



23 August 2022

Ms. Kristi Herzer  
Vermont Agency of Natural Resources  
Department of Environmental Conservation  
Waste Management and Prevention Division  
National Life Campus, 1 National Life Drive  
Montpelier, Vermont 05620-3704

Reference: Former Energizer Battery Manufacturing Facility  
401 Gage Street  
Bennington, Vermont 05201  
VTDEC Site Number 2006-3509

Subject: Indoor Air Field Sampling Plan

Dear Ms. Herzer:

The purpose of this Indoor Air Field Sampling Plan (FSP) is to document the procedures that will be used to evaluate indoor air quality at the former Energizer Holdings, Inc. (Energizer) facility located at 401 Gage Street in Bennington, Vermont (the "Site"). Extensive investigation and remediation activities have been completed at the Site and associated reports have been provided to the Vermont Department of Environmental Conservation (VTDEC) under Site Number 2006-3509. This FSP describes an additional indoor air assessment proposed to prepare the Energizer facility for closure per the VTDEC Vermont Hazardous Waste Generator and Facility Closure Guidance and to support the Corrective Action Plan (CAP) for the indoor air inhalation pathway/vapor intrusion pathway.

Environmental Resources Management (ERM) has been retained by Energizer to design and implement indoor air sampling at the Facility. ERM has relied on the following documents to prepare this FSP in a manner consistent with the current state of the practice:

- Interstate Technology and Regulatory Council (ITRC) Petroleum Vapor Intrusion: Fundamentals of Screening, Investigation, and Management, October 2014;
- ITRC Vapor Intrusion Pathway: A Practical Guideline, January 2007;
- United States Environmental Protection Agency (USEPA) Standard Operating Procedure for Mercury Air Sampling – National Institute for Occupational Safety and Health (NIOSH) Method 6009, January 2021;
- VTDEC Investigation and Remediation of Contaminated Properties Rule (IRule), January 2019;
- VTDEC Vapor Intrusion Guidance, March 2020;
- VTDEC Vermont Hazardous Waste Generator and Facility Closure Guidance, May 2005; and
- Generally accepted best management practices.

The FSP describes the following activities:

- Completion of a building evaluation and chemical inventory;
- Mercury field readings and room survey; and
- Implementation of sampling activities, including the following:
  - Indoor air and outdoor ambient air sampling for Volatile Organic Compounds (VOCs).
  - Indoor air and outdoor ambient air sampling for Mercury.

## 1. SITE DESCRIPTION

The Site is located on the south side of Gage Street, northeast of downtown Bennington in Bennington County, Vermont. The Walloomsac River is located to the south. The general location of the Site Property and the surrounding area are depicted on **Figure 1**.

The Site comprises approximately 9.29 acres containing six buildings: Plant 1, Plant 2, a Boiler House, Tank Farm Enclosure, an unnamed storage building, and a wooden storage shed. Site geology consists of a high permeability aquifer, comprised of sand, gravel, cobbles, and boulders, overlying an aquitard, comprised of a silt layer overlying a lodgement till. Groundwater flows to the west-northwest at an estimated velocity ranging from 7 to 70 feet per day.

Operations in Plant 1 at the Site historically included the manufacturing of miniature batteries. Ancillary activities included packaging and shipping, quality assurance/quality control (QA/QC) laboratories, and administrative activities. Plant 1 was built in stages between approximately 1896 and the 1970s. Prior to battery manufacturing, the facility was a hosiery manufacturer. Plant 2 and the Boiler House were built in 1917 and were originally a manufacturing facility for cotton underwear and later used by Energizer for battery manufacturing and storage. The surrounding land use is primarily residential with some office and apartment zoning located south of the Site on the opposite side of the Walloomsac River (**Figure 1**).

Energizer submitted the Hazardous Waste Generator Pre-Closure Notification Form for the Site on 4 February 2020, and operations at the Site ceased in January 2021. Facility decommissioning, equipment packing and moving and facility cleaning has been ongoing since that time. Future facility and property reuse is unknown at this time.

Energizer submitted a Supplemental Site Investigation Report (SSIR) on 16 June 2021, which was approved by VTDEC on 13 July 2021. Based on the findings of the SSIR, Energizer submitted an Evaluation of Corrective Action Alternatives (ECAA) to mitigate groundwater contamination and potential vapor intrusion at the Site on 27 July 2021. VTDEC approved the ECAA on 20 October 2021. The approved corrective actions include long term groundwater monitoring for Site Contaminants of Concern (COCs), and active vapor mitigation with institutional controls to mitigate the vapor intrusion pathway. On 3 December 2021, Energizer submitted a Corrective Action Plan (CAP) which details the long term groundwater monitoring program for the Site. As described in the ECAA, a separate CAP addendum will be prepared for soil vapor and vapor intrusion at a later date when future Site use can be incorporated into the plan.

## 2. PROPOSED SCOPE OF WORK

The following scope of work is proposed to assess indoor air quality at the Site. The activities documented in this FSP will be limited to Plant 1, Plant 2 and the Boiler House.

### 2.1 Building Evaluation and Chemical Inventory

Prior to implementation of the FSP, ERM representatives will complete a building evaluation to determine property-specific conditions that may affect the design and/or results of the sampling program. Information regarding building conditions and building contents may also facilitate identification of possible background factors that could influence the results. The building surveys will include:

- Inspection of the integrity of the ground floor slab in the two main buildings (Plant 1 and Plant 2) and the boiler houses;
- A chemical inventory to document the presence/absence of remaining materials onsite that may affect indoor air VOC or mercury concentrations;
- An inventory of the buildings' remaining heating/ventilation (HVAC) systems to inform the location of mercury samples; and,
- Documentation of the status HVAC system operations both prior to and during sampling.

The Site is currently vacant and the buildings are essentially empty; therefore, it is not anticipated that containers of chemicals (i.e., stored manufacturing chemicals, cleaning agents, etc.) will be stored at on-Site. The building evaluation includes a chemical inventory as a conservative measure.

The buildings are no longer used for operations and there are no employees present (except limited security personnel). Some heating and cooling systems are still operable as part of general building upkeep. HVAC systems will be operated in this general "upkeep" mode during the indoor air sampling event. In addition, as part of operations shut down and building cleaning, some building areas have been vented with fans, open doors and open windows. These venting activities will be discontinued and the building will be returned to general "upkeep" status for at least two weeks prior to the start of indoor air sampling.

### 2.2 Room Survey and Field Readings

In conjunction with the building survey and chemical inventory, real-time field readings for mercury and for total VOCs will be collected in various rooms and spaces on each floor of Plant 1, Plant 2 and the boiler house. Survey activities will be as follows:

- Collection of real-time field readings of mercury concentrations in indoor air using a handheld mercury meter (i.e., a Jerome 405 meter or equivalent);
- Collection of real-time field readings of total VOC concentrations in indoor air using a handheld parts-per-billion by volume (ppbv) photoionization detector (PID) equipped with a 10.6 eV lamp;

- Real-time mercury and total VOC readings will also be collected from several locations outside of each building including locations deemed to be generally upwind of each building;
- Development of a facility map including approximate room locations, the locations of mercury and VOC field readings, existing HVAC systems, and other pertinent information; and
- Other visual observations made by the field team.

Where possible, field readings will be collected from the approximate center of a room/space and will be collected between 3 and 5 ft above the floor. The collection of real-time field readings for mercury and total VOCs will follow the measurement instructions included with each field instrument. One field reading for mercury and one for total VOCs will be collected from each room of each building.

Field readings will be recorded on the updated facility map and will be used as part of the indoor air assessment as well as to inform the locations of the laboratory indoor air samples.

## 2.3 SAMPLE LOCATION PLACEMENT AND COLLECTION

After completing the building evaluation, room survey, and field readings, the location of each laboratory indoor air sample will be finalized and recorded on a field sketch.

The following sections describe the procedures for indoor air and outdoor ambient air sample collection for VOCs and mercury. In addition, field documentation and the analytical method are outlined. Template sampling forms are included in [Appendix A](#).

### 2.3.1 INDOOR AIR SAMPLE COLLECTION

ERM will complete air sampling as described below. ERM proposes the following indoor and outdoor air samples to be collected from the Site:

- Plant 1 (118,000 ft<sup>2</sup>, 3 floors plus a partial basement)
  - VOCs: 16 indoor air samples, 2 outdoor ambient air samples
  - Mercury: 18 indoor air samples, 2 outdoor ambient air samples
- Plant 2 (26,000 ft<sup>2</sup>, 5 floors)
  - VOCs: 2 indoor air samples, 1 outdoor ambient air sample
  - Mercury: 4 indoor air samples, 1 outdoor ambient air sample
- Boiler house (assumed 2 stories)
  - Mercury: 1 indoor air sample

In total, 21 VOC samples and 26 mercury samples will be collected from the Site. In addition to the above, duplicate samples will be collected at a rate of approximately one per 20 samples (i.e., 1 VOC duplicate, 1 mercury duplicate). Field blank samples will also be collected for mercury analysis from each separate floor or structure being sampled (4 from Plant 1, 3 from Plant 2, 1 from the boiler house). Media blanks will be analyzed by the laboratory and lot-matched to the

sampling tubes used in the field. ERM's proposed sample locations are presented on **Figure 2**; however, final sample locations will be field adjusted based on the findings of the building evaluation and room survey. For sample coordination and efficiency, and to mitigate sampling bias, ERM will process and collect the VOC indoor air samples first, followed by the mercury air samples over a separate 8-hour period.

#### 2.3.1.1 VOC Sampling

Samples collected for VOCs will be limited to ground level or basement level locations. If VOC-containing products are observed at the time of sampling, they will be documented with a photograph and on the sampling data sheet and may be removed if appropriate. Final VOC sampling locations may be modified in the field based on the results of the PID readings as detailed above.

VOC samples will be collected with the objective to obtain an 8-hour sample in simulation of an 8-hour workday exposure scenario. A 6-liter Summa® canister equipped with a calibrated 8-hour flow regulator will be used to collect the indoor air samples. The canisters will be batch certified clean by the laboratory prior to use. Personnel will check on each canister periodically to monitor changes in vacuum and note changes in the vicinity of the sample location. The vacuum reading of each canister will be recorded on the sampling data sheet prior to the start of sampling, during the periodic checks, and also at the conclusion of the sampling period. The residual vacuum remaining in the indoor air canister at the conclusion of the sampling period will not be less than approximately 5 inches of mercury (in Hg). It is recommended that indoor air sampling canisters maintain residual vacuum to demonstrate that the canister was collecting air throughout the entire sampling period. The residual vacuum will be confirmed and recorded by the laboratory after receipt of the canisters.

The air intake of each canister will be located at breathing zone heights of approximately 3 to 5 feet above the floor surface. If applicable, areas where chemicals or cleaning agents are/were used or stored will be avoided. The indoor air samples will be collected away from outside windows or doors, if possible. At the time of sample retrieval, noticeable changes in the condition of the sampling area, such as open windows or doors, or condition or location of items in proximity to the canister, will be noted on the sample data sheet.

At the end of the sampling time period, Summa® canisters will be closed and the label will be filled out with the appropriate sample information. Samples will be transported to the lab for analysis in accordance with standard Chain of Custody procedures.

#### 2.3.1.2 Mercury Sampling

Samples for mercury will, where appropriate, be collocated with VOC samples. ERM will use a handheld mercury meter to evaluate indoor air mercury concentrations prior to selecting final sampling locations per the room survey task detailed above.

Mercury samples will be collected over an 8-hour period in simulation of an 8-hour workday exposure scenario. Samples will be collected on solid sorbent material (Hopcalite in a single section, 200 milligram [mg]) contained in glass tubes according to NIOSH Method 6009. A personal air sampling pump (SKC Universal XR Sampling Pump Model 224-PCXR8 or equivalent)

will be connected to the sampling tube with Tygon® tubing, and will draw air continuously through the sorbent media to collect a representative air sample. Prior to sample collection, the flow rate of each pump will be verified using a handheld electronic flow meter (ADM3000, or equivalent). The flowrate of each sampling pump will be recorded on the sampling data sheet prior to the start of sampling, during periodic checks of the sample, and also at the conclusion of the sampling period. Flowrate will be adjusted as needed to reach an approximate total air sample volume of 100 liters over the 8-hour collection period (approximately 0.21 liters per minute).

During sample collection, personnel will check on each sample periodically to verify operation of the sampling pumps and note changes in the vicinity of the sample location. The air intake of each sampling pump will be located at breathing zone heights of approximately 3 to 5 feet above the floor surface. At the time of sample retrieval, noticeable changes in the condition of the sampling area will be noted on the sample data sheet.

Following the 8-hour sample collection period, personnel will verify and record the sample run time displayed on the pump. Prior to turning off the pump, pump flowrate will again be verified using an electronic flow meter. The final flow rate will be recorded on the sampling data sheet and compared to the flow rate at the start of the collection period. An average flowrate will be calculated to determine the total volume of air sampled. To retrieve the sample, personnel will remove the sorbent tube from the sampling train and cap both ends. The solid sorbent tube will be placed in a sealed bag labeled with sample ID #, total volume, and required analysis. Samples will be transported to the lab for analysis in accordance with standard Chain of Custody procedures.

Mercury sampling also includes collection of field blank for each separate structure or floor being sampled (8 total). Field blanks will be prepared at the start of sampling by breaking both sides of a sorbent sampling tube. Field blank samples will then be immediately capped and left in the vicinity of the sampling locations for the duration of sample collection. Field blanks will be sealed, labeled, and transported for analysis along with the normal samples.

### **2.3.2 OUTDOOR AMBIENT AIR SAMPLE COLLECTION**

Outdoor ambient air samples for VOCs and mercury will be collected during the same respective sampling periods as the indoor air samples. Outdoor ambient air samples will be collected from locations generally upwind of the buildings being investigated. To the extent allowed by site features, air samples will be collected away from wind obstructions, such as trees or buildings. To the extent known and feasible, representative sample locations will be selected that reduce bias toward known point sources (e.g., industrial facilities, fuel terminals, gas stations or dry cleaners). Sampling locations may also need to be adjusted for security of the samples during each 8-hour sampling period.

Due to the size of the building, two outdoor sample locations will be chosen generally upwind of Plant 1. One location will be chosen generally upwind of Plant 2 and the boiler house. The wind direction will be determined in the field on the day of sampling by reviewing the local weather report.

The air intake of each outdoor air sample will be located at breathing zone heights of approximately 3 to 5 feet above the ground surface. Outdoor air sampling procedures for VOCs

and mercury will follow the same sampling procedures for indoor air described in [Sections 2.3.1.1 and 2.3.1.2](#), respectively.

### 3. LABORATORY ANALYSES

Indoor air and outdoor ambient air VOC samples will be analyzed by Eurofins/TestAmerica Laboratories Inc., (Eurofins) of South Burlington, Vermont. Indoor and outdoor ambient air VOC samples will be analyzed for select VOCs via EPA Method TO-15 Low Level. The reporting list for the VOC analysis will be limited to Site COCs, specifically tetrachloroethene, trichloroethene, *cis*-1,2-dichloroethene, *trans*-1,2-dichloroethene, vinyl chloride, 1,1-dichloroethylene, chloroform, benzene, toluene, ethylbenzene, *o*-xylene, and *m/p*-xylene.

Mercury samples will be analyzed by Eurofins of Ashland, Virginia, by NIOSH method 6009. Detections reported below the laboratory reporting limit, but above the method detection limit will be qualified with estimated concentration qualifiers.

### 4. FIELD DOCUMENTATION

Field activities will be recorded on sampling data sheets and photographs will be taken to document activities conducted. Field personnel will document the following information either in a field notebook or on the sampling data sheet:

- Date, time, weather conditions and personnel collecting the samples,
- The location of each sample;
- Field sampling procedures;
- Status of each Summa<sup>®</sup> canister or mercury sampling train during sample checks, if applicable; and
- Noted observations that may influence air samples.

A sketch map of the property and structure will be included in the field notes, and relevant features will be represented. The sketch will primarily be used to illustrate sample locations relative to identifiable structure features.

### 5. REPORTING

After receiving analytical data, ERM will prepare the following:

- Summary table of laboratory analytical mercury and VOC data;
- Summary table of mercury field readings;
- Summary table of total VOC field readings;
- Sampling locations figure; and,
- Figure with relevant concentration data.

Laboratory reports, tables, and figures will be provided to VTDEC via email. Data from the indoor air sampling may be incorporated into other Site reports as needed (e.g., Hazardous Waste Facility Closure documentation, site investigation addendum, CAP addendum, etc) at a later date.

## 6. SCHEDULE

The sampling and reporting activities detailed in the above FSP may be completed under the following schedule. This schedule assumes VTDEC approval of the FSP to be granted no later than 31 August 2022.

- September 2022:
  - Conduct building evaluation and room survey/field readings;
  - Finalize indoor air sampling locations;
  - Conduct VOC and mercury sampling over two separate 8-hour sampling periods; and
  - Prepare sample and field documentation and submit samples for laboratory analysis.
- October 2022:
  - Receive analytical results from laboratory (10-day turn-around time);
- November/December 2022:
  - Compile and analyze data; and,
  - Submit data summary email to VTDEC.

Please call either of the undersigned at (617) 997-2208 or (617) 863-0499 if you have any questions or require additional information.

Yours sincerely,

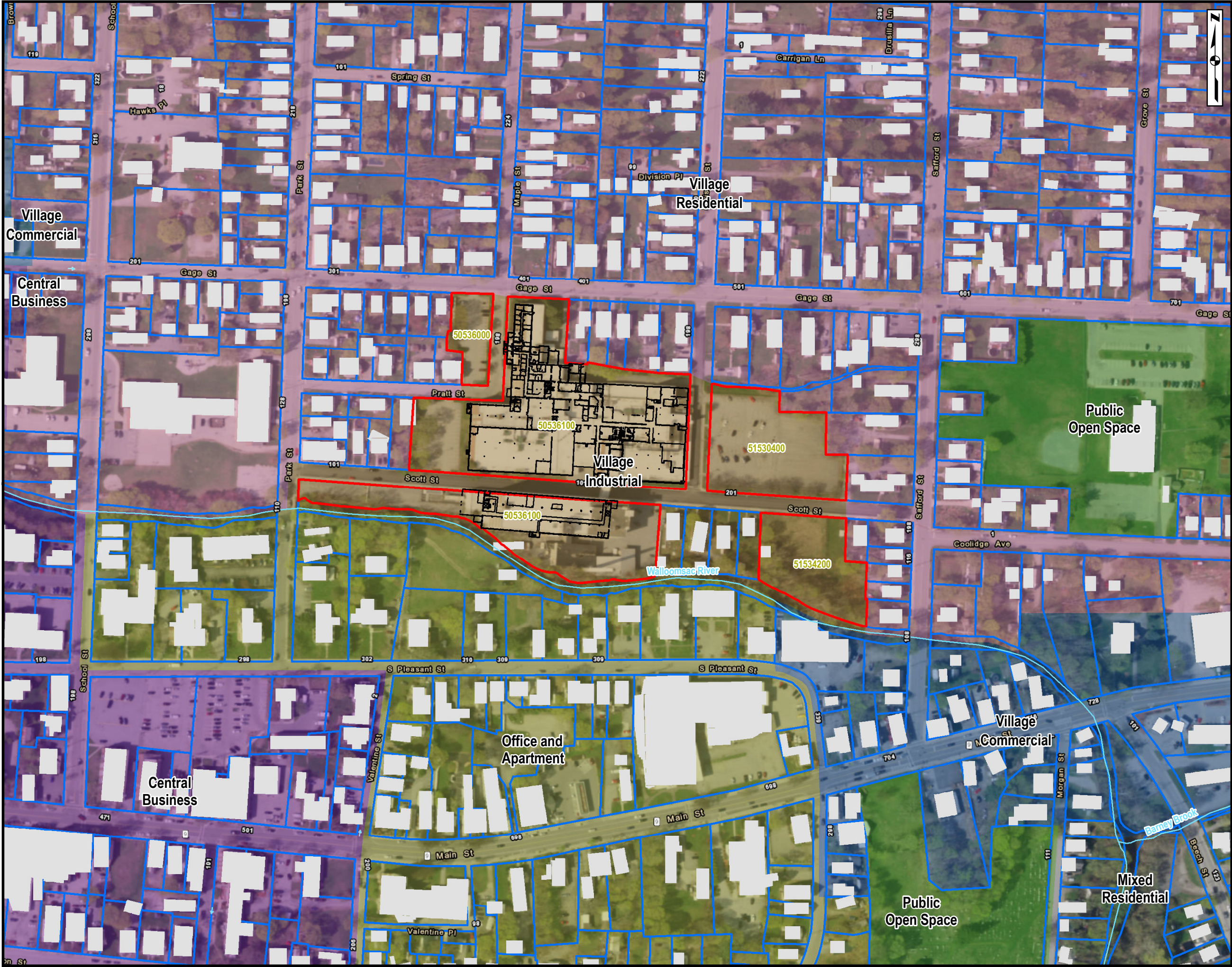


Catherine Regan, PE  
Partner



Jason Hnatko  
Project Manager

## FIGURES



#### Legend

- Site Building Outline
- Site Property Boundaries
- Tax Parcels

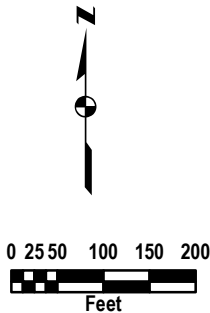
#### Zoning

- Central Business
- Office and Apartment
- Public Open Space
- Village Commercial
- Village Industrial
- Village Residential

50536100 Tax Parcel ID

#### NOTES:

1. Aerial Imagery: ESRI World Imagery  
Reproduced under license in ArcGIS 10.7
2. Data collected from Vermont Agency of Natural Resources



**Figure 1: Vicinity Map**  
Energizer Holdings, Inc.  
Bennington, Vermont



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bing



 Hg IA Sample  
 VOC IA Sample  
 Basement<sup>2</sup>  
 Site Building

**NOTES:**

1. Final sample locations will be field adjusted based on the findings of the building evaluation and room survey.
2. Assumed area of basement. IA samples collected in basement (not ground floor). Extent of basement to be confirmed.

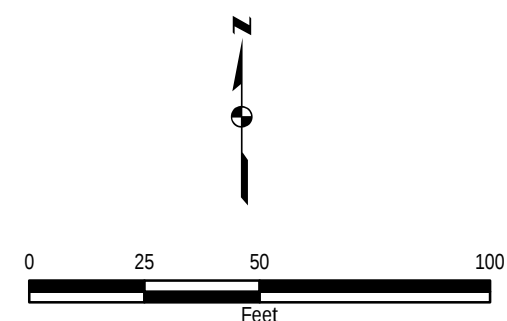
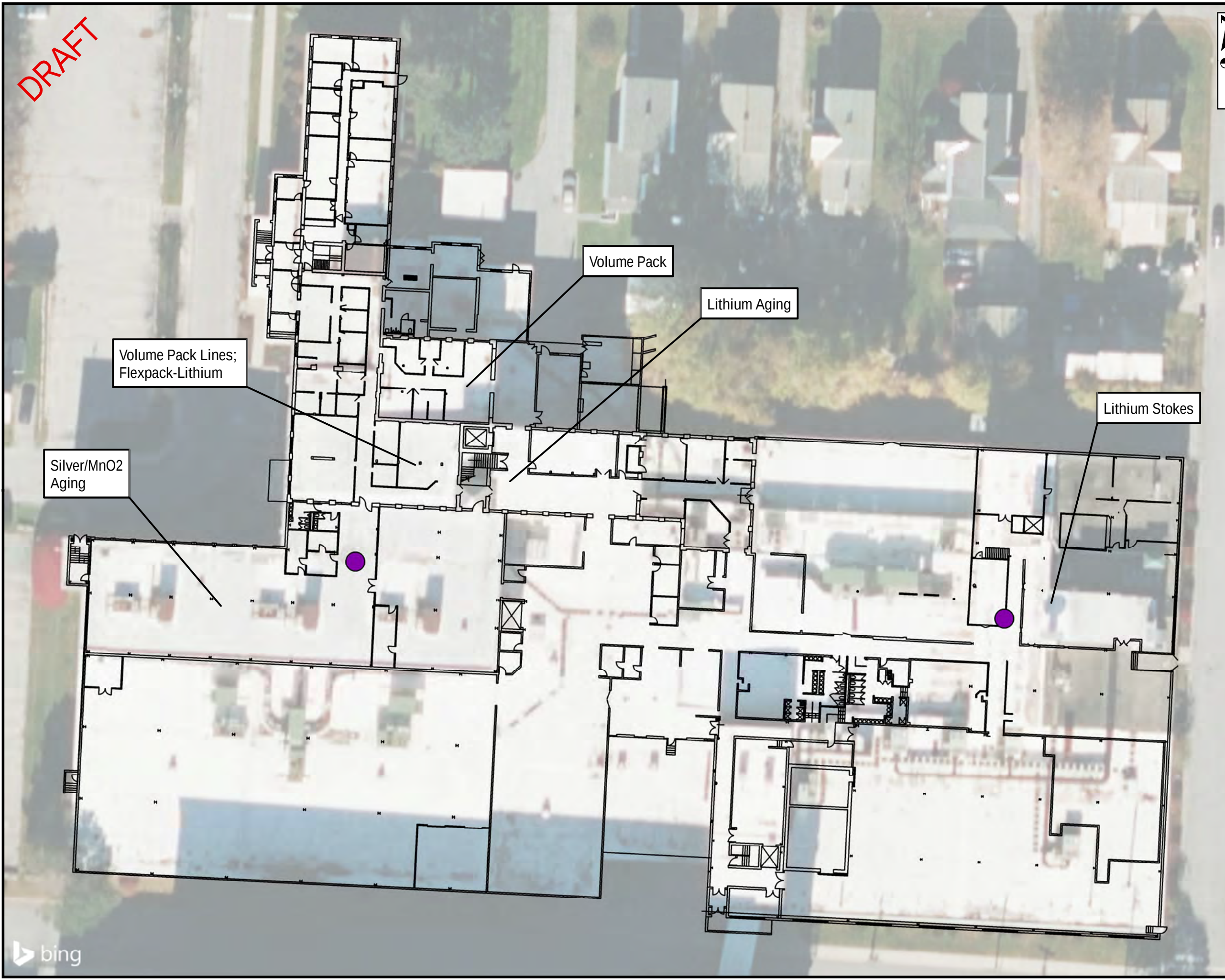


Figure 2a: Proposed Indoor Air Sampling Locations  
Plant 1, Basement  
Energizer Holdings, Inc.  
Bennington, Vermont





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Legend

Proposed Indoor Air Samples<sup>1</sup>

- Hg IA Sample
- VOC IA Sample
- Site Building

NOTES:

1. Final sample locations will be field adjusted based on the findings of the building evaluation and room survey.

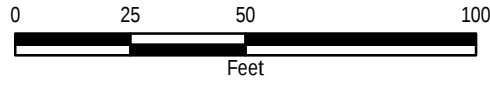
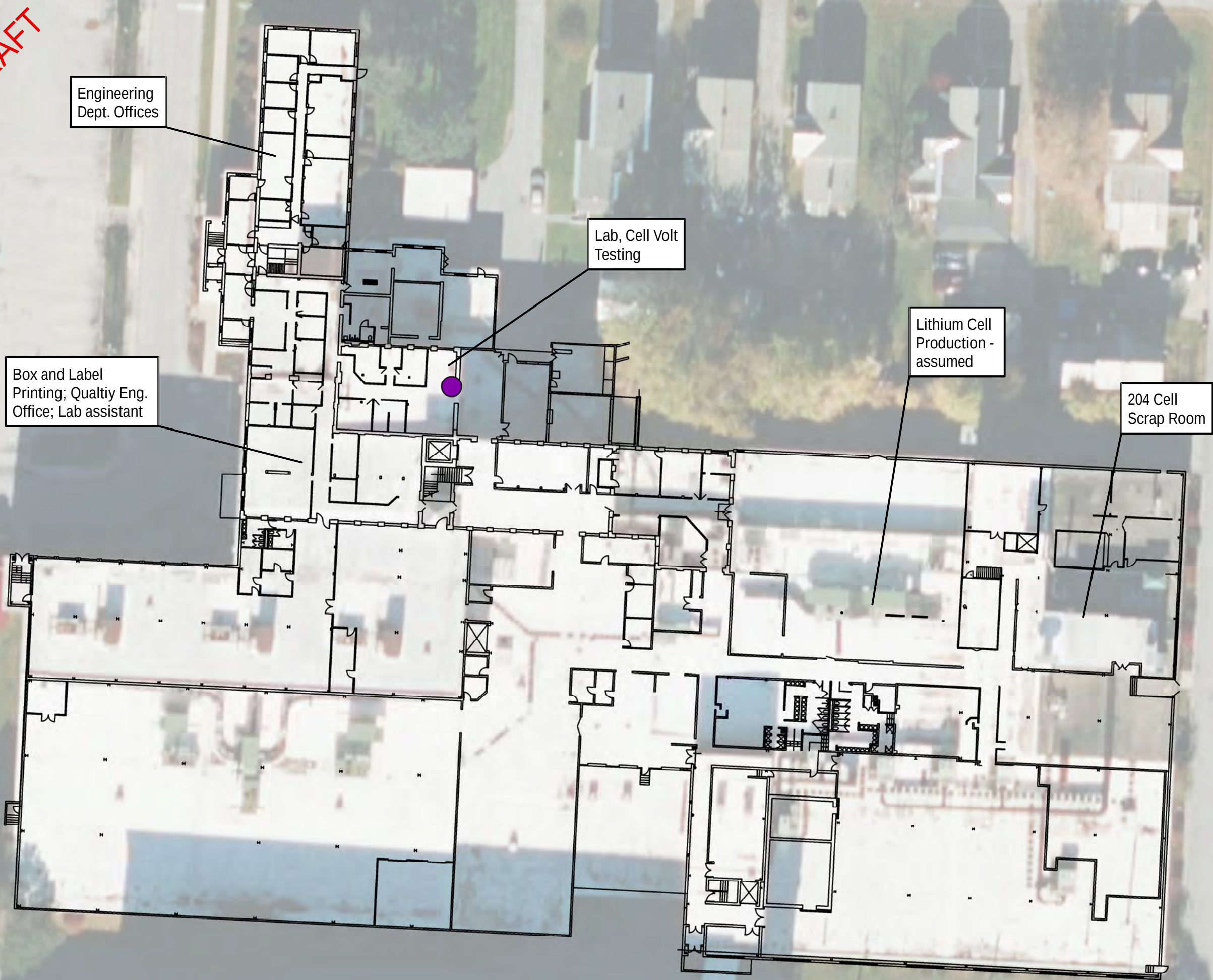


Figure 2c: Proposed Indoor Air Sampling Locations  
Plant 1, Second Floor  
Energizer Holdings, Inc.  
Bennington, Vermont

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- Legend
- Proposed Indoor Air Samples<sup>1</sup>
- Hg IA Sample
  - VOC IA Sample
  - Site Building

NOTES:

1. Final sample locations will be field adjusted based on the findings of the building evaluation and room survey.

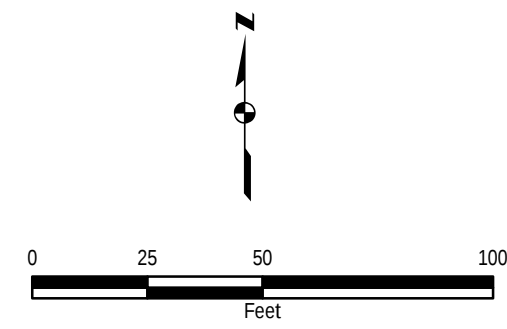
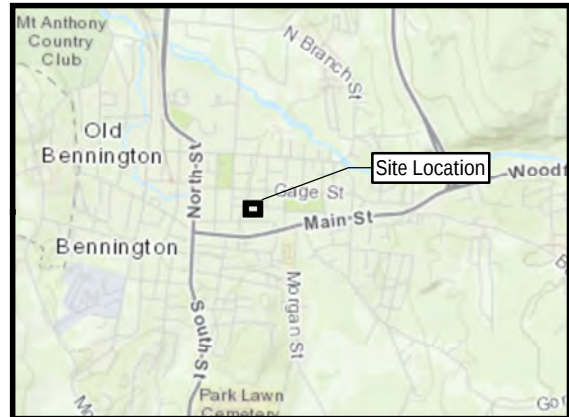


Figure 2d: Proposed Indoor Air Sampling Locations  
Plant 1, Third Floor  
Energizer Holdings, Inc.  
Bennington, Vermont

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Legend

Proposed Indoor Air Samples<sup>1</sup>

-  Hg IA Sample
-  VOC IA Sample

 Site Building

NOTES:

1. Final sample locations will be field adjusted based on the findings of the building evaluation and room survey.
2. Former first floor use: gasket coating, gasket molding, seal molding.

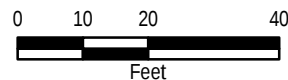
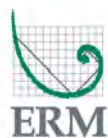
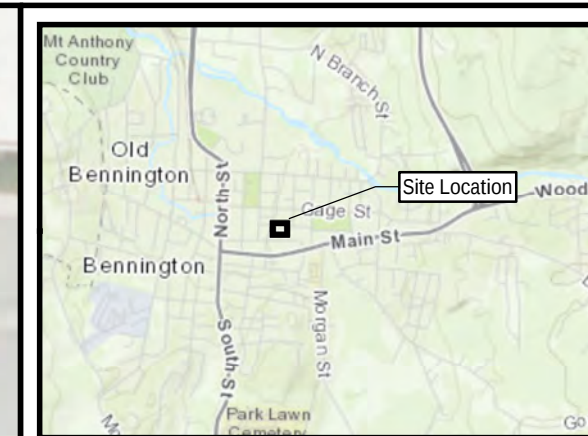
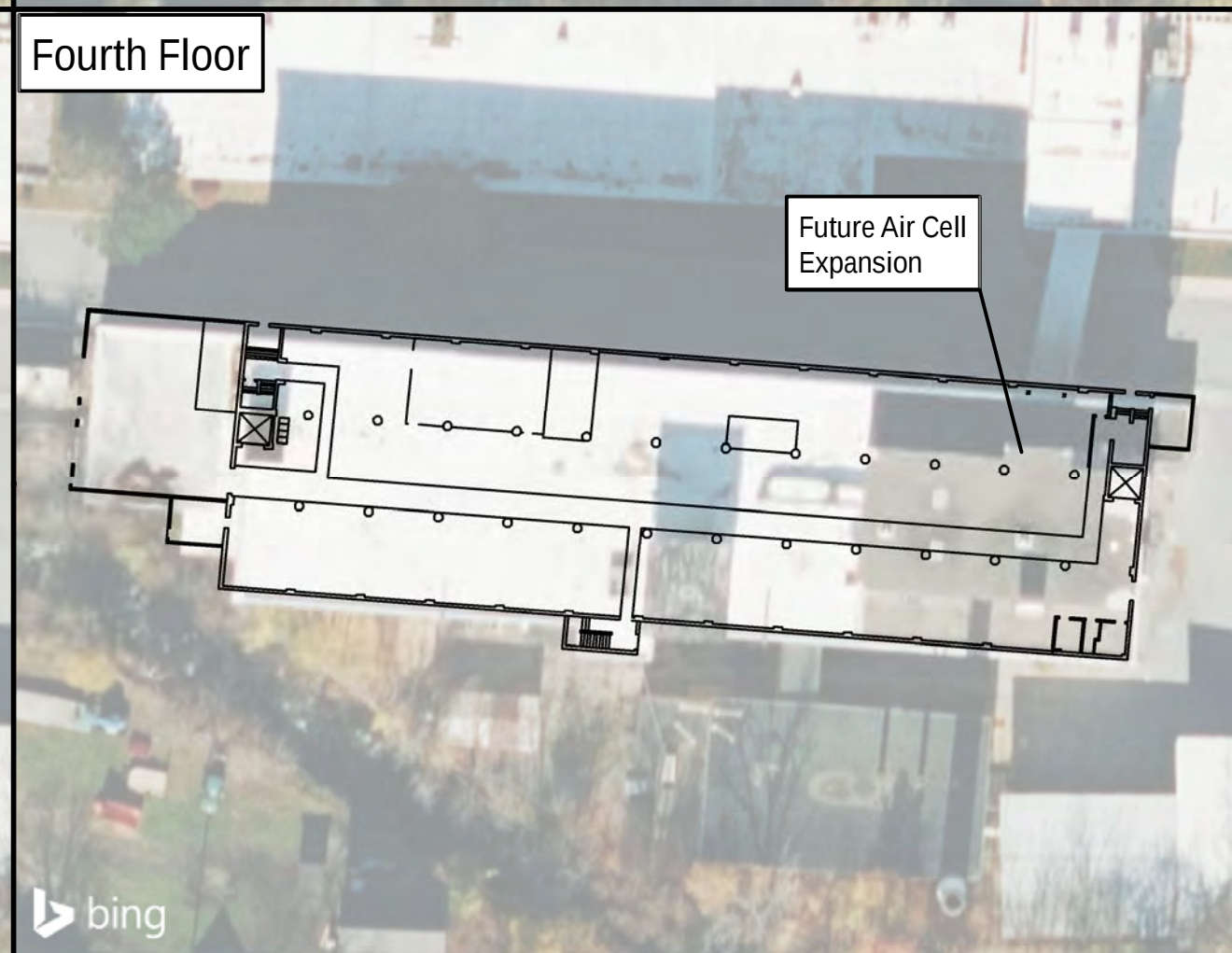
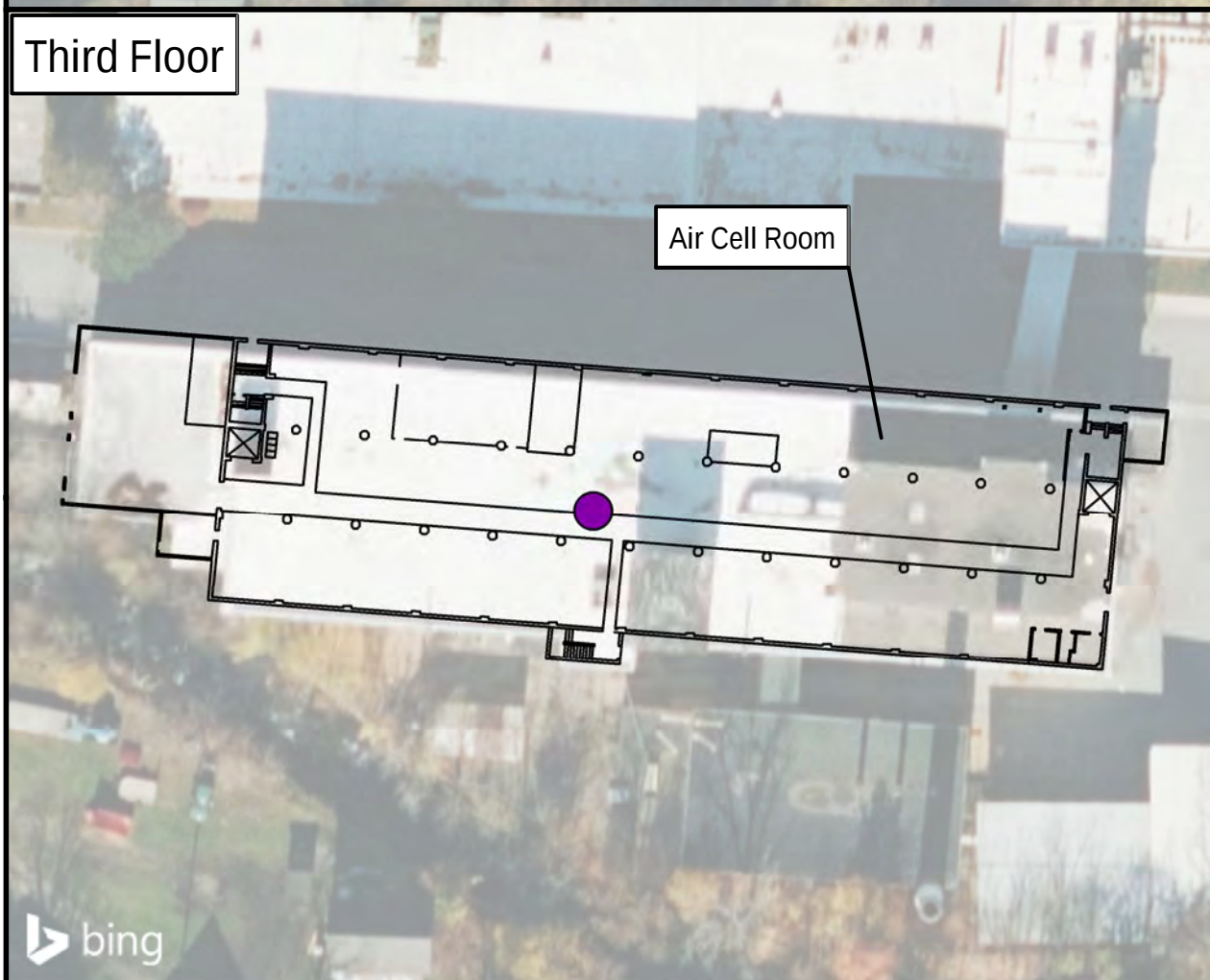
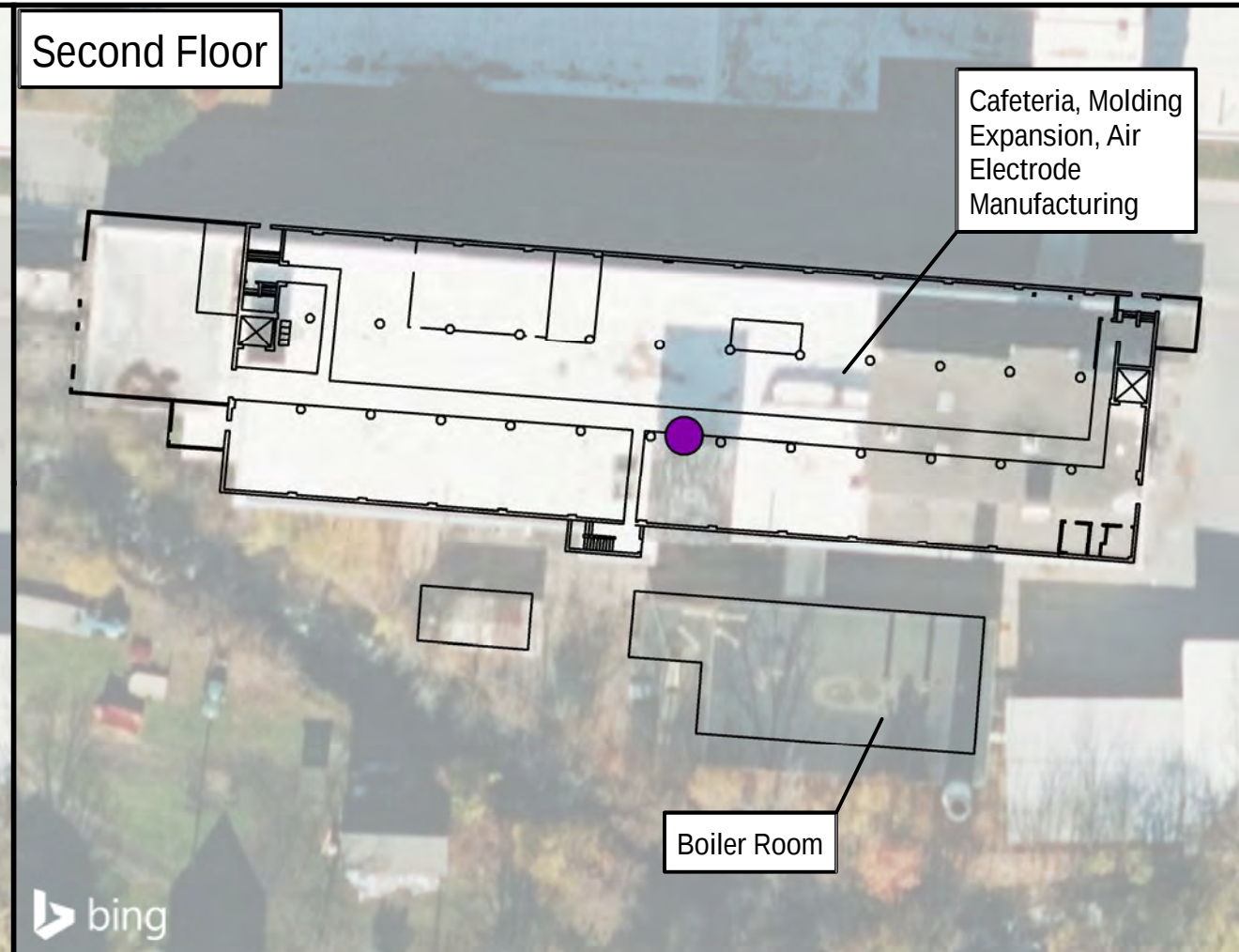
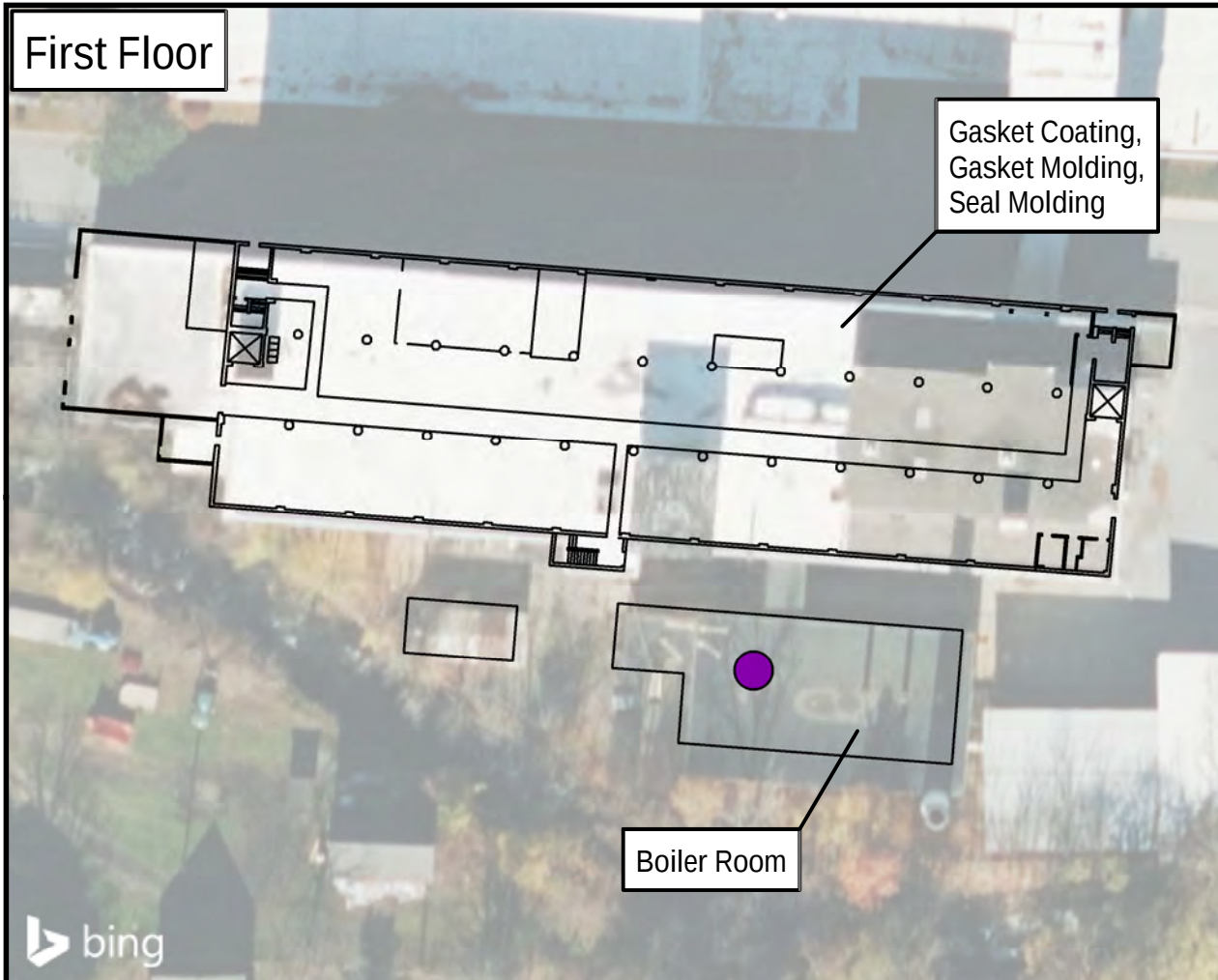


Figure 2e: Proposed Indoor Air Sampling Locations  
Plant 2, First Floor  
Energizer Holdings, Inc.  
Bennington, Vermont





Legend

Proposed Indoor Air Samples<sup>1</sup>

● Hg IA Sample

□ Site Building

NOTES:

1. Final sample locations will be field adjusted based on the findings of the building evaluation and room survey.

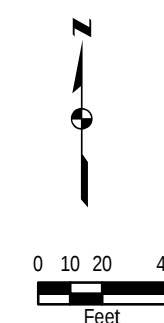
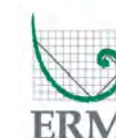


Figure 2f: Proposed Indoor Air Sampling Locations  
Plant 2  
Energizer Holdings, Inc.  
Bennington, Vermont



## **APPENDIX A      EXAMPLE FIELD SAMPLING FORMS**



