Work Plan Addendum
Indoor Air and Sub-Slab Vapor Sampling
Round 9
June 2010
Lockheed Martin Middle River Complex
2323 Eastern Boulevard
Middle River, Maryland

Prepared for:

Lockheed Martin Corporation

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Section 1
Introduction and Scope

This document serves as a technical memorandum documenting the proposed field activities in support of the August 2010 Indoor Air Quality (IAQ) and Sub-Slab Vapor (SV) sampling event at the Lockheed Martin Middle River Complex (MRC). This memorandum was prepared in accordance with the scope-of-work described in Tetra Tech's proposal to Lockheed Martin dated February 24, 2010. This technical memorandum is an addendum to Tetra Tech's Indoor Air Quality Assessment Work Plan for Buildings A, B, C, and VLS, Lockheed Martin Middle River Complex, (Tetra Tech, 2006).

The proposed August 2010 sampling of IAQ and SV at the MRC will be the ninth sampling event performed at the MRC to evaluate potential sub-slab vapor intrusion of volatile organic compounds (VOCs) present in soil, groundwater, and soil gas beneath the MRC. Figures 1-1, 1-2, and 1-3 illustrate the locations at the MRC that have been sampled to date**.** The scope-of-work associated with the proposed field investigation and addressed by this memorandum includes: Identification of proposed SV sampling locations; Identification of proposed IAQ sample locations; Installation of permanent vapor monitoring points (VMPs); and, Collection and analysis of IAQ and SV samples.

1.1 PROPOSED PERMANENT SUB-SLAB VAPOR MONITORING POINT LOCATIONS

Based on the results of the Round 6, 7, and 8 sub-slab and indoor air sampling investigations and discussions with Lockheed Martin's oversite contractor, locations for the installation of new VMPs were identified. Fourteen new VMPs are proposed in key areas of the buildings to establish a grid-like pattern of monitoring. The proposed new VMP locations are illustrated in Figure 1-4. Table 1-1 presents detailed information on the proposed sample locations, their unique identifiers and sample-specific notes. As presented in Table 1-1, the samples are identified first by the type of sample being collected (i.e., SV), followed by building identifier (A, C), sequential numbering, and

Table 1-1

Proposed Permanent Soil Vapor Points Round 9 Rationale
Lockheed Martin Middle River Complex
Middle River, Maryland

New Permanent Sub-Slab Vapor (SV)/Temporary Soil Gas (SG) Points	Location	Investigation Depth (feet)	Rationale/Purpose
SV-19-A and SV-20-A	Located north and south of SV-18 in the Building A Basement	0.5	Complete sampling grid. Evaluate spatial extent of sub-slab contamination north and south of SV-18.
SV-21-A and SV-22-A	Located in the northern portion of Building A	0.5	Complete sampling grid. Fill data gaps.
SV-23-A and SV-24-A	Located east of Building A Plating Shop.	0.5	Complete sampling grid. Evaluate area between Plating Shop sample SV-A-15 and SV-A-6 east of Plating Shop.
SV-25-B through SV-29-B	Located in northwest part of Building B Basement and south-central portion of Building B first floor.	0.5	Complete sampling grid. Fill data gaps.
SV-30-C through SV-31-C	Located in northeast corner and central portion of Building C Basement	0.5	Complete sampling grid. Evaluate area northeast of SV-C-4.
Existing SV locations	Throughout facility	0.5	Locations with past SV contaminant concentrations above screening levels and that provide complete grid coverage.
New IAQ	Near permanent soil vapor locations	0	To evaluate presence/absence of VOCs in indoor air
Existing IAQ	Locations with historic TCE > 1 $\mu g/m^3$ and chemical markers of vapor intrusion	0	Continued characterization of sub-slab to indoor air pathway

Legend: SV = Sub-Slab Vapor (indoor locations)
IAQ = Indoor Air Quality

sample round. Final sample locations will be determined based on conditions at the time of VMP installation and/or utility locations.

In Building A, a total of six new VMPs are proposed. The purposes of the proposed VMP locations are to help complete a sampling grid across the MRC and fill identified data gaps. Two sample locations are proposed for the northern portion of the Building A first floor. These samples will help complete the grid and fill a data gap where no samples were previously collected including at the northwest corner of Building A. Two samples are proposed east of the Building A Plating Shop on the first floor of Building A. These samples will help complete the sampling grid and provide information regarding the presence or absence of sub-slab contamination between locations where sub-slab contamination is known to be present (Building A Plating Shop sample SV-A-15 and sample location SV-A-6). The remaining two proposed sample locations are in the Building A Basement. These sample locations will help complete the sampling grid but will also provide information about the possible extent of sub-slab contamination north and south of where it has been historically detected at sample location SV-A-18.

In Building B, a total of five new VMPs are proposed. These samples include four on the first floor of Building B and one in the Building B Basement. These samples are proposed to complete the sampling grid in Building B and to fill the data gap due to an absence of data.

One new VMP is proposed for installation south of Building B in the Masking Area of the Fire Coat Building. This location is proposed due to an absence of data and to provide information about possible association between this location, results of soil gas samples collected south of Building B during the Block I Investigation (Tetra Tech, 2009) and SV results from inside of Building B.

In Building C, a total of two new VMPs are proposed. These samples will fill two data gaps. The first sample is located in the northeast corner of the Building C Basement. This location will complete the grid covering the last corner of the MRC that has not been sampled and will provide information about possible associations with soil gas results collected during the Block I Investigation (Tetra Tech, 2009). The second proposed VMP location is in the central portion of the Building C Basement. This sample is proposed to help complete the sampling grid as well as

to fill the data gap associated with the absence of data northeast of where sub-slab contamination has been identified at sample locations SV-C-4 and ISG-03.

1.2 PROPOSED IAQ SAMPLING LOCATIONS

Based on discussions with Lockheed Martin's oversite contractor, locations for collection of IAQ samples were identified. These locations were co-located with VMP locations proposed for sampling to evaluate potential relationships between sub-slab and IAQ results. IAQ sample locations were also selected to further evaluate areas where elevated results and chemical markers of vapor intrusion (i.e. cis-1,2-dichloroethene, trans-1,2-dichloroethene) had been previously reported. The proposed IAQ locations are illustrated in Figure 1-4**.** A total of 34 IAQ samples are proposed for sampling and analysis. In addition to the proposed IAQ locations, ambient air samples will be collected from four background locations. Background samples will be collected at locations used in previous rounds of sampling. Figure 1-5 illustrates the proposed background sample locations.

1.3 PERMANENT SUB-SLAB VAPOR MONITORING POINT INSTALLATION

Upon confirmation of sampling locations, Tetra Tech will initiate subsurface utility clearance. All MRC requirements will be addressed prior to initiating any intrusive activities. Subsurface utility clearance of the proposed VMP locations will be conducted in accordance with [Corporate Staff Procedures CS-28 Digging Projects]. The utility clearance program will include the notification of an underground utility location center (Miss Utility of Maryland 1-800-257-7777; www.MissUtility.net), obtaining and review of available facility maps containing utility information including, but not limited to, the Site Plan (TAI, October 2002), and the use of a private utility locating contractor. The utility locating contractor will utilize geophysical survey to locate and mark all underground utility lines within a 20-ft radius of the proposed VMP locations. A combination of electromagnetic resistivity/conductivity and line locating, and ground penetrating radar will be used to assure that all proposed sampling locations will not encounter underground utilities. Proposed VMP locations may be offset based on the results of the subsurface utility survey. VMPs that require relocation due to subsurface obstructions will be positioned as close as possible to the original location identified.

Tetra Tech will install up to fourteen permanent soil vapor sampling points (VMPs) beneath the slabs of Buildings A, and C at the Middle River Complex. All new VMPs will be installed in accordance with the methods detailed in the Phase II Investigation Work Plan Block I (Tetra Tech, 2008).

Based on the historic implementation of this type of work, Tetra Tech will conduct this work under the existing Health and Safety Plan which already addresses all aspects of the IAQ-SV study. The plan will be reviewed and updated as necessary prior to conducting work under this project.

1.4 IAQ AND SUB-SLAB VAPOR SAMPLING

Sampling for IAQ will be performed in accordance with the IAQ Assessment Work Plan (Tetra Tech, 2006). Sampling will be conducted as up to 8-hour events using pre-conditioned Summa canisters in accordance with Environmental Protection Agency Toxic Organic Method 15 (EPA TO-15).

Up to 34 IAQ samples plus three duplicate samples will be collected during the proposed sampling event. Four background samples will be collected at the locations historically used (Figure1-4).

Sub-slab vapor samples will be collected at the same time as the IAQ samples. Up to 34 sub-slab samples and three duplicate samples will be collected during the proposed sampling event from beneath the slabs of the Middle River Complex Buildings A, B, and C. Samples will be collected from newly installed and existing VMPs as illustrated in Figure 1-4. Sub-slab sampling will be performed in accordance with the Phase II Investigation Work Plan Block I (Tetra Tech, 2008)

For SV and IAQ samples collected from existing locations (i.e. SV-5, ISG-3) sample nomenclature will remain the same except for the inclusion of a building letter i.e. A, B, C, and the number 9 to identify the sample as having been collected during Round 9. For example, the sample collected at locations SV-5 and ISG-3 will become SV-5-C-9 and ISG-3-C-9 respectively.

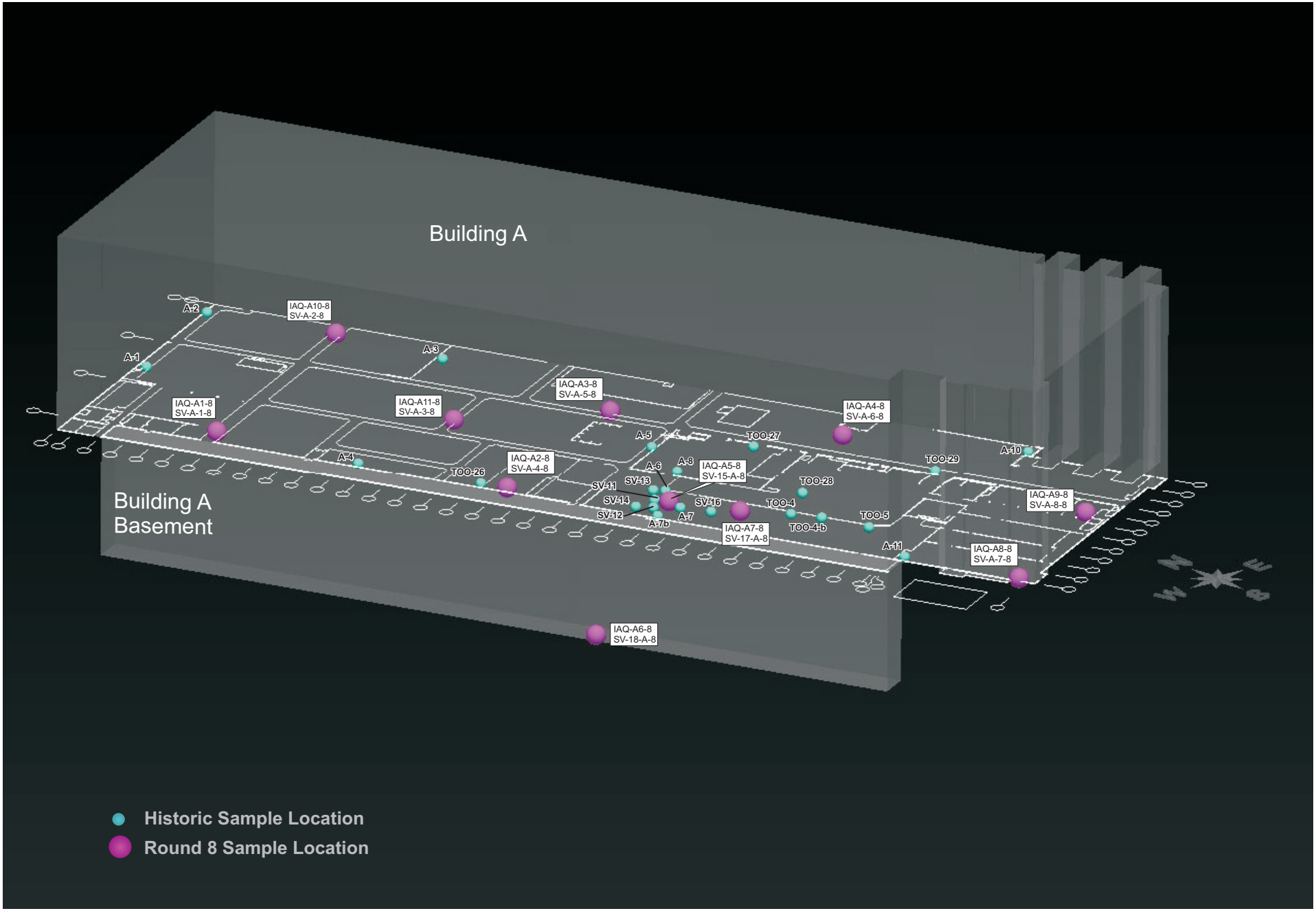
For samples collected from new SV and IAQ locations, laboratory submitted samples will be identified by the matrix sampled i.e. SV for sub-slab vapor, IAQ for indoor air quality, followed by a building letter i.e. A, B, C, then the number of the location (1, 2, 3…). Finally, the number 9

will be added at the end to identify the sample as having been collected during Round 9. A new SV sample location in the Building C basement may be SV-C-5-9.

Following the sampling period, each canister will be closed and sent to an off-site laboratory under proper chain-of-custody procedures. Each sample will be submitted for TO-15 analysis. The analytical parameter list historically used for indoor air sampling and sub-slab sampling at the MRC will be amended for this sampling round with the addition of 1,1,1-trichloroethane, 1,1,2-trichloroethane, and chlorodifluoromethane (Freon 22). Trichloroethane is being proposed for inclusion to help provide information on the source(s) of 1,1-dichloroethane and 1,2-dichloroethane in sub-slab samples as they are not naturally occurring and are breakdown products of trichloroethane. Chlorodifluoromethane is proposed as it is an emerging chemical of concern in groundwater at the Middle River Complex. The proposed analytical list includes:

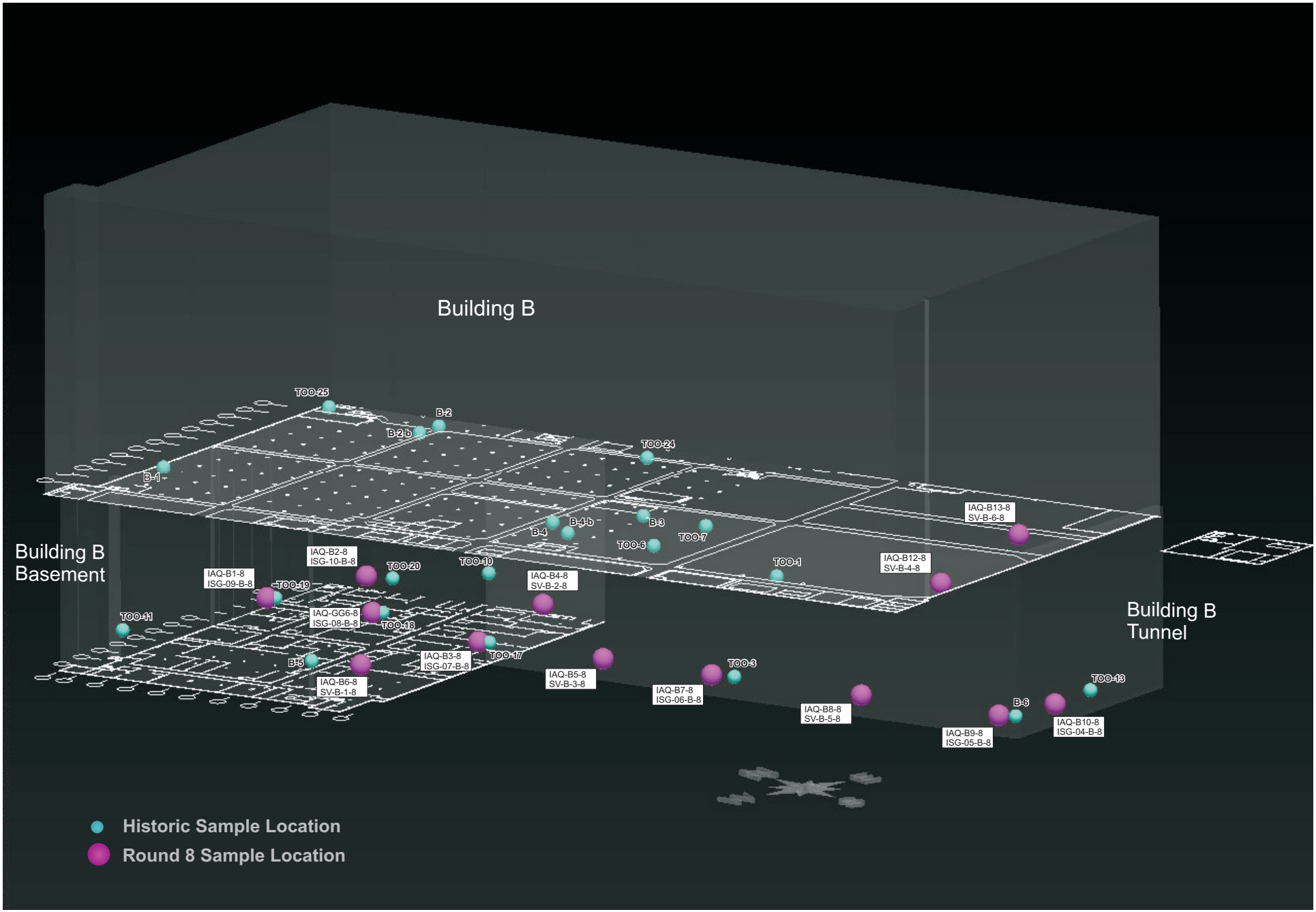
- Benzene
- Carbon tetrachloride
- Chloroform
- Chlorodifluoromethane
- Dichlorodifluoromethane
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- 1,2-Dichloroethane
- cis-1,2-Dichloroethene
- trans-1,2-Dichloroethene
- Ethylbenzene
- Methyl tert-butyl ether
- Methylene Chloride
- Naphthalene
- Tetrachloroethene
- Toluene
- 1,2,4-Trichlorobenzene
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichloroethene
- Vinyl chloride
- m-Xylene, o-Xylene, &
- p-Xylene

Figure 1-1
Indoor Air and Sub-Slab Vapor Monitoring Locations for Building A Round 8 February 2010



K:\GProject\MartinStateAirport-LMC\GeoData\MVS\Building A Sample Locations No TCE_figure 1-1.cdr

Figure 1-2
Indoor Air and Sub-Slab Vapor Monitoring Locations for Building B Round 8 February 2010



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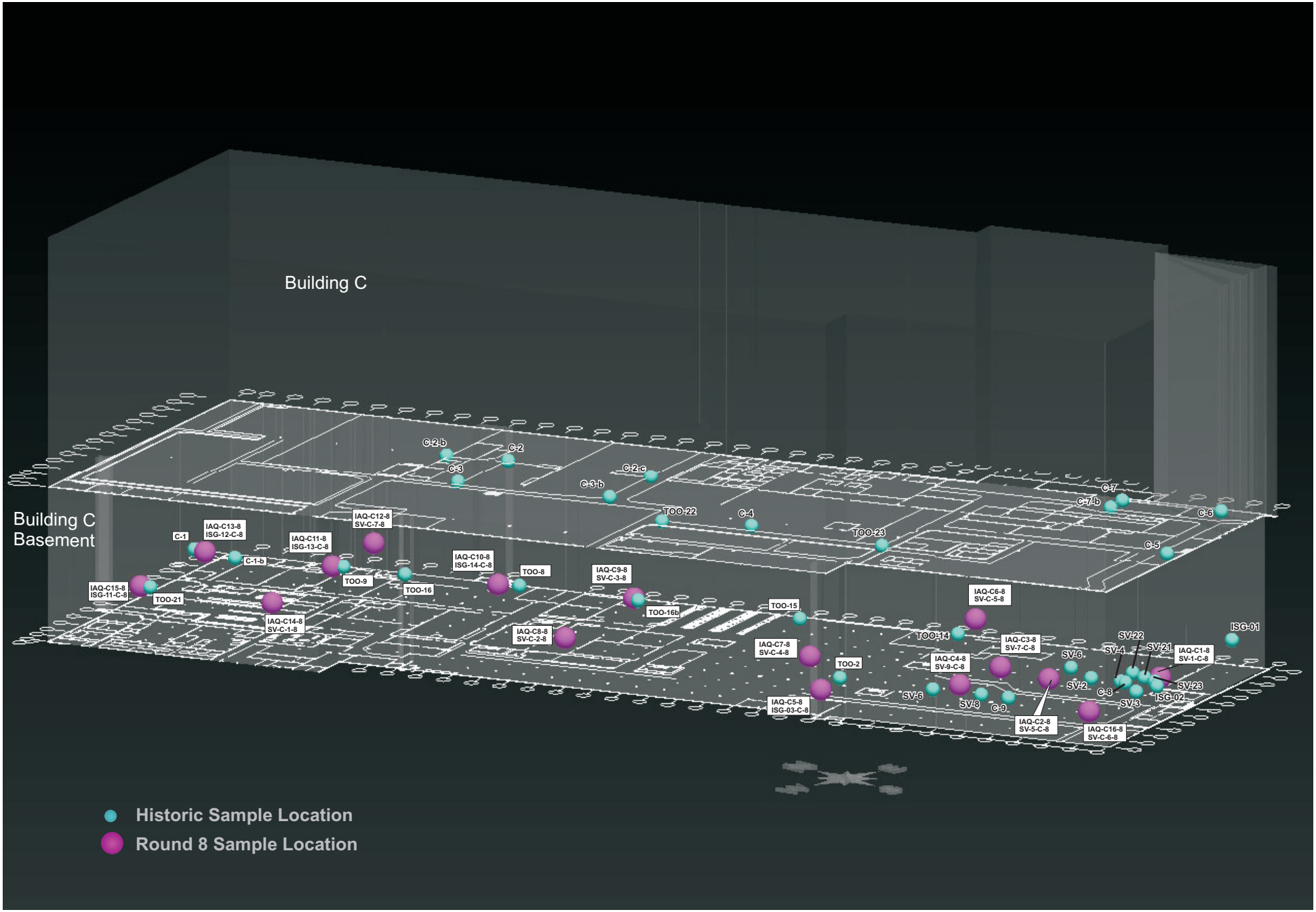
Building B Sample Locations Figure 1-2.cdr

Figure 1-3
Indoor Air and Sub-Slab Vapor Monitoring
Locations for Building C Round 8 February 2010



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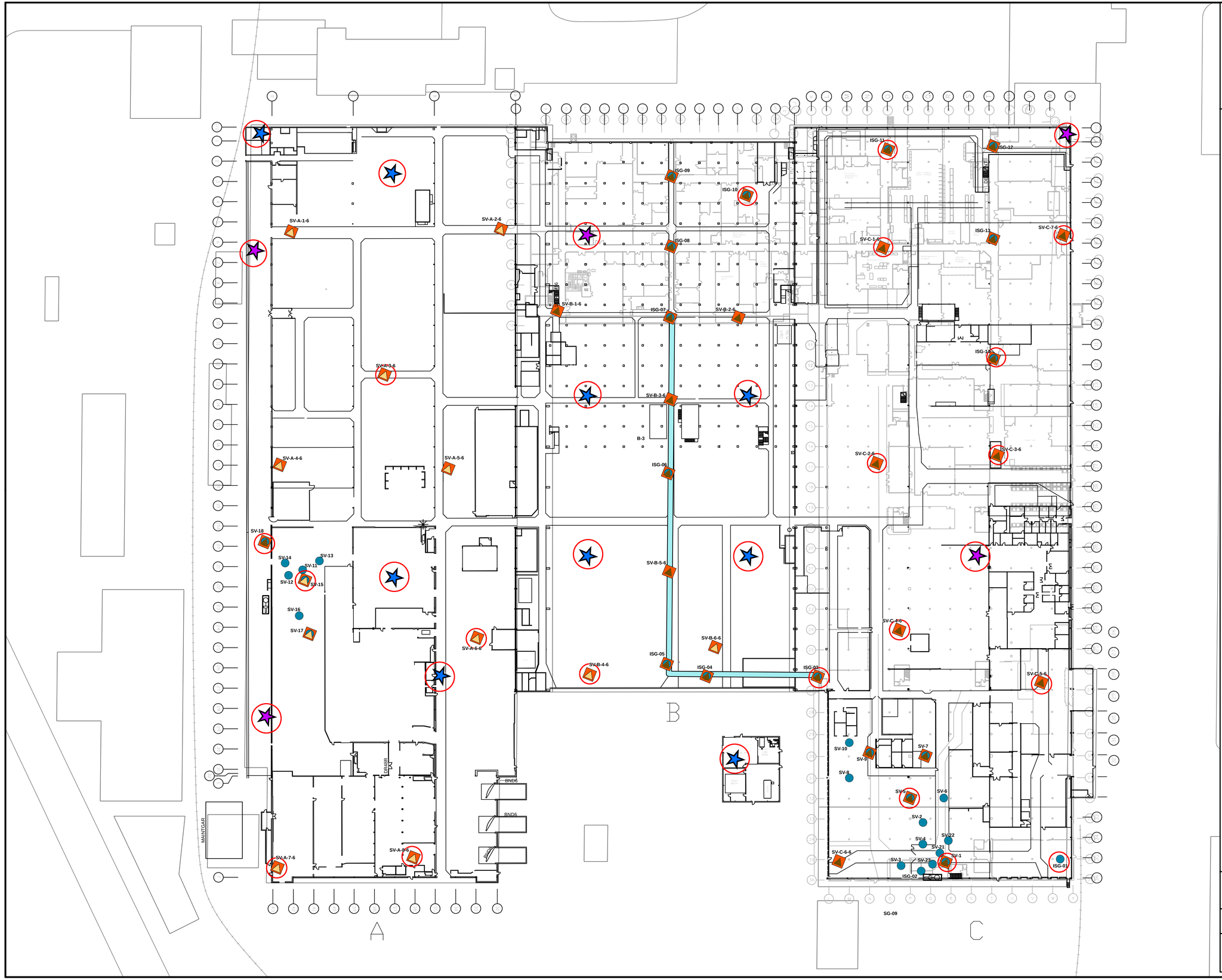
No TCE_figure 1-3.cdr

Figure 1-4
Proposed Additional Soil Vapor Sample Locations for Buildings A, B, and C
Round 9 August 2010



Legend

- Proposed Additional SV Basement Samples
- Proposed Additional SV First Floor Samples
- IAQ, Basement
- IAQ, 1st Floor
- SV/ISG
- Tunnel
- Buildings A, B, and C
- Building B and C Basement
- SSD Treatment Unit
- New SV Sampling Location (June 2009)
- Proposed Sampling of Existing Location
- SV Location Proposed for Sampling

N

0 25 50 100 150 200 Feet

Lockheed Martin Middle River Complex
Middle River, Maryland

DATE MODIFIED: 6/23/10

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Tetra Tech, Inc.

Map Document: (K:\GProject\middle_river\Maps\Block I bldg ABC showing B C basement_23June10.mxd)
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MARTIN STATE AIRPORT

FIGURE 1-5

IAQ BACKGROUND SAMPLING LOCATIONS
ROUND 9 AUGUST 2010

LEGEND

- BACKGROUND SAMPLING LOCATION
- WATER

Lockheed Martin Middle River Complex
Middle River, Maryland

0 100 200 300 400 Feet

N

DATE MODIFIED: 6/17/10

CREATED BY: MP

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Section 2
References

1. Tetra Tech, Inc., 2006. Indoor Air Quality Assessment Work Plan for Buildings A, B, C, and VLS, Lockheed Martin Middle River Complex, November, 2006.

2. Tetra Tech, Inc., 2008. Phase II Investigation Work Plan Block I Lockheed Martin Middle River Complex, August, 2008.

3. Tetra Tech, Inc., 2009. Phase II Block I Site Investigation Report Lockheed Martin Middle River Complex, July, 2009.