OBG

REPORT

Corrective Measures Study Interim Report - Institutional and Engineering Controls Plan

GE Aviation – Evendale Facility
Evendale, Hamilton County, Ohio

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1. INTRODUCTION

This Interim document describes the Institutional and Engineering Control Plan (I&EC Plan) for the GE Aviation facility (Facility) located in Evendale, Ohio (**Figure 1**). This I&EC Plan has been prepared in accordance with the USEPA-approved Corrective Measures Study (CMS) Work Plan (OBG, 2014).

1.1. BACKGROUND

The GE Aviation facility is located on an approximately 400-acre site in Ohio's Hamilton County, approximately ten miles north of Cincinnati. The Facility is a secure, highly active, manufacturing facility located within the heavily industrialized I-75 corridor between Cincinnati and Evendale, Ohio. The Facility has been used for military and commercial turbine engine manufacturing since the 1940s. Due to established site security and continued future industrial use, engineered controls, in combination with an institutional control (environmental covenant), are anticipated to be sufficient to control potential exposure to chemical constituents in the soil, soil vapor and groundwater exposure pathways within the boundaries of the Facility.

1.1.1. SWMUs/AOCs and Impacted Environmental Media

Impacted environmental media associated with previously identified solid waste management units (SWMUs) and areas of concern (AOCs) at the Facility include soil, soil vapor and groundwater. These impacts were identified during the previous Remedial Facility Investigation (RFI) and documented in numerous reports (see Section 6 – References). Table 1 includes a summary of the SWMUs/AOCs at the Facility. Figure 2 identifies the approximate locations of the SWMUs/AOCs without surveyed descriptions for this I&EC Plan. The major groups of chemical constituents associated with these SWMUs/AOCs, referred to as Chemicals of Potential Concern (COPCs) include chlorinated volatile organic compounds (CVOCs; specifically, trichloroethene (TCE)), total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals (specifically arsenic, cyanide and nickel).

1.1.2. Preliminary Soil Pathway Analysis

Following a review of recommended further actions as documented in the 2014 CMS Work Plan, GE completed a preliminary soil pathway analysis to identify the areas that could potentially require risk management at the Facility. The results of this soil pathway analysis were provided to USEPA in the July 2014 CMS Interim Report and are also included in the attached Table 1.

1.1.3. Definitions

According to the USEPA Office of Solid Waste and Emergency Response (OSWER) Guide Sheet (November 2010), engineering or engineered controls (ECs) "encompass a variety of engineered and constructed physical barriers (e.g., soil capping, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. An institutional control (IC) is an "administrative or legal instrument (e.g., deed restrictions/notices, easements, covenants, zoning) that impose restrictions on the use of contaminated property or resources. ICs can also identify the presence of ECs and long-term stewardship requirements. Long-term stewardship refers to the activities necessary to ensure that ECs are maintained and that ICs continue in force."

1.2. OBJECTIVES

The corrective measures to be implemented at the site will depend on the implementation of an effective program for engineered and institutional controls for the site. The basis of this program will be an environmental covenant. The objective of this I&EC Plan is to establish the procedures to prevent exposure to subsurface impacted media (soil, groundwater and soil vapor) at the Facility. The approach to meet this objective includes:

- Protection of site employees and workers from exposure to subsurface impacted media;
- Establishment of procedures that should be followed to maintain compliance with safety and environmental regulations; and
- Identifying areas for the application of specific controls, and the plans and procedures for maintaining and managing these controls.

Additional items associated with completing the final I&EC Plan will be addressed in the CMS. The final I&EC Plan will provide for a comprehensive review of corrective measures at least every five years. This review will include an evaluation of the progress of corrective measures, documenting the continued efficacy of institutional and engineered controls, and providing recommendations for changes to the corrective measures program, as appropriate, based on changing conditions.

The general strategy of management-in-place is to minimize direct exposure, and to provide for an incomplete pathway for the movement of COPCs. When impacted materials remain on site at concentrations above values for an unrestricted use/unlimited exposure (UU/UE) scenario, I&ECs are typically applied to prevent or limit exposure to COPCs. This is typically accomplished by maintaining engineered barriers (e.g., caps of clean soil, buildings, and pavement) over impacted areas and by developing and implementing controls over activities, such as utility repairs or construction work, involving disturbance of engineered barriers or potential exposure to workers. After an environmental covenant has been placed on the property, this approach allows for safe, continued operations.

2. CONCEPTUAL SITE MODEL

2.1. SITE LOCATION AND DESCRIPTION

The GE Aviation facility is located on an approximately 400-acre site in southwestern Ohio's Hamilton County. The Facility is situated in the Mill Creek Valley between the West Fork and Mill Creek and generally bordered by Interstate 75 to the west, the Mill Creek and CSX-Norfolk Southern railroad tracks to the east and southeast, Glendale-Milford Road to the north, and Shepherd Lane to the south (Figure 1).

The GE Aviation manufacturing plant in Evendale was originally established as a World War II aircraft engine production plant in the 1940's by Wright Aeronautical and was occupied by General Electric beginning in 1948. GE acquired a major portion of the plant in 1958. GE began operations as a manufacturer of military aircraft engines, but later expanded to the manufacture of commercial engines beginning in the early 1960's. In 1989, GE acquired the adjacent Ford Motor Company warehouse (north end of Facility) and the U.S. Air Force (USAF) Plant 36 (former AFP36) complex (south end of Facility). Former AFP36 was situated on a 66.4-acre parcel of land located within the confines of property now owned by GE Aviation (Figure 1). This area was used to support and supplement the activities of the adjacent GE-owned property.

The Interstate 75 corridor between Cincinnati and Evendale is heavily industrialized. Property use in the area surrounding the Facility includes heavy industrial and general industrial areas to the east, an independent trucking operation to the north, public facilities, and general commercial and industrial areas to the south. Industrial properties located northeast to southeast of the Facility include Formica, Barrett (Cavett) asphalt plant, Dow/Rohm & Haas chemical (former Morton, Carstab), Cincinnati Drum Recycling, the City of Reading former municipal landfill, incinerator, and ash fields, and the Pristine Superfund Site. In addition, the former DuPont Lockland Works was located to the west of the Facility (Figure 1). Residential properties of the City of Reading are located to the southeast, the Village of Evendale to the east, and the Village of Lincoln Heights, City of Wyoming, and Village of Lockland to the west/southwest of the Facility.

2.2. PHYSICAL SETTING AND SUBSURFACE CONDITIONS

The Facility is located in the Till Plains section of the Central Lowland Province of Ohio, a broad plateau which has been dissected by a number of large valleys. Mill Creek Valley, which trends north-northeast to south-southwest, is one of these dissecting valleys. Locally, the valley is drained by the East and West Forks of Mill Creek, the confluence of which lies approximately 1.5 miles south of the Facility.

Subsurface conditions at the Facility are characterized as follows:

- Soils beneath the Facility consist of unconsolidated overburden materials composed of fill material and silty clay to an average depth of approximately 10 feet, grading into the sand and gravel of the saturated Perched zone.
- The stratigraphy underlying the study area consists of five major sedimentary facies:
  - Perched zone – groundwater flow is south-southeast
  - Upper Confining Layer (discontinuous silt and clay unit)
  - Upper Sand and Gravel (USG) – groundwater flow predominately southwest with a southeast component
  - Lower Confining Layer (discontinuous silt and clay unit)
  - Lower Sand and Gravel (LSG) – groundwater flow is south-southwest.
- The constituents of potential concern (COPCs) identified in surface and shallow soils are comprised of several different chemical classes, including metals (arsenic, cyanide, and nickel), PAHs, PCBs, VOCs (TCE), and TPH.
- The COPCs found in groundwater consist of TCE and its daughter products cis- and trans-1,2-dichloroethene (cis/trans-1,2-DCE); 1,1-dichloroethene (1,1-DCE); vinyl chloride (VC); and 1,1,1-trichloroethane (TCA) and

its daughter product 1,1-dichloroethane (DCA). These chlorinated aliphatic hydrocarbons are referred to herein as chlorinated volatile organic compounds or CVOCs.

- Observations of aquifer conditions favorable to anaerobic degradation of CVOCs and of degradation products, such as cis-1,2-DCE, vinyl chloride, and 1,1-DCA suggest that the TCE and TCA are undergoing natural attenuation via mechanisms such as biodegradation, dispersion, and sorption. Intrinsic biodegradation is occurring in the three water-bearing units (Perched, USG, and LSG), and together with other natural attenuation mechanisms, is affecting the overall limits of the groundwater CVOC plume.
- The overall extent of impacted groundwater in the Perched zone, USG, and LSG appears to be stable or decreasing, as evidenced by stable or decreasing: 1) total mass of the plumes, 2) center of mass of the plumes and 3) most individual well concentrations.

2.3. SUMMARY OF PREVIOUS INVESTIGATIONS

Several investigations of soil and groundwater conditions at the Facility have been completed (Geraghty & Miller, 1988; Geraghty & Miller, 1989), including implementation of a RCRA Facility Investigation (RFI) (O'Brien & Gere, 1995). In 1985, the USAF initiated a concurrent environmental assessment and characterization of the former AFP36 property (Figure 1), conducted under the USAF Installation Restoration Program (IRP). The assessments included a number of investigations to identify source areas and associated environment impacts (Engineering-Science, 1985; Chem-Nuclear Geotech, 1993; Earth Tech, 1997; Earth Tech 2003; and Earth Tech, 2004). In addition, O'Brien & Gere completed a treatability study, evaluation of IRM alternatives, source area investigation, aquifer performance testing, groundwater sampling and conceptual site model updates between 2006 and 2008.

As a result of investigative activities by GE Aviation, the focus of environmental investigations shifted toward developing a better understanding of the nature and extent of constituents of potential concern (COPCs) in the subsurface beneath the Facility, and in particular, the groundwater migrating off-site from the southern end of the Facility.

2.3.1. Interim Measures

In the early 1990s, several interim measures were undertaken to assess the need for, or to begin remedial measures for, selected areas identified by GE, USAF and the USEPA. These interim measures include (Figure 2):

- Implementation of soil and groundwater treatment in two product release areas
- Implementation of groundwater treatment for containment purposes at two perimeter locations
- Investigation of an abandoned fuel transfer line of suspect integrity, including remediation of soils along one section of the pipeline in a suspected release area
- Site-wide inventory of underground storage tanks (USTs)
- Investigation and remediation of sediments in the plant drainage ditch for VOCs and metals.

In 2009, a groundwater Interim Remedial Measure (IRM) was initiated to address off-site migration of CVOCS in the southern (downgradient) portion of the Facility within the area of former AFP36 (O'Brien & Gere, 2009). The groundwater remedial measure was initiated with the objective of mitigating off-site migration of COPCs, while minimizing the risk of cross-contamination and/or reducing the effectiveness of biodegradation processes. The groundwater IRM consists of seven groundwater extraction wells and a groundwater treatment plant (GWTP). The GWTP was started on July 11, 2011, following construction and commissioning of the system. Groundwater monitoring activities, including baseline monitoring, have been conducted since startup in accordance with the approach and methods outlined in the *IRM Performance Monitoring Plan* (PMP), O'Brien & Gere (2010).

In addition, cleanup activities of PCBs within the plant drainage ditch and a select number of storm sewer manholes were undertaken in cooperation with Ohio EPA during 2000.

2.3.2. SWMUs/AOCs and Impacted Environmental Media

Based on the USEPA's 1989 Facility-wide Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA), there were 135 solid waste management units (SWMUs) and 20 areas of concern (AOCs) identified at the Facility. As described in the approved CMS Work Plan, there are approximately 50 SWMUs/AOCs retained for further evaluation based on data from the Remedial Facility Investigation (RFI) and other previous investigations. Those remaining SWMUs/AOCs are listed in Table 1 and shown in Figure 2.

Impacted environmental media associated with the remaining SWMUs/AOCs at the Facility include soil, soil vapor, and groundwater.

2.3.2.1. Soil Vapor

Since 2006, GE has been actively investigating the potential for environmental impacts from the migration of vapors associated with impacted soil and groundwater. A large part of these investigations has included the collection of shallow (5 to 8 ft below ground surface (bgs)) and deep (12 to18 ft bgs) soil vapor concentrations focused on the southern portion of the Facility. CVOC concentrations are generally greatest and most widely distributed (relative to others) in the southern area. Also, CVOC-containing groundwater moves in a predominantly southward direction from the Facility. The investigations have revealed:

- Soil vapor was observed to attenuate by several orders of magnitude from deep to shallow sample locations and from shallow samples to indoor air within several of the buildings at the Facility. This attenuation is attributed to the low permeability of shallow silts and clays and to industrial building construction and operation (e.g., thick concrete floors, air exchange rates).
- Soil vapor has also decreased as much as several orders of magnitude over the history of vapor monitoring along the southern property boundary. This decrease is attributed to the effects of the groundwater IRM program (startup in 2011) and to natural attenuation of CVOCs in the aquifer.
- Minimal to non-detect concentrations of TCE and PCE have been identified in the perched groundwater zone along the southwest and southeast property boundaries. A significant decrease in soil vapor CVOC concentrations has occurred over time, such that the majority of soil vapor sampling locations around the perimeter of the site are now non-detect for CVOCs.

2.3.2.2. Soil

A review of surface and subsurface (<12 feet depth) soil data was conducted in 2015 as part of the soil exposure pathway evaluation, with results provided in the July 2015 CMS Interim Report. The review included data collected during completion of the RFI in 1995. The Facility data were compared to current USEPA Regional Screening Levels (RSLs) and background soil concentrations of metals for each of the Facility SWMUs and AOCs retained from the RFI for additional evaluation. Highlights of the soil pathway evaluation (OBG, July 2015) include:

- approximately 20 SWMU/AOCs were eliminated from further evaluation due to soil concentrations below USEPA industrial Regional Screening Levels (RSLs) or background, with a total of approximately 30 SWMUs/AOCs retained for further evaluation
- within the 30 SWMUs/AOCs retained for further evaluation, there were a total of eight COPCs identified in soil, including metals (arsenic, cyanide, and nickel), PAHs, PCBs, VOCs (TCE), and TPH
- Potential receptors included indoor/outdoor industrial workers, construction workers, utility workers and adult/adolescent trespassers. Using exposure dose/concentration and toxicity data, risk-based preliminary soil cleanup goals were calculated for each COPC for these potential receptors. Values for soil cleanup goals were lowest (most conservative) for the outdoor industrial worker or construction worker given the higher intensity of potential soil exposure by these potential receptors.

2.3.2.3. Groundwater

Groundwater conditions have been investigated since 1988, including quarterly RCRA groundwater monitoring, off-site investigations, and focused performance monitoring of the groundwater IRM since its startup in 2011. The overall extent of impacted groundwater in the Perched zone, USG, and LSG appears to be stable or

decreasing. A review of groundwater concentrations of CVOCs since 2007 for these water-bearing units indicates:

- ***Perched Zone*** - isoconcentration maps for the Perched zone for 2009, 2011 and 2013 indicate an overall decreasing extent of the Perched zone plume(s), especially downgradient of the Perched zone extraction wells. Concentrations along the downgradient portion of the Perched zone plume(s) have dropped from highs of over 1,700 µg/L total CVOCs to 577 µg/L.
- ***Upper Sand & Gravel*** - concentrations along the eastern portion of the USG plume(s) have dropped from highs of over 3,700 µg/L total CVOCs to approximately 1,400 µg/L. The overall size of the USG plume(s) along the western portion of the Facility has remained stable, with concentrations decreasing from highs of over 500 µg/L total CVOCs to less than 50 µg/L.
- ***Lower Sand & Gravel -*** Concentrations within the LSG plume(s) beneath the Facility have dropped from highs of over 1,500 µg/L total CVOCs to generally less than 500 µg/L. The majority of LSG wells show decreasing trends, and the overall size and mass of the LSG plume has decreased.

Since startup on July 11, 2011, the IRM groundwater extraction system (GWES) continues to operate and the groundwater is monitored in accordance with the USEPA-approved PMP, including IRM performance monitoring (influent and effluent concentrations), and groundwater quality and hydraulic (water level) monitoring. A summary of groundwater performance monitoring results since initiation of the groundwater IRM is provided in a June 2015 CMS Interim Report. A review of water quality data for the IRM extraction wells indicates steady-state or decreasing concentrations in CVOCs, with fluctuations associated with plume movement within the system capture zone. Monitoring well hydraulic and chemical data do not indicate significant trends in vertical hydraulic gradients or VOC concentrations that are indicative of cross-contamination. Groundwater will continue to be monitored to evaluate the effectiveness of the IRM to mitigate the potential for off-site migration of COPCs. Natural attenuation of VOCs in groundwater will also continue to be monitored for its potential to mitigate off-site migration of dissolved COPCs.

2.4. CONSTITUENTS OF POTENTIAL CONCERN

The primary COPCs in soil identified during previous investigations are listed by SWMU/AOC in Table 1, including the results above RSLs and the maximum concentration of each COPC. The major groups of chemical constituents associated with these SWMUs/AOCs include VOCs, TPH, semivolatile organic compounds (SVOCs), PCBs, and metals (specifically arsenic, cyanide and nickel).

The primary COPCs found in groundwater consist of TCE and its daughter products cis/trans-1,2-DCE; 1,1-DCE; VC; and TCA and its daughter product DCA.

3. EVALUATION OF EXPOSURE PATHWAYS

Documentation for the Human Health Environmental Indicator (EI) under the RCRA program (CA725) was submitted to USEPA and approved in May 2000. As part of the EI evaluation, GE considered potential pathways of human exposure and identified one exposure pathway (groundwater) that could not be confirmed as incomplete.

As part of the CMS Soil Pathway Interim Report (OBG, 2015), a human health conceptual site model (CSM) was developed to identify the relationship between chemical impacts and the current and future potential receptors. The CSM was used to assist in identifying potential exposure pathways (dermal, inhalation, ingestion) that were not screened-out as incomplete under current and reasonably anticipated future industrial/commercial land use. As outlined in the Soil Exposure Pathway Interim Report, preliminary soil cleanup goals were developed that will form the basis for future development of soil corrective measures objectives (CMOs) and, ultimately I&ECs for the Facility. The development of risk-based soil cleanup goals does not consider potential vapor emissions from soil into the indoor spaces of worker-occupied buildings. As noted below, the vapor pathway is being evaluated separately and is not further discussed in this report.

Groundwater use restrictions in the form of an environmental covenant are anticipated to be sufficient to control potential exposure to chemical constituents in the groundwater within the boundaries of the Facility. Off-site migration of impacted groundwater and evaluation of the off-site groundwater exposure pathway will be addressed during development of groundwater CMOs and is not further discussed in this report.

The following sections provide an overview of potential exposure pathways, by medium, as relevant to the Facility on-site exposure pathway.

3.1. SOIL VAPOR/INDOOR AIR

Affected surface and subsurface soil which has the potential to contribute to vapors and the inhalation exposure route is restricted to the Facility. On-site, the surface soil-to-vapor pathway is not confirmed to be incomplete for industrial workers, construction workers, utility workers, and trespasser exposures. However, the potential for on-site exposures is low, given site conditions and because of engineered and procedural controls discussed in Section 4.0. In addition, the subsurface soil-to-vapor pathway is concluded to be incomplete for all exposure scenarios other than on-site construction or utility workers. The potential for exposure to construction or utility workers will be managed as discussed in Section 4.0.

As previously noted, the development of risk-based soil cleanup goals does not consider potential vapor emissions from soil into the indoor spaces of worker-occupied buildings and is being evaluated separately.

3.2. SURFACE SOIL

Affected surface soil is restricted to the Facility, rendering potential pathways to residential, recreational, and off-site worker exposures incomplete. On-site, the surface soil pathway is not confirmed to be incomplete for workers, construction workers, and trespasser exposures. The potential for such on-site exposures is low, however, given site conditions and because of engineered and procedural controls discussed in Section 4.0. Most of the SWMUs and AOCs are covered by buildings or pavement and affected surface soil is not exposed in most locations. Where the SWMUs and AOCs are not covered by buildings or pavement, access is restricted, which limits the potential for exposure to on-site workers. The site also has fencing, surveillance, and security, preventing trespass, and limiting the potential for exposures under this scenario. Management methods to minimize exposure to construction or utility workers are discussed in Section 4.0.

3.3. SUBSURFACE SOIL

The subsurface soil pathways are confirmed to be incomplete except for on-site construction or utility worker scenarios. Subsurface soil with COPC concentrations above Industrial RSLs has been detected only on-site. The potential for exposure to construction or utility workers will be managed as discussed in Section 4.0.

3.4. GROUNDWATER

Construction or utility workers cannot reasonably be expected to be exposed to affected groundwater (at depths of 12 feet or less). Affected groundwater in the Perched zone is below the typical depth of construction, but may be encountered by utility workers. Section 4.0 discusses the management plan for construction and utility installation/repair projects.

4. MANAGEMENT PLAN

GE intends to employ a corrective action approach to attain cleanup standards for industrial land use, therefore, the establishment of the engineered and institutional controls are crucial in ensuring that the industrial cleanup standards remain protective. The establishment of an environmental covenant will ensure that the Facility will not be compromised by future site activities within these impacted areas.

4.1. ADMINISTRATIVE CONTROLS AND RESPONSIBILITIES

GE will prepare an environmental covenant describing specific restrictions and limitations for the Facility. The covenant will ensure that future activities will not unreasonably compromise impacted areas. The covenant will require that excavations or other disturbances of soils in identified impacted areas be in compliance with the conditions presented within this Plan. The covenant will include legal descriptions of the impacted areas and ALTA survey metes and bounds of those areas. In addition, the covenant will prohibit residential land use of the entire Facility. Potable use of groundwater at the Facility will also be prohibited.

The I&EC Plan will be maintained by GE for onsite activities within the impacted areas. A mechanism will be established by GE for reviewing and authorizing intrusive activities within impacted areas at GE. Based on the established mechanism, restrictions to the proposed intrusive activities, if any, and the required documentation will be determined and provided for in the authorization provided by GE.

Specific roles and responsibilities under this plan include:

Facility Environmental Health & Safety (EHS)

- Review plans for construction or utility installation/repairs in impacted areas, within the metes and bounds descriptions contained in the covenant.
- Coordinate with Facility leaders and activity leaders on activities which could disturb engineered caps (unimpacted soil cover, concrete, and pavement) or could involve potential exposure or intrusive activities within impacted areas.
- Review JSAs and performing H&S auditing of job sites as necessary.
- Specify requirements for characterizing, profiling, transporting and disposal of soil or other impacted materials/media.
- Perform annual inspections of ECs.
- Maintain documentation of annual EC inspections and maintenance.

Facility Leadership, Engineering and Production Support

- Involve Facility EHS personnel in planning of activities which may disturb identified impacted areas.
- Adhere to the I&EC Plan.

Facility EHS Site Workers and Contractors (only those involved in intrusive activities)

- Adhere to Facility contractor safety requirements, including using safe work practices and proper use of personal protective equipment (PPE).
- Adhere to the I&EC Plan.

4.2. FACILITY MANAGEMENT STRATEGY

In general, Facility EHS will provide the following oversight for construction or other activities that have the potential to disrupt a cap or may uncover contaminated materials within impacted areas:

- Establish and implement a training program for contractors to meet the requirements of this Plan.
- Inspect or audit the project areas for conformance to the Plan, as appropriate.

4.2.1. Soils

Soils on the Facility are impacted mainly by CVOCs, and to a lesser degree by PCBs, PAHs and metals. Impacted soils with concentrations above soil cleanup goals will be defined by metes and bounds descriptions in the environmental covenant. Implementation of this I&EC Plan will assure continued control over unacceptable exposure to COPCs at these impacted areas. Controls will be accomplished through planning and Facility EHS involvement in construction or utility installation or repair projects within these designated areas. As mentioned previously, Facility EHS will establish health and safety requirements, coordinate with project personnel to promote safe work practices, and provide procedures for the appropriate handling of impacted materials.

4.2.2. Groundwater

Groundwater in select areas of the Facility contains COPCs above USEPA tap water RSLs and groundwater CMOs[1]. It has been demonstrated that groundwater is not a drinking water source at the Facility, and construction and/or utility workers are not reasonably expected to be exposed to affected groundwater at depths of 12 feet or less. A groundwater interim remedial measure (IRM) in the form of a groundwater pump and treat system is located in the southern (AFP36) portion of the Facility, that involves the extraction of groundwater from seven wells that are installed in three different groundwater-bearing zones.

The IRM system performance is currently monitored with quarterly groundwater sampling and reporting events for volatile organic compounds (VOCs) and semi-annual monitoring for natural attenuation. Monitoring reports are submitted to USEPA on a quarterly basis. In addition, the monitoring wells that are a part of the IRM monitoring network are inspected on an annual basis for signs of damage or evidence of unauthorized entry to the casing, locking cap, protective cover or concrete pad. Well deficiencies are documented and addressed as necessary.

4.3. ENGINEERED CONTROLS MONITORING AND MAINTENANCE

Impacted areas on the Facility, which will be identified by metes and bounds within the environmental covenant, are generally covered by buildings, asphalt/concrete pavement or uncontaminated soils. We do not anticipate the installation of new ECs for the impacted areas. These areas have the potential to subside and/or become damaged over time, and therefore may warrant regular monitoring and maintenance. Typical causes of these damages can include differential settling of soils, cracks or potholes from freeze/thaw cycles or constant vehicular traffic or excessive vegetative growth.

GE, or an authorized contractor, will conduct annual inspections of ECs in impacted areas. Damage that unacceptably impedes the effectiveness of ECs will be repaired. Records of the inspections and repair activities will be maintained by GE, as appropriate.

4.3.1. Construction Projects

Contractors and GE personnel involved in construction projects located within or near an impacted area will follow the I&EC Plan as well as internal GE protocols for intrusive work and proper handling of COPC-containing soils. Facility EHS will participate in the review and planning of construction projects. Project planning will include a review of health and safety requirements and contractor qualifications, and coordination of impacted soil management and contingency plans, as may be appropriate to the work. Project-specific JSA documentation may also be developed at the discretion of Facility EHS.

4.3.2. Utility Installations/Repairs

Similar to construction projects, Facility EHS will coordinate with persons involved in utility installation and repair projects located within or near an impacted area. Intrusive repair works within an impacted area will be performed in compliance with Facility safety priorities and procedures and this I&EC Plan.

The following minimum procedures will be followed when excavating into impacted soils through an EC:

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[1] Groundwater CMOs are under development and will be submitted to EPA for approval under a separate document

- Work will conform to Facility safety priorities and procedures and this I&EC Plan. The contractor will meet GE's pre-qualification requirements.
- Cover material that has been removed will be segregated to the extent practicable so they can be reused and replaced following completion of the project. Excavated impacted soils will be placed either on an impervious surface and covered or within a container, such as a drum or a roll-off box.
- Following completion of the work, the excavated impacted soils will be managed in accordance with approved Facility EHS protocol for reuse or disposal, making sure to restore the area in a manner consistent with the original condition (*e.g.*, pavement vs. clean soil cover).
- If offsite transport and disposal is determined to be necessary, procedures for these activities are documented in Section 4.4 below.

4.3.3. Emergency Response Actions

In the event it becomes necessary to disturb soils in impacted areas due to an emergency response situation, first responders will immediately report the activities to Facility EHS, who will ensure adherence to the Plan. Situations like this could include emergency utility repair, spills, natural disasters and fires. If an emergency response is determined to be necessary, Facility EHS will notify USEPA after these events occur.

4.4. OFFSITE MANAGEMENT OF SOILS AND OTHER IMPACTED MEDIA

If it is determined that impacted soils or other environmental media or materials need to be transported offsite for proper disposal, Facility EHS will adhere to the following procedures:

- Facility EHS will determine if the materials require characterization or waste profiling for the transport, storage and disposal facilities that are approved for offsite disposition.
- Materials that have been designated for offsite disposal will be managed according to applicable regulations.
- Materials awaiting analysis for offsite disposal will be staged within a covered container or on plastic sheeting or impermeable surface with a plastic cover so as to protect against the effects of adverse weather. Materials should be staged appropriately until results are received and the material is ready for final disposition.

4.5. MAINTENANCE OF CONTROLS

GE will be responsible for the implementation, maintenance, and modification/termination of the ECs. Facility EHS will perform annual inspections of ECs to assess the condition and functionality of ECs. Functional deficiencies (e.g., preventing soil dust inhalation, preventing dermal contact) identified during the annual inspections will be corrected within a period of time specified by Facility EHS.

4.6. SUBMITTALS / REPORTING

GE will maintain records of inspection and maintenance of controls, as appropriate. Reporting requirements as outlined in the CMS Work Plan will continue to be followed until the CMS Report is approved by USEPA. Following CMS approval, a five-year regulatory review summarizing on-going monitoring activities will be conducted and summarized in a letter report to USEPA.

5. SUMMARY

This I&EC Plan outlines numerous Facility management and maintenance practices to minimize the potential for exposure to COPCs in groundwater, soils and soil vapor. The practices include:

- Institutional and Engineering Controls will be formalized through an Environmental Covenant.
- Where applicable, health and safety plans will be used to protect site workers and/or contractors from remaining COPCs in impacted areas.
- Buildings, asphalt/concrete pavement and unimpacted soil covers exist on top of the majority of the impacted areas at the facility. The cover at designated areas will be periodically inspected and maintained to preserve functionality.
- The Facility will manage in place the impacted areas through safe work practices that identify COPCs and procedures for working within impacted areas.
- Roles and responsibilities have been outlined in this Plan to assure long-term stewardship and maintenance of the Plan provisions.

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TABLES

Soil Screening Evaluation Summary for SWMUs/AOCs GE Aviation - Evendale Ohio

SWMU Number		IRP Site No.	RFA	RFI		Recommended Further Action[3]
			Evidence of Release	Results Above Industrial RSLs[1]	Retained Metals Above Background?[2]	
8/12	Temporary Drum Storage Area (Former Bldg. 509) / Drum Crusher Unit		Yes	TCE, benzo[a]pyrene, benzo[b]fluoranthene, TPH, PCBs, As	None	CMS
14	Battery Storage Area		Yes	As	None	--
16	Weigh Station Sump		Yes	TPH, As	As	CMS
17	Reading Road Landfill		Yes	As	As	CMS
18	Sludge Basin Landfill		Yes	TPH, As	As	CMS
19	East Landfarm		No	As	None	--
20	Former North Landfarm		No	Benzo[a]pyrene, benzo[b]fluoranthene, As	None	CMS
21/22	Former 508 Sludge Basin		Yes	TCE, benzo[a]pyrene, benzo[b]fluoranthene, PCBs, TPH, As, CN, Ni	Ni	CMS
27/28	Former Lime Precipitate Basins 1 and 2		Yes	As	As	CMS
29	Lime Precipitate Basin 3		Yes	As	None	--
31	Lime Precipitate Basin 5		Yes	TPH, As	None	CMS
42	Former Chip Loading Area	SS-20	No	--	--	--
61/67	Underground Waste Oil/Fuel Storage Tank 304-7		No	--	--	--
79	Former Bldg. 800 Wastewater Pretreatment System		No	--	--	--
86	Oil/Water Separator 301-2		No	--	--	--
87/88	Oil/Water Separators 303-1 and 303-3		No	PCBs, As	None	CMS
93/94	Oil/Water Separators 500-1E and 500-1W		No	TPH, As	None	CMS
95	Oil/Water Separator 500-2		No	--	--	--
98/99	Oil/Water Separators 703-1E and 703-1W		No	--	--	--
100	Oil/Water Separator 707-1		No	As	None	--
118	Process Sewer System - Sanitary Sewer	SD-23	No	PCBs	--	IRP
122	Stormwater Pumphouse 422		No	As	None	--
123	Stormwater Pumphouse 423		No	As	None	--
124	Stormwater Pumphouse 506		No	As	As	CMS
141	Gravel Media Coalescing Separator	SD-26	No	TPH	--	IRP
142	Bldg. 800 Machine Sump (Added 1/16/91)		No	TPH, As	None	CMS
AOC A	Bldg. P Fuel Spill	SS-27	Yes	--	--	--
AOCs D and I	Bldg. B Fuel Spills No. 1 and 2	SS-28/SS-29	Yes	TPH	--	IRP
AOC L	Bldg. 304 Fuel Spill		Yes	TPH	-	CMS
AOC W2 / SWMUs 62/63	Inactive Underground Product Storage Tanks 417-E M-1; Underground Waste Oil/Fuel Storage Tanks 417-2 and 417-3		Unknown	--	--	--
AOC W3 / SWMUs 64/68	Inactive Underground Product Storage Tanks 515-1 to 27		Unknown	TPH	--	CMS
AOC W4 / SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14		Unknown	TPH	--	CMS
AOC W10 / SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5	ST 15-19	Unknown	TPH	--	IRP
AOC LD	Bldg. 700 South Loading Dock		Yes	TCE	--	CMS
AOC PST	TCE/TCA Product Storage Tanks		Yes	TCE	--	CMS

Notes:

RSL - Regional Screening Level

(1) Analytical results were compared to USEPA Industrial Soil RSLs (January 2015).

(2) This column refers to metals with maximum concentrations above Industrial RSLs and soil background concentrations reported for the Cincinnati area (Ohio EPA, 2015).

(3) Under Recommended Further Action: CMS - Indicates Corrective Measures Study

IRP - Indicates future investigations and/or a Corrective Measures Study

Maximum Concentrations of COPCs for SWMUs/AOCs GE Aviation - Evendale Ohio

SWMU Number		RFI		Action Levels[1]			
		Results Above Industrial RSLs[1]	Maximum Concentration[2]	USEPA Industrial RSL	Soil Background Concentration[3]	Ohio VAP Generic Standard[4]	BUSTR Action Level[5]
8/12	Temporary Drum Storage Area (Former Bldg. 509) / Drum Crusher Unit	TCE	22.0	6	--	51	--
		benzo[a]pyrene	2.1	0.29	--	5.8	1.1
		benzo[b]fluoranthene	4.1	2.9	--	58	11
		PCBs	390	1	--	20	--
		TPH	18000	see note 6	--	--	see note 7
		As	18.1*	3	12.9	77	--
16	Weigh Station Sump	TPH	4600	see note 6	--	--	see note 7
		As	23.5	3	12.9	77	--
17	Reading Road Landfill	As	18.0	3	12.9	77	--
18	Sludge Basin Landfill	TPH	2700	see note 6	--	--	see note 7
		As	17.0	3	12.9	77	--
20	Former North Landfarm	benzo[a]pyrene	2.5	0.29	--	5.8	1.1
		benzo[b]fluoranthene	4.6	2.9	--	58	11
		As	9.3	3	12.9	77	--
21/22	Former 508 Sludge Basin	TCE	20*	6	--	51	--
		benzo[a]pyrene	0.97	0.29	--	5.8	1.1
		benzo[b]fluoranthene	3.4	2.9	--	58	11
		PCBs	9.0	1	--	20	--
		TPH	7700	see note 6	--	--	see note 7
		CN	1500*	130	--	1000000	--
		As	9.6	3	12.9	77	--
		Ni	38000*	22000	14.8	74000	--
27/28	Former Lime Precipitate Basins 1 and 2	As	20.0	3	12.9	77	--
31	Lime Precipitate Basin 5	TPH	780*	see note 6	--	--	see note 7
		As	8.5*	3	12.9	77	--
87/88	Oil/Water Separators 303-1 and 303-3	PCBs	1.53	1	--	20	--
		As	7	3	12.9	77	--
93/94	Oil/Water Separators 500-1E and 500-1W	TPH	480	see note 6	--	--	see note 7
		As	7.3	3	12.9	77	--
118	Process Sewer System - Sanitary Sewer	PCBs	1.502**	1	--	20	--
124	Stormwater Pumphouse 506	As	18.2*	3	12.9	77	--
141	Gravel Media Coalescing Separator	TPH	11796	see note 6	--	--	see note 7
142	Bldg. 800 Machine Sump (Added 1/16/91)	TPH	23000	see note 6	--	--	see note 7
		As	6.5	3	12.9	77	--
AOCs D and I	Bldg. B Fuel Spills No. 1 and 2	TPH	4327	see note 6	--	--	see note 7
AOC L	Bldg. 304 Fuel Spill	TPH	3700	see note 6	--	--	see note 7
AOC W3 / SWMUs 64/68	Inactive Underground Product Storage Tanks 515-1 to 27	TPH	9100	see note 6	--	--	see note 7
AOC W4 / SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14	TPH	8000*	see note 6	--	--	see note 7
AOC W10 / SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5	TPH	306	see note 6	--	--	see note 7
AOC LD	Bldg. 700 South Loading Dock	TCE	9.6*	6	--	51	--
AOC PST	TCE/TCA Product Storage Tanks	TCE	14	6	--	51	--

Notes:

RSL - Regional Screening Level

(1) Analytical results were compared to USEPA Industrial Soil RSLs (January 2015) and soil background

(2) Concentrations in mg/kg

(3) Soil background concentrations reported for the Cincinnati area (Ohio EPA, 2015)

(4) Ohio VAP action level - Commercial/Industrial Generic Direct Contact Soil Standard

(5) BUSTR action level - Class 1 Soil Action Level

(6) The USEPA Industrial RSLs for TPH ranges are: 420 mg/kg for TPH (Aromatic Low), 440 mg/kg for TPH (Aliphatic Medium), and 33,000 mg/kg for TPH(Aromatic High).

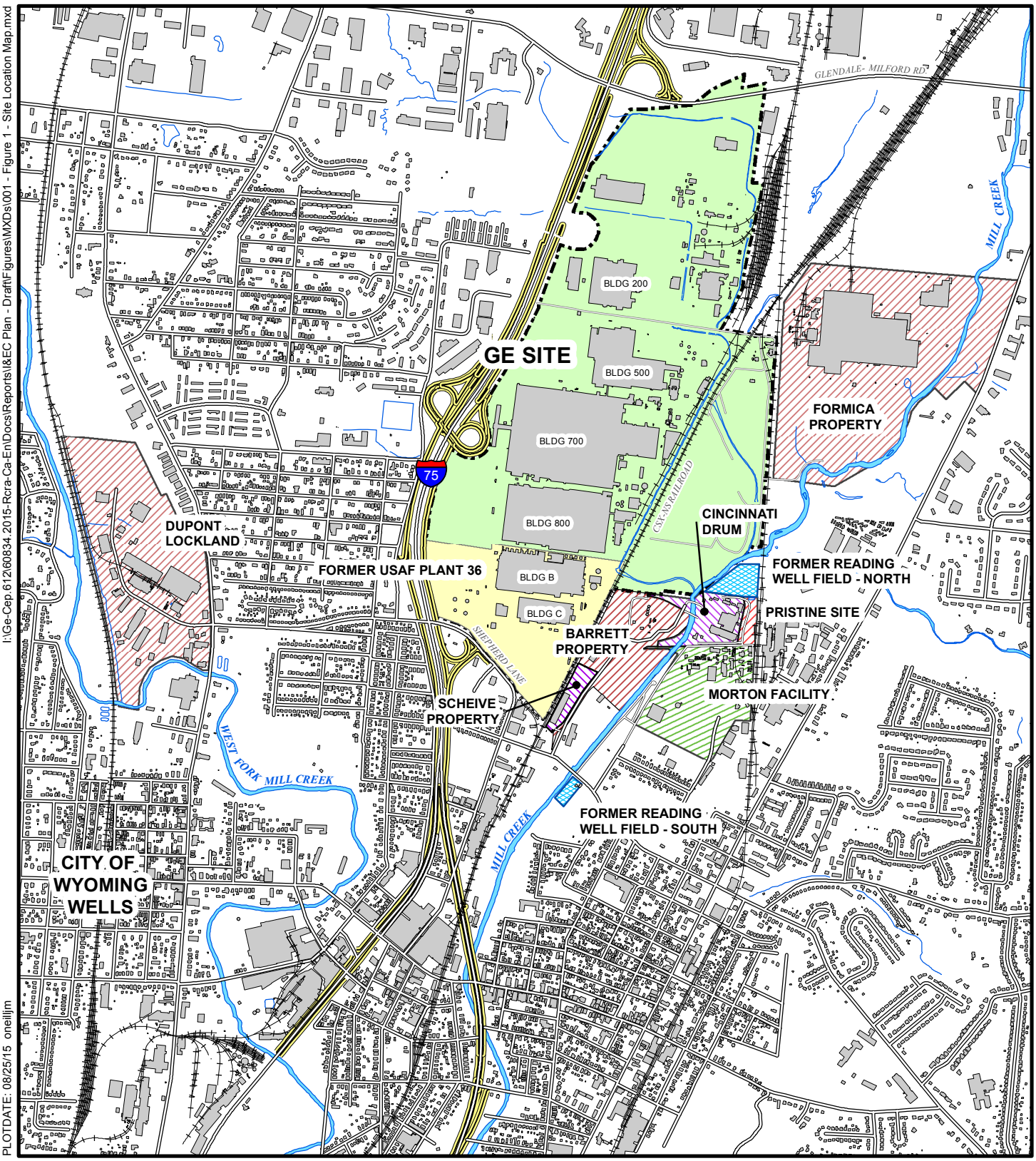
(7) The BUSTR action levels for TPH ranges are: 1,000 mg/kg for TPH (C_6-C_{12}), 2,000 mg/kg for TPH (C_{10}-C_{20}), and 5,000 mg/kg for TPH (C_{20}-C_{34}).

* Sample concentration at depth > 12 feet (assumed to be inaccessible for worker exposure)

** Sewer sediment concentration

FIGURES

FIGURE 1



I:\Ge-Cep.612\60834.2015-Rcra-Ca-En\Docs\Reports\I&EC Plan - Draft\Figures\MXDs\001 - Figure 1 - Site Location Map.mxd

PLOTDATE: 08/25/15 oneilljm

GREATER CINCINNATI AREA

GE AVIATION
EVENDALE, OHIO

SITE LOCATION MAP

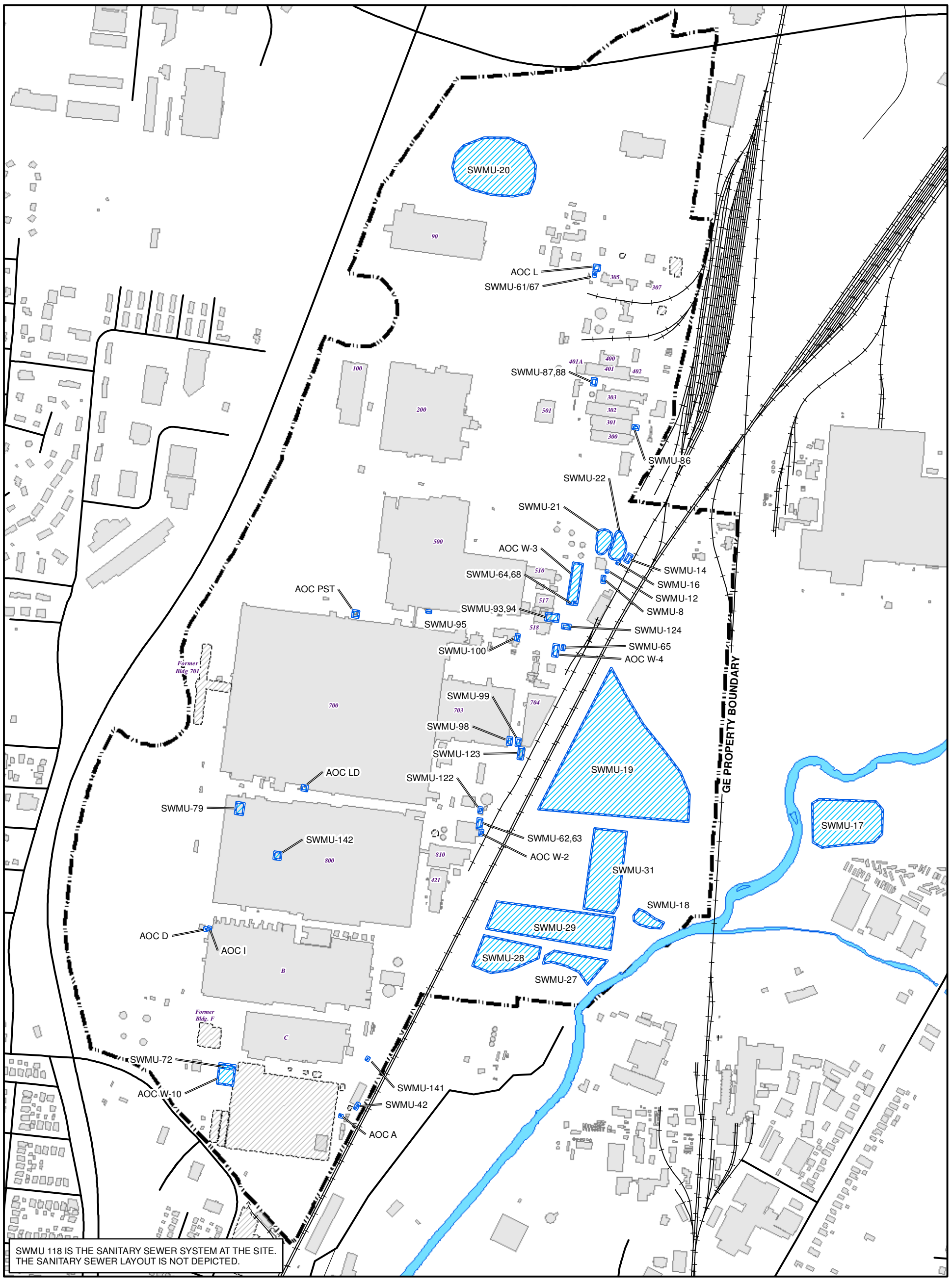
0 800 1,600 3,200
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

612/60834-001
AUGUST 2015

FIGURE 2



SWMU 118 IS THE SANITARY SEWER SYSTEM AT THE SITE.
THE SANITARY SEWER LAYOUT IS NOT DEPICTED.

I:\Ge-Cep.612\60834.2015-Rcra-Ca-En\Docs\Reports\I&EC Plan - Draft\Figures\MXDs\002 - Figure 2 - SWMUs and AOCs.mxd

PLOTDATE: 11/23/15 oneilljm

LEGEND

- SOLID WASTE MANAGEMENT UNIT (SWMU) or AREA OF CONCERN (AOC)
- EXISTING BUILDING
- FORMER BUILDING
- 800 BUILDING ID

GE AVIATION
EVENDALE, OHIO

SWMUs AND AOCs RECOMMENDED IN THE RFI FOR FURTHER EVALUATION

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0 200 400 800 1,200 1,600
Feet

FIGURE 3

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I:\Ge-Cep.612\60834.2015-Rcra-Ca-En\Docs\Reports\I&EC Plan - Draft\Figures\MXDs\003 - Figure 3 - RCRA IRM Location Map.mxd

PLOTDATE: 11/17/15 oneiljm

LEGEND

- HISTORIC IRM LOCATION
- HISTORIC DRAINAGE DITCH REMEDIATION
- EXISTING IRM EXTRACTION WELLS
- EXISTING IRM TREATMENT BUILDING
- EXISTING IRM PIPING (UNTREATED)
- EXISTING IRM PIPING (TREATED)

GE AVIATION
EVENDALE, OHIO

RCRA IRM LOCATION MAP

0 200 400 800
Feet

N

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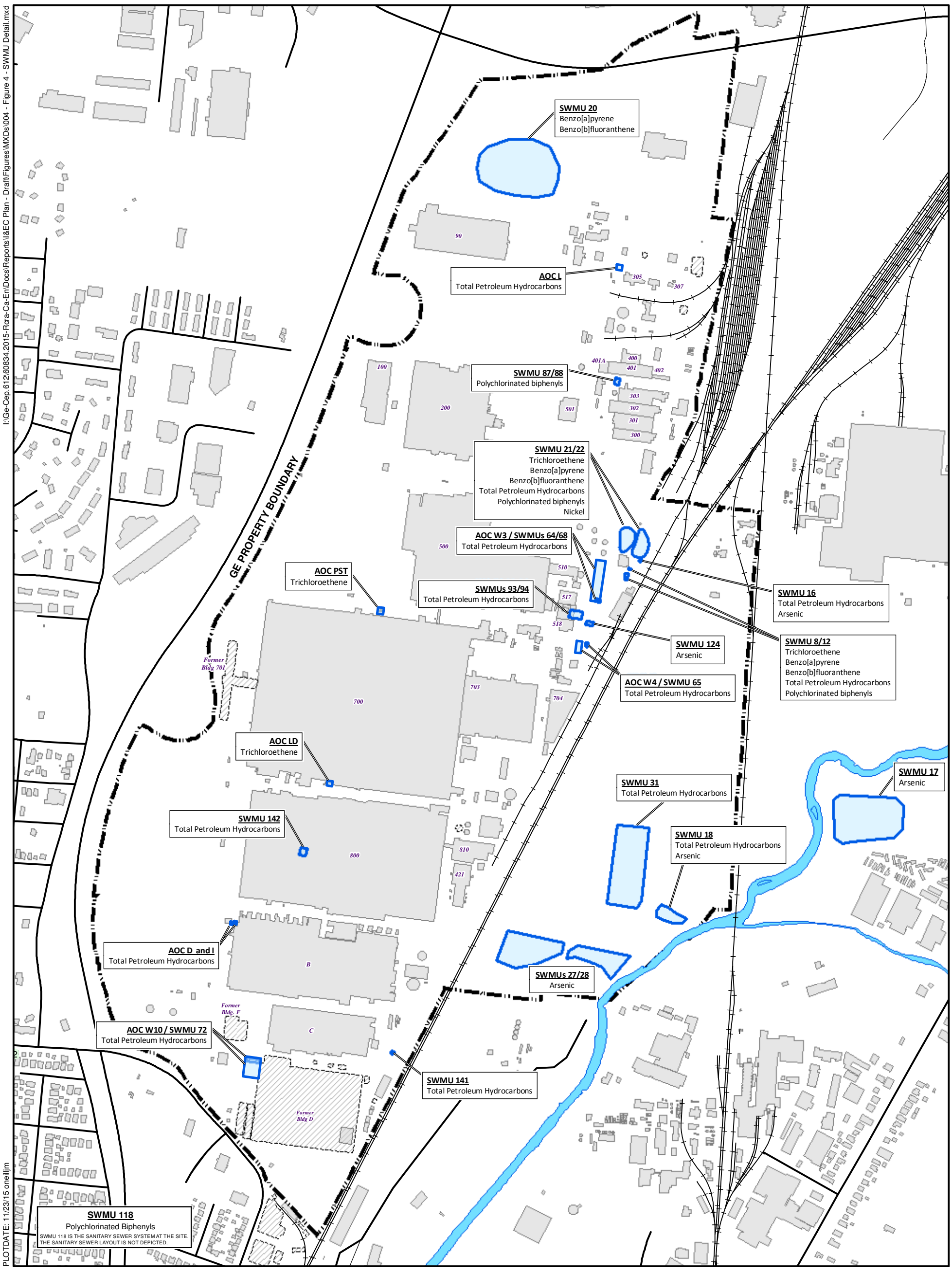
FIGURE 4



LEGEND

- SWMUs AND AOCS WITH ANALYTICAL CONCENTRATIONS ABOVE INDUSTRIAL RSLs OR BACKGROUND METALS
- SWMU 17 / Arsenic — SWMU ID / CONSTITUENT
- EXISTING BUILDING
- FORMER BUILDING
- 800 — BUILDING ID

GE AVIATION
EVENDALE, OHIO

SWMUs AND AOCs DETAIL OF SOIL ANALYTICAL CONCENTRATIONS ABOVE SCREENING VALUES

N

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0 200 400 800 1,200 1,600
Feet