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Memorandum

To: Kim Tisa, United States Environmental Protection Agency

From: David M. Sullivan, LSP CHMM, TRC Environmental Corporation

cc: Scott Alfonse, Cheryl Henlin, City of New Bedford

Subject: Recommended indoor air sampling locations for updated round of PCB indoor air monitoring New Bedford High School (NBHS)

Date: November 23, 2010

TRC Environmental Corporation's (TRC's) Certified Industrial Hygienist (CIH), Project Manager and ventilation consulting subcontractor (STV, Incorporated) conducted a site walk at New Bedford High School (NBHS) on October 15, 2010 to evaluate potential indoor air sampling locations for polychlorinated biphenyls (PCBs). Locations were evaluated based on the ventilation of the area, the potential presence of PCB sources (i.e., building materials or equipment), and relative exposure potential to occupants.

This memorandum summarizes and discusses recommended indoor air sampling locations for an updated round of indoor air monitoring for PCBs at NBHS, and is responsive to input provided by the United States Environmental Protection Agency (EPA) during a site walk on Monday, August 30, 2010. As you know, the most recent rounds of indoor air sampling for PCBs at NBHS took place in February 2008, when samples from 25 interior locations were collected, and in August 2010, where a targeted air sampling event was conducted in one location (the Little Whalers Day Care in room A-227-4). As discussed during the site walk with EPA, TRC planned to consider the above-noted factors in assembling sampling recommendations, which are discussed herein.

Please call or write if you have any questions regarding this memorandum.

Summary

TRC's recommended sampling program for indoor air PCBs is summarized in Table 1 and illustrated in Figures 1A-1C. The recommended sampling program includes 20 of the 26 interior locations from the February 2008 and targeted 2010 sampling rounds and an additional 24 locations selected based on heating, ventilation and air conditioning (HVAC) system performance and functionality and the presence of lighting fixtures with potential PCB-containing ballasts and/or residues from releases from PCB ballasts. Samples will also be collected to help refine the estimate of human health risk posed by the presence of PCBs in indoor air at the school.

The PCB air sampling is proposed to be conducted by methods identical to those employed previously for indoor air sampling at NBHS. Air samples will be collected and analyzed for PCB Homologues by EPA Method TO-10A using low volume personal sampling pumps and polyurethane foam (PUF) cartridges. The samples will be analyzed for homologue groups (mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, octa-, nano-, and decachlorobiphenyl). Samples will be collected over an approximately 24-hour period. Duplicate and outside background sampling will also be conducted for quality control (QC) purposes. Per discussions with EPA during the August site walk, a subset of samples will be collected for dioxin-like congeners to confirm that the PCB homologue analysis is sufficient as an estimator for human health risk. The number of samples in the subset will be coordinated in consultation with EPA.

The proposed sampling provides considerable coverage throughout the building. Given TRC's understanding of the HVAC system and possible indoor sources of PCBs, the sampling program will provide results that are expected to represent or, in locations where the HVAC system is not functioning properly, overestimate PCB concentrations in additional occupied areas of the high school building.

Background

As noted above, the previous multi-location indoor air sampling event was conducted in February 2008, following the completion of the ventilation system cleaning and repairs to certain ventilation systems (roof top exhaust fans and univent systems in the classrooms of the A- and B-Blocks at NBHS).

During an August 30, 2010 site visit with the EPA and the City, EPA stated that an expanded round of monitoring covering more locations and environments in the building was required. EPA acknowledged that overlap with the February 2008 monitoring round was needed to maintain a basis of comparison with the prior round of monitoring. The sampling would provide a status report update on overall PCB air levels throughout the school.

Evaluation Framework

In framing the recommendations for further sampling and analysis, TRC considered the following:

- **Basis of comparison/overlap –** To establish a basis for comparison, the prior interior sampling locations were included to provide for a pre- and post-remediation evaluation of indoor air measurements for PCBs.

- **Estimate of cumulative risk –** To facilitate recalculation of the cumulative risk estimate, PCB air sampling will be conducted in areas that have been sampled for volatile organic compounds (VOCs) during the 2010 investigation of the Critical Exposure Pathway (CEP) issue

- **HVAC system performance –**HVAC system performance was evaluated to help identify areas of the building where the air exchange rate (AER) may be lowest, which could be evidenced or suggested by relatively elevated dew points, higher rates of filter media buildup and/or blinding, mechanical problems (e.g., motor failures), occupant performance opinions, etc. Areas of potentially low AER provide targets of PCB indoor air measurements.

- **PCB building material sources –** Based on an evaluation of the recent inventory of the lighting fixture ballasts and ballast releases, these PCB source types are found throughout the

building. Further evaluation of the impact of this source on indoor air quality will be conducted to support decision making relative to future remedial actions. TRC identified areas of lesser or greater ballast/release presence in the lighting fixtures and targeted them for PCB air sampling.

The coverage provided by the above-outlined framework amends the prior sampling program and improves sampling density throughout the building. A detailed rationale for the proposed sampling program is provided below.

Base of comparison/overlap

As noted above, 20 of the February 2008/August 2010 sampling locations are included to provide a basis of comparison to evaluate changes over time. These locations are illustrated in blue on the attached Figures 1A-1C.

Refine the estimate of cumulative risk

TRC previously evaluated the levels of PCBs and VOCs in indoor air and determined that there is no significant risk to the health of building occupants. This evaluation was based on criteria established by the Massachusetts Department of Environmental Protection (MassDEP). The evaluation was performed conservatively, relying on the maximum detected PCB indoor air concentration from February 2008 and the results from the 2010 indoor air monitoring for VOCs. Air samples for VOCs have been collected from a total of 15 locations. Of these, two locations (classroom A-105-2 and the Mechanical Room B-114) were sampled for PCBs in 2008. This plan includes sampling for PCBs in rooms A-105-2, B-114 (Mechanical Room), A-112-3, and A-105-4, all of which are locations where VOCs have been detected in past rounds (identified in Figure 1A).

HVAC system performance

TRC and STV conducted a site walk and interview of NBHS engineering staff on October 15, 2010, and also reviewed existing engineering drawings, to evaluate areas of the building spanning the performance capability/current functionality of the building's HVAC systems. TRC sought to identify areas of the building where the HVAC system may be potentially less efficient or effective due to system condition, operational settings, building configuration, or building modifications subsequent to original HVAC system installation (e.g., new interior walls subdividing larger spaces without changes to the HVAC system), or other conditions that might support a worst case scenario for the detection of PCBs in indoor air.

TRC and STV observations are summarized below. Many of these observations highlight repair needs and/or performance deficiencies. These observations provide an appropriate basis for sampling to provide a snap-shot of NBHS indoor air quality. However, TRC also notes significant recent investment in the HVAC system, such as the replacement of roof-top exhaust fans in 2007, the recent replacement of 31 air-conditioning equipped unit ventilators in the B-Block (Core), and the installation of a computer controlled HVAC Building Management System (BMS). The BMS system significantly enhances the ability of facility engineers to monitor and adjust system components, much of which can be accomplished from the desk top.

- **Non-functioning univents -** Several univents were noted as not functioning and requiring repair at the time of the site visit. Seven rooms with univents in this category are listed below, none of which have been used for PCB indoor air sampling in past rounds:
  - A-110-1
  - A-203-2

- A-306-1
- A-310-1
- A-315-1
- D-124
- D-132

Six of the above listed locations where targeted for sampling. Room D-132 was not included since it is next to D-124.

- **Univent filter replacement -** TRC/STV observed the filter replacement procedures for the classroom univent systems. The filter units in the original univent systems consist of a hinged steel frame and mesh grill into which is placed a filtration element/blanket cut from a supply roll. The filter frame can be difficult to remove since the housing into which it is installed does not allow the filter frame to slide readily and can catch on the filter frame. In addition, once removed from its housing, the hinged filter frame itself can also be difficult to open. These handling impediments can cause dust to be knocked off the filter medium and frame, requiring clean-up and causing delay in the maintenance activity. Disposable paper-based filter inserts that do not require the frame system have been utilized from time-to-time, and do not present the impediments associated with the metal filter frame system, require less time to replace, and are less likely to release dust during change out. However, the disposable filters are not purchased routinely and have been used infrequently. NBHS engineering staff noted that first floor univents that draw outside air from landscaped areas tend to load the filter media quickly. A representative selection of first-floor rooms with univents drawing air from landscaped areas were chosen to evaluate potential impacts on PCB indoor air quality. These include A-112-1, A-112-2, A-112-3, A-112-4 and A-110-1.

- **Non-functioning HVAC units -** The school building is served by 36 separate HVAC units and approximately (11) ceiling univent systems. During the site visit, the NBHS engineering staff noted that some HVAC and ceiling univent systems are not presently working. These units are listed below:

  - CU-8 (serves the auditorium hallway)
  - HV-16 (serves the boys' pool locker room)
  - HV-17 (serves the girls' pool locker room)
  - HV-18 A/B (serves the pool room)
  - HV-19 (serves the pool filter room)
  - E-Block ceiling univent (serves E-118 Health Education Room)
  - Several D-Block ceiling univents (serving the D-Block classrooms)

  The boys and girls pool locker rooms, the pool filter room, and Room E-118 were targeted for sampling.

- **Operation by non-engineering staff -** NBHS engineering staff noted two rooms in the "D-block" where the room occupants will manually shut down the HVAC system serving the room due to noise. These rooms included D-112 (computer aided manufacturing laboratory [CAM Lab]) and D-143 (Rifle Range). TRC/STV suggested the installation of lock-out boxes to control unauthorized system control. These locations are also included in the sampling program. The rifle range and Room D-112 (also noted below) were included for sampling.

- **Modified rooms –** NBHS engineering staff noted locations where modifications to the occupied space following original construction might impact air flow. These locations include

room D-112 (computer aided manufacturing laboratory), B-313 (classroom) and the Main Offices of the school. Two locations, (D-112) and the main office, are included in the sampling program.

- **Moisture –** The second floor of the "D-Block" was noted as having a relatively higher dew point during the site walk. NBHS engineering staff noted that this is typical in this area and at times there is moisture build-up on the walls in the hallways. The high dew point suggests lower AER. TRC evaluated air flow in the second floor hallway of "D-Block" through an informal smoke test, and noted the very slow dispersion of the smoke, which is indicative of a low volume of air flow/exchange. These observations are consistent with the information provided by facility engineering staff as to the status of the ceiling univent systems in this portion of the building. The second floor D-Block hallway is included in the sampling program.

- **Rooms with no ventilation –** NBHS engineering staff alerted TRC/STV to a room that is periodically occupied for computer repair (D-208). This room does not have a ventilation system. This room was included in the sampling program.

PCB building material/equipment sources

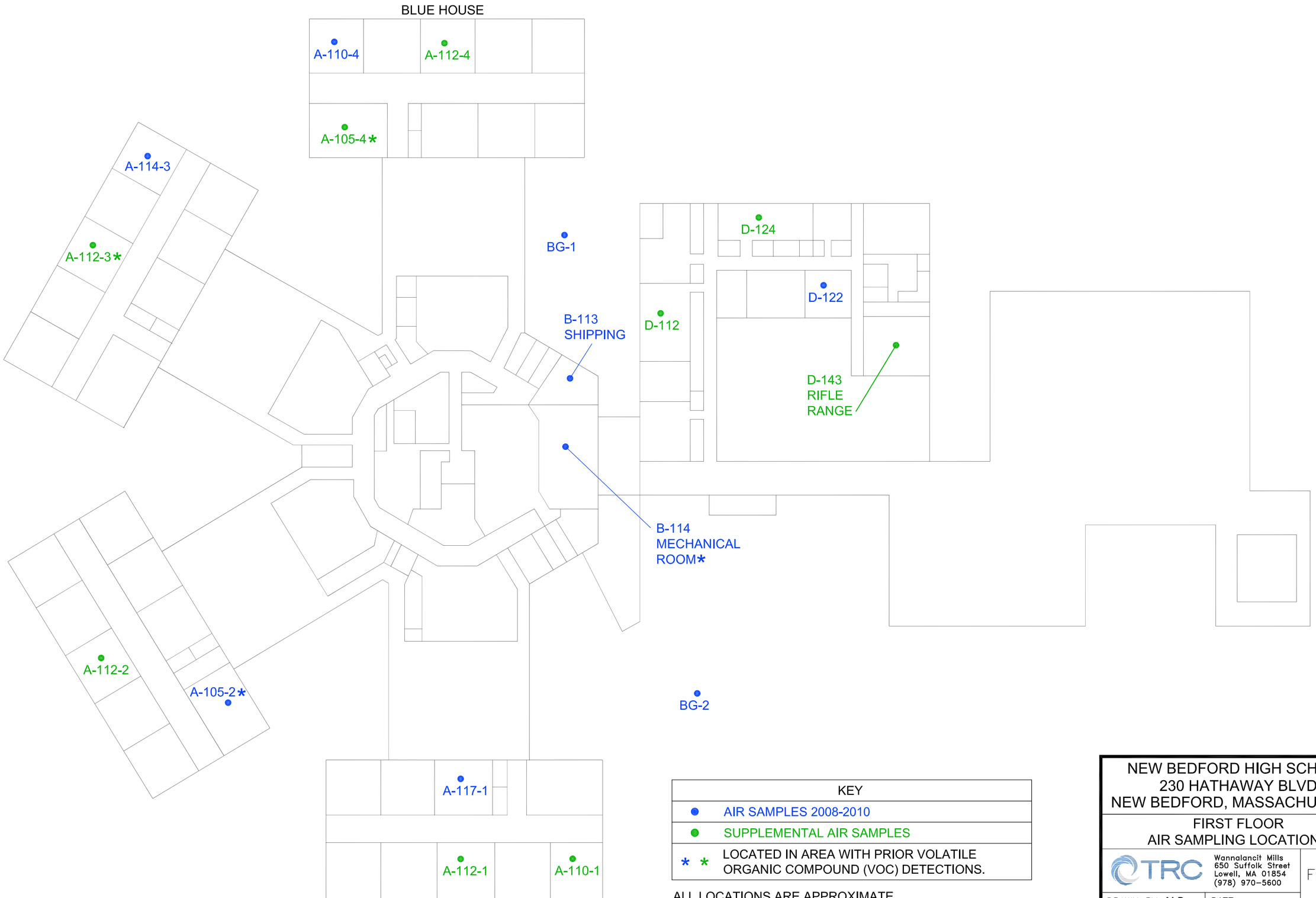
A series of significant interior PCB building source material removals have been conducted each summer at NBHS since 2007. Lighting fixtures with potential PCB containing ballasts or ballast releases are found at varying frequencies throughout the building. PCB ballasts have emerged as a potential source of PCBs in indoor air. PCB-containing ballasts with releases are not permitted.

TRC conducted a unit by unit inspection and inventory of fluorescent lighting fixtures during August and September 2010 for the presence of PCB ballasts remaining in service (or presently located in the lighting fixture in a disconnected/de-energized state) and residues from past ballast releases/failures. This inspection involved over 7,700 individual lighting units. The data from the inventory effort are presently under review and will be provided in a separate report. However, to help select potential sampling locations to evaluate the potential impact of PCB ballasts and/or residues on indoor air quality, TRC identified the classrooms and the stretches of hallway with the highest and lowest percentage of impacted ballasts:

Location	Percent Impacted	Number impacted	Total fixture count	Category
B-320 (Biology Lab)	95%	19	20	Highest classroom
B-Block Hallway, 2nd Flr.	91.4%	53	58	Highest hallway
A-114-4 (classroom)	0%	0	20	Lowest classroom
A-217-4 (classroom)	0%	0	15	Lowest classroom
A-115-2 (classroom)	0%	0	17	Lowest classroom
D-Block Hallway, 1st Flr.	48.8%	20	41	Lowest hallway
Little Theater (D-250)	0%	0	22	Lowest classroom

Of the above summarized locations, room B-320 and the B-Block Hallway (second floor) were selected as representative of occupied spaces with the highest percentage of impacted fixtures, and room A-217-4 and the Little Theater (D-250) were selected as locations representative of rooms without fixture impacts. None of these locations have been sampled for PCBs in indoor air previously; all will be included in the proposed sampling event. Note that no storage rooms were identified for sampling since they are not regularly occupied spaces.

Table 1 – Recommended Sampling Program – NBHS PCBs Indoor Air		
Locations	**Rationale**	**Notes**
2008 - 2010 Sample locations (20 locations).	These locations provide a basis for comparing indoor air quality before and after remediation, and they include a room with potentially sensitive receptors that has been the object of community focus (A-227-4, the Little Whalers Day Care).	Most of these locations were sampled more than once in past indoor air monitoring at NBHS. The locations not included from the 2008 round include the Blue House Cafeteria, the Auditorium, the Girl's Gym, the Auto Shop, and room A-227-2, all of which were consistently below the EPA's 0.05 ug/m^3 Action Level or were non-detect.
A-112-3 and A-105-4	Potential CEP-related VOCs have been detected in these rooms.	Indoor air quality data for these rooms will help to estimate risk from simultaneous exposure to PCBs and VOCs.
A-110-1, A-203-2, A-306-1, A-310-1, A-315-1, and D-124.	These rooms have non-functioning univents.	Room D-132 also has a non-functioning univent, but will not be sampled because indoor air quality data for the adjacent room (D-124) are expected to represent conditions in D-132.
A-112-1, A-112-2, A-112-3, A-112-4	These first floor rooms have univents that draw outside air from landscaped areas, soiling filters more quickly than other units in the building.	These rooms will provide data from a selection of rooms in each "A-Block" house with univents that draw outside air from landscaped areas with the potential for faster filter buildup.
F-115 boys locker, F-115 girls locker, F-115 filter room, E-118 Health Ed. Room, D-Block second floor hallway	These locations are served by non-functioning HVAC or ceiling univent systems.	These locations include places where moisture build-up was observed (i.e., D-Block hallways and the pool locker rooms).
D-112 (CAM Lab) and D-143 (Rifle Range)	Non-engineering staff tend to manually shut-down the HVAC system in these rooms due to noise.	Included to evaluate potential impacts from lower AER stemming from non-engineering system shut-downs.
Main Office, D-112	Post-construction modified rooms/areas.	D-112, noted above due to non-engineering controls issues, is also a room space that was modified post-construction.
D-208	This room has no ventilation system.	This room is used for computer repair and is infrequently occupied.
B-320 (Biology Lab), B-Block Hallway (second floor hallway), A-217-4 (classroom), and Little theater (D-250).	These locations represent those with the high potential and low potential for PCB release from ballasts.	Note that the D-Block hallways have also been noted to have lower air flow/exchange attributed to non-functioning ceiling univent systems.



KEY	
●	AIR SAMPLES 2008-2010
●	SUPPLEMENTAL AIR SAMPLES
* *	LOCATED IN AREA WITH PRIOR VOLATILE ORGANIC COMPOUND (VOC) DETECTIONS.

ALL LOCATIONS ARE APPROXIMATE

NOT TO SCALE

NEW BEDFORD HIGH SCHOOL
230 HATHAWAY BLVD
NEW BEDFORD, MASSACHUSETTS

FIRST FLOOR
AIR SAMPLING LOCATIONS

TRC
Wannalancit Mills
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FIGURE
1-A

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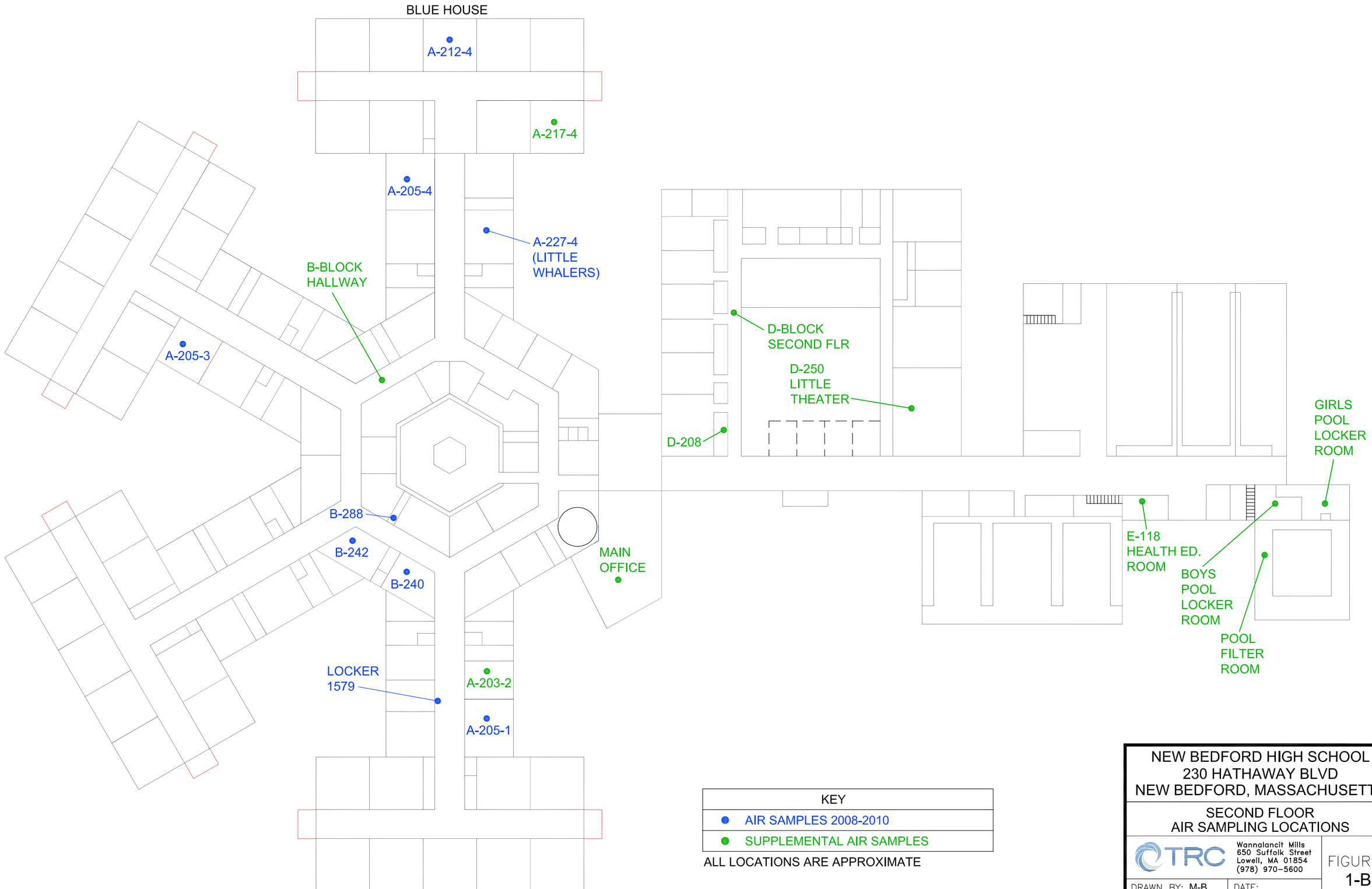

KEY
● AIR SAMPLES 2008-2010
● SUPPLEMENTAL AIR SAMPLES

ALL LOCATIONS ARE APPROXIMATE

NOT TO SCALE

NEW BEDFORD HIGH SCHOOL
230 HATHAWAY BLVD
NEW BEDFORD, MASSACHUSETTS

SECOND FLOOR
AIR SAMPLING LOCATIONS

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FIGURE
1-B

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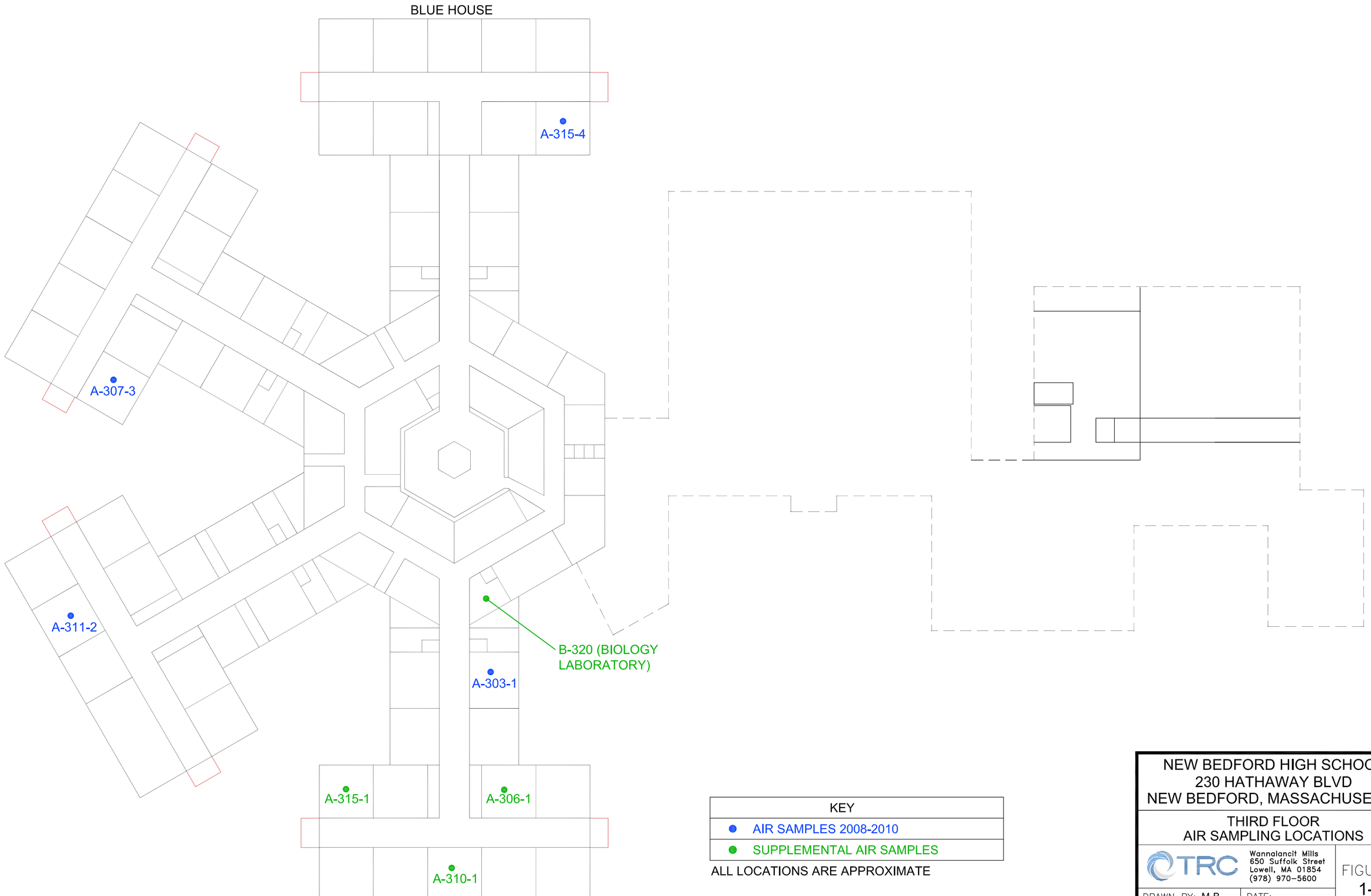

KEY
● AIR SAMPLES 2008-2010
● SUPPLEMENTAL AIR SAMPLES

ALL LOCATIONS ARE APPROXIMATE

NOT TO SCALE

NEW BEDFORD HIGH SCHOOL
230 HATHAWAY BLVD
NEW BEDFORD, MASSACHUSETTS

THIRD FLOOR
AIR SAMPLING LOCATIONS

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FIGURE 1-C

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