND
	8/23/2007	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IAS-5 (TR-3)	12/13/2006	2.4	ND	ND	ND	ND	ND	3.0	8.9	1.8	5.6	2.2
	2/15/2007	1.7	ND	ND	ND	ND	ND	1.7	8.6	ND	1.3	ND
	5/9/2007	1.6	ND	ND	ND	ND	ND	2.2	34	2.1	7.4	2
	8/23/2007	1.1	ND	ND	ND	ND	1.0	1.0	6.7	0.92	2.6	0.81
SSAS-5 (TR-3)	12/13/2006	100	ND	ND	ND	ND	ND	25	110	13	44	17
	2/15/2007	72	ND	ND	ND	ND	ND	1.1	10	ND	ND	ND
	5/9/2007	91	ND	ND	ND	ND	ND	0.53	23	ND	ND	ND
	8/23/2007	88	ND	ND	ND	ND	ND	ND	28	ND	ND	ND
IAS-6 (TR-2)	12/13/2006	20	ND	0.64	ND	ND	ND	7.9	26	4.0	13	5.2
	2/15/2007	8.7	ND	ND	ND	ND	ND	3.1	28	1.4	4.4	1.4
	5/9/2007	4.7	ND	ND	ND	ND	ND	2.4	20	3.3	10	2.3
	8/23/2007	0.86	ND	ND	ND	ND	ND	3.5	15	2.5	6.6	2.4
SSAS-6 (TR-2)	12/13/2006	780	ND	ND	ND	ND	ND	39	260	48	170	65
	2/15/2007	1000, 1200 E	ND	1.2	0.9	ND	ND	1.8	52, 59	ND	ND	ND
	5/9/2007	1000	ND	ND	ND	ND	ND	ND	130	ND	ND	ND
	8/23/2007	870	ND	ND	ND	ND	ND	ND	250	ND	5.8	ND
IAS-7 (TR-2)	2/15/2007	9.5	ND	0.78	ND	ND	ND	6.5	30	2.6	9.9	2.6
	5/9/2007	3.8	ND	ND	ND	ND	ND	4.0	27	4	13	3.6
	8/23/2007	0.96	ND	ND	ND	ND	ND	2.7	11	2	5.3	1.7
IAS-7 (TR-2) Lab Duplicate	8/23/2007	1.1	ND	ND	ND	ND	ND	2.9	12	2.1	5.8	2.1
IAS-8 (TR-2)	2/15/2007	9.2	ND	ND	ND	ND	ND	3.6	26	1.7	5.4	1.6
	5/9/2007	1.9	ND	ND	ND	ND	ND	1.6	12	2.5	6.8	1.5
	8/23/2007	0.57	ND	ND	ND	ND	ND	1.6	6.6	1.9	3.9	1.4
IAS-9 (TR-2)	2/15/2007	2	ND	ND	ND	ND	ND	2.1	40	1.1	3.2	1.1
	5/9/2007	6.7	ND	ND	ND	ND	ND	2.6	22	3.3	10	2.3

Page 1
Sub-Slab, Indoor, and Outdoor Air Sample Results
4th Quarter 2006 and 1st thru 3rd Quarters 2007
Carrier Corporation, Thompson Road Facility
Syracuse, New York

ID/Location	Date	TCE	1,1-DCE	cis- 1,2-DCE	trans 1,2-DCE	1,1-DCA	Vinyl Chloride	Benzene	Toluene	Ethyl Benzene	m,p- Xylene	o- Xylene
	8/23/2007	1.1	ND	ND	ND	ND	ND	2.6	12	2.3	5.3	2
IAS-10 (TR-6)	2/15/2007	1.4	ND	ND	ND	ND	ND	17	110	15	63	17
	5/9/2007	0.31	ND	ND	ND	ND	ND	1.6	7.8	1.7	6.7	2.1
	8/23/2007	3	ND	ND	ND	ND	ND	0.96	11	6.8	24	5.3
	12/11/2007	3.8	ND	ND	ND	ND	ND	2.6	26	59	230	45
IAS-10 Duplicate (TR-6)	12/11/2007	4.1	ND	ND	ND	ND	ND	2.2	23	57	230	43
SSAS-10 (TR-6)	2/15/2007	310	ND	10	1.6	1.3	ND	2.3	12	2.2	8.7	2.6
	5/9/2007	240	ND	9.7	0.76	1.1	ND	ND	0.84	ND	2.1	0.88
	8/23/2007	370	ND	5.0	ND	ND	ND	ND	ND	ND	ND	ND
	12/11/2007	220	1.5	3.6	0.72	0.68	ND	0.68	5.2	12	47	8.6
SSAS-10 (TR-6) Lab Duplicate	8/23/2007	370	ND	5.4	ND	ND	ND	ND	ND	ND	ND	ND
IAS-11 (TR-4 south)	2/15/2007	2.1	ND	ND	ND	ND	ND	0.78	1.4	ND	0.75	ND
	5/9/2007	1.2	ND	ND	ND	ND	ND	0.97	3.7	1.2	3.6	1.1
	8/23/2007	0.82	ND	ND	ND	ND	ND	0.52	1.6	ND	ND	ND
	12/11/2007	2.7	ND	ND	ND	ND	ND	0.6	1.6	ND	ND	ND
SSAS-11 (TR-4 south)	2/15/2007	270	ND	1.2	ND	ND	ND	1.3	6.2	0.67	1.2	ND
	5/9/2007	290	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND
	8/23/2007	380	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/11/2007	540	ND	2.8	ND	ND	ND	ND	ND	ND	ND	ND
SSAS-11 (TR-4 south) Lab Duplicate	8/23/2007	370	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IAS-12 (TR-1 south)	2/15/2007	0.62	ND	ND	ND	ND	ND	2.3	19	1.6	5.6	1.5
	5/9/2007	1.2	ND	ND	ND	ND	ND	3.2	11	1.8	7.3	2.1
	8/23/2007	0.53	ND	ND	ND	ND	ND	1.9	7.9	1.4	3.8	1.1
	12/11/2007	1.1	ND	ND	ND	ND	ND	2.8	12	2.8	12	3.9
SSAS-12 (TR-1 south)	2/15/2007	18	ND	ND	ND	ND	ND	5.6	14	0.95	3.5	0.86
	5/9/2007	51	ND	ND	ND	1.7	ND	0.54J	0.82	ND	0.96	ND
	8/23/2007	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/11/2007	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
OAS-1 (Outside & west of TR-4)	12/13/2006	ND	ND	ND	ND	ND	ND	1.1	5.2	0.90	3.2	1.1
	2/15/2007	ND	ND	ND	ND	ND	ND	0.98	2.6	ND	1.3	ND
	5/9/2007	ND	ND	ND	ND	ND	ND	0.71	1.6	ND	ND	ND
	8/23/2007	1.4	ND	ND	ND	ND	ND	0.53	1.4	ND	ND	ND

Page 1
Sub-Slab, Indoor, and Outdoor Air Sample Results
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ID/Location	Date	TCE	1,1-DCE	<i>cis</i> - 1,2-DCE	<i>trans</i> - 1,2-DCE	1,1-DCA	Vinyl Chloride	Benzene	Toluene	Ethyl Benzene	m,p- Xylene	o- Xylene
OAS-2 (Outside & west of TR-18)	12/13/2006	ND	ND	ND	ND	ND	ND	0.84	1.2	0.93	3.2	1.1
	5/9/2007	ND	ND	ND	ND	ND	ND	0.66	1.6	ND	ND	ND
	8/23/2007	ND	ND	ND	ND	ND	ND	0.54	1.3	ND	ND	ND
SVS-1 (North end of Kinne St. Swale)	8/23/2007	ND	ND	ND	ND	ND	ND	82	850	160	370	120
	12/11/2007	ND	ND	ND	ND	ND	ND	1.1	2.3	ND	0.83	ND
SVS-2 (South end of Kinne St. Swale)	8/23/2007	0.26	ND	ND	ND	ND	ND	4.8	190	74	200	58
	12/11/2007	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
NYSDOH Air Guideline Values, indoor air		5										
EPA BASE Data, indoor air				<1.0		<0.5	<0.9	2.1 - 5.1	10.7 - 26	<1.6 - 3.4	4.1 - 12	<2.4 - 4.4

Notes:

(uG/m3)

ND - Not Detected

NE - Not Established

NA - Not Applicable, lab did not use this sample for duplicate QA/QC

NS - Not Sampled due to cannister malfunction or water vapor in tubing

IAS-1 (TR-18S) - Indoor Air Sample from TR-18S

SSAS-1 (TR-18S) - Subslab Vapor Sample from TR-18S

>**EPA Base Data** - Building Assessment and Survey Evaluation (BASE '94-'98). Unpublished.
Indoor Environments Division, US Environmental Protection Agency, Washington, DC.

>The NYSDOH generally uses the EPA BASE data when evaluating office or commercial buildings.

>No outdoor detections exceed the EPA Base Data for Outdoor air.

2.0 ASSESSMENT OF CURRENT CONDITIONS

As mentioned previously, seven buildings have been monitored as part of the soil vapor intrusion monitoring program. (Note: all soil vapor intrusion monitoring was conducted in accordance with the NYSDOH Guidance for Evaluation Soil Vapor Intrusion in the State of New York, October 2006.) A description of the monitoring program is described below:

Building TR-1 (IAS-3/SSAS-3): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from a vacant office area in this building. Indoor air TCE concentrations ranged from 0.39 to 1.6 $\mu\text{g}/\text{m}^3$, concentrations typical of background levels found throughout the state by NYSDOH. No indoor air TCE concentrations were detected above the NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$.

Building TR-1 south end (IAS-12/SSAS-12): This portion of the building was monitored due to its proximity to SWMUs 1 through 4. Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (February 2007 through December 2007) from another vacant area in this building. Indoor air TCE concentrations ranged from 0.53 to 1.2 $\mu\text{g}/\text{m}^3$, concentrations typical of background levels found throughout the state by NYSDOH. Sub-slab vapor TCE concentrations were obtained from two of the four monitoring quarters at 18 and 51 $\mu\text{g}/\text{m}^3$.

Building TR-2 (IAS-6/SSAS-6, IAS-7, 8 and 9): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from an office area in this warehouse building. Three additional indoor air samples were obtained in the warehouse area surrounding the office area (IAS-7, 8, and 9) for the last three quarterly sampling events in this building. Indoor air TCE concentrations in the office area ranged from 0.86 to 20 $\mu\text{g}/\text{m}^3$. The NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$ was exceeded two times during the monitoring period; once in December 2006 and once in February 2007. Sub-slab vapor concentrations over the four quarter sampling period ranged from 780 to 1,200 $\mu\text{g}/\text{m}^3$. The indoor air samples in the warehouse area each had one sample that exceeded the NYSDOH air guideline as follows: IAS-7 ranged from 0.96 to 9.5 $\mu\text{g}/\text{m}^3$; IAS-8 ranged from 0.57 to 9.2 $\mu\text{g}/\text{m}^3$; and IAS-9 ranged from 1.1 to 6.7 $\mu\text{g}/\text{m}^3$.

Building TR-3 (IAS-5/SSAS-5): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from an office area in this building. Indoor air TCE concentrations ranged from 1.1 to 2.4 $\mu\text{g}/\text{m}^3$, concentrations typical of, or just slightly above background levels found throughout the state by NYSDOH. No indoor air TCE concentrations were detected above the NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$. Sub-slab vapor concentrations remained relatively low over the four quarter sampling period, ranging from 72 to 100 $\mu\text{g}/\text{m}^3$.

Building TR-4 (IAS-4/SSAS-4): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from an office area in this building. Indoor air TCE concentrations ranged from non-detect to 0.58 $\mu\text{g}/\text{m}^3$, concentrations below typical background levels found throughout the state by NYSDOH. No indoor air TCE concentrations were detected above the NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$. Sub-slab vapor concentrations ranged from 11 to 23 $\mu\text{g}/\text{m}^3$ over this monitoring period.

TR-4 south end (IAS-11/SSAS-11): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (February 2007 through December 2007) from a lab area in this building. Indoor air TCE concentrations ranged from 0.82 to 2.7 $\mu\text{g}/\text{m}^3$, concentrations typical of, or just slightly above background levels found throughout the state by NYSDOH. No indoor air TCE concentrations were detected above the NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$. Sub-slab vapor concentrations over the four quarter sampling period ranged from 270 to 540 $\mu\text{g}/\text{m}^3$.

Building TR-6 (IAS-10/SSAS-10): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (February 2007 through December 2007) from an employee break-room area in this building. Indoor air TCE concentrations ranged from 0.31 to 3.8 $\mu\text{g}/\text{m}^3$, concentrations typical of, or just slightly above background levels found throughout the state by NYSDOH. No indoor air TCE concentrations were detected above the NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$. Sub-slab vapor concentrations over the four quarter sampling period ranged from 220 to 370 $\mu\text{g}/\text{m}^3$.

Building TR-18 (IAS-2/SSAS-2): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from an office area in this building. Indoor air TCE concentrations ranged from 0.82 to 6.9 $\mu\text{g}/\text{m}^3$. The NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$ was exceeded one time in February 2007. Sub-slab vapor concentrations over the four quarter sampling period ranged from 630 to 1,100 $\mu\text{g}/\text{m}^3$.

Building TR-18S (IAS-1/SSAS-2): Indoor air and sub-slab vapor samples were obtained for four consecutive quarters of monitoring (December 2006 through August 2007) from an office area in this building. Indoor air TCE concentrations ranged from 3.5 to 7.0 $\mu\text{g}/\text{m}^3$. The NYSDOH air guideline of 5 $\mu\text{g}/\text{m}^3$ was exceeded two times during this monitoring period; once in May 2007 and once in August 2007. Sub-slab vapor concentrations over the four quarter sampling period ranged from 3,100 to 5,800 $\mu\text{g}/\text{m}^3$.

3.0 CONCEPTUAL SITE MODEL

The primary pathway for TCE vapor migration into the sub-slab of the affected buildings is unlikely to be via wide-spread groundwater contamination. Water level measurements from the piezometer and groundwater monitoring well network, and the elevations of the storm sewer lines located throughout the facility indicate that the main lines of the storm sewer are located below the water table. Based on previous water level elevation data collected, the potentiometric surface map of the facility indicates that the storm sewer system is exerting an influence over the local groundwater flow system and that groundwater flows toward the main storm sewer lines, as opposed to north toward Sanders Creek. Years of groundwater data show TCE concentrations to be low throughout the site, with the exception of SWMUs 1 through 4 and the recently investigated MW-18 area at TR-1.

The vapor migration pathway appears to be related to the storm water lines that emanate from the SWMUs 1 through 4 source area. Available site plans show storm lines to pass under or through the SWMUs 1 through 4 source area and directly under Buildings TR-2, TR-18, and TR-18S. Lateral lines from the main trunk line appear to extend to many of the buildings surrounding SWMUs 1 through 4 and the trunk line, as shown in **Figure 3 — Potential Vapor Migration Pathway**.

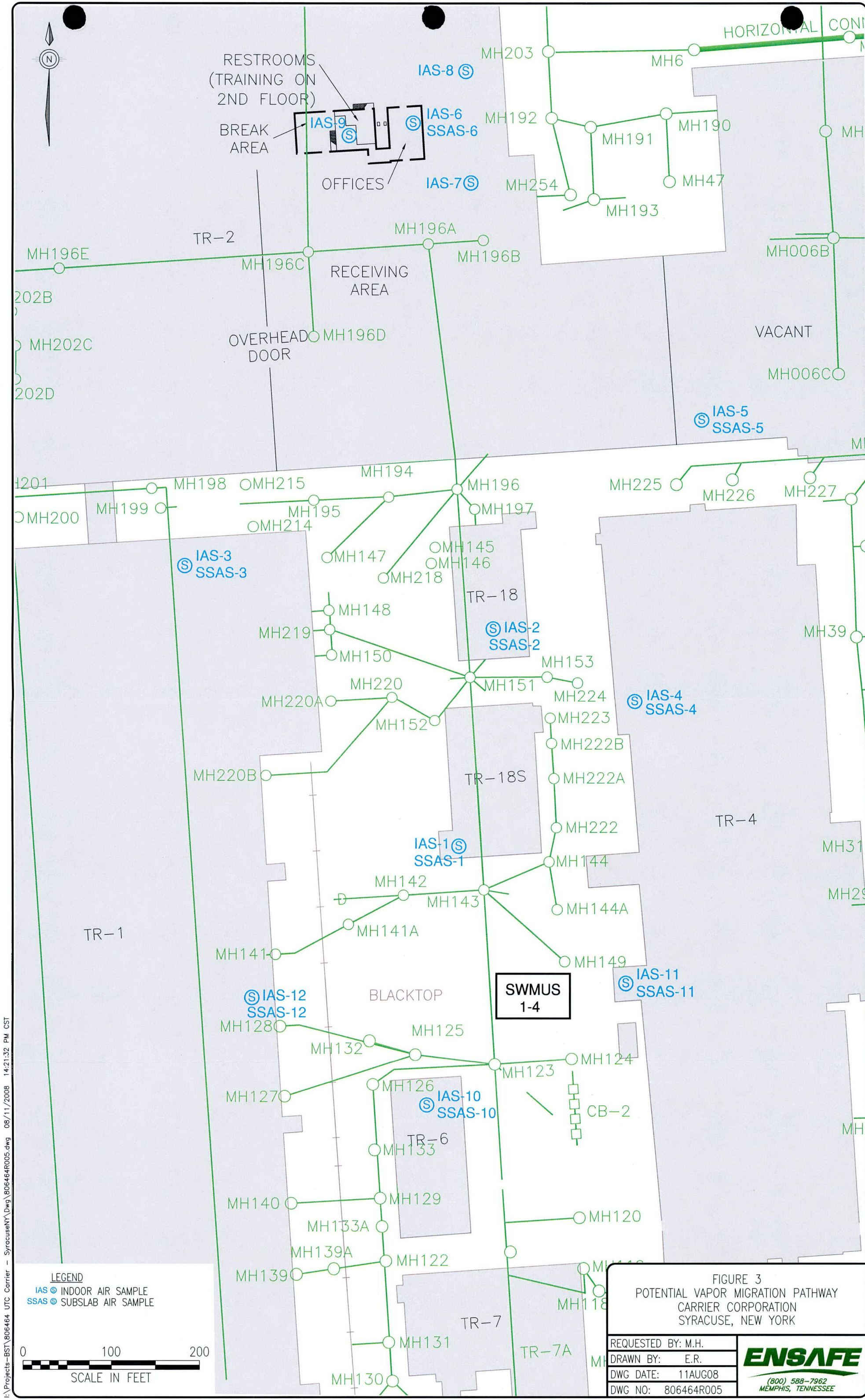


FIGURE 3
POTENTIAL VAPOR MIGRATION PATHWAY
CARRIER CORPORATION
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	11AUG08
DWG NO:	806464R005



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4.0 PRIMARY PATHWAY MITIGATION

Carrier will focus mitigation activities on the primary pathway for TCE vapor migration in an effort to stabilize and possibly reduce vapor concentrations in the sub-slab of the affected buildings.

Building TR-1 (IAS-3/SSAS-3): The NYSDOH Decision Matrix 1 (**Table 2 — Soil Vapor/Indoor Air Matrix 1**), states that a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. **Table 3 — Quarterly Soil Vapor/Indoor Air Matrix 1 Results**, summarizes the action required by the NYSDOH matrix for each of the quarters sampled for each sampling location. Therefore, Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-1 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Building TR-1 south end (IAS-12/SSAS-12): Based on these data combined with the buildings vacancy, no further action is required at this location. If this portion of the building becomes occupied, Carrier will begin a quarterly monitoring program for indoor air and sub-slab vapors.

Building TR-2 (IAS-6/SSAS-6, IAS-7, 8 and 9): Carrier recommends that a mitigation action be taken at this building to reduce indoor air TCE concentrations below the NYSDOH air guideline. Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-2 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Table 2
Soil Vapor/Indoor Air Matrix 1
October 2006

Sub-Slab Vapor Concentration of Compound ($\mu\text{g}/\text{m}^3$)	Indoor Air Concentration of Compound ($\mu\text{g}/\text{m}^3$)			
	<0.25	0.25 to 1	1 to <5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify sources(s)	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to <5.0	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to 250	9. MONITOR	10. MONITOR/MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

Notes:

> = greater than
 < = less than

Table 3
Quarterly Soil Vapor/Indoor Air Matrix 1 Results
5 quarters of monitoring from December 2006 to December 2007

Building	Action based on Matrix 1 above				
	December 2006 — 1 st Quarter	February 2007 — 2 nd Quarter	May 2007 — 3 rd Quarter	August 2007 — 4 th Quarter	December 2007 — 5 th Quarter
TR-1 (vacant office)	Mitigate	Mitigate	Mitigate	Mitigate	—
TR-1 south	—	Monitor	Monitor	Monitor/Mitigate	Monitor
TR-2	Mitigate	Mitigate	Mitigate	Mitigate	—
TR-3	Mitigate	Mitigate	Mitigate	Mitigate	—
TR-4	NFA	Monitor	Monitor	Monitor	—
TR-4 south	—	Mitigate	Mitigate	Mitigate	Mitigate
TR-6	—	Mitigate	Monitor/Mitigate	Mitigate	Mitigate
TR-18S	Mitigate	Mitigate	Mitigate	Mitigate	—
TR-18	Mitigate	Mitigate	Mitigate	Mitigate	—

Notes:

Blue — Indoor Air Data indicates TCE vapors above NYSDOH air guideline of 5 µg/m³

Green — Indoor Air Data shows TCE vapors not to be of concern

Light Blue — Indoor Air Data is less than NYSDOH air guideline of 5 µg/m³, but sub-slab concentrations require mitigation

Building TR-3 (IAS-5/SSAS-5): The NYSDOH Decision Matrix 1 requires a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. Therefore, Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-3 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Building TR-4 (IAS-4/SSAS-4): Per the NYSDOH Decision Matrix 1, no further action is required at this location.

Building TR-4 south end (IAS-11/SSAS-11): The NYSDOH Decision Matrix 1 requires a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. Therefore, Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters the south end of Building TR-4 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Building TR-6 (IAS-10/SSAS-10): The NYSDOH Decision Matrix 1 requires a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. Therefore, Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-6 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Building TR-18 (IAS-2/SSAS-2): The NYSDOH Decision Matrix 1 requires a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. Carrier recommends that a mitigation action be taken at this building to reduce indoor air TCE concentrations below the NYSDOH air guideline. Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-18 so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

Building TR-18S (IAS-1/SSAS-2): The NYSDOH Decision Matrix 1 requires a mitigation action be taken at this location based on the sample results obtained over a four-quarter monitoring period. Carrier recommends that a mitigation action be taken at this building to reduce indoor air TCE concentrations below the NYSDOH air guideline. Carrier will assess the storm line as the primary pathway for soil vapor intrusion. If the field assessment shows the storm line to be the primary pathway, then Carrier will perform a mitigation action at or near the storm line where it enters Building TR-18S so that future migration of vapors into the sub-slab is prevented. Carrier will implement quarterly indoor air and sub-slab monitoring in this building for two consecutive quarters during operation of the mitigation system. After this monitoring period, Carrier will evaluate the air data to determine the efficacy of the mitigation action on indoor air quality and to determine future monitoring needs.

5.0 DATA DEVELOPMENT FOR MITIGATION

The vapor migration pathway to the affected buildings appears to be related to the storm water lines that pass through/under the SWMUs 1 through 4 source area. Rather than continuing to collect indoor and sub-slab data in these affected areas, Carrier proposes to perform mitigation at some of the locations by controlling the assumed vapor pathway — the storm sewer lines and possibly other subsurface utilities.

Additionally, Carrier will evaluate the listed areas of historical chlorinated solvent used in manufacturing operations:

- Building TR-1 degreaser location: between columns C9 and D9 and immediately west of column E22
- Building TR-2 degreaser locations: at/near columns E2 and M2

Once the evaluation of these areas is completed, Carrier will perform quarterly vapor intrusion sampling for a period of one year, in conjunction with the Building TR-5 vapor intrusion sampling (discussed in Section 5.4).

Through research by Carrier facility personnel, a degreaser has already been identified as having been formerly located in the southeast corner of Building TR-3. A detailed description of the investigation in this area is described in the *MW-18 Source Area Investigation Report, July 2007*. Once the historical information has been collected, the proposed Soil Vapor Intrusion (SVI) sampling plan described in Section 5.4 may be expanded. No SVI investigation is proposed because the building is not occupied and slated for demolition.

5.1 Storm Line Construction Data Collection

Carrier will obtain and review existing documentation on storm sewer line and utility layout and construction in the area shown on **Figure 3**. Portions of the Carrier facility, originally a General Electric facility, were constructed as early as the 1940s, and construction records for some of the storm lines may not be available. In this case, Carrier will perform a limited site investigation to gather information not available in construction plans. Information that will be needed in order to develop a focused CMS for vapor migration mitigation includes:

- Location of the storm lines — Available site plans show storm lines to pass under or through the SWMUs 1 through 4 source area and directly under Buildings TR-18S, TR-18, and TR-2. Lateral lines from the main trunk line appear extend to many of the buildings surrounding SWMUs 1 through 4 and the trunk line, as shown in **Figure 3**. Carrier will conduct a desktop and in-field study to map the storm lines in this area so that future monitoring and/or mitigation can be addressed adequately.
- Construction of storm sewer lines — The materials of construction of the storm lines is known to vary throughout the site. Additionally, it is known that the integrity of the storm lines is compromised and that groundwater seeps into the lines at various locations. These breeches in the storm lines can also serve as a vapor migration pathway to the affected buildings. Carrier will obtain information on the construction of the storm lines as follows:
 - Material of construction
 - Depth of construction
 - Integrity of the storm line/utility — it may be necessary to perform an in-line camera survey of the lines shown in **Figure 3** to determine if there are significant vapor migration pathways into the storm lines
- Underlying construction of storm lines — bedding material underlying storm lines (e.g. compacted soil, sand, gravel). A more porous bedding media is presumed to provide a preferred vapor migration pathway.
- Foundation construction of affected buildings — this information will be useful in determining the vapor migration pathway(s) under the building, and help in assessing the effectiveness of a mitigation system in depressurizing the sub-slab, thereby reducing contaminant vapor concentrations.

5.2 Sealing of Infiltration Points

Sub-slab soil vapor can enter a building through cracks or perforations in slabs or anywhere there is a difference between interior and exterior pressures. To address this potential mitigation pathway, Carrier will inspect concrete floor slabs for visible vapor migration pathways during the data development phase of the mitigation plan. A sealing material (e.g. elastomeric joint sealant — as defined in American Society for Testing Materials C920-87, compatible caulks, non-shrink mortar, grouts, or expanding foam) will be used to seal these points to further limit potential for vapor intrusion under any conditions. The actual sealing of these points will be completed during the vapor sample collection activities described in Section 5.3.

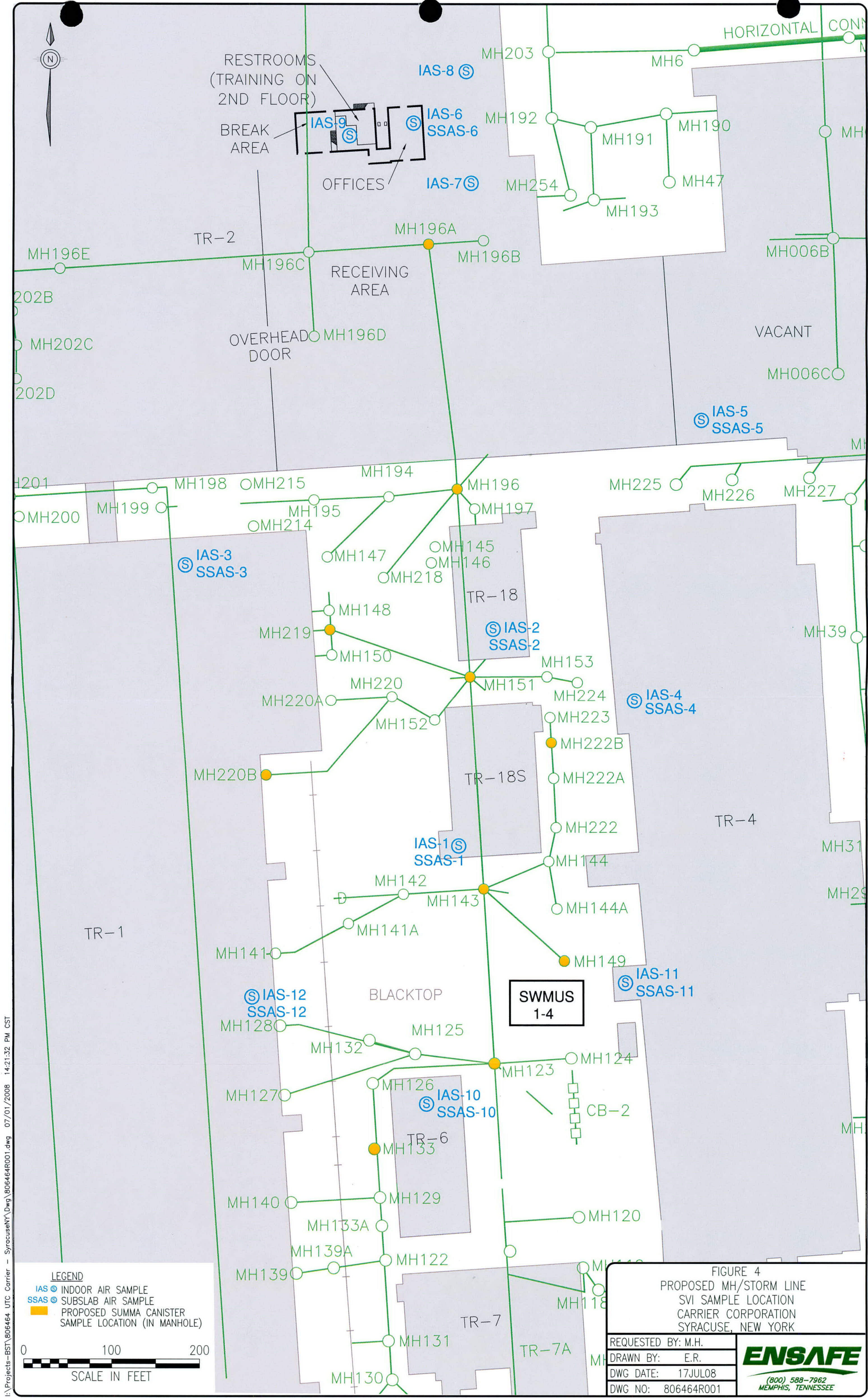
5.3 HVAC Modifications

During the data development phase of the mitigation plan, the HVAC system in each of the affected buildings will be checked for positive pressure conditions (e.g., verify a pressure controller is maintaining the desired pressure differential and/or measure the pressure differential between the sub-slab and indoor air by using field instruments). Back-drafting conditions will be evaluated and corrected, as necessary. It is important to note that the HVAC systems at various Carrier facility buildings are operated to satisfy customer and energy conservation requirements.

5.4 Manhole Vapor Sample Collection

Once the data pertaining to the layout of the storm line and pertinent construction characteristics of the storm line have been collected, Carrier will place Summa canisters in strategic manholes along the lines to collect vapor samples. At a minimum, a Summa canister will be placed at the manhole closest to the affected building. The location(s) of the trunk line, laterals, and size of the building will determine, in part, how many canisters are placed. **Figure 4 — Proposed Manhole SVI Sample Locations**, shows the proposed locations; however these locations may be moved and/or new locations added pending the outcome of the data collection study outlined previously.

If possible, a soil vapor sample will be obtained from the bedding material underlying or surrounding the storm line at these locations to determine if it is a vapor migration pathway into the building. This will be achieved by installing a soil vapor probe adjacent to the storm line into the bedding material. However, the ability to install and obtain reliable data from the soil probe will depend on the construction of the storm lines (i.e. underlying bedding material, if any) and site conditions such as depth to ground water. A description of soil vapor probe installation and sampling will be consistent with those proposed and approved in Carrier's *Soil Vapor Intrusion Work Plan, September 2006, EnSafe*, prepared as part of consent order requirements on soil vapor intrusion at the site.



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LEGEND

- IAS ⓘ INDOOR AIR SAMPLE
- SSAS ⓘ SUBSLAB AIR SAMPLE
- PROPOSED SUMMA CANISTER SAMPLE LOCATION (IN MANHOLE)

0 100 200

SCALE IN FEET

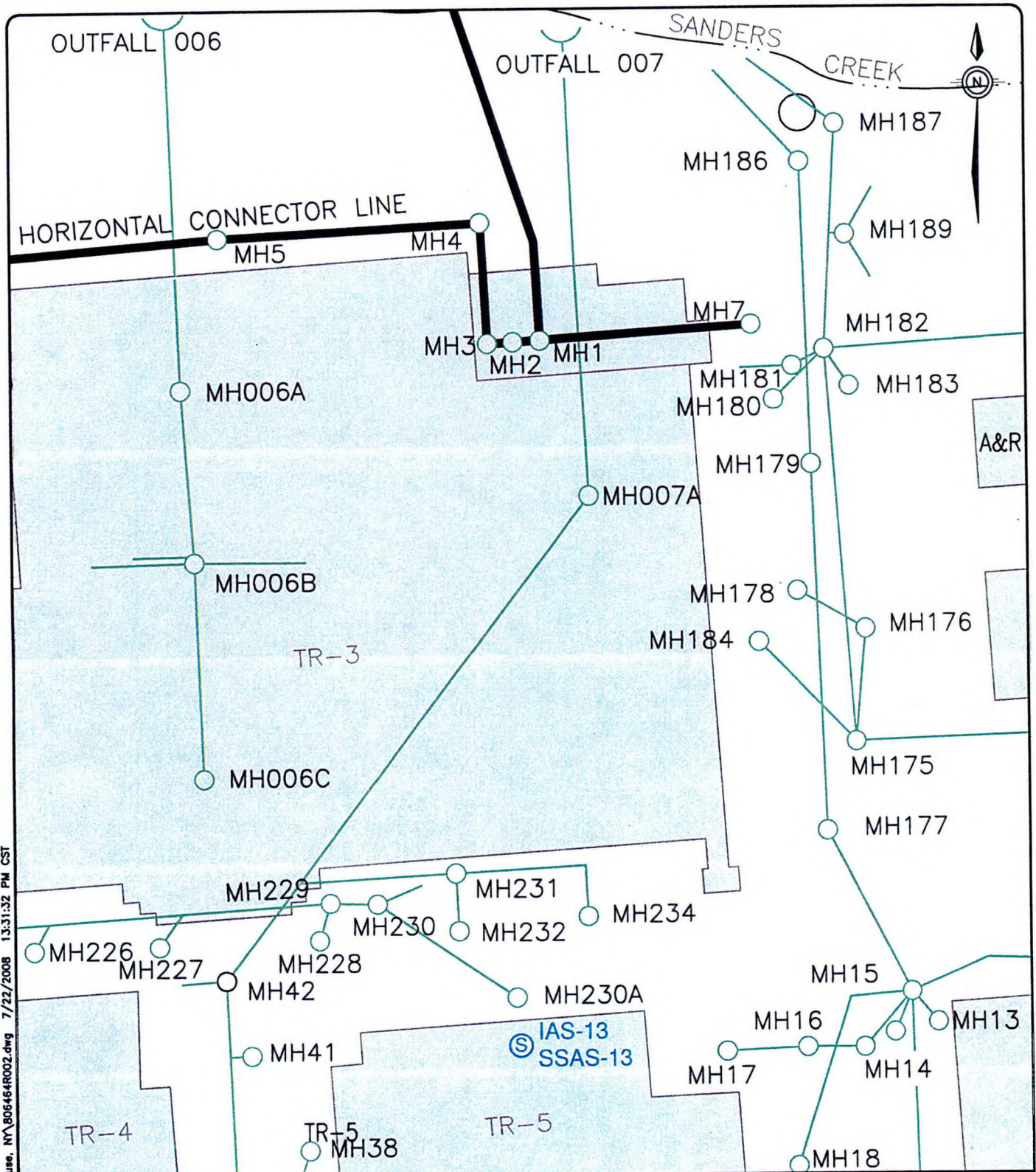
FIGURE 4
PROPOSED MH/STORM LINE
SVI SAMPLE LOCATION
CARRIER CORPORATION
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	17JUL08
DWG NO:	806464R001

ENSAFÉ
(800) 588-7962
MEMPHIS, TENNESSEE

Building TR-5 SVI Sampling

The analytical results from the TR-3 degreaser investigation confirm a source area near the former location of the degreaser in Building TR-3. As shown on **Figure 5**, Building TR-5 is approximately 50-feet south of the former degreaser location, with storm lines and laterals passing from the former degreaser location to the north and western sides of the Building TR-5. Therefore, Carrier proposes a quarterly indoor and sub-slab sample be obtained from the north end of Building TR-5 for a period of one year (**Figure 5 — Proposed Building 5 SVI Sample Location**).



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LEGEND

- IAS ● INDOOR AIR SAMPLE
- SSAS ● SUBSLAB AIR SAMPLE

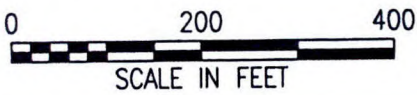


FIGURE 5
PROPOSED BUILDING 5
SVI SAMPLE LOCATIONS
CARRIER FACILITY
SYRACUSE, NEW YORK

REQUESTED BY: M.H.
DRAWN BY: E.R.
DWG DATE: 22JUL08
DWG NO: 806464R002



6.0 SAMPLING AND ANALYSIS PLAN

Information on the Sampling and Analysis Plan can be found in the *Corrective Measures Implementation Work Plan, Soil Vapor Intrusion Work Plan*, September 2006.

7.0 ANALYTICAL METHODS

Information on the Analytical Methods can be found in the *Corrective Measures Implementation Work Plan, Soil Vapor Intrusion Work Plan*, September 2006.

8.0 HEALTH AND SAFETY PLAN

Information on the Health and Safety Plan can be found in the *Corrective Measures Implementation Work Plan, Soil Vapor Intrusion Work Plan*, September 2006.

9.0 REFERENCES

- EnSafe. (2007). *Soil Vapor Intrusion Monitoring Report 4th Quarter 2006*.
- EnSafe. (2007). *Soil Vapor Intrusion Monitoring Report 1st Quarter 2007*.
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- New York State Department of Health. (2006). *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Bureau of Environmental Exposure Investigation. October 2006.