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Indoor Air Quality Testing at the Middle River Complex

October 2018

Indoor Air Quality Testing at the Middle River Complex

Lockheed Martin has been investigating and, more recently, cleaning up soil and groundwater at the Middle River Complex (MRC). The contaminants addressed by this effort are likely the byproduct of historical operations at the MRC. They include volatile organic compounds (VOCs), which have the potential to move from underground into buildings through cracks in foundations and basement floors, through sumps, and through utility openings by a process known as vapor intrusion.

Do employees need to be concerned? No. Air and soil testing results indicate that employees do not need to be concerned about air quality resulting from vapor intrusion. A vapor intrusion safety and prevention program is also in place. It includes two basic components discussed below: an indoor air and vapor testing program, and sub-slab depressurization systems (SSDSs) in A- and C-Buildings that collect and treat VOC vapors from under the buildings and discharge the cleaned air at roof level.

Employees are encouraged to ask questions and raise concerns to Lockheed Martin, and they will be addressed promptly.

What indoor air and soil vapor testing has Lockheed Martin done to date? Since 2006, Lockheed Martin has conducted 25 rounds of air quality testing inside A-, B-, and C-Buildings, and has tested the vapor in soil directly beneath these buildings, to ensure that indoor air quality at the Middle River Complex is safe for workers. Sampling is conducted generally twice a year to account for differences in conditions between summer and winter, when heating, ventilation and air conditioning can affect the rate at which soil vapors may be pulled into, blocked from entering, or pushed out of a building. In addition, outside air is monitored at locations surrounding the MRC to measure chemicals that might already be present in outside air from other sources. This information helps identify whether chemicals found inside the facilities are from ongoing site operations, outside sources, or from underneath the buildings.

Indoor air concentrations in the main working areas of the MRC have consistently been acceptable during the 25 rounds of indoor air testing. Trichloroethene (TCE), a degreasing solvent, has occasionally been found in indoor air samples at concentrations greater than its conservative health risk-based screening level of 8.8 micrograms per cubic meter in the southern part of the A-Building basement.

SSDS – Sub-slab depressurization systems draw air/vapors from beneath the building through closed piping to a treatment system which removes contaminants, releasing clean air outside.

TCE – trichloroethene, a solvent commonly used historically for degreasing.

VOCs – volatile organic compounds – a group of chemicals (like TCE) that easily volatilize or evaporate into air.

Employees are rarely working in the A-Building basement continuously throughout an 8-hour work day. However, testing for potential vapor intrusion is considered a best practice whenever a screening level is exceeded. Those levels are determined by the United States Environmental Protection Agency (US EPA) and/or Maryland Department of the Environment (MDE).

What mitigation measures has Lockheed Martin already taken? Sub-slab depressurization systems (SSDSs) were installed beneath the former Plating Shop in A-Building and beneath the south end of C-Building basement in 2008

For More Information

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Sampling equipment was more complex than in previous sampling activities, and included extending tubing throughout the southern end of the basement and into the middle of the basement, and into subfloor drainage structures

as proactive measures to minimize the potential for vapor intrusion. Each SSDS draws vapor from the soil beneath the foundation slab, treats it, and releases it into the outdoor air. In addition to the periodic monitoring described above, the vapor is tested monthly to assess the performance of the SSDS. Each system has since been expanded to increase the overall areas beneath the main floors where vapors are pulled into the system.

What was the additional sampling that took place in the A-Basement in February and April 2017? In addition to the first round of 2017 semi-annual indoor air and sub-slab vapor sampling performed within A-, B-, and C-Buildings, another sampling activity in the A-Building basement took place from February 22 through April 21. Sampling equipment was more complex than in previous sampling activities, and included extending tubing throughout the mid- and southern areas of the room. This sampling activity allowed for (1) continuous sampling over the course of eight weeks rather than the typical 8-hour duration during the semi-annual event, and (2) additional sampling locations, including in-floor features such as sumps and drains to try to identify potential sources of TCE vapors (see figure attached for sampling locations).

Planned Investigations and Studies Related to TCE Contamination:

Completed: Expansion of the SSDS to add further protection to the main floor of A-Building

Completed: A robotic camera survey to investigate duct work between the basement and the main floor of A-Building

Completed: A camera survey to investigate floor features and sump connections in A-Building basement

Ongoing: A feasibility study to review alternatives for safely sealing sumps in the basement

Ongoing: An expanded groundwater investigation west of A-Building

Completed: A vapor intrusion investigation in the maintenance building west of A-Building involving sampling soil vapor beneath the building

What were the findings of the additional sampling? We learned several things from the continuous sampling. First, TCE concentrations in indoor air continually change and increase and decrease on a daily and weekly basis. The changing levels may be associated with air currents in the basement and possibly increased water levels beneath the floor after it rains. All indoor air concentrations, however, were less than an MDE-approved screening level adjusted for limited exposure in the basement.

Second, TCE vapors are present in sumps and floor drains, with some source locations higher than others. If these sumps and floor drains are covered, then concentrations of TCE in indoor air decrease significantly. Therefore, extracting or removing vapors from these subsurface sources will improve air quality in the basement.

Why not just cover up the sumps now? We have to be careful because as the vapors build up they may eventually be released somewhere. As an initial step to reduce TCE levels in the basement we conducted a test to see if the SSDS was powerful enough to remove vapors from the sump with the highest TCE levels and still allow the SSDS to be effective enough to control the vapor beneath the main floor of Building A. The test was successful and the sump is now covered and the vapors are being pulled into the SSDS. Additional sumps may be sealed or added to the SSDS as well. The recent August 2018 (Round 25) indoor air results showed that there were indoor air exceedances of the conservative screening level in the basement at two locations. However, no exceedances were detected in resamples collected in September 2018 from the same locations. Additional work to reduce TCE concentrations in the sumps is ongoing.

What kind of sampling was conducted on the main floor vents of A-Building in July 2017? An air testing sampling device was used to conduct a two-day survey to measure TCE concentrations in indoor air to determine if TCE detected in sumps in the basement may be present in the floor vents connected through air ducts remaining from the old heating system. TCE was detected in some vents, although the results varied during the two-day survey. Since the floor vents were part of the old heating system and are no longer in use, all of the vents on the main floor were permanently covered in September 2017, including vents that were partially covered by walls. For those vents, holes were cut in the dry wall to cover the vent and then the wall drywell was repaired.

What comes next? In the A-Building basement, Lockheed Martin is in the process of evaluating the best way to permanently reduce TCE concentrations in A-Building sumps. The final solution may be a combination of sealing the sumps, pulling vapor from one or more sumps into the SSDS and removing water from the sumps by either treating the water or removing it for offsite disposal. In the meantime, the air filtration units will continue to operate in the basement. On the main floor of A-Building, Lockheed Martin will be conducting a follow up survey with the air sampling device to make sure that the floor vents have all been sealed up successfully.

Who do I contact if I have questions?

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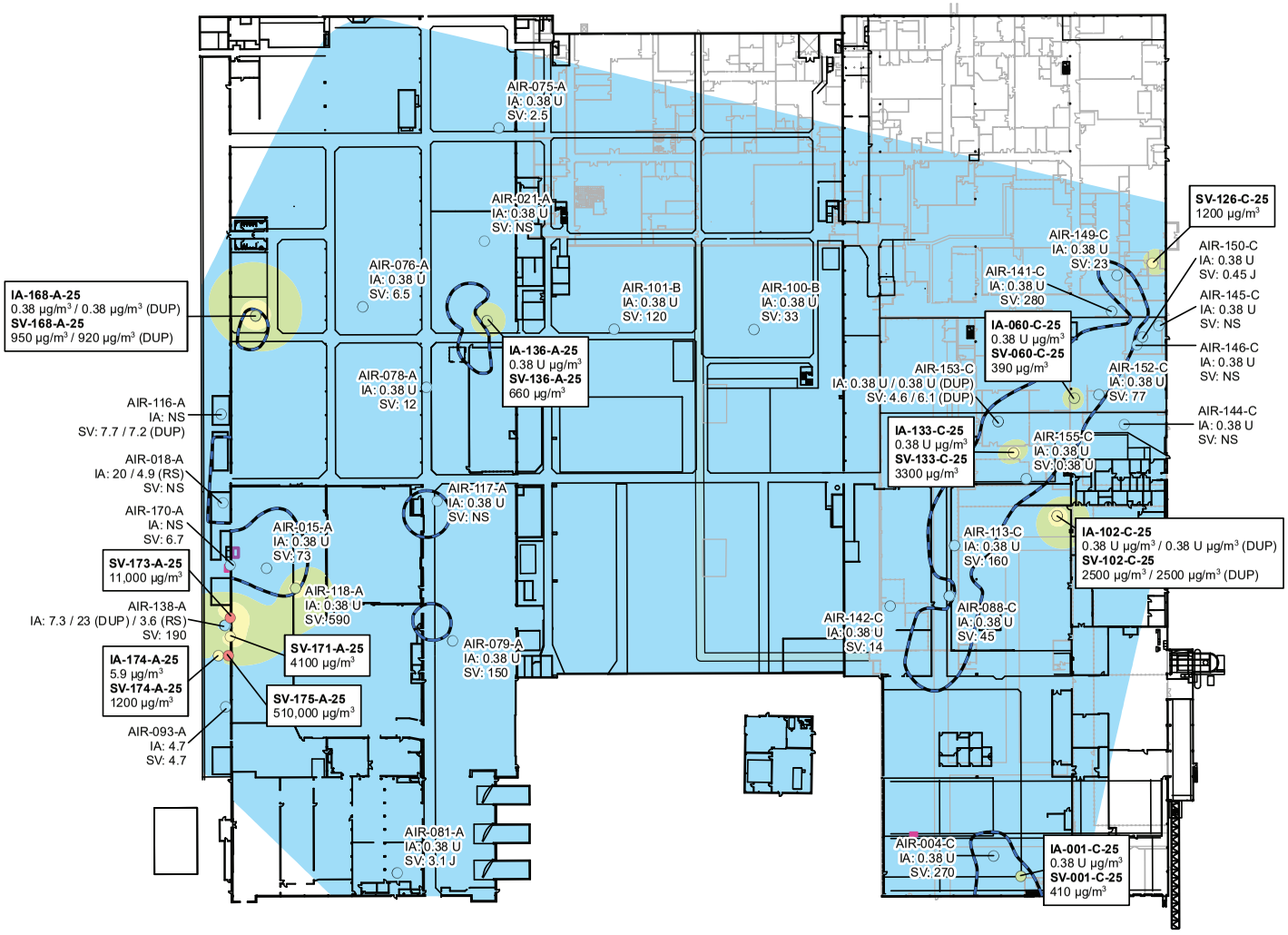

FIGURE 1

TRICHLOROETHENE SAMPLING RESULTS, ROUND 25 BUILDINGS A, B AND C

LEGEND

Soil Vapor Sample Results

- < 293 µg/m³
- 293 -1000 µg/m³
- 1000 - 10,000 µg/m³
- > 10,000 µg/m³
- SSD Treatment Unit
- SSD Radius of Influence
- Buildings A, B and C
- Building B and C Basement
- Tunnel

All units in µg/m³.

DUP - Duplicate sample.
NS - Not sampled.
RS - Resample.
IA - Indoor air.
SV - Soil vapor.

Screening Levels

Indoor Air	Soil Vapor
8.8	293

February 2018 Sub-Slab Vapor TCE Concentration

10000 ug/m3
1000 ug/m3
293 ug/m3
0.1 ug/m3

Lockheed Martin Middle River Complex
Middle River, Maryland

0 60 120 Feet

DATE MODIFIED: 09/28/18

CREATED BY: JEE

TETRA TECH

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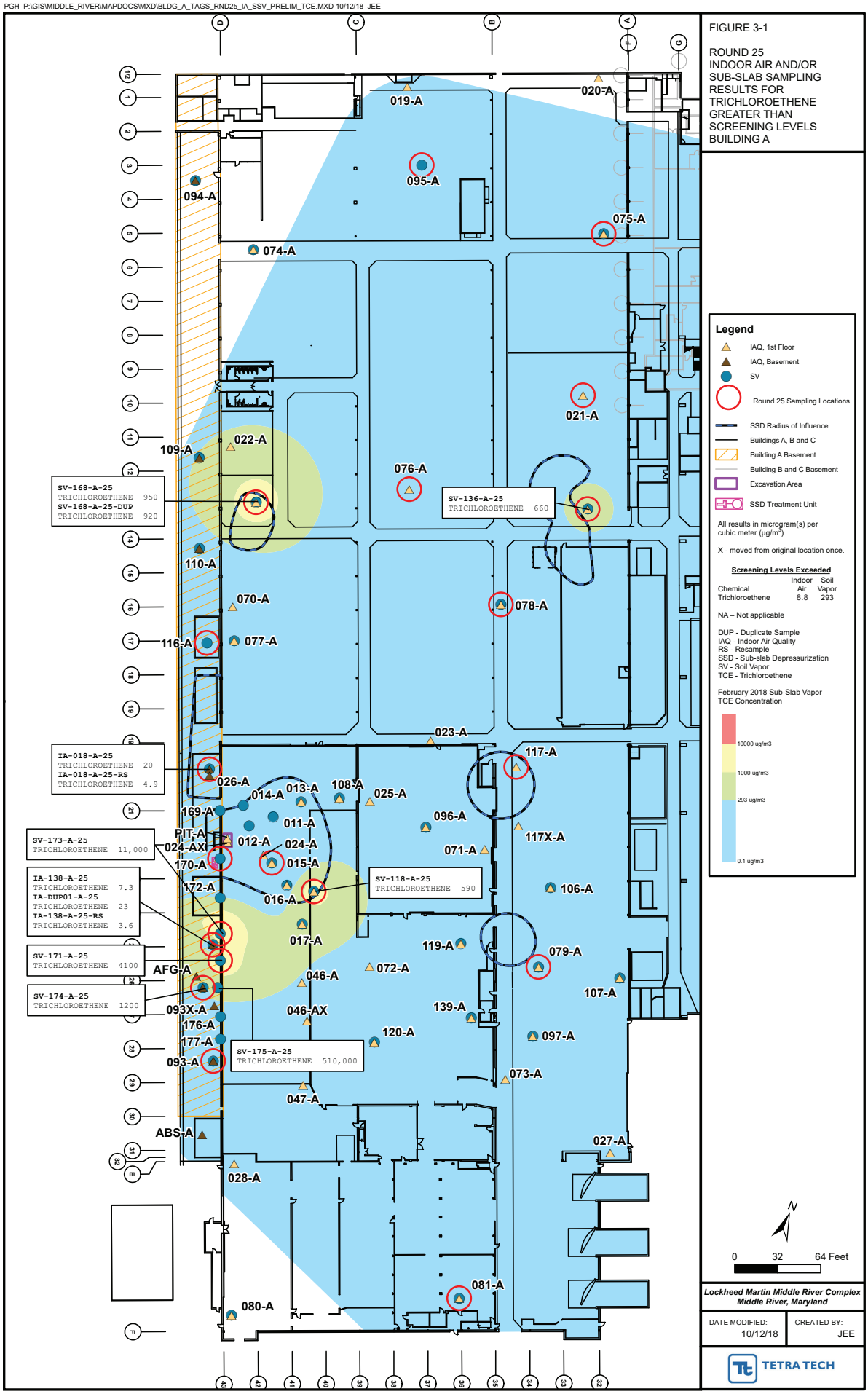

FIGURE 3-1

ROUND 25
INDOOR AIR AND/OR
SUB-SLAB SAMPLING
RESULTS FOR
TRICHLOROETHENE
GREATER THAN
SCREENING LEVELS
BUILDING A

Legend

- IAQ, 1st Floor
- IAQ, Basement
- SV
- Round 25 Sampling Locations
- SSD Radius of Influence
- Buildings A, B and C
- Building A Basement
- Building B and C Basement
- Excavation Area
- SSD Treatment Unit

All results in microgram(s) per cubic meter (µg/m³).

X - moved from original location once.

Screening Levels Exceeded

Chemical	Indoor Air	Soil Vapor
Trichloroethene	8.8	293

NA – Not applicable

DUP - Duplicate Sample
IAQ - Indoor Air Quality
RS - Resample
SSD - Sub-slab Depressurization
SV - Soil Vapor
TCE - Trichloroethene

February 2018 Sub-Slab Vapor TCE Concentration

- 10000 ug/m3
- 1000 ug/m3
- 293 ug/m3
- 0.1 ug/m3

0 32 64 Feet

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Middle River, Maryland

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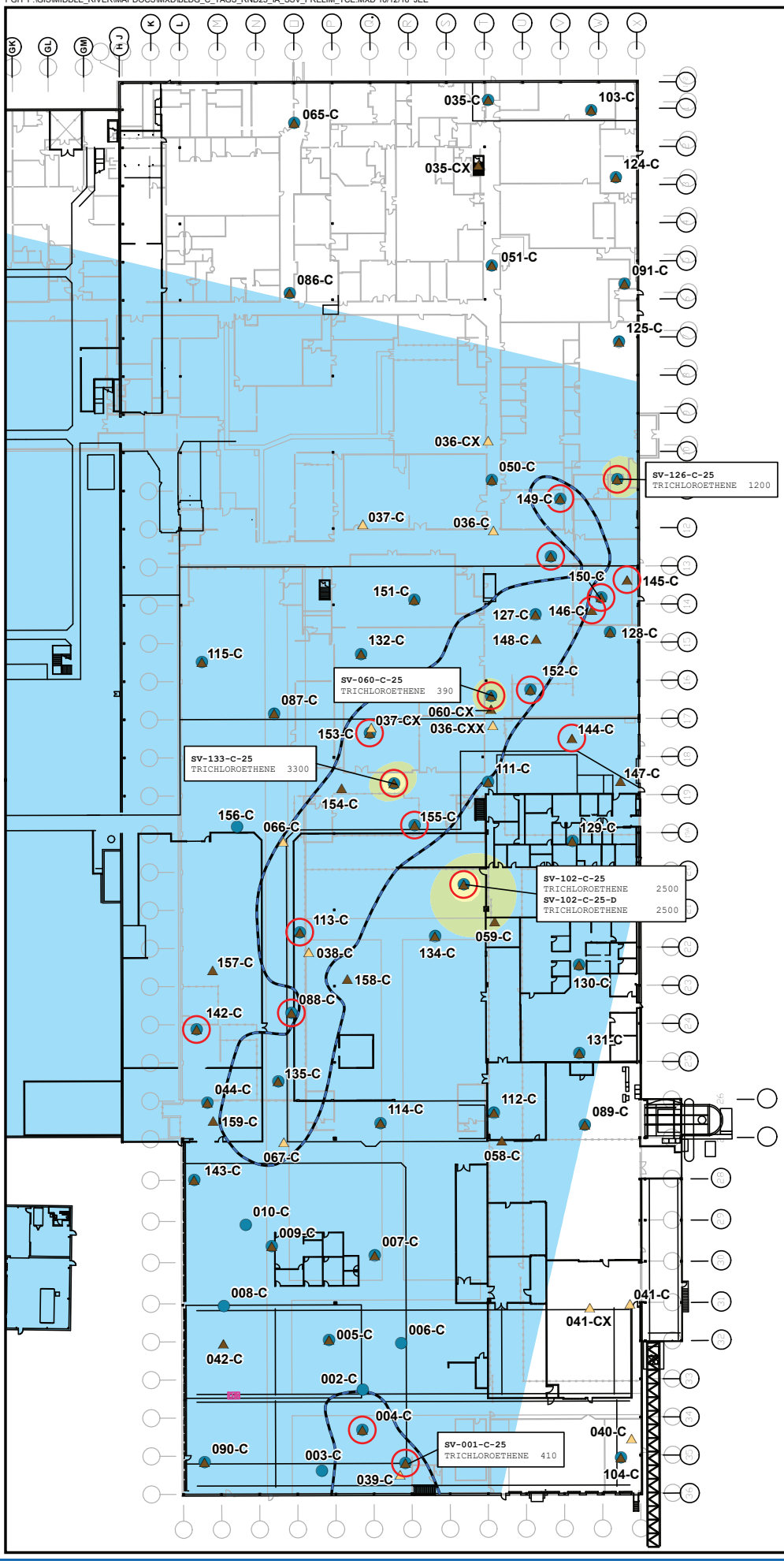

FIGURE 3-3

INDOOR AIR AND/OR SUB-SLAB SAMPLING RESULTS FOR TRICHLOROETHENE GREATER THAN SCREENING LEVELS BUILDING C

Legend

- IAQ, 1st Floor
- IAQ, Basement
- SV
- Round 25 Sampling Locations
- SSD Radius of Influence
- Buildings A, B and C
- Building B and C Basement
- Tunnel
- SSD Treatment Unit

All results in microgram(s) per cubic meter (µg/m^3).

X - moved from original location once.

Screening Levels Exceeded

Chemical	Indoor Air	Soil Vapor
Trichloroethene	NA	293

NA – Not applicable

IAQ - Indoor Air Quality
J = Estimated Value
SSD - Sub-slab Depressurization
SV - Soil Vapor
TCE - Trichloroethene

February 2018 Sub-Slab Vapor TCE Concentration

- 10000 ug/m3
- 1000 ug/m3
- 293 ug/m3
- 0.1 ug/m3

N

0 32 64 Feet

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Middle River, Maryland

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