ARCADIS BBL
Infrastructure, environment, facilities

General Electric Company
Pittsfield, Massachusetts

Project Operations Plan

- **Waste Characterization Plan**
- **Soil Cover/Backfill Characterization Plan**
- **Site Management Plan**
- **Ambient Air Monitoring Plan**
- **Construction Quality Assurance Plan**
- **Contingency and Emergency Procedures**

Originally submitted September 2000
Revised March 2007

PROJECT OPERATIONS PLAN

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PROJECT OPERATIONS PLAN

1.0 Introduction

In October 1999, a Consent Decree (CD) executed by the General Electric Company (GE), the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and several other government agencies was lodged in the United States District Court (Court) for the District of Massachusetts. Following a public comment period, the Court entered the CD on October 27, 2000. The CD governs (among other things) the performance of response actions to address polychlorinated biphenyls (PCBs) and other hazardous constituents in soils, sediment, and groundwater in several areas at and near Pittsfield, Massachusetts that collectively comprise the GE-Pittsfield/Housatonic River Site (the Site).

The CD and its accompanying *Statement of Work for Removal Actions Outside the River* (SOW) (Volume I of Appendix E to the CD) identify the Removal Actions that GE is required to perform at or related to several specific areas of the Site. These areas -- referred to as Removal Action Areas (RAAs) -- have been identified based on a number of considerations, including geographic location, prior regulatory definition and status, scope and timing of response actions, current and reasonably foreseeable land use, and nature and extent of the affected media. The RAAs are identified on Figures 1 and 2 of this document, and include areas within and near the GE facility and along the Housatonic River**.** The Housatonic River itself is not subject to the Removal Actions described in the SOW, but is subject to response actions under a different framework pursuant to the CD.

For Removal Actions Outside the River, the CD and the SOW establish the Performance Standards that must be achieved. Although the scope of each Removal Action varies depending on the specific RAA, certain Removal Action components involve common or similar activities. For such activities, GE has prepared this *Project Operations Plan* (POP) to ensure that these activities are performed in a manner that supports the attainment of the applicable Performance Standards. The general scope and contents of the POP were established in Technical Attachment C to the SOW.

The POP comprises a series of topic-specific plans (identified below) that address several common aspects of the Removal Actions and apply to various activities to be conducted as part of those Removal Actions, ranging from initial pre-design activities (i.e., field sampling) to the performance and completion of remediation activities. Collectively, these plans describe the minimum requirements, general activities,

protocols, and methodologies that are applicable to the Removal Actions Outside the River. The following plans comprise the POP:

- Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP);
- Site Health & Safety Plan (HASP);
- Waste Characterization Plan;
- Soil Cover/Backfill Characterization Plan;
- Site Management Plan;
- Ambient Air Monitoring Plan ;
- Construction Quality Assurance Plan (CQAP); and
- Contingency and Emergency Procedures Plan (CEPP).

With the exception of the FSP/QAPP and HASP, each of the plans identified above is attached to this document. The FSP/QAPP was originally submitted in September 2000, approved by EPA in a letter dated October 17, 2000, and has been submitted separately from the remainder of the POP. Also bound separately from the rest of the POP is the HASP. The HASP will be updated as needed and provided to EPA for review and informational purposes.

The remaining plans that constitute the POP (Attachments A through F of the POP) were originally submitted to EPA in December 2000 and January 2001. Subsequently, based on discussions among GE, EPA, and MDEP, GE submitted an Addendum to the POP dated October 19, 2001. EPA approved the POP, as modified by that Addendum, in a letter dated January 2, 2002. In the future, these plans will be reviewed and updated as necessary on approximately an annual basis. Any changes will be subject to EPA review and approval.

The remainder of this document identifies the overall objectives of the POP (Section 2), provides a general description of the various plans that comprise the POP (Section 3), and further explains the circumstances under which these plans will be periodically reviewed and (if necessary) updated (Section 4).

2.0 Objectives and Format of Document

The overall objective of the POP is to support the design and implementation of the various Removal Actions Outside the River. By establishing certain requirements, protocols, and methodologies for several components of the Removal Actions, the POP promotes a level of consistency, uniformity, and comparability among the response action activities to be conducted at the Site. In addition, certain components of the POP have been developed to ensure that various response actions are: 1) performed in a manner that is protective of worker and community safety and the environment, 2) consistent with the remedial design objectives, and 3) in compliance with applicable federal, state, and local requirements. The requirements, protocols, and methodologies set forth in the POP will be used as reference standards for a number of future Removal Action components, and will thus minimize the amount of duplicative information that would otherwise be included in the technical Removal Design/Removal Action (RD/RA) submittals for each Removal Action.

As previously indicated, the POP does not address all of the activities that may be performed by GE during the course of conducting Removal Actions for the various RAAs. Instead, the POP establishes minimum requirements and general protocols and methodologies for those topics and activities that are common to the Response Actions to be conducted at the various RAAs. Even then, some of the common topics/activities addressed in this POP will vary depending on the specific RAA, and the corresponding type, scope, and magnitude of the response action activities. Adapting the contents of the POP to account for such variations would be prohibitively difficult and inconsistent with the goal of preparing reference standards for such common elements. Therefore, the contents of the POP are necessarily general and subject to modification and/or adjustment based on specific pre-design and RD/RA activities for a given Removal Action and any site- or activity-specific considerations.

3.0 Description of POP Components

This section provides an overview of the various plans that comprise the POP, and identifies the attachment to this document where the specific plan can be found. Collectively, these plans address several activities that may be performed -- depending on the specific RAA -- during the course of conducting the Removal Actions. Certain of the plans in the POP are primarily related to the performance of pre-design and other investigative activities (i.e., the FSP/QAPP), while other plans are related to

remedial design efforts (i.e., *Waste Characterization Plan and the Soil Cover/Backfill Characterization Plan*) and various remedy implementation activities (i.e., the *Ambient Air Monitoring Plan* and the CQAP). Finally, certain plans contained in this POP are applicable to all of the Removal Action activities, including the HASP, the *Site Management Plan*, and the CEPP.

Except as otherwise noted, the plans that comprise the POP apply only to the response actions conducted as part of the Removal Actions, as identified in GE's work plans and other RD/RA submittals, and only the timeframe during which those response actions are performed. Once those response actions are completed (excluding Post-Removal Site Control activities), the requirements established in this POP will no longer apply to the subject RAA, except as provided in the Post-Removal Site Control Plan for that RAA.

A description of the various plans is provided below.

3.1 Field Sampling Plan/Quality Assurance Project Plan (Previously Submitted and Approved)

The FSP/QAPP identifies the various procedures, protocols, and methodologies to be used by GE during the performance of investigations at the RAAs. The FSP/QAPP contains general requirements regarding such investigations, including sampling and field procedures, laboratory analytical methods, sample handling and documentation procedures, and quality assurance/quality control (QA/QC) procedures. However, details concerning the scope of a particular investigation activity (e.g., specific objectives, type, location, rationale, quantity, frequency, depths, constituents to be analyzed for, etc.) will be identified in the specific RD/RA submittals prepared for each Removal Action, with references provided (as appropriate) to the FSP/QAPP.

As a component of the POP, the FSP/QAPP is subject to review and modifications on an annual basis or more frequently if appropriate (e.g., if analytical methodologies are updated).

3.2 Site Health & Safety Plan

The HASP establishes the minimum health and safety requirements and procedures for all response actions to be performed at the RAAs, ranging from the performance of field investigations to the implementation of remedial response actions. In addition, the HASP provides a general description of each RAA that is covered by this HASP. However, consistent with several of the plans that comprise the POP, it is not practicable to prepare a single health and safety plan that is applicable to all of the RAAs and response actions associated with the Site as discussed below.

Each RAA is unique with respect to its physical characteristics and location, nature and type of affected media and contaminants, and other site-specific features. These factors, plus the fact that additional information regarding the characteristics of each RAA will be gathered as part of the future response actions, do not allow for a comprehensive description of each RAA within the HASP. In addition, at this point in time, the specific type and scope of activities that may be performed within each RAA as part of the overall response actions are unknown. Depending on the specific activity, GE may use one or more contractors, each of whom is responsible for implementing its own health and safety program and procedures.

Based on the above considerations, each contractor retained by GE to perform activities related to the Removal Actions will be provided with a copy of this HASP. In addition, each contractor will be required to develop, if needed, a contractor-specific HASP. The contractor-specific HASP(s) will consider not only the general information and minimum requirements contained in the general Site HASP, but also the specific information related to the particular work area and task(s) to be performed by the contractor. Each contractor-specific HASP will be submitted to EPA for review prior to commencement of the on-site activities covered by such HASP. In combination, the Site HASP and any additional contractor-specific HASP are expected to be sufficient to satisfy the contractor's obligations under applicable Occupational Safety and Health Administration (OSHA) regulations.

3.3 Waste Characterization Plan (Attachment A)

Certain Removal Actions at the Site will involve the removal of soils, sediments, and other materials from the various RAAs and subsequent disposition either at an appropriate off-site location or location(s) within the Site -- e.g., GE's On-Plant Consolidation Areas (OPCAs). The specific disposition option selected by GE for a given material will consider a number of factors, including the type of material and its chemical characteristics, specific disposal restrictions regarding the OPCAs, and the availability/capacity of the OPCAs. Regardless of the disposition option that is selected, the materials subject to disposal will be subject to pre-disposal characterization activities pursuant to the *Waste Characterization Plan*.

In addition to the Removal Actions Outside the River, GE will demolish certain buildings at the GE facility under a Definitive Economic Development Agreement (DEDA) executed by GE, the City of Pittsfield, and the Pittsfield Economic Development Authority (PEDA). The building demolition debris resulting from these activities -- as well as from demolition activities conducted on other GE-owned property within the Site -- may be consolidated at the GE facility (either within the OPCAs or, for certain buildings, within the foundations of the buildings themselves) or sent off-site for disposition. Although the building demolition activities themselves are not subject to EPA approval under the CD and the SOW, the disposition of any demolition debris at the GE facility is subject to certain Performance Standards and other requirements under the CD and the SOW and thus will be subject to waste characterization to ensure its appropriate disposition.

For materials excavated as part of the Removal Actions, and for building demolition debris from the GE facility or other GE-owned property within the Site, the *Waste Characterization Plan* describes the procedures that will be used to identify and assess possible disposal options. Included in the plan is a summary of the Performance Standards contained in the SOW related to the disposition of materials into the OPCAs, a discussion of how the information obtained from the pre-design investigations or other characterization activities will be used to evaluate disposition options, and the procedures that will be followed for those materials that are subject to off-site disposal. (The *Waste Characterization Plan* does not provide specific protocols to govern the consolidation of building demolition debris in building foundations; if GE elects to conduct such activities, the protocols will be presented in separate work plans.)

3.4 Soil Cover/Backfill Characterization Plan (Attachment B)

As described above, certain Removal Actions will require the excavation of soils to achieve the applicable Performance Standards. Subsequent to that removal, the affected areas will require restoration, which will typically involve the placement of backfill and/or other soil materials. Over the last few years, GE has conducted numerous removal actions where the restoration activities involved the use of backfill materials and an overlying soil cover. For each source of backfill/soil that was used in these restorations, GE conducted analytical testing to demonstrate that the materials were suitable for use.

The *Soil Cover/Backfill Characterization Plan* provides a description of the procedures that GE will use during the Removal Actions to characterize and evaluate materials for potential use as soil cover/backfill material, including characterization sampling, review and evaluation of analytical data, and consideration of potential impacts to the Performance Standards for the RAA where the material may be used.

3.5 Site Management Plan (Attachment C)

The *Site Management Plan* establishes the general procedures and measures that will be implemented during the course of the response actions to control access to the appropriate areas of the RAA and thus to reduce the potential for site safety hazards and theft of or damage to facilities or equipment.

The plan describes security measures (both physical and operational) as well as management practices that will be implemented to minimize the potential for physical access to, and physical contact with, hazardous waste or hazardous materials, structures, or equipment within designated portions of the Site. The plan considers activities that may be routinely performed within each RAA (e.g., investigations and construction), as well as the location of the RAA relative to GE-owned property, where certain security measures and access restrictions are currently in place.

3.6 Ambient Air Monitoring Plan (Attachment D)

Certain of the response actions to be conducted by GE at the RAAs will involve construction activities (e.g., soil removal) and other material handling activities that could result in the generation of airborne particulates originating from the RAAs. To monitor the generation and potential wind-induced migration

of such particulates, and in some cases airborne PCBs, GE will conduct an ambient air monitoring program during the field components of these response actions. The primary objective of air monitoring is to assess potential impacts to ambient air during construction activities, the need for EPA notification, and the need for dust control or other mitigating measures.

The *Ambient Air Monitoring Plan* describes general activities that will be conducted for those response actions that could potentially generate airborne particulates and/or PCBs. Included in the plan is a discussion of sampling locations and frequencies, sampling parameters, sampling and analytical methodologies, notification and action levels based on the monitoring results, and the types of mitigating measures that may be taken to address exceedances of the applicable action levels.

3.7 Construction Quality Assurance Plan (Attachment E)

The CQAP describes the various procedures and requirements that will be implemented during construction-related response actions performed at the Site as part of the Removal Actions Outside the River. By establishing such procedures/requirements, the overall objective of the CQAP is to ensure, with reasonable certainty, that a completed response action meets or exceeds its design criteria, plans, and specifications, thus supporting the achievement of the applicable Performance Standards.

The CQAP describes the various roles and responsibilities of the organizations and personnel involved in a given construction project. It also describes the mechanisms by which communications between these parties will be conducted to: 1) facilitate implementation of the technical design, 2) identify potential construction issues/deviations, 3) resolve technical questions, and 4) document the completed activities.

A key component of the CQAP is the performance of QA/QC activities conducted prior to and during the construction activities. To ensure appropriate QA/QC for these activities, the CQAP provides information concerning the various materials, activities, and procedures that may be conducted during the response actions, the technical specifications for these items, the various testing that will be performed for each item, and the acceptable testing results.

Finally, similar to several other plans that comprise the POP, the CQAP is subject to modification based on the specific RAA and its applicable Performance Standards and construction-related response actions. Any modifications to the contents of the CQAP will be presented in the technical RD/RA submittals for the Removal Action in question.

3.8 Contingency and Emergency Procedures Plan (Attachment F)

The CEPP provides information to assist GE and its contractors in minimizing potential risks to on-site workers and the public resulting from an unplanned release of hazardous constituents or other emergency within the RAAs. Each contractor retained by GE to perform activities related to the Removal Actions will be provided with a copy of this CEPP and instructed to develop, if needed, a contractor-specific CEPP. The contractor-specific CEPP(s) will consider the general information contained in the CEPP, as well as specific information related to the particular work area and task(s) to be performed by the contractor. Collectively, these plans will provide contingency measures and required/appropriate courses of action for potential spills and discharges from materials handling and/or transportation activities, other emergencies (e.g., fire and explosions), and unanticipated conditions that may be encountered during the performance of the Removal Actions.

4.0 Future POP Modifications

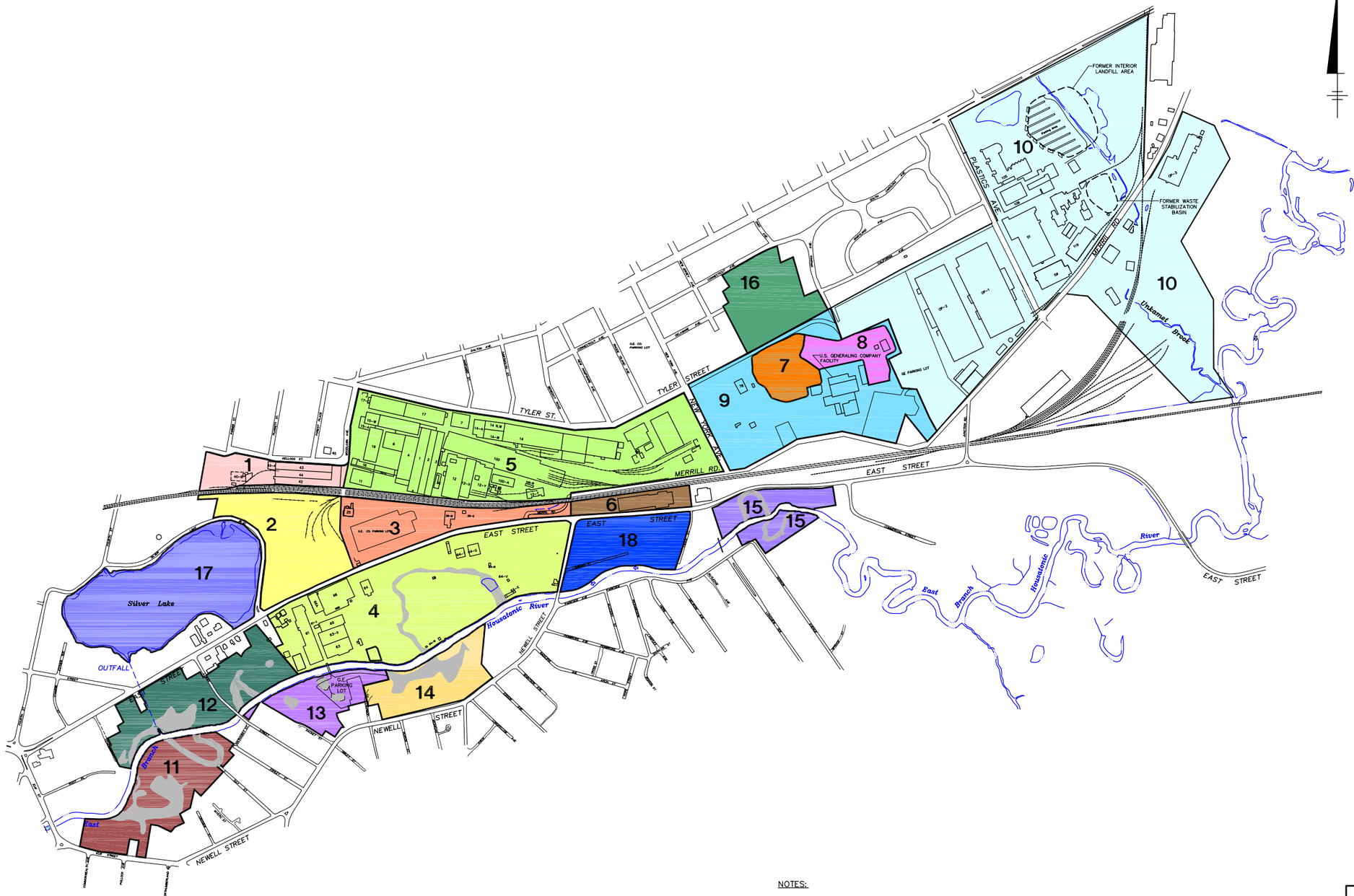
As previously described, the POP comprises a series of topic- and activity-specific plans that address several common aspects of the Removal Actions, ranging from initial pre-design investigations to the performance and completion of remediation activities. Given the wide range of activities that are covered by the POP, and considering the extended schedule over which these activities will performed at the various RAAs within the Site, it is necessary to allow for flexibility and future modifications (as needed) to the POP.

With the exception of the Site HASP, each of the plans contained in the POP is subject to EPA review and approval. Following EPA approval, the POP (or individual plans contained within the POP) will be referenced as appropriate in submittals for the Removal Actions Outside the River. For example, during the preparation of pre-design or RD/RA work plans for a given Removal Action, GE will review the

contents of the POP in consideration of the specific response actions to be performed. If no modifications are necessary, the subject submittal will identify the POP as the reference standard for the applicable activities. However, if this review indicates that modifications to the POP are necessary, such modifications will be presented in the appropriate work plan(s) for that Removal Action, and will be subject to EPA review and approval.

Separate from any Removal Action-specific modifications as described above, the POP will be reviewed and updated as necessary on approximately an annual basis. Excluding the HASP, any changes to the POP will be subject to EPA review and approval.

Figures



GENERAL ELECTRIC PLANT AREA

1. 40s COMPLEX
2. 30s COMPLEX
3. 20s COMPLEX
4. EAST STREET AREA 2–SOUTH
5. EAST STREET AREA 2–NORTH
6. EAST STREET AREA 1– NORTH
7. HILL 78 CONSOLIDATION AREA
8. BUILDING 71 CONSOLIDATION AREA
9. HILL 78 AREA–REMAINDER
10. UNKAMET BROOK AREA

FORMER OXBOW AREAS

11. FORMER OXBOW AREAS A AND C
12. LYMAN STREET AREA
13. NEWELL STREET AREA II
14. NEWELL STREET AREA I
15. FORMER OXBOW AREAS J AND K

OTHER AREAS

16. ALLENDALE SCHOOL PROPERTY
17. SILVER LAKE AREA
18. EAST STREET AREA 1– SOUTH (NAPL/GROUNDWATER ONLY)

0 500' 1000'
APPROXIMATE SCALE

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES/LIMITS ARE APPROXIMATE.
4. REFER TO FIGURE 1–2 FOR IDENTIFICATION OF REMOVAL ACTION AREAS RELATED TO THE HOUSATONIC RIVER FLOODPLAIN.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
PROJECT OPERATIONS PLAN

REMOVAL ACTION AREAS

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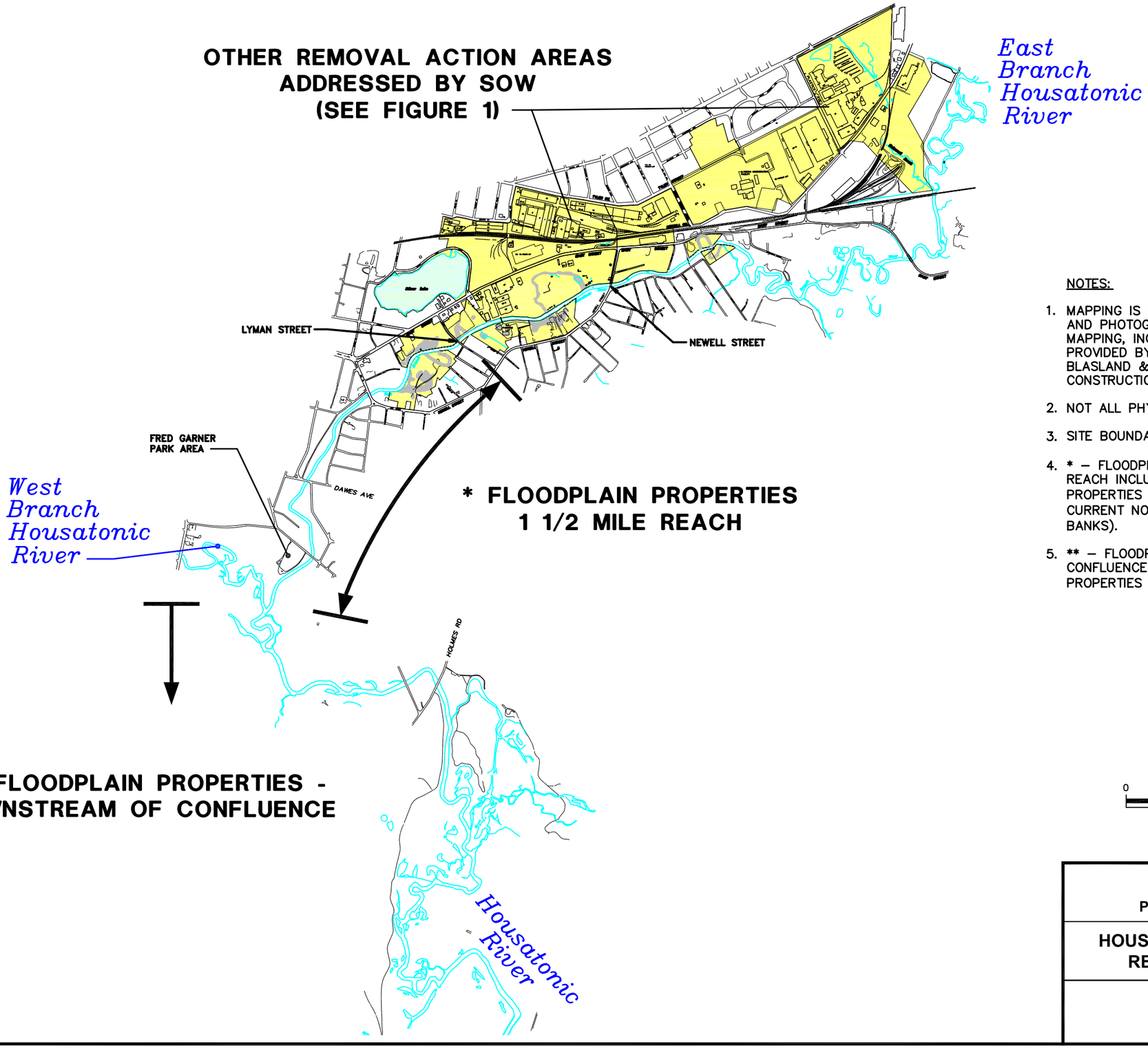
FIGURE
1



NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES ARE APPROXIMATE.
4. * – FLOODPLAIN PROPERTIES ALONG 1–1/2 MILE REACH INCLUDE CURRENT RESIDENTIAL PROPERTIES (ACTUAL/POTENTIAL LAWNS) AND CURRENT NON–RESIDENTIAL AREAS (EXCLUDING BANKS).
5. ** – FLOODPLAIN PROPERTIES DOWNSTREAM OF CONFLUENCE INCLUDE CURRENT RESIDENTIAL PROPERTIES (ACTUAL/POTENTIAL LAWNS).

0 2000' 4000'

APPROXIMATE GRAPHIC SCALE

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HOUSATONIC RIVER FLOODPLAIN RESPONSE ACTION AREAS

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FIGURE
2

Attachments

Attachment A

Waste Characterization Plan

ATTACHMENT A

WASTE CHARACTERIZATION PLAN

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ATTACHMENT A

WASTE CHARACTERIZATION PLAN

1.0 Introduction

This *Waste Characterization Plan* describes the procedures that the General Electric Company (GE) will use to evaluate and select disposition options for certain materials generated during Removal Actions at the GE-Pittsfield/Housatonic River Site (Site) under a Consent Decree (CD) executed by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other government agencies in October 1999 and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this plan applies to the Removal Actions that GE is obligated to perform under the CD at several Removal Action Areas (RAAs) within the Site (see Figure 1), which exclude the response actions being taken and to be taken at the Housatonic River. Additional information regarding these Removal Actions and the applicable Performance Standards for them are contained in a document titled *Statement of Work for Removal Actions Outside the River* (SOW), which is Volume I of Appendix E to the CD.

Depending on the specific Removal Action and its corresponding Performance Standards, GE will perform certain response actions at each RAA. These response actions could include the removal and subsequent disposition of soils, sediments, or other materials from the RAA. Once removed, several disposition options are available, including off-site transport and disposal or placement at one of several potential areas within the Site. Using this *Waste Characterization Plan* as a guide, the disposition of materials associated with a specific Removal Action will be based on the available data and the type, scope, and magnitude of the response action activities. The results of this evaluation -- and the corresponding waste disposal plan -- will be based on the procedures outlined herein and presented in the technical removal design/removal action (RD/RA) work plans and other submittals for each Removal Action.

As discussed further below, this Waste Characterization Plan also applies to the characterization and selection of disposition options for demolition debris resulting from the demolition of certain buildings located at the GE facility or on GE-owned property within the Site. Although the demolition activities themselves are not subject to the CD and the SOW, the disposition of the resulting demolition debris within the GE facility (if conducted) is subject to the CD and the SOW. As a result, characterization of demolition debris will be addressed in this plan, primarily through the incorporation of protocols set forth in an attached document entitled Protocols for Building Demolition and Associated Characterization Activities (Exhibit A-1 to this plan).

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WASTE CHARACTERIZATION PLAN

This *Waste Characterization Plan* was originally submitted to EPA in December 2000, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications set forth in the October 19, 2001 Addendum, as well as other modifications identified since that time. In the future, this plan will be reviewed and updated as necessary on approximately an annual basis. Any changes will be subject to EPA review and approval.

Finally, it should be noted that for excavations conducted at the GE facility that are not part of the Removal Actions under the CD and SOW, GE=s *Protocols for the Management of Excavation Activities* (November 1996) will continue to apply until such time as a Grant of Environment Restriction and Easement (ERE) has been recorded for the pertinent portion of the facility.

2.0 Summary of Disposition Alternatives

2.1 General

This section summarizes the types of waste materials that may be generated during the performance of response actions for the various RAAs (as well as during building demolition activities at the GE facility or other GE-owned property located within the Site), and the subsequent disposition options for these materials. As previously indicated, the technical RD/RA submittals for each Removal Action will identify the response actions that will be performed for that RAA and, if applicable, the types, volume, and characteristics of the materials subject to removal and disposition. Therefore, the contents of this section are necessarily general and will be supplemented by the Removal Action-specific submittals.

This section also provides information regarding the on-plant (i.e., within the GE facility) and off-site disposition options available for waste disposition. Included is a discussion of the Performance Standards contained in the SOW related to the disposition of materials at GE=s On-Plant Consolidation Areas (OPCAs) and other on-site locations, and the disposal options related to off-site disposition.

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WASTE CHARACTERIZATION PLAN

2.2 Types and Sources of Disposition Materials

The Removal Actions to be conducted by GE pursuant to the CD and SOW will generate a variety of materials requiring treatment and/or disposition. Among these, soils and sediments that contain polychlorinated biphenyls (PCBs) and other hazardous constituents are expected to constitute the largest volume-based waste component. Other types of material generated during the conduct of these Removal Actions include waste derived from investigations at the RAAs, liquid wastes, and residuals generated from the on-site treatment of certain liquid wastes. Each of these materials is discussed further below.

Separate from GE=s obligations under the CD and SOW, there are two other sources of waste materials that are either directly or indirectly related to the CD and SOW, and therefore addressed within this plan:

- First, as part of GE=s Definitive Economic Development Agreement (DEDA) with the City of Pittsfield and the Pittsfield Economic Development Agency (PEDA) and/or as part of other future activities, several existing buildings located within the GE facility or on GE-owned property within the Site may be demolished. Certain of the materials generated from these activities may be consolidated at one or more locations within the facility. For example, such building demolition debris may be taken to the OPCAs located within the GE facility. These OPCAs have been designed and constructed pursuant to the CD and SOW, and waste consolidation at the OPCAs is subject to provisions contained in the CD and SOW. Alternatively, debris from the building demolition activities may be placed in the foundations of the buildings themselves (for certain specified buildings, as provided in the CD and SOW), or such debris may be used as backfill or cover material in other ways subject to building-specific approval by EPA.

- Second, in addition to the response actions conducted by GE, EPA will be performing response actions for the 1 2 -Mile Reach of the Housatonic River. A portion of the waste materials generated by those response actions may be transported to the OPCAs for disposal.

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WASTE CHARACTERIZATION PLAN

Four general categories of waste materials deriving from the above-described activities and subject to subsequent disposition have been identified. They are as follows:

- Soil, Sediment, and Other Inert Excavated Materials - Several RAAs within the Site have Performance Standards that may -- based on the results of pre-design investigations or other characterization activities -- involve the removal of soils and/or sediments containing PCBs and non-PCB hazardous constituents. In addition, this category also includes non-organic materials (asphalt, concrete, or other) that are excavated as part of response actions at various RAAs.

- Building Demolition Debris - This category includes building demolition debris which may be generated as a result of activities performed by GE under the DEDA, as well as any other building demolition debris that is generated from within the Site.

- Investigation-Derived Waste - Pre-design investigations at certain of the RAAs will involve the installation of several soil borings and groundwater monitoring wells to characterize the potential presence of PCBs and other hazardous constituents in the soil and groundwater at each RAA. As a result of these activities, personal protective equipment (PPE), investigation-derived waste (IDW) (e.g., soil boring cuttings, residual sample materials, sampling equipment and materials, etc.), and monitoring well development, purge, and sampling water will be generated and require treatment and/or disposition, as discussed in Section 3.5 below.

- Liquids and Water Treatment Residuals - During the performance of response actions, several types of liquid wastes may be recovered/generated, including groundwater, free product (i.e., light or dense non-aqueous-phase liquid), leachate, and other miscellaneous waters generated during remediation activities. Depending on the specific type of liquid, these materials will be subject to on-site treatment/disposition or off-site disposal, as described in Section 3.3.

2.3 Summary of Disposition Options

Depending on the type of waste material, several disposition options are available. The CD and SOW provide that, with certain exceptions and limitations, materials that are excavated or otherwise removed from their current locations at the Site and demolition debris from building demolition may be consolidated at one of the OPCAs located within GE=s facility (or, for building demolition debris from certain buildings at the GE facility, within the building foundations). For materials that are prohibited from such consolidation, as well as those materials that GE elects to dispose of at an off-site location, GE will utilize one or more appropriate off-site treatment, storage, or disposal facilities (TSDFs). The various on-plant and off-site disposition options available to GE are further described in Sections 2.3.1 and 2.3.2 below.

2.3.1 Disposition Locations within the GE Facility

Each of the general types of waste material described in Section 2.2 may be subject to disposition at one or more locations within the GE facility. The primary on-site disposition location for all non-liquid waste materials will be the OPCAs. However, other potential on-site disposition locations exist, including the consolidation of demolition debris within certain subgrade building foundations identified in the SOW and, with specific EPA approval, the use of building demolition debris and/or excavated site soils as backfill or cover material within the RAAs. Finally, certain liquid wastes resulting from various response actions may be subject to on-site treatment and discharge, as discussed in Section 2.3.1.4.

2.3.1.1 OPCAs

GE is utilizing and will continue to utilize two OPCAs within the GE Plant Area -- the Hill 78 OPCA and the Building 71 OPCA. Figure 1 identifies the general locations of these areas. Non-liquid materials generated during pre-design investigations and subsequent response actions may be consolidated at these OPCAs, subject to conditions set forth in the CD and the SOW. These materials generally include soils, sediments, PPE/IDW, other inert materials (e.g., asphalt, concrete, brick, etc.), building demolition debris, and residuals generated from the on-site treatment of various liquid wastes (i.e., filter cake). In addition, a portion of the OPCAs are available for the disposition of certain materials generated by EPA as part of the 1½ Mile Reach Removal Action.

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WASTE CHARACTERIZATION PLAN

With respect to the consolidation of materials at the two OPCAs, the following Performance Standards related to waste disposition have been established under the CD and the SOW:

- Materials to be consolidated within the Hill 78 OPCA shall be limited to materials that contain less than 50 ppm PCBs (as determined by an appropriate composite sampling technique or other techniques approved by EPA) and are not classified as a hazardous waste under EPA's regulations pursuant to the Resource Conservation and Recovery Act (RCRA).

- Materials to be placed in the OPCAs shall not include free liquids, free product, intact drums and capacitors, other equipment that contains PCBs within its internal components, or asbestos-containing material required by applicable law to be removed from structures prior to demolition. Such materials, if any, shall be sent to an appropriate off-site facility for disposal.

- GE shall operate the OPCAs in accordance with the operations plan and requirements set forth in the *Detailed Work Plan for On-Plant Consolidation Areas* (BBL, June 1999) and subsequent submittals (including an Addendum to the Detailed Work Plan and responses to EPA comments on the Addendum, dated August 12, 1999 and June 13, 2000, respectively).

2.3.1.2 Subgrade Building Foundations

The CD and SOW allow for the disposition of building demolition debris from certain buildings within the existing foundations of those buildings. Under this disposition scenario, materials placed in building foundations shall not include free liquids, free product, intact drums and capacitors, other equipment that contains PCBs within its internal components, or asbestos-containing material required by applicable law to be removed from structures prior to demolition.

The specific buildings where demolition debris may be placed within the building foundations were identified in the SOW: Buildings 2, 3C, 12, 12X, 12Y, and 31. To the extent that GE elects to pursue this type of consolidation activity, GE will prepare a separate work plan or work plans detailing the demolition activities and the placement of the demolition debris in the building foundations. Since building demolition activity itself is not subject to the requirements of the CD or SOW, GE will (in addition to any other submittals that may be required by applicable law) submit the work plan(s) or portions thereof addressing building

demolition to EPA for informational purposes. However, the placement of building demolition debris in the building foundations is subject to certain requirements under the SOW. Hence, those portions of the work plan(s) or portions thereof related to the placement of building demolition debris in the building foundations will be presented to EPA for review and approval. For the placement of building demolition debris in the foundations of Buildings 12, 12X, and 12Y, such procedures and protocols shall include the requirement that all debris will be placed only below the existing ground surface elevation at the building involved.

2.3.1.3 Excavation Backfill Material

Under certain situations, GE may propose to use existing site materials generated during the Removal Actions and/or as part of building demolition activities as backfill or cover material within an RAA. Such materials may include soils and related debris that are excavated as part of soil-related response actions, or inert building demolition debris (e.g., concrete, brick, etc.). In the event that GE proposes to use such materials, the provisions outlined in the *Soil Cover/Backfill Characterization Plan* (Attachment B to the POP) will be adhered to. That plan establishes certain criteria concerning the allowable analytical and geotechnical testing requirements and properties of the subject material, as well as other conditions under which the materials may be considered for use as backfill or cover material. Any proposal to use existing site materials as backfill or cover material within an RAA will be presented in an appropriate RD/RA submittal for EPA review and approval.

2.3.1.4 On-Site Water Treatment Facilities

As previously indicated, certain liquids are routinely generated as part of the ongoing pre-design soil investigations and groundwater monitoring programs. For liquids that are generated within that portion of the Plant Site 1 Groundwater Management Area (GMA 1) located north of East Street, GE will properly containerize and transport the various wash waters and groundwaters to its Building 64G groundwater treatment facility for treatment and disposal. In addition, for other liquids generated or encountered during Removal Actions, GE may consider and seek EPA approval, on a case-by-case basis, for the treatment of such liquids at its on-plant Building 64G water treatment facility. Such liquids may include water that is encountered during groundwater monitoring programs in areas that are not within the portion of GMA 1 specified above, or groundwater or stormwater runoff that is encountered during the performance of soil-related response actions. The possibility of treating these liquids will be based on the specific chemical

characteristics of the candidate liquids and the conditions associated with the liquid waste and potential treatment activities (i.e., volume, duration, capacity of the treatment facility, etc.). Should GE consider the on-plant treatment facility for treatment of such liquids, specific details will be provided in the technical RD/RA submittals associated with the Removal Action involved.

2.3.2 Off-Site Disposition Locations

During performance of Removal Actions at an RAA, certain materials may require off-site disposition at an appropriate TSDF. GE currently uses several facilities for the off-site disposition of waste materials. While future waste materials from any RAA may be designated for disposition at other TSDFs, the facilities currently used for off-site disposition of waste materials, and a brief discussion of the type(s) of waste material typically sent to each of these facilities, is presented below.

- **Chemical Waste Management, Inc. (CWM) High Acres Facility -** This facility located in Fairport, New York, may be used for disposition of soils, sediments, other excavated solid materials, and building demolition debris that contain PCB concentrations less than 50 ppm and do not constitute hazardous waste under RCRA.

- **CWM=s Model City Facility -** This facility located in Model City, New York, may be used for disposition of soil, sediments, and building demolition debris for which disposal is regulated under the Toxic Substances Control Act (TSCA) (i.e., PCB concentrations greater than or equal to 50 ppm) and/or for certain wastes that constitute hazardous waste under RCRA. In addition, this facility may be used for disposal of waste materials that are removed from buildings prior to demolition and are not subject to on-site consolidation.

- **CWM=s Port Arthur, Texas Facility -** This facility, located in Port Arthur, Texas, would potentially be used for incineration of all hazardous liquids and/or materials not sent to the above-mentioned facilities.

- **Non-Hazardous Liquid Disposal Locations** - GE currently uses several licensed facilities for the disposition of non-hazardous liquids.

ATTACHMENT A

WASTE CHARACTERIZATION PLAN

3.0 Waste Characterization Procedures

This section identifies the procedures by which waste materials generated during response actions will be characterized for disposition. The starting point for these waste characterization activities will be information developed as part of the pre-design investigation activities or other characterization activities, and the subsequent remedial design activities. This information will include the type and volume of the waste material, as well as the type and concentration of the detected constituents in the waste materials. Based on this information, GE will identify the required/preferred disposition option (i.e., on-site vs. off-site) and initiate waste characterization activities as described below. Any sampling and analysis activities to be conducted for such waste characterization purposes will be performed in accordance with GE=s approved *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP).

3.1 Materials Prohibited from On-Site Disposition

As previously indicated, certain materials are prohibited from disposition within the GE facility. These include free liquid, free product, intact drums and capacitors, and other equipment that contains PCBs within its internal components, as well as asbestos-containing material required by applicable law to be removed from structures prior to demolition. As encountered, these materials will be transported off-site for disposition at an appropriate TSDF such as those listed in Section 2.3.2. For such materials, characterization activities will be dictated by the specific TSDF and any applicable operating requirements and conditions. While the information collected as part of the pre-design investigations or other characterization activities may be sufficient, the TSDF may require additional information to fully profile the material before accepting it at their facility.

ATTACHMENT A

WASTE CHARACTERIZATION PLAN

3.2 Soils, Sediments, and Non-Demolition Debris

It is anticipated that the majority of the soils, sediments, inert debris, and other excavated materials will be subject to on-site disposition at either the Hill 78 OPCA or the Building 71 OPCA. Once it has been determined that the OPCAs are an appropriate and preferred consolidation option for a given quantity of such material, the following evaluations will be conducted:

Step 1: GE will review the available PCB data to determine whether the waste material subject to disposition (or a portion thereof) contains PCBs at concentrations less than 50 ppm and thus may (depending on other characterization activities described below) be suitable for placement at the Hill 78 OPCA. Several methods may be used to support this determination and are described below. The specific method selected by GE to determine waste disposition, and its application to the specific Removal Action, will be fully described in technical RD/RA submittals developed for the given Removal Action.

a. Use of Discrete Sampling Data - The PCB data available from the pre-design investigations or other waste characterization efforts will be reviewed to determine -- on a discrete sample-by-sample basis -- whether PCBs have been detected at concentrations at or above 50 ppm. If all of the sampling data are below 50 ppm PCBs, the materials will be suitable for consolidation at the Hill 78 OPCA (subject to the additional characterization/assessment activities described in Step 2 below). If the discrete sampling data indicate the presence of PCBs at concentrations equal to or greater than 50 ppm, then the available data (and/or any future sampling data) will be used to determine the specific horizontal and vertical extent of the area(s) where PCBs are present at levels at or above 50 ppm. The materials from such area(s) will be subject to disposition at the Building 71 OPCA, while the remaining materials (i.e., those from areas containing PCBs less than 50 ppm PCBs) may be suitable for disposition at the Hill 78 OPCA, pending the results of Step 2 below.

b. Averaging of Existing Data - The CD and SOW allow for the characterization of materials for disposition within the OPCAs using an appropriate composite sampling technique or other technique approved by EPA. As such an Aother@ technique, GE proposes, in some instances, to use a data averaging technique, based on the PCB data collected during the pre-design investigations, to characterize the waste for disposition. Under this approach, the same averaging protocols specified in Attachment E to the SOW for determining the scope of response actions will also be applied to the waste materials identified for removal from the RAA. Using these protocols, a spatial average PCB concentration will be calculated for the material subject to removal and will be used to characterize that material for purposes of subsequent disposition.

c. Use of Composite Sampling Data - In addition to the possible use of discrete sampling data or a data averaging technique as described above, GE may elect to use a composite sampling approach to determine a representative PCB concentration for a given quantity of waste material. Under such an approach, once the location, area, and volume of material(s) subject to disposition have been determined (based on the pre-design investigations and subsequent remedial design activities), additional sampling will be performed to further characterize the material(s) for disposition. Unless otherwise proposed in the specific RD/RA submittals for the Removal Action, such sampling will involve the collection of 10 discrete Agrab@ samples for each volume of waste material containing up to 2,000 cubic yards. (If the volume of waste material to be characterized is less than 2,000 cy, 10 Agrab@ samples will still be collected from that material). These discrete grab samples will be collected at spatially distributed locations within the waste material and will be composited into a single sample for PCB analysis. The results of that sample will be used to characterize the waste material sampled.

ATTACHMENT A

WASTE CHARACTERIZATION PLAN

Step 2: Based on the results of Step 1, certain materials may be suitable for potential disposition at the Hill 78 OPCA based on their PCB concentration. However, the CD and SOW also require that materials subject to disposition at the Hill 78 OPCA must not be classified as hazardous waste under regulations pursuant to RCRA. To assess the potential for materials to be classified as RCRA hazardous waste, an initial evaluation of the available data will be conducted by dividing the sample results (expressed as mg/kg, or parts per million) by 20, changing the reporting units from mg/kg to micrograms per liter, and comparing the converted results to the allowable extract concentration limits associated with the Toxicity Characteristic Leaching Procedure (TCLP) procedure. Materials that are determined through this screening evaluation to have concentrations within allowable TCLP concentrations will not be considered to be RCRA hazardous waste, so that their disposition at the Hill 78 OPCA is acceptable.

If this screening exercise indicates the potential for exceedances of the allowable TCLP extract concentrations for any constituent, GE will either: (a) conduct a more detailed evaluation; or (b) opt to dispose of the material off-site or at the Building 71 OPCA. If a more detailed evaluation is conducted, it will consist of the collection of additional, representative samples for analysis by the TCLP procedure. If these analyses do not show any exceedances of the allowable TCLP extract concentrations, the material will be deemed not to constitute RCRA hazardous waste and will be subject to disposition at the Hill 78 OPCA. If any of the collected samples contains constituents at levels above the allowable TCLP extract concentrations, these materials will be designated as RCRA hazardous waste and subject to disposition at the Building 71 OPCA or an appropriate off-site TSDF.

In the event that GE proposes to consolidate excavated soil or other non-demolition debris at an on-site location other than the OPCAs, GE will include such a proposal in an appropriate RD/RA submittal for EPA review and approval. That submittal will include specific details regarding the nature of the proposed consolidation and the available waste characterization data.

3.3 Liquid Wastes

The available options for the disposition of liquid wastes generated during Removal Actions (other than investigation- and monitoring-derived liquids, which are discussed in Section 3.5) include treatment and discharge through GE=s Building 64G water treatment facility or off-site disposition at an appropriate TSDF. Should GE elect to utilize its water treatment facility, the candidate liquid wastes will be characterized by collecting representative samples of the material for analyses of PCBs and priority pollutants in accordance with the NPDES discharge permit for the Building 64G water treatment facility. The data for these samples will then be evaluated to determine whether the liquid waste can be treated at the treatment facility in consideration of its treatment capabilities, available capacity, permit/operating requirements, etc. If any liquid waste generated during Removal Actions at an RAA cannot be treated on-site, such waste will be sent off-site for disposal. In that event, or if GE otherwise elects to send these liquids off-site for disposal, additional testing may be performed as described in Section 3.1.

3.4 Building Demolition Debris

For demolition debris resulting from building demolition activities at the GE facility or other GE-owned property at the Site, GE has developed protocols for characterizing that building material for the purposes of determining its subsequent disposition. Those characterization protocols are included in a document entitled *Protocols for Building Demolition and Associated Characterization Activities*, a copy of which is attached to this plan as Exhibit A-1. These protocols include procedures for identifying and removing certain materials from the buildings prior to demolition and disposing of those materials at appropriate off-site TSDFs. These materials include free liquid or free product, equipment or devices containing PCBs within their internal components, asbestos-containing materials required by applicable law to be removed from structures prior to demolition, items containing liquid mercury, and chlorofluorocarbons. The protocols also contain procedures for characterizing the other building materials to determine whether they contain PCB concentrations at or above 50 ppm and/or would constitute hazardous waste under EPA=s RCRA regulations, so as to evaluate the suitability of such materials for disposition at the Hill 78 OPCA. GE will follow the characterization protocols described in Exhibit A-1 – or alternate procedures if specifically approved by EPA -- in determining the appropriate disposition options for building demolition debris.

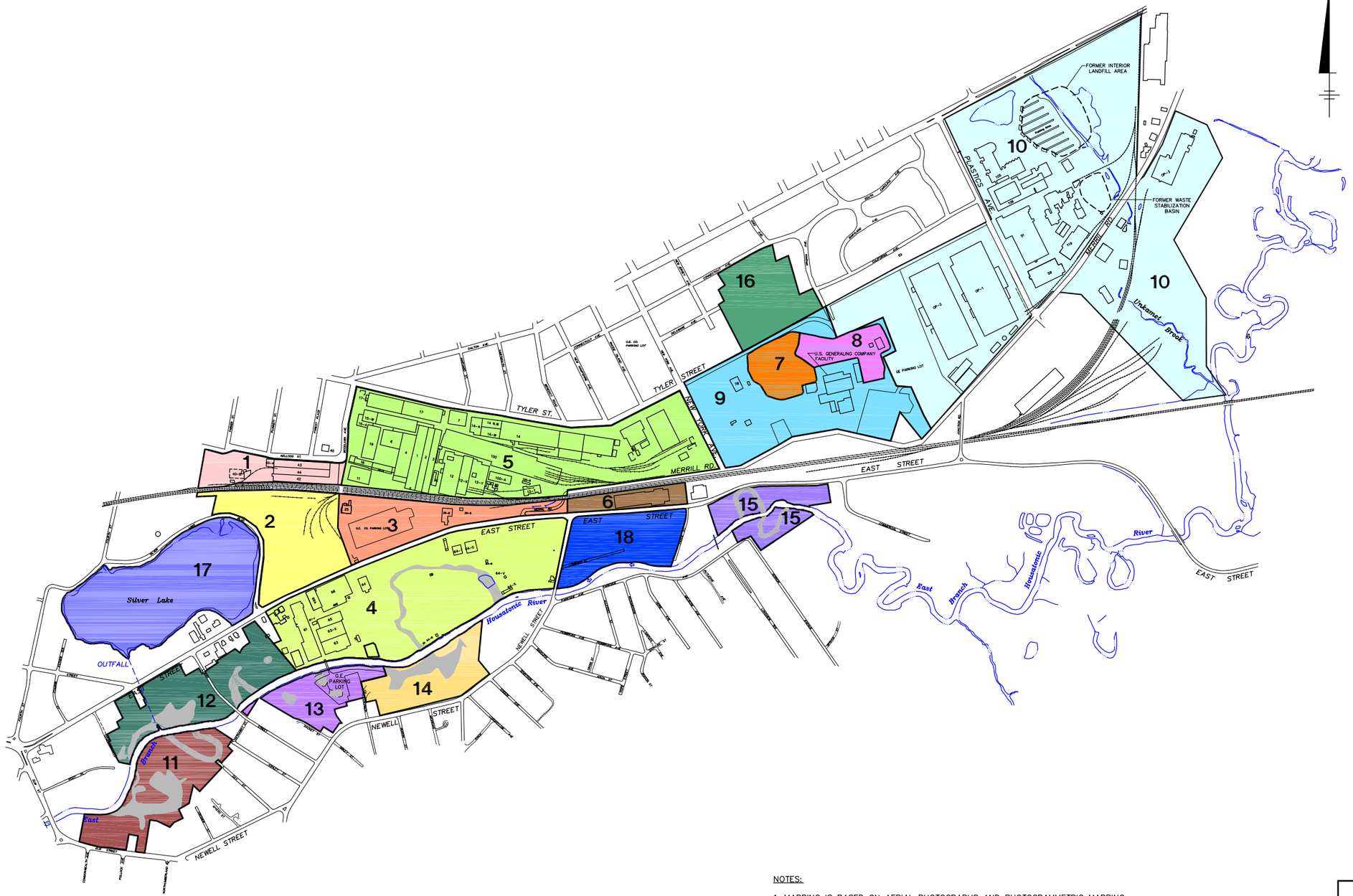
3.5 Investigation- and Monitoring-Derived Wastes

Several types of investigation- and monitoring-derived wastes may be generated during the Removal Actions or building demolition activities, including:

- Soil boring cuttings (residual soils from performance of soil borings/monitoring wells);
- Residual sample materials;
- Sample collection equipment/sample glassware;
- Personal protective equipment;
- Equipment decontamination materials;
- Washwater/rinsates; and
- Monitoring well development and purge water.

Any liquid wastes generated during investigation and monitoring activities associated with Removal Actions or building demolition activities will either be transported off-site for disposal or sent to GE=s Building 64G water treatment facility for treatment and discharge in accordance with the procedures described in Sections 2.3.1.4 and 3.3. Any non-liquid wastes will either be: (a) sent to the Building 71 OPCA without characterization; or (b) characterized based on the analytical results from the associated media from which the materials originated or which they contacted during use (e.g., soil, sediment, building demolition debris), and then disposed of in accordance with the allowable disposition options, as described in this plan, for such associated material. In some cases, GE may elect to perform additional sampling of this waste material to assist with such characterization.

Figure



GENERAL ELECTRIC PLANT AREA

1 40s COMPLEX
2 30s COMPLEX
3 20s COMPLEX
4 EAST STREET AREA 2–SOUTH
5 EAST STREET AREA 2–NORTH
6 EAST STREET AREA 1– NORTH
7 HILL 78 CONSOLIDATION AREA
8 BUILDING 71 CONSOLIDATION AREA
9 HILL 78 AREA–REMAINDER
10 UNKAMET BROOK AREA

FORMER OXBOW AREAS

11 FORMER OXBOW AREAS A AND C
12 LYMAN STREET AREA
13 NEWELL STREET AREA II
14 NEWELL STREET AREA I
15 FORMER OXBOW AREAS J AND K

OTHER AREAS

16 ALLENDALE SCHOOL PROPERTY
17 SILVER LAKE AREA
18 EAST STREET AREA 1– SOUTH (NAPL/GROUNDWATER ONLY)

0 500' 1000'
APPROXIMATE SCALE

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES/LIMITS ARE APPROXIMATE.
4. REFER TO FIGURE 1–2 FOR IDENTIFICATION OF REMOVAL ACTION AREAS RELATED TO THE HOUSATONIC RIVER FLOODPLAIN.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

WASTE CHARACTERIZATION PLAN

REMOVAL ACTION AREAS

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
1

SYR-54-YCC LAF KEW L: ON=*, OFF=REF
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PROJECTNAME:----
XREFS: IMAGES:

Exhibit A-1 – Protocols for Building Demolition and Associated Characterization Activities

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

Table of Contents

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

1.0 Introduction and Purpose

This document identifies the general protocols that the General Electric Company (GE) will use to perform building characterization and demolition activities for buildings located on certain GE-owned property in Pittsfield, Massachusetts. Under an agreement known as the Definitive Economic Development Agreement (DEDA) executed by GE, the City of Pittsfield, and the Pittsfield Economic Development Authority (PEDA), GE will raze the above-grade portions of several buildings at its Pittsfield facility, and perform ancillary decommissioning activities, over the next several years. Under the DEDA, following the demolition of these buildings and the performance of various response actions in areas containing these buildings, a number of those areas may be transferred to PEDA for possible redevelopment. Separate from activities related to the DEDA, GE may in the future demolish other buildings located within its facility or on other GE-owned property within the GE-Pittsfield/Housatonic River Site (Site) (as defined in the Consent Decree discussed below).

In October 1999, GE entered into a Consent Decree (CD) with the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other federal and state governmental agencies, as well as the City of Pittsfield and PEDA. Following lodging in the United States District Court (Court) for the District of Massachusetts, the CD was subject to a public comment period, and was subsequently entered by the Court on October 27, 2000. The CD and an accompanying *Statement of Work for Removal Actions Outside the River* (SOW) (which is Volume I of Appendix E to the CD) establish Performance Standards and other requirements for several Removal Actions to be conducted by GE at the Site. The actual demolition activities for buildings located within the GE facility or on other GE-owned property within the Site are not part of the response actions subject to the CD and the SOW and thus do not require specific approval from EPA; such actions will be subject to applicable federal, state, and local laws and regulations. However, the CD and SOW allow for the disposition of certain building demolition debris within On-Plant Consolidation Areas (OPCAs) located at the GE facility and/or within the subgrade foundations of certain identified buildings, and they provide that the disposition of such building demolition debris within the OPCAs or building foundations is part of the response actions under the CD and the SOW and hence requires EPA review and approval of the procedures and protocols for such disposition.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

This document describes the procedures and protocols that GE will follow related to building characterization, building demolition, and post-demolition activities. This document addresses those building demolition activities in which the building demolition debris will be either transported off-site for disposal or permanently consolidated at the OPCAs. For such activities, consistent with the provisions of the CD and the SOW (as described above), some of the procedures and protocols set out herein are presented to EPA for review and approval, while others are included only for informational purposes and for any comments or input that EPA may have. Specifically:

- The procedures and protocols presented herein that relate to on-site disposition of building demolition debris at the OPCAs, including the necessary characterization of the material to allow such consolidation, are proposed to EPA for review and approval.

- The remaining procedures and protocols presented herein, including those relating to other pre-demolition activities, the building demolition activities themselves, off-site disposition of demolition debris, and post-demolition activities, are provided for informational purposes and for any comments that EPA may have. (Note, in particular, that off-site disposition of building demolition debris is not subject to the CD and SOW, but will be governed by existing federal, state, and local laws and regulations.)

This document does not present procedures and protocols for placement of demolition debris within the specified existing building foundations where such placement is allowed by the CD and the SOW (i.e., Buildings 2, 3C, 12, 12X, 12Y, and 31). For these instances, to the extent that GE elects to place demolition debris in such building foundations, GE will prepare and submit a separate work plan(s) describing the demolition activities, associated characterization procedures, and the placement of debris in the building foundations.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

These Protocols were initially submitted to EPA in December 2000. The present version of the Protocols incorporates the modifications that were previously agreed upon between GE and EPA and set forth in an Addendum to these Protocols submitted by GE to EPA on December 18, 2001.

2.0 On-Plant Consolidation Area Requirements

As outlined in the SOW, two OPCAs -- the Hill 78 OPCA and the Building 71 OPCA -- are available for the consolidation of various materials (e.g., soil, sediment, debris, etc.) generated during the performance of the response actions governed by the CD, as well as for consolidation of building demolition debris generated at the GE facility and other GE-owned areas within the Site. Regarding the use of these OPCAs, the CD and the SOW establish the following disposition-related requirements:

- Specifically excluded from consolidation within either OPCA are free liquids, free product, intact drums and capacitors, and other equipment that contains polychlorinated biphenyls (PCBs) within its internal components, as well as asbestos-containing material required by applicable law to be removed from structures prior to demolition.

- Consolidation within the Hill 78 OPCA shall be limited to those materials that contain less than 50 parts per million (ppm) PCBs (as determined by appropriate composite sampling techniques or other techniques approved by EPA) and are not classified as a hazardous waste under EPA's regulations issued pursuant to the Resource Conservation and Recovery Act (RCRA). If these requirements are not met, then materials can be consolidated at the Building 71 OPCA, provided that they are not precluded from on-plant consolidation based on the first criterion specified above.

In consideration of the above requirements, and for those materials potentially subject to disposition at the OPCAs, GE will perform certain assessment, removal, and characterization activities prior to and/or following demolition activities. The results of these activities will be used to ensure that the disposition of the building demolition debris meets the above requirements and that GE's activities satisfy other applicable federal and state requirements.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

3.0 Pre-Demolition Assessment/Removal Activities

Prior to conducting demolition activities GE will perform certain activities to assess, and remove as appropriate, materials that are prohibited from on-plant consolidation under the CD and the SOW and/or are required by applicable laws and regulations to be removed prior to demolition. These activities are summarized below.

- **Equipment Containing Free Liquids, Free Product, or PCBs** – Prior to demolition of a building, GE will identify machinery, equipment, or other items located in the building that may contain free liquid or free product or may contain liquid PCBs within their internal components. To perform these activities, GE will use only qualified and experienced contractors working in accordance with specifications and requirements developed by GE. If any such items are identified, GE will drain those items and transport the free liquid, free product, or liquid PCBs off-site for appropriate disposal in accordance with applicable regulations. To perform the removal of liquids from such items, a building reconnaissance and equipment inventory will initially be prepared by qualified and experienced personnel to identify the location, type, and potential volume of liquid that may be present within a given item. This assessment may involve review of the manufacturer's information, if available. A removal plan will then be developed based on the type, nature, and location of the subject liquids and the applicable disposition requirements. Removal activities will be equipment- and liquid-specific; as needed, certain equipment will be dismantled to access liquids. Following liquid removal, adsorbent materials (e.g., speedi-dry) will be placed within the former liquid reservoir(s) to adsorb any liquid residuals that may be present. Subsequent to the removal of any free liquids, free product, or liquid PCBs, the equipment or item may be disposed of either at the OPCAs or at an appropriate off-site facility, subject to the applicable restrictions associated with such disposition. As an alternative, rather than drain the liquids from such equipment or other items, GE may elect to transport the equipment or item itself (either in its entirety or portions thereof) containing the free liquid, free product, or liquid PCBs off-site for subsequent removal and disposal activities at the off-site facility.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

- **Asbestos-Containing Material** - GE will perform an inspection for the presence of Asbestos-Containing Material (ACM) on interior and exterior building components, utilizing sample collection and analysis by Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM). These activities will be performed in accordance with the Occupational Safety and Health Administration (OSHA) regulations in 29 CFR 1926.1101 and all other applicable federal, state, and local regulations. Based on the results of this inspection, GE will remove ACM that is required by applicable laws and regulations to be removed from structures prior to demolition (see 40 CFR Part 61 Subpart M, 301 CMR 7). Such ACM will be sent off-site for disposal at an appropriate, permitted disposal facility. The removal, containerization, transportation, and disposal of such ACM will be performed in accordance with applicable federal, state, and local regulations, including 29 CFR 1910.1101, 40 CFR Part 61 Subpart M, 310 CMR 6, and 453 CMR 6. Abatement will be performed by a Massachusetts-licensed abatement contractor under the oversight of a Massachusetts-Licensed Asbestos Project Monitor. A 10-day notification must be supplied to the Commonwealth of Massachusetts prior to the commencement of abatement activities.

- **Equipment Containing Chlorofluorocarbons (CFCs)** – GE will identify air conditioning units and compressors that contain CFCs. The CFCs will be removed from these devices in accordance with applicable laws and regulations and properly treated and/or disposed of off-site.

- **Mercury-Containing Devices** – GE will also identify and remove thermostats and switches containing liquid mercury and will send those items to appropriate off-site disposal facilities.

In addition to the bulleted items listed above, GE will ensure that, prior to the initiation of demolition activities, bulk waste solids that are stored, staged, stockpiled, or otherwise present within the interior of a building (i.e., excluding the building materials themselves) and that could potentially leach contaminants at concentrations exceeding TCLP levels will be separately characterized to determine whether they constitute hazardous waste under RCRA. The results of this testing will be considered along with the results of the pre-demolition building characterization discussed in Section 4.0 in developing a plan for the appropriate disposition of the materials from the given building.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

4.0 Characterization of Building Demolition Debris

Following the performance of the pre-demolition assessment/removal activities described in Section 3.0, characterization of the remaining building materials will be performed in consideration of the potential disposition alternatives, namely off-site disposal and/or consolidation at the OPCAs. As previously noted, certain limitations have been established in the CD and the SOW regarding the materials that may be placed in one of the OPCAs -- i.e., the Hill 78 OPCA. Hence, the building characterization activities described in this section will focus in particular on obtaining the data necessary to determine whether demolition debris may be consolidated at that OPCA (i.e., have average PCB concentrations less than 50 ppm and do not constitute hazardous waste under EPA's RCRA regulations). In the event that GE pre-determines that certain demolition debris will be consolidated at the Building 71 OPCA, characterization of such materials is not necessary or required, and need not be conducted by GE, provided GE ensures that such debris does not contain free liquids, free product, or any of the other items that are prohibited from being consolidated at the OPCAs under the CD and SOW, as described above.

The procedures described in this section for characterization of building demolition debris apply to the characterization of the building structure and materials of construction prior to the performance of demolition activities. In the event that GE desires, instead, to characterize the building demolition debris after the demolition of the building, a separate specific protocol for such post-demolition characterization will be submitted to EPA for review and approval.

Under the pre-demolition characterization approach, prior to the initiation of demolition activities, a building-wide characterization program will be conducted to supplement any existing characterization data. The results of these characterization activities will be used to assess the overall condition of the building and to determine the need for, and scope and extent of, any debris segregation and consolidation that may be necessary. If, based on review of these data and consideration of the demolition technique to be utilized, additional characterization information is needed, GE may collect additional building material samples from floor, wall, or ceiling locations. In general, the characterization of a given building will include the following activities:

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

- With the exception of wood block flooring and structural steel (discussed below), GE will initially characterize the building materials subject to demolition and consolidation/disposition using an area-based sampling approach. Samples of floor materials will be collected at minimum frequencies of one sample per 5,000 square feet of total floor area for PCB analysis (or one sample per building if the total floor area is less than 5,000 square feet) and one sample per 50,000 square feet of total floor area for Toxicity Characteristic Leaching Procedure (TCLP) analysis (or one sample per building if the total floor area is less than 50,000 square feet). Sample selection will be biased toward areas that appear to be impacted based on visual inspection and historical data. The sample locations identified by GE will be reviewed by EPA (as part of a pre-sampling building reconnaissance) for its concurrence. Following receipt of the results of the initial sampling activities, GE will then implement one of the following options with respect to the need for additional sampling:

  - If GE elects to dispose of the demolition debris at the Building 71 OPCA, no further sampling of such material will be necessary.

  - If GE elects to dispose of the building demolition debris at an off-site disposal facility, additional sampling of such material will be conducted as necessary to meet the characterization requirements of the off-site disposal facility.

  - If the initial PCB and TCLP sample results indicate that the demolition materials are suitable for disposition at the Hill 78 OCPA (based on the requirements established in the CD and SOW), no further characterization sampling of such material will be conducted, provided that: (1) the characterization data set consists of a minimum of six PCB sample results and two TCLP samples results per building; (2) there is a minimum of one PCB and one TCLP sample result per building floor (if applicable); and (3) on a discrete sample basis, each PCB sample result is below 50 ppm PCBs and no TCLP extract sample exceeds its allowable levels. Under these conditions (and also considering that disposal of demolition debris at the Hill 78 OPCA can be based on average concentrations and that sampling approach will have been biased toward visually

impacted areas), the characterization data are considered sufficient to support disposition at the Hill 78 OPCA.

- If the initial PCB and TCLP sample results indicate that the demolition debris may be suitable for disposition at the Hill 78 OCPA, but the above conditions are not met, or if those results indicate that portions, but not all, of the demolition debris may be suitable for disposition at the Hill 78 OPCA, and if GE wishes to further consider possible disposition of this material at the Hill 78 OPCA, additional characterization sampling for the areas in question will be performed according to an EPA-approved approach. The sampling frequency for this additional sampling will be one PCB sample per 1,000 square feet of floor area and one TCLP sample (for the parameters of interest) for every 5,000 square feet of the subject area.

- For wood block flooring and structural steel building materials, GE will decide, at its option, whether to (i) consolidate these materials in the Building 71 OPCA, (ii) dispose of these materials at an appropriate off-site disposal facility, or (iii) characterize these materials by appropriate methodologies to determine their suitability for consolidation at the Hill 78 OPCA. If GE chooses to consolidate these materials within the Building 71 OPCAs, no additional characterization will be performed. Should GE decide to dispose of wood block or structural steel at an off-site location, GE will perform the necessary characterization activities to facilitate such disposal. Similarly, if GE should elect to characterize these materials to determine their suitability for consolidation at the Hill 78 OPCA, GE will characterize such materials by appropriate sampling and analysis methodologies.

  All sampling and analysis activities will be conducted in accordance with the procedures set forth in GE's approved FSP/QAPP and/or its subsequent revisions. In the event that GE wishes to utilize alternate procedures (not set forth in the approved FSP/QAPP or revisions) for building characterization sampling, the specific sampling and/or analytical procedure(s) proposed will be submitted to EPA for approval prior to performance of said activities.

  Following completion of initial (and any necessary supplement) characterization activities, GE will provide a pre-demolition data report for EPA review.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

5.0 Demolition Activities

Following completion of the pre-demolition assessment/removal activities described in Section 3.0 and -- if performed -- the characterization activities described in Section 4.0, GE will initiate building demolition activities. The demolition activities will be building-specific, and will consider the size, location, and condition of the building and any available characterization data. Based on this information, GE will develop an overall approach for the performance and sequencing of building demolition and related activities. Certain of these activities are discussed in further detail below.

Prior to initiating demolition activities, GE will abandon/relocate utilities (e.g., former process supply lines, sanitary sewer, storm sewer, potable and fire water supply, steam and condensate return piping, electrical, telephone/cable, etc.) as necessary to facilitate building razing. These activities will be performed, as appropriate, in accordance with utility owner specifications and requirements and applicable local, state, and federal codes and regulations. Utilities to be abandoned will be either: 1) cut, capped, and/or grouted in-place; or 2) removed and either consolidated within the OPCAs or disposed of at an appropriate off-site disposal facility. Materials subject to either consolidation within the OPCAs or off-site disposal will be appropriately characterized to facilitate segregation/disposal. Specifically, for materials that will be disposed of at an off-site location or consolidated at the OPCAs, GE will perform characterization activities and evaluations in accordance with its *Waste Characterization Plan* (Attachment A to the POP). In the event that GE considers the possible re-use of the excavated materials as backfill -- or if materials from an off-site location are utilized as backfill -- the materials will be sampled as necessary and will be evaluated for their suitability for use as backfill in accordance with the procedures set out in GE's *Soil Cover/Backfill Characterization Plan* (Attachment B to the POP). If active subgrade utilities will remain in the area, GE will ensure specifically that the spatial average PCB concentration of the backfill material does not exceed 25 ppm, as provided in the CD and SOW.

EXHIBIT A-1

PROTOCOLS FOR BUILDING DEMOLITION AND ASSOCIATED CHARACTERIZATION ACTIVITIES

Once all utilities have been abandoned/relocated, GE will raze the building structure. It is anticipated that such activities will be performed utilizing conventional construction equipment, including, but not limited to, bulldozers, excavators, cranes, backhoes, etc. Such activities will be performed in accordance with 310 CMR 7 and all other applicable local, state, and federal codes and regulations.

GE will conduct ambient air monitoring for particulates during activities that could potentially produce dust. (Such monitoring will be performed in addition to any other monitoring to be performed as part of the contractor's health and safety plan.) The ambient air monitoring will be conducted at a minimum of three monitoring locations to include at least one upwind and one downwind location. This particulate matter monitoring will be performed for approximately 10 hours daily (approximately 7:00 a.m. to approximately 5:00 p.m.) during each day of active demolition activities and will be conducted using the procedures and methods specified in Appendix J to GE's approved FSP/QAPP**.**

In addition, GE anticipates that where demolition activities could result in the generation of airborne PCBs, GE will conduct ambient air monitoring for PCBs at the same stations as for particulates. This monitoring will be conducted at a frequency of approximately one monitoring event for every 4 weeks (cumulative time basis) of active demolition activities, except that: (1) a minimum of one PCB air sampling event will be conducted for each building, even if the demolition activities occur in a timeframe less than 4 weeks; and (2) in the event that the overall active demolition activities are anticipated to be completed in a timeframe less than 4 weeks, one round of PCB air sampling will be performed. This monitoring will be performed using the PCB monitoring procedures and methods specified in Appendix J to the FSP/QAPP.

The notification and action levels to be used in this ambient air monitoring program, as well as the actions to be taken in the event that those levels are exceeded, will be same as those specified in GE's *Ambient Air Monitoring Plan*, which is Attachment D to the POP.

As needed, GE will use appropriate methods for controlling dust emissions (e.g., water spray) during demolition activities. Additionally, the maximum size of demolition debris to be consolidated and the consolidation activities themselves will be consistent with the operational requirements for the OPCAs, as set

forth in the *Detailed Work Plan for the On-Plant Consolidation Areas* (BBL, June 1999) and modified by subsequent OPCA-related submittals and correspondence between GE and EPA (including GE's August 12, 1999 Addendum to the Detailed Work Plan. GE's June 13, 2000 responses to EPA comments on the Addendum, EPA's conditional approval letter of January 30, 2001, and GE's clarification letter of March 9, 2001).

6.0 Evaluation of Debris for Disposition

As previously indicated, building demolition debris that contains an average PCB concentration less than 50 ppm and is not classified as RCRA hazardous waste (based on the TCLP sample results) can be placed in the Hill 78 OPCA. This section describes how GE will make that determination based on the results of the pre-demolition characterization of the building material described in Section 4.0. (As noted above, if GE desires to characterize the demolition debris after demolition, it will submit a separate specific proposal for doing so to EPA for review and approval. In that event, GE's proposal will also describe the proposed procedures for evaluating the building demolition debris for disposition based on the post-demolition characterization data.)

If GE has characterized the building materials prior to demolition, and if GE wishes to consolidate some or all of that debris at the Hill 78 OPCA, the data derived from the pre-demolition characterization activities will be evaluated to determine whether the demolition debris can be consolidated at the Hill 78 OPCA. To evaluate whether such debris meets the PCB criterion for such consolidation, an average PCB concentration will be determined for the building or an appropriate portion of the building (e.g., story or segment of the building), based on the available PCB data and anticipated demolition techniques (e.g., whether multiple stories or building segments will be collapsed together, or can be feasibly segregated during demolition). The area of the building (i.e., whole building or appropriate story or segment of the building) for which such average PCB concentrations will be calculated will be proposed to EPA for review and approval.

To estimate the average PCB concentration for such a building, story, or segment, a representative PCB concentration will first be determined for each category of demolition debris (e.g., brick, concrete block, concrete slabs, as well as wood and/or steel if characterized) from such building, story, or segment,

considering the area and volume of the specific debris. For instances where PCB data for a specific building material are not available (e.g., walls), available PCB data for adjacent and related building material (e.g., floors) will be utilized to develop a conservative PCB concentration for this material. For example, if the average PCB concentration for a floor is below 50 ppm, it will be assumed that the walls likewise have PCB concentrations below 50 ppm; however, if the floor concentration is above 50 ppm, it will be assumed that the wall concentrations are also above 50 ppm unless sampling data are collected that show otherwise. As to ceilings, where a given ceiling is also the floor of the story above (e.g., a concrete floor slab), the characterization of that floor will also serve to characterize the ceiling. Where the ceiling has no story above it (or is constructed of different materials) and no PCB data are available for that ceiling, the ceiling will be characterized according to the procedure described above for walls (i.e., based on available PCB data for adjacent and related building material). Once a PCB concentration has been determined for each category of building material from the appropriate building, story, or segment, those category-specific PCB concentrations will be averaged, using appropriate averaging techniques (e.g., area-weighted and/or volume-weighted averaging), to determine an overall average PCB concentration for that building, story, or segment.

If the average PCB concentration of the building materials for the building or appropriate story/segment of the building is less than 50 ppm, the TCLP analytical data available for that building/story/segment will then be reviewed to determine whether the demolition materials would constitute hazardous waste under RCRA. This evaluation will be conducted in a manner similar to that described above concerning PCBs and will, to the extent possible, consider the types, areas, and volumes of demolition debris associated with the building.

7.0 Disposition of Demolition Debris

If a given set of building demolition debris contains an average PCB concentration less than 50 ppm and does not constitute hazardous waste under RCRA, it may be permanently consolidated at the Hill 78 OPCA. For demolition debris that contains an average PCB concentration at or above 50 ppm or is classified as hazardous waste under RCRA, GE will consider several options or a combination of options. These include the placement of such debris within the Building 71 OPCA, the transport of such debris for off-site disposal, or the development of a debris segregation plan whereby certain categories of the demolition debris would be

segregated and evaluated further (based on review of the PCB data for such specific categories and/or additional characterization sampling as necessary) to determine their suitability for placement within the Hill 78 OPCA. Any such debris segregation plan would be submitted to EPA for review and approval.

8.0 Post-Demolition Activities

Post-demolition activities to be conducted by GE will include, but not be limited to, the placement of gravel borrow materials and/or concrete, as needed, to bring the final base surface up to grade so that it is suitable for its intended use (i.e., re-use under the DEDA or, for non-DEDA buildings, other appropriate use). Any fill material used to prepare that surface will be sampled and evaluated for its suitability for such use in accordance with the procedures set out in GE's *Soil Cover/Backfill Characterization Plan* (which is Attachment B to the POP).

Following the completion of post-demolition activities, GE will prepare letter reports for submission to EPA which document the demolition activities grouped by complex (e.g., 20s Complex, 30s Complex, 40s Complex, etc.). These letter reports will include, but not be limited to, analytical data, photographs, and quantities of materials consolidated at the OPCAs.

Attachment B

Soil Cover / Backfill Characterization Plan

ATTACHMENT B

SOIL COVER/BACKFILL CHARACTERIZATION PLAN

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ATTACHMENT B

SOIL COVER/BACKFILL CHARACTERIZATION PLAN

1.0 Introduction

This *Soil Cover/Backfill Characterization Plan* outlines the procedures that the General Electric Company (GE) will use to evaluate potential sources of soil cover and backfill material for various Removal Actions to be conducted at the GE-Pittsfield/Housatonic River Site (Site) under a Consent Decree (CD) executed by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and several other government agencies in October 1999 and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this plan applies to the Removal Actions that GE is obligated to perform under the CD at several Removal Action Areas (RAA) within the Site, which exclude the response actions being taken and to be taken for the Housatonic River. These Removal Actions are subject to a *Statement of Work for Removal Actions Outside the River* (SOW) (which is Volume I of Appendix E to the CD) and the applicable Performance Standards contained therein. Certain of these response actions will involve the removal of soils, sediments, or other below-grade materials, followed by the placement of backfill materials. Additionally, response actions may, depending on the specific RAA, involve the placement of soil materials as part of a soil cover or engineered barrier.

This plan describes the general procedures that GE will use to identify, evaluate, and select possible sources of soil cover and backfill materials for the response actions at the RAAs. As discussed herein, the use of a potential material will be dependent on three primary criteria: 1) its geotechnical characteristics and overall suitability for the intended use, 2) its chemical characteristics (i.e., the presence and concentrations of hazardous constituents in the candidate materials), and 3) its potential role in achieving the applicable Performance Standards for the subject Removal Action. The selection and evaluation of soil cover/backfill materials -- using the procedures contained in this plan -- will be addressed in the appropriate technical RD/RA submittals for the specific Removal Action.

This Soil Cover/Backfill Characterization Plan is one of several plans that collectively comprise the Project Operations Plan (POP) for these Removal Actions. This plan was originally submitted to EPA in December 2000, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications set forth in the October 19, 2001 Addendum, as well as other modifications identified and agreed upon between GE and EPA since that time.

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In the future, this plan will be reviewed and updated as necessary on approximately an annual basis. Any changes will be subject to EPA review and approval.

Two of the other EPA-approved plans included in the POP contain information that is relevant to this plan -- the Field *Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP) and the *Construction Quality Assurance Plan* (CQAP). Pertinent sections of those plans will be referenced herein as appropriate.

2.0 Characterization of Potential Soil Cover/Backfill Materials

As potential sources of soil cover or backfill materials are identified, GE will evaluate each source using the general characterization procedures described in this section and the subsequent assessment activities described in Section 3 of this plan. The characterization of a candidate source will initially involve a qualitative review of the potential source, followed by analytical testing to determine the material's chemical and (if appropriate) geotechnical properties. These characterization procedures are described below. For sources that have already undergone such characterization, GE will present the results to EPA in the appropriate RD/RA submittal.

To date, the soil cover and backfill materials that have been used by GE have originated primarily from off-site locations. GE anticipates that similar off-site materials will continue to be used to restore most excavation areas and to construct various soil covers and engineered barriers. However, as discussed in Section 3.3 of this plan, GE may propose (in the technical RD/RA submittals for a given Removal Action) to utilize existing materials from within the Site as backfill material under certain conditions (specified in Section 3.3).

2.1 Initial Material Assessment

As potential sources of fill/soil material are identified, GE will conduct an initial assessment (if not previously conducted) to determine whether the material appears to be potentially suitable for use so as to warrant further evaluation through sampling and analysis. This assessment will likely include some or all of the following: a site visit to inspect the materials and/or the location of the materials, and discussions with the owner of the

material and/or property owner regarding the origin of the material, its prior uses, and any chemical/physical characterization data. The level of detail involved in this assessment will likely be based on the specific source material, and will be limited if the potential materials are undisturbed in-place materials. Assuming that the initial assessment described above indicates that the materials are potentially usable and thus warrant further evaluation, GE will arrange for sampling and analytical testing of the potential materials.

2.2 Initial Characterization Sampling

If the results of the initial assessment indicate that the candidate material may be suitable for use, GE will collect representative sample(s) for subsequent laboratory analyses. The specific laboratory analyses will be consistent with the testing that GE has performed to date for various completed/ongoing remedial programs (e.g., the Allendale School Removal Action, the Upper 2-Mile Reach Removal Action, and the Off-Site Residential Fill Property program). Specifically, representative samples will be analyzed for PCBs and the volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals listed in Appendix IX of 40 CFR 264, plus benzidine, 2-chloroethyl vinyl ether, and 1,2-diphenylhydrazine (Appendix IX+3 VOCs, SVOCs, and metals). All samples will be collected, analyzed, and validated in accordance with GE's approved FSP/QAPP.

The frequency of sampling and testing will depend on the source/location of the potential material. If the candidate material is from a undisturbed in-place source (e.g., an active gravel/borrow pit), one representative sample will be collected and analyzed. (The results of this sample will be considered to represent the materials that originate from this source, until such time as the physical characteristics of the source location significantly change.) For off-site materials that have been generated from prior excavation/handling activities (e.g., materials located in a stockpile), the frequency of characterization testing will involve the collection of 10 discrete "grab" samples for each volume of such material containing up to 2,000 cubic yards (cy). (If the volume of material to be characterized is less than 2,000 cy, 10 "grab" samples will still be collected from that material.) These discrete grab samples will be collected at spatially distributed locations within the source material and will be composited into a single sample for performance of the appropriate analyses. As noted above, for sources (including either undisturbed in-place sources or source materials

generated from prior excavation/handling) that have already undergone appropriate sampling and analysis, GE will present the analytical results to EPA for approval.

As previously indicated and as discussed in Section 3.3, GE may propose that existing materials from within the Site be used as backfill materials (subject to certain conditions). In that event, it is anticipated that sufficient analytical data will be available to characterize the candidate material, primarily as a result of the pre-design investigations performed for the specific RAA. However, as needed, additional characterization data may be obtained.

2.3 Geotechnical Sampling

Depending on the specific RAA and response action(s) under consideration, the physical characteristics and geotechnical parameters of a potential soil cover or backfill material may be an important consideration in terms of its potential use. As necessary, samples of a potential soil cover and/or backfill material will be analyzed for geotechnical parameters to support the appropriate response action. In such instances, certain geotechnical parameters will be identified in the technical RD/RA submittals for the specific Removal Action, including the type and required specifications for the material. In addition, the CQAP provides additional information related to the specified material, such as the various technical specifications, testing requirements, and testing criteria. The CQAP identifies minimum specifications (e.g., loam content, grain size distribution, etc.) for materials associated with several types of response actions and also specifies the required sampling intervals.

2.4 Future Characterization Activities

Depending on the availability and volume of a candidate material (once it has been initially characterized and determined to be suitable for use), it is possible the source will be used for several RAAs over an extended period of time. To maintain an up-to-date characterization of the source, sampling and analyses as described in Section 2.2 will be conducted approximately annually for sources that are used by GE on a consistent basis. If a particular source of soil cover and/or backfill material was previously characterized but has not been used by GE in the prior 18 months, the characterization activities described in Section 2.2 will be repeated.

Additionally, notwithstanding the timing associated with the use of a particular material, GE will perform sampling and analysis for a previously characterized material if the physical characteristics of the material have significantly changed. In the event that a chemical release occurs at or near a previously characterized source of soil cover or backfill material, GE will re-evaluate the continued use of that source. If, based on this evaluation, GE decides that continued use of the material is warranted, GE will sample and analyze material from the area potentially affected by the release to confirm its suitability for continued use. GE will provide EPA with the analytical results from such re-sampling prior to continued use of material from the affected area.

3.0 Evaluation of Potential Source Materials

3.1 General

Once it has been determined that a potential source of soil cover and/or backfill material is suitable from a geotechnical perspective, the available chemical characterization data will be used to determine whether the material can be used as part of the response action and, if acceptable, any limitations regarding its use. The primary considerations involved in these determinations include the origin of the material (i.e., whether the material will be brought to the RAA from an off-site location or whether the materials currently exist within the Site), and the presence and levels of PCBs and non-PCB constituents. Section 3.2 describes the PCB and non-PCB criteria that will be applied to materials originating from off-site locations, while Section 3.3 describes the conditions for possible use of existing materials from within the Site and the PCB and non-PCB criteria that will be applied to such materials.

3.2 Off-Site Soil Cover / Backfill Sources

Based on the materials that have been characterized to date, it is not expected that detectable levels of PCBs, VOCs, or SVOCs or concentrations of metals above background will be present in soil cover or backfill materials that originate from an undisturbed, off-site, in-place source. However, in the event that such constituents are present in the candidate material, the materials will be evaluated further in accordance with the proposed criteria described below.

3.2.1 PCB Criteria

Soil cover/backfill materials originating from an off-site location will be acceptable for use in Removal Actions Outside the River without limitation if the following criteria are met:

- The candidate material does not contain any PCB concentrations exceeding 2 ppm -- which corresponds to the Massachusetts Contingency Plan (MCP) Method 1 standard for PCBs in soil in unrestricted areas and is also consistent with the lowest numerical PCB Performance Standard for soil contained in the CD and SOW; and

- The use of such material will allow the response action to achieve the applicable PCB Performance Standards at the RAA in question.

3.2.2 Criteria for Non-PCB Constituents

The evaluation of VOCs, SVOCs, and metals in a potential soil cover or backfill material will generally follow the procedures described in Technical Attachment F to the SOW (Protocols for the Evaluation of Non-PCB Constituents in Soil). As described in Section 2 of this plan, candidate soil cover/backfill materials will, in addition to PCBs and certain geotechnical parameters, be analyzed for Appendix IX+3 VOCs, SVOCs, and metals. Any detectable levels of these non-PCB constituents will be evaluated using the procedures described below.

The analytical data for these constituents in the candidate material will initially be compared with the applicable EPA Region 9 Preliminary Remediation Goals (PRGs), using the residential PRGs for material being considered for use in residential or recreational areas and the industrial PRGs for material being considered for use in commercial/industrial areas. A list of the relevant Region 9 residential and industrial PRGs is included as Exhibit F-1 to Technical Attachment F to the SOW. For certain constituents for which Region 9 PRGs do not exist, surrogate PRGs, based on Region 9 PRGs for similar chemicals, will be used, as described in Attachment F to the SOW. (The Region 9 PRGs and these surrogate PRGs are referred to jointly as "Screening PRGs.") Specifically, the maximum concentration of each constituent in the candidate material

will be compared to the applicable Screening PRG. If the maximum concentration of each such constituent is below the applicable Screening PRG, the material will be considered suitable for use without limitation in its intended application (i.e., at residential/recreational areas or commercial/industrial areas, depending on which set of PRGs was used).

If the candidate soil cover or backfill material contains Appendix IX+3 VOCs, SVOCs, or metals at concentrations that exceed the Screening PRGs, GE may further evaluate the materials within the context of the specific RAA for which its use is being considered. Specifically, for each constituent that is not eliminated through the comparison to Screening PRGs, an average concentration for that constituent within the overall RAA (or specific portion thereof, depending on the applicable Performance Standards) will be determined, based on data for the existing soils that will remain after the response actions have been completed, together with data associated with the candidate soil cover/backfill material. GE will calculate separate average concentrations for surface soils and subsurface soil (using depth increments consistent with those evaluated for PCBs for the RAA).

The average constituent concentrations, calculated as described above, will be then compared to the applicable MCP Method 1 soil standard (S-1, S-2, or S-3), as amended (or, if a MCP Method 1 standard does not exist, a derived Method 2 standard), or incorporated into an area-specific risk evaluation in accordance with the provisions established in Technical Attachment F to the SOW. In determining the applicable set of Method 1 (or 2) standards (i.e., S-1, S-2, or S-3), as amended, GE will follow the MCP criteria for categorizing soil. If, after incorporating the candidate backfill/soil cover material into the anticipated response actions, the resulting average concentrations for VOCs, SVOCs, and metals across the RAA (or appropriate portions of the RAA) and at the appropriate depth increments are below the applicable MCP Method 1 (or 2) soil standards, as amended, or result in acceptable area-specific risks, the candidate materials will be considered acceptable for use under the specific conditions that were subject to evaluation.

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3.3 Conditions and Criteria for Use of Site Materials

Depending on the specific RAA and response action(s), GE may propose -- in the technical RD/RA submittals for a given Removal Action -- to use existing excavated Site soils or to use crushed building demolition debris from the Site (to the extent authorized by the CD, as modified) in lieu of materials originating from an off-site location. Use of such existing Site soils or crushed building materials may be appropriate in certain situations. For example, in some instances, soil containing chemical constituents at low or non-detectable levels may need to be removed to gain access to underlying soils that contain higher levels of contamination, but would be entirely suitable for use as backfill. In other instances, certain soils may need to be removed to achieve the Performance Standards for a given depth increment (e.g., the top foot) but would meet the Performance Standards for a deeper increment and thus could be suitable for use as backfill for that deeper increment. In these situations, it may be more efficient to use such Site soils as backfill rather than transporting them to one of GE's On-Plant Consolidation Areas (OPCAs) or to an off-site location and bringing in new soil for use as backfill. This approach would involve less truck traffic and less transport of PCB-containing materials over public roads, could be accomplished more expeditiously than removing those materials and bringing in new soil, and would save OPCA capacity. Crushed building demolition debris may be used only pursuant to the terms of the Fourth Modification of Consent Decree (entered on June 23, 2006) or similar future modifications of the CD.

In consideration of the above factors, GE may, under certain conditions, use existing Site soils or crushed building demolition debris (to the extent authorized by the CD, as modified) as backfill and/or cover material. First, if such material meets the same PCB and non-PCB criteria specified in Section 3.2 for use of material from off-site sources (as well as comparable geotechnical criteria), then that material will be considered acceptable for use as backfill or cover material under the same conditions set out in Section 3.2 for use of off-site material. Second, if such Site material does not meet those criteria for off-site sources, then GE may either: (a) use such material from a given RAA as backfill or cover material within that same RAA provided that the conditions and criteria set forth below in this section are met; or (b) propose, for EPA approval, to use such material from a given RAA as backfill or cover material within a different RAA so long as the conditions and criteria set forth below in this section are met. In any of these cases, the technical RD/RA submittals for a given Removal Action will provide pertinent information.

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General Limitations

- Such existing Site material will not be considered for use within residential properties.

- For other types of properties and areas, such existing Site material will be considered for use only for depths greater than one foot below grade, unless otherwise approved by EPA.

- The subject material must have appropriate geotechnical properties for its intended purpose (determined through geotechnical testing if needed).

PCB Criteria

- Site soils or crushed building demolition debris (to the extent authorized by the CD, as modified) will be considered acceptable for use as backfill or cover material (subject to the above conditions) if the following criteria are met:

  - The PCB concentrations in the candidate material do not exceed the PCB Performance Standards set forth in the CD and the SOW for backfill material associated with future utility installations or repairs -- namely: (a) an average concentration of 25 ppm at industrial/commercial areas; or (b) average concentrations of 10 ppm for the top 3 feet and 25 ppm for deeper depth increments at recreational areas; and

  - The use of such material in the response action for the RAA in question will allow the response action to achieve the applicable PCB Performance Standards at that RAA.

- In the event that such Site material contains PCB levels above the Performance Standards summarized above for future utility corridor backfill materials, GE may still propose to use such material as subsurface backfill material in the response action. Any such proposal, along with the

supporting rationale (which will be primarily based on a demonstration that the use of such material will allow achievement of the applicable Performance Standards), will be provided in the appropriate technical RD/RA submittal for EPA review and approval.

Criteria for Non-PCB Constituents

- The evaluation of VOCs, SVOCs, and metals in a potential backfill or cover material originating from within the Site will follow the same procedures and criteria described in Section 3.2.2.

Attachment C

Site Management Plan

ATTACHMENT C

SITE MANAGEMENT PLAN

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SITE MANAGEMENT PLAN

1.0 Introduction

1.1 General

This *Site Management Plan* (Site Management Plan) describes the site management and security measures to be implemented by the General Electric Company (GE) during its performance of Removal Actions at the GE-Pittsfield/Housatonic River Site (Site) under a Consent Decree (CD) executed by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other government agencies in October 1999 and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this plan applies to the Removal Actions that GE is obligated to perform under the CD at several Removal Action Areas (RAAs) within the Site, excluding the response actions being taken and to be taken at the Housatonic River. Additional information regarding these Removal Actions and the applicable Performance Standards for them are contained in a document titled *Statement of Work for Removal Actions Outside the River* (SOW), which is Volume I of Appendix E to the CD. The overall objective of the Site Management Plan is to control access to the RAAs during the performance of various Removal Actions. By doing so, a corresponding reduction in potential site safety hazards should be realized, as well as a reduction in the potential for theft of or damage to facilities or equipment.

The Site Management Plan describes security measures (both physical and operational), as well as operational practices that will be implemented to minimize the potential for physical access to and contact with hazardous waste or hazardous materials, structures, or equipment during the performance of the response actions at the RAAs. In developing this plan, the general types of response action activities (e.g., pre-design investigations, construction activities, etc.), as well as the location and physical features of each RAA (e.g., RAAs that are within GE-owned and -controlled property) were considered. This plan, as approved by EPA, will be referenced as appropriate in future submittals relating to these Removal Actions.

ATTACHMENT C

SITE MANAGEMENT PLAN

This Site Management Plan is one of several plans that are part of GE's *Project Operations Plan* (POP). Other plans that are part of the POP and are referenced herein include GE's *Field Sampling Plan/Quality Assurance Project Plan* (previously submitted and approved by EPA), GE's *Site Health and Safety Plan* (HASP), and GE's *Contingency and Emergency Procedures Plan* (CEPP).

This Site Management Plan was originally submitted to EPA in December 2000, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications set forth in the October 19, 2001 Addendum, as well as certain additional modifications identified since that time. In the future, this plan will be reviewed and updated as necessary on approximately an annual basis as part of the annual reviews of the POP, and any such changes will be subject to EPA review and approval. In addition, separate from future POP modifications, this plan is subject to change based on the specific Removal Action and any site- or activity-specific considerations. Any such modifications will be presented in the technical removal design/removal action (RD/RA) submittals for the specific Removal Action for EPA review and approval.

1.2 Format of Document

Section 2.0 of this plan identifies the RAAs within the Site and describes the types of activities that will be conducted by GE as part of the Removal Actions required by the CD. It also describes the general responsibilities of GE and its representatives in the implementation of site management activities. Section 3.0 describes the various security measures and management operations that currently exist and/or will be implemented during the response actions at the RAAs.

2.0 Applicability of Site Management Plan

2.1 General

This Site Management Plan applies to specific response actions conducted as part of the Removal Actions Outside the River. It focuses on those activities for which there is a reasonable potential for public interaction based on the location of the RAA (relative to the GE Plant Area and local community); the type, duration, and timing of the various response actions; physical site features and access limitations; and any security measures

and controls that are currently in place. The requirements of this Plan apply during the time that the response actions are being conducted (excluding Post-Removal Site Control activities) and will terminate upon completion of those response actions (except as provided in the Post-Removal Site Control Plan).

The response actions performed within the RAAs will vary in both type and scope, as well as the particular phase of the overall Removal Action (i.e., pre-design activities vs. remedial construction activities). For example, during pre-design investigations, it is likely that large portions of a RAA will be subject to soil sampling, monitoring well installations, survey activities, etc. However, depending on the results of these pre-design activities and the applicable Performance Standards for the particular Removal Action, it is possible that any further response actions (e.g., soil excavations, installation of a soil cover, etc.) may occur within smaller areas of the RAA. Therefore, the site management activities described herein may require modification to reflect the specific areas subject to future response actions. Any modifications will be identified in the technical RD/RA submittals for the specific Removal Action.

Additional information regarding the areas and types of response action activities addressed by this plan is presented below.

2.2 Removal Action Areas

A total of 20 RAAs within the Site are subject to Removal Actions under the CD and the SOW (excluding the Allendale School Property, at which the required Removal Action has already been completed, and the Housatonic River, where separate response actions are ongoing or will be conducted under the CD). These RAAs are generally described in the SOW. The RAAs located at and near the GE Pittsfield facility are depicted on Figure 1. The RAAs located within the GE Plant Area are owned primarily by GE, except that significant portions of the Unkamet Brook Area RAA are owned by other parties, as shown on Figure 2. The Former Oxbow Areas have some portions owned by GE and some portions owned by other parties, as shown on Figures 3 and 4. The floodplain RAAs are mostly owned by non-GE entities.

2.3 Response Action Activities

Several types of response action activities are addressed by this Site Management Plan. A general description of these activities is provided below.

- **Pre-Design Investigations** - These include activities such as advancement of soil borings; groundwater monitoring well installation; soil, groundwater, and/or surface water sampling and laboratory analyses; and/or surveying activities.

- **Groundwater Monitoring** - This includes such activities as the installation of groundwater monitoring wells, groundwater elevation measurements, recovery of non-aqueous phase liquids (NAPLs), and/or groundwater sampling and laboratory analyses.

- **Remedial Construction** - This includes such activities as soil or sediment excavation, material handling and stockpiling, backfilling, construction of a surface cover or engineered barrier, and restoration activities.

- **Waste Transportation** - This includes activities such as the transportation of waste materials to the On-Plant Consolidation Areas (OPCAs) at the GE facility, to staging areas at the Site, or to off-site disposal facilities.

- **Equipment/Material Delivery** - This includes the delivery of construction equipment, backfill or soil cover materials, and/or personnel to the Site.

- **Ambient Air Monitoring** - This includes air monitoring within the designated RAAs and/or on adjacent properties not specifically part of the RAAs.

In addition to the activities listed above, a key component of the Site Management Plan and other components of the POP is the coordination of visitors to the RAAs during performance of the response actions. Potential visitors may include EPA and MDEP personnel and their contractors, GE employees and consultants,

prospective contractors, public officials, landowners, tenants, and members of the community or the general public. Visitor access is discussed in Section 3.4.3.

2.4 Site Management Responsibilities

Given the number and different types of properties within the RAAs and the large range of potential response actions, the contents of this Plan are necessarily general and subject to further definition (as needed) in the technical RD/RA submittals for the individual Removal Actions. As a result, individual site management responsibilities cannot be specified herein for all the different RAAs and response actions. In general, GE (and, where appropriate, the Remediation Contractor) will be responsible for implementation of the activities described in this Site Management Plan and for compliance with the requirements of this Plan. However, for some response actions, GE may designate one or more other entities to serve as GE's representative(s) for purposes of performing certain site management functions. Such entity(ies) are referred to in this Plan as "GE's Representative." Further information regarding site management responsibilities is presented below.

For each Removal Action, GE will assign a Project Manager who will serve as the primary point of contact for all phases of the Removal Action and the various response actions to be performed as part of that Removal Action. With respect to the site management aspects of a Removal Action, the general responsibilities of the GE Project Manager include the following:

- Ensure that all activities are conducted in conformance with this Site Management Plan and other components of the POP;

- Coordinate with on-site personnel involved in the response actions concerning security, site control, work practices, etc.;

- To the extent possible, inform on-site personnel involved in the response actions of any approved visitors prior to their arrival;

- As appropriate, arrange for security patrols of work areas during inactive periods; and

- Ensure that measures taken in accordance with this Site Management Plan are consistent with and do not interfere with potential emergency response procedures described in the CEPP (Attachment F to the POP).

In addition, GE or GE's Representative will conduct the following site management activities:

- Document all visitors to the work area;
- Conduct inspections of work area security measures;
- Identify site security deficiencies and outstanding security issues;
- Implement and document corrective actions, to the extent possible, for deficiencies observed during the inspections or reported by other personnel;
- Brief all visitors or other personnel entering the work area on potential hazards and site management procedures; and
- Verify that all personnel entering the work area have completed the appropriate training.

3.0 Site Management Activities

3.1 General

Although specific response activities may vary between GE-owned and non-GE-owned areas, the primary goals of site management (e.g., protecting workers and the public from risks of harm) are similar, as are the activities that will be taken to achieve these goals. This section discusses site management activities and protocols which will be implemented for response action within each RAA.

3.2 Communications

Throughout the performance of the Removal Actions, communications will be an important component of site management. Depending on the response action being undertaken and the RAA involved, GE or GE's Representative will communicate with a variety of entities, including EPA and MDEP and their contractors, GE's contractors, public officials, property owners/tenants, and/or the community. The topics of communication will vary based on the location and type of response action being undertaken, but could include:

- Short- and long-term scheduling issues;
- Site access and security procedures, access arrangements, etc.;
- Work progress updates;
- Coordination between multiple contractors and/or owners;
- Arrangement of site visits;
- Equipment storage arrangements;
- Identification of exclusion zones or contamination reduction zones;
- Scheduling of work activities on public or private property;
- Location of utilities; and/or
- Arrangements for work within and adjacent to public roadways.

To aid in communications, GE or GE's Representative will develop a detailed contact list for each response action and distribute this list to appropriate persons.

3.3 Existing and Future Site Controls

The majority of the GE facility itself is secured by perimeter fencing. While public access between East Street and Woodlawn Avenue is allowed on some occasions by GE during business hours, all gates to the facility are locked each evening. Signs are posted at all access gates to announce the access limitations and phones are available to arrange access through a particular gate, if required. In addition, the GE plant is

regularly patrolled for security purposes. Most of the GE-owned areas at the Site outside the main plant area are also secured by perimeter fencing and subject to regular patrols on behalf of GE.

These or comparable security measures will remain in place at the GE facility and other GE-owned areas at the Site during the Removal Actions. In addition, the need for further security measures at these areas during the performance of specific response actions will be assessed, and additional security will be added as necessary. The need for and type of such additional security will be addressed in the RD/RA submittals for the Removal Action in question.

For non-GE owned areas, site controls will need to address the increased potential for contact with unauthorized visitors, and provide for access and/or activities conducted by the property owner or tenant. The key difference between these areas and the GE-owned areas is the absence of existing in-place security systems. For non-GE-owned areas within the RAAs, site and work area security will have to be planned and implemented on an activity- and property-specific basis, taking into account the following factors:

- Type of response actions being conducted;
- Location and current use(s) of the property, and any disruptions that the response actions may cause;
- Accommodations that will be required to allow for owner/tenant access onto the property;
- Existing security measures (e.g., fencing or security guards), if any; and
- Temporary security measures to be instituted by GE.

The proposed security measures for the non-GE-owned areas, taking into account the above factors, will be addressed in the technical RD/RA submittals for the Removal Actions involving such areas.

3.4 Activity-Specific Security Measures

Security procedures may vary depending on the particular phase of the Removal Actions. For example, site management procedures for conducting groundwater sampling at a non-GE-owned property may simply require the sampling contractor to notify the property owner/tenant prior to sample collection, whereas

excavation activities may require that portions of the property be temporarily fenced, with access to the work areas strictly controlled and monitored. A listing of specific procedures to be followed for each phase of work at each non-GE-owned property is beyond the scope of this general Site Management Plan. As necessary, details will be presented in access agreements between GE and the property owner and/or in the technical RD/RA submittals for the specific Removal Action.

3.4.1 Sampling Activities

Sampling activities (i.e., soil, groundwater, and/or surface water sampling) will be performed for most RAAs to support the preparation of RD/RA work plans for each Removal Action. These activities generally involve limited manpower and equipment. In general, due to the low visibility of these activities and the low likelihood of any safety problems, surveillance by GE or GE's Representative during the performance of these activities should be sufficient (in addition to the site controls currently in place at the GE facility) to prevent unauthorized access to sampling areas or interference with the sampling activities. Indeed, GE has performed sampling activities of this nature on numerous occasions at both GE and non-GE properties without incident.

However, for certain types of sampling activities or for sampling activities conducted in certain types of areas, additional site control measures will be required. These types of activities include:

- Sampling conducted within or adjacent to public roads;
- Activities involving placement of unmanned sampling or monitoring equipment; and/or
- Sampling conducted in the vicinity of other ongoing, but unrelated activities.

Some of the additional security measures necessary for these activities are discussed below. Task-specific requirements will be specified in the appropriate contractor-specific health and safety plans or other RD/RA submittals for each Removal Action.

ATTACHMENT C

SITE MANAGEMENT PLAN

Traffic control measures will be implemented for any activities that take place within or adjacent to a public roadway. Flagmen will be used to control traffic through the work areas. In addition, signs will be used to warn oncoming traffic of any lane restrictions. GE or GE's Representative will obtain the appropriate traffic control permits/approvals and make any required notifications prior to initiating traffic control measures.

If sampling or monitoring equipment is to be left unattended, it will be secured in place. Access to open wells or boreholes will be closed off to the extent possible. Traffic cones, fencing, and/or guard posts will be placed to warn drivers and others of the presence of the equipment, if necessary.

During the course of performing the response actions, it is possible that multiple, unrelated activities may occur concurrently within a single RAA. In these situations, GE or GE's Representative will implement measures to ensure that on-site personnel will not adversely interfere with other activities. Tasks where such interference is unavoidable will be planned to allow their completion with minimum interruptions/risks to others in the area.

3.4.2 Construction Activities

Several construction activities (e.g., excavation, backfilling, etc.) may be performed as part of the Removal Actions and could entail a number of typical construction-related hazards. Safety precautions involving the on-site work personnel will be implemented in accordance with all applicable OSHA requirements, the contents of the Site HASP, and any contractor-specific health and safety plan (which must meet the standards outlined in the Site HASP). Security precautions during off-work hours will be addressed by the following measures:

- For the GE facility and other GE-owned areas at the Site, the current security measures described for such areas in Section 3.1 (or comparable security measures) will remain in place. In addition, where applicable, additional gates or barricades (e.g., chain or cable) will be placed across access roads to direct vehicular traffic. Signs will be posted at the gates and the access gates or barricades will be locked during off-work hours and will be monitored during normal working hours.

ATTACHMENT C

SITE MANAGEMENT PLAN

- All construction-related excavations that cannot be feasibly backfilled at the close of a work day will be secured with temporary construction fencing to notify persons who may enter the work area.

- If temporary stockpiles are established for excavated materials and/or backfill materials, the stockpiles will be placed in locations that will not interfere with normal operations at the property involved (to the extent feasible), with response actions, or with normal traffic flow. In addition, the temporary stockpiles will be covered with tarps to minimize the potential for rainfall to contact the stockpile. Also, stockpiles will be located and/or constructed in such a manner to minimize the potential for migration of contaminants in the stockpiled soils into site surface soils or drainage ditches.

- On a daily basis, all areas affected by construction activities will be secured.

- During construction activities, inspections of the active work area will be performed on each day of construction. The inspections will be performed to note and, if necessary, respond to any changes to the conditions of the work area.

- The need for additional security measures during specific response actions will be evaluated and any proposed additional measures will be included in the Removal Action-specific RD/RA submittals.

In addition to the above measures, specific security measures will be required for: (a) construction activities performed within or adjacent to public roads; (b) activities involving placement of unmanned construction equipment; and (c) activities in the vicinity of other ongoing, but unrelated activities. The security measures for such activities will be the same as those specified for sampling activities of the same type, as described in Section 3.4.1.

3.4.3 Daily Access/Site Visitors

Security measures associated with daily access and work area visitors will be controlled through the performance of a number of actions, depending on the reasons for access and the types of response actions underway at the time of access. Inadvertent, unauthorized access to active work areas will be minimized as a result of the measures described in the following subsections. Any evidence of unauthorized entry and/or trespassing should be reported to the GE Project Manager.

GE Access - GE project personnel and GE's Representative will have access to observe the progress of the Removal Actions at all work areas at all times during implementation of the CD. Upon arrival at a work area, GE project personnel and GE's Representative will inform the on-site workers of their presence and intended activities.

Contractor Access - During the active portions of investigations and response actions, it is expected that employees of the various contractors will enter and exit the RAAs on a daily basis. Each employee is required to have undergone the appropriate health and safety training as described in the Site HASP. For construction activities, a sign-in/sign-out system will be administered by the Remediation Contractor at a designated location to monitor contractor access and, if necessary, to check compliance with training requirements. For sampling activities or other short-term tasks, the names of all contractors accessing a work area will be recorded in field logbooks or otherwise documented.

Agency Access - The United States and the States of Massachusetts and Connecticut and their representatives, including agents, contractors, subcontractors, and employees, will have access to the Site during implementation of the CD. These agencies have agreed that their representatives shall use reasonable efforts to comply with all reasonable safety rules enforced by GE on a non-discriminatory basis against all GE employees and non-GE employees visiting the Site, including the use of protective clothing and equipment appropriate for site conditions. However, if GE requires the use of non-standard personal protective equipment for entry to a particular portion of a work area, and if the governmental representatives do not have such equipment and GE is unable to supply the required non-standard equipment upon request, then GE shall not deny access to such portion of the work area. Furthermore, nothing in this paragraph shall be construed to

be a waiver of the United States' right, or the rights of Massachusetts and Connecticut, to access the Site in accordance with federal and state laws and regulations.

Owner/Tenant Access - The owners or tenants of properties where Removal Actions will take place will generally have access to their properties during implementation of the Removal Actions. However, access to specific work areas may be limited at certain times, based on provisions of access agreements between GE and the property owner/tenant, the status of ongoing activities, and/or health and safety considerations.

General Visitor Access - Other visitors to the Site may include public officials, citizens groups, and the media, among others. These visitors will be required to contact GE at least 24 hours prior to the desired access date. During this initial contact, discussions will involve the purpose of the visit, relevant safety training, arrival time, meeting place, and other arrangements. At the time of access, all visitors will be accompanied by a GE employee or designated representative for the duration of their visit. Once such visitors have obtained general access onto the premises, their access to specific areas will be dependent on the status of ongoing activities and specific health and safety requirements.

3.5 Equipment Cleaning

During the course of certain response actions, sampling, construction, or other reusable equipment may contact affected materials and require cleaning prior to removal from the RAA. Cleaning of sampling equipment is addressed in GE's approved FSP/QAPP. For other equipment, the potential for such contact will be minimized through the implementation of site controls and operations. For example, access roads will be constructed within the RAA to minimize, to the extent practicable, the potential for contact of trucks and other ancillary equipment with the existing affected soils within the RAA. As another example, certain response actions may involve the use of dedicated construction equipment that remains at the RAA for extended periods to minimize the use of (and subsequent cleaning of) several pieces of construction equipment. For each response action, GE or GE's Representative will evaluate and implement measures to minimize the frequency/occurrence of equipment contact with affected site materials.

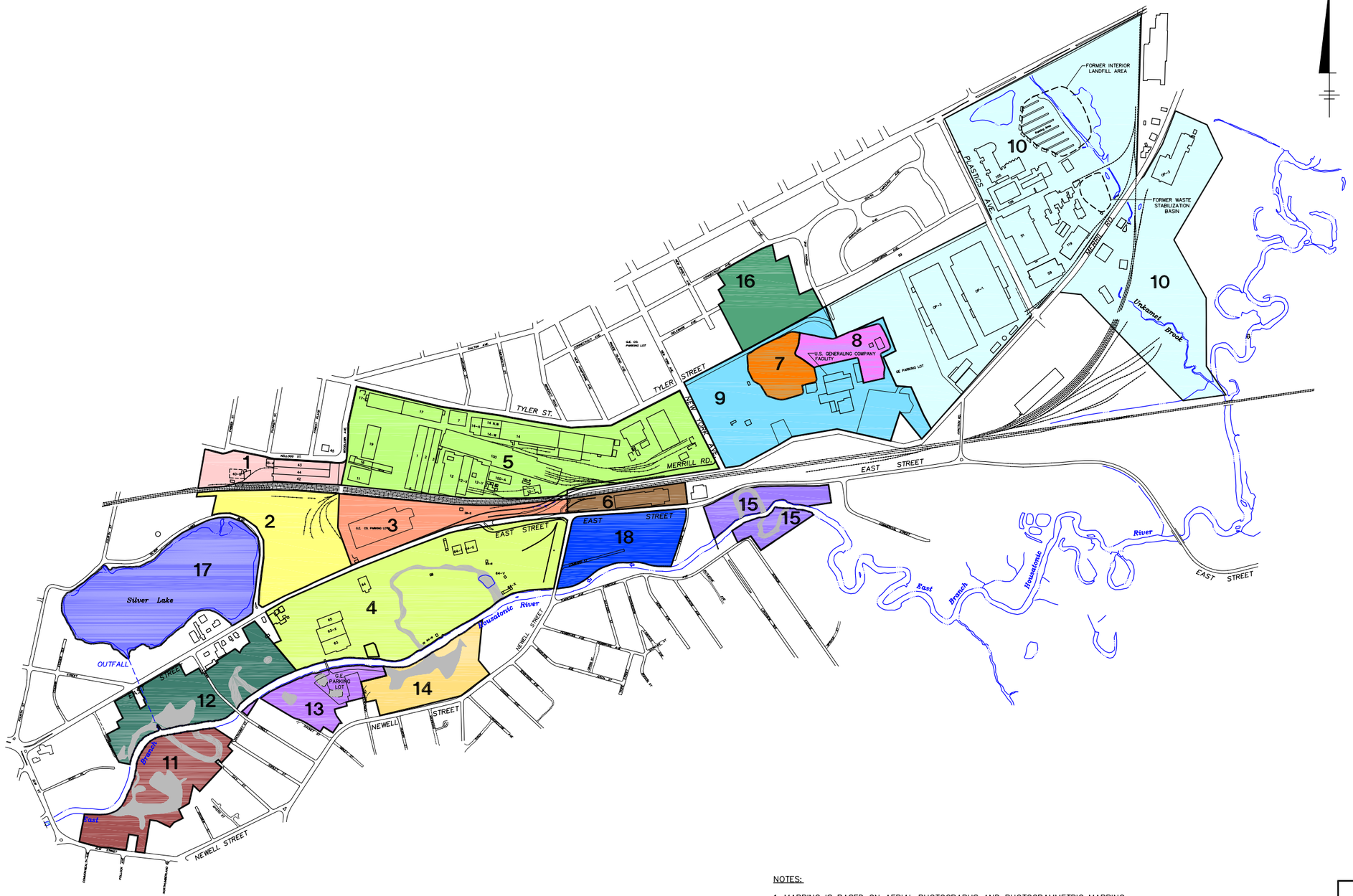
ATTACHMENT C

SITE MANAGEMENT PLAN

For equipment that has contacted affected materials within the RAA, cleaning activities will be performed prior to removal of the equipment. The goal of this cleaning activity is to minimize the potential for transport of affected site materials from the RAA. The method and extent of equipment cleaning will be dictated by GE or GE's Representative in consideration of a number of factors, including the specific activities performed by the equipment, the type of media contacted and its chemical constituent concentration, the potential future use of the equipment, and the ownership of the equipment.

Cleaning activities may involve any number of measures, including one or more of the following: visual inspection of the areas of the equipment that have contacted the affected site materials; manual cleaning of such portions of the equipment within the RAA using brooms, brushes, and/or a water spray; and/or the transport of the affected equipment to the GE facility for high pressure water and/or detergent cleaning. In certain instances (e.g., where the specific equipment is not owned by GE and may be used at other locations external to the Site), GE may require that samples of the cleaned equipment be collected and subject to laboratory analyses (e.g., wipe sampling of a backhoe bucket for PCB analysis). Equipment will not be removed from a given RAA until authorization is provided by GE or GE's Representative.

Figures



GENERAL ELECTRIC PLANT AREA

1 40s COMPLEX
2 30s COMPLEX
3 20s COMPLEX
4 EAST STREET AREA 2–SOUTH
5 EAST STREET AREA 2–NORTH
6 EAST STREET AREA 1– NORTH
7 HILL 78 CONSOLIDATION AREA
8 BUILDING 71 CONSOLIDATION AREA
9 HILL 78 AREA–REMAINDER
10 UNKAMET BROOK AREA

FORMER OXBOW AREAS

11 FORMER OXBOW AREAS A AND C
12 LYMAN STREET AREA
13 NEWELL STREET AREA II
14 NEWELL STREET AREA I
15 FORMER OXBOW AREAS J AND K

OTHER AREAS

16 ALLENDALE SCHOOL PROPERTY
17 SILVER LAKE AREA
18 EAST STREET AREA 1– SOUTH (NAPL/GROUNDWATER ONLY)

0 500' 1000'
APPROXIMATE SCALE

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES/LIMITS ARE APPROXIMATE.
4. REFER TO FIGURE 1–2 FOR IDENTIFICATION OF REMOVAL ACTION AREAS RELATED TO THE HOUSATONIC RIVER FLOODPLAIN.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SITE MANAGEMENT PLAN

REMOVAL ACTION AREAS

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
1

SYR-54-YCC PGL KEW L: ON=*; OFF=REF
G:\CAD\GE-CAD\GE_ACTIVE\VN\20457020\20457B04.DWG SAVED:3/20/2007 4:34 PM LAYOUT:Layout1 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:3/23/2007 11:00 AM BY:KSARTORI
PROJECTNAME:----
XREFS: IMAGES:

SYR-85-DMW LAF LAYER: ON=*; OFF=*REF*
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PROJECTNAME: ----
XREFS: IMAGES:
20423X01

SECTION OF UNKAMET BROOK SUBJECT TO RE-ROUTING

FORMER INTERIOR LANDFILL

PARKING AREA

SOUTH CAROLINA AVE.

MARYLAND AVE.

VIRGINIA AVE.

CALIFORNIA AVE.

PLEASANT ST.

JUNCTION RD.

GE PARKING LOT

OP-1

OP-2

OP-3

L12-2-2

L12-1-5

L12-1-4

L12-1-3

L12-1-2

L11-4-15

L12-2-1

L11-4-11

Unkamet Brook

LEGEND:

- APPROXIMATE REMOVAL ACTION AREA BOUNDARY
- SUBAREAS OF REMOVAL ACTION AREAS (APPROXIMATE)
- FENCE
- PROPERTY LINE
- L12-2-1 PROPERTY IDENTIFICATION
- 100-YEAR FLOODPLAIN BOUNDARY (DASHED WHERE INFERRED)
- APPROXIMATE PALUSTRINE/EMERGENT WETLANDS BOUNDARY
- WATER
- PAVED AREA
- RECREATIONAL PROPERTY (GE OWNED)
- RECREATIONAL PROPERTY (NON-GE OWNED)
- COMMERCIAL/INDUSTRIAL PROPERTY (NON-GE OWNED)
- COMMERCIAL/INDUSTRIAL PROPERTY (GE OWNED)

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. -FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND, BOUCK & LEE, INC. (BBL) CONSTRUCTION PLANS, AND ON OBSERVATIONS DURING A SITE VISIT BY BBL PERSONAL ON DECEMBER 3, 1997.
2. SITE BOUNDARIES ARE APPROXIMATE.
3. NOT ALL PHYSICAL FEATURES SHOWN.
4. EXTENT OF PAVED/UNPAVED AREAS IS APPROXIMATE.
5. 100-YEAR FLOODPLAIN BOUNDARY IS BASED ON FLOOD ELEVATION PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY: "FLOOD INSURANCE STUDY - CITY OF PITTSFIELD, MASSACHUSETTS" JANUARY 19, 1987; AND "FLOOD INSURANCE RATE MAP - CITY OF PITTSFIELD, MASSACHUSETTS" (PANELS 250037 0010C AND 25037 0020C), FEBRUARY 19, 1982, AND TWO-FOOT CONTOUR TOPOGRAPHIC MAPPING GENERATED PHOTOGRAMMETRICALLY IN 1990 AT A BASE SCALE OF 1:2,400.
6. TAX ASSESSORS' PARCEL IDENTIFICATION NUMBERS AND BOUNDARY INFORMATION OBTAINED FROM CITY OF PITTSFIELD'S TAX ASSESSOR'S OFFICE AND IS CURRENT THROUGH SEPTEMBER 5, 1997.

0 400' 800'

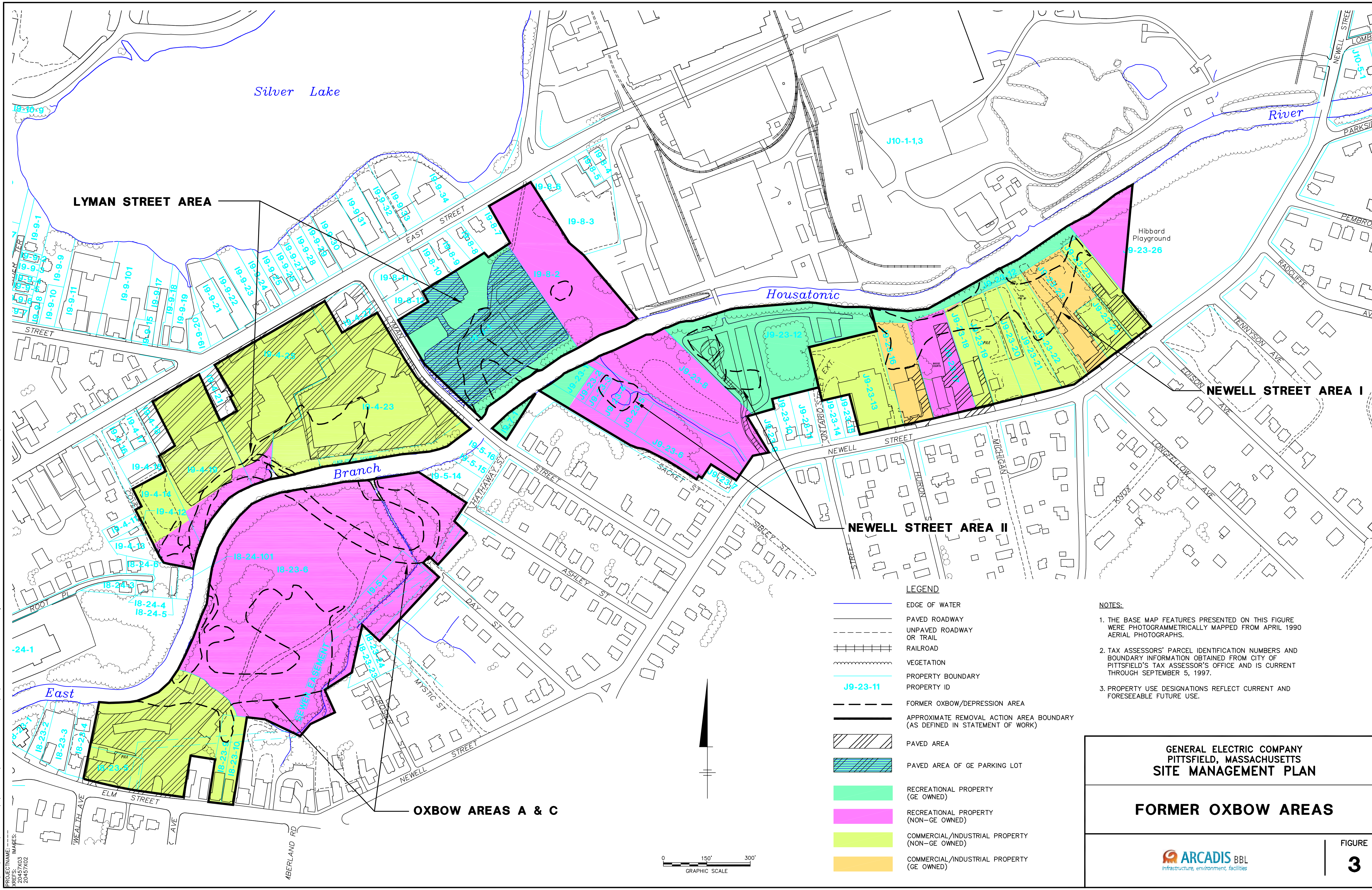
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SITE MANAGEMENT PLAN

HOUSATONIC RIVER FLOODPLAIN RESPONSE ACTION AREAS

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
2

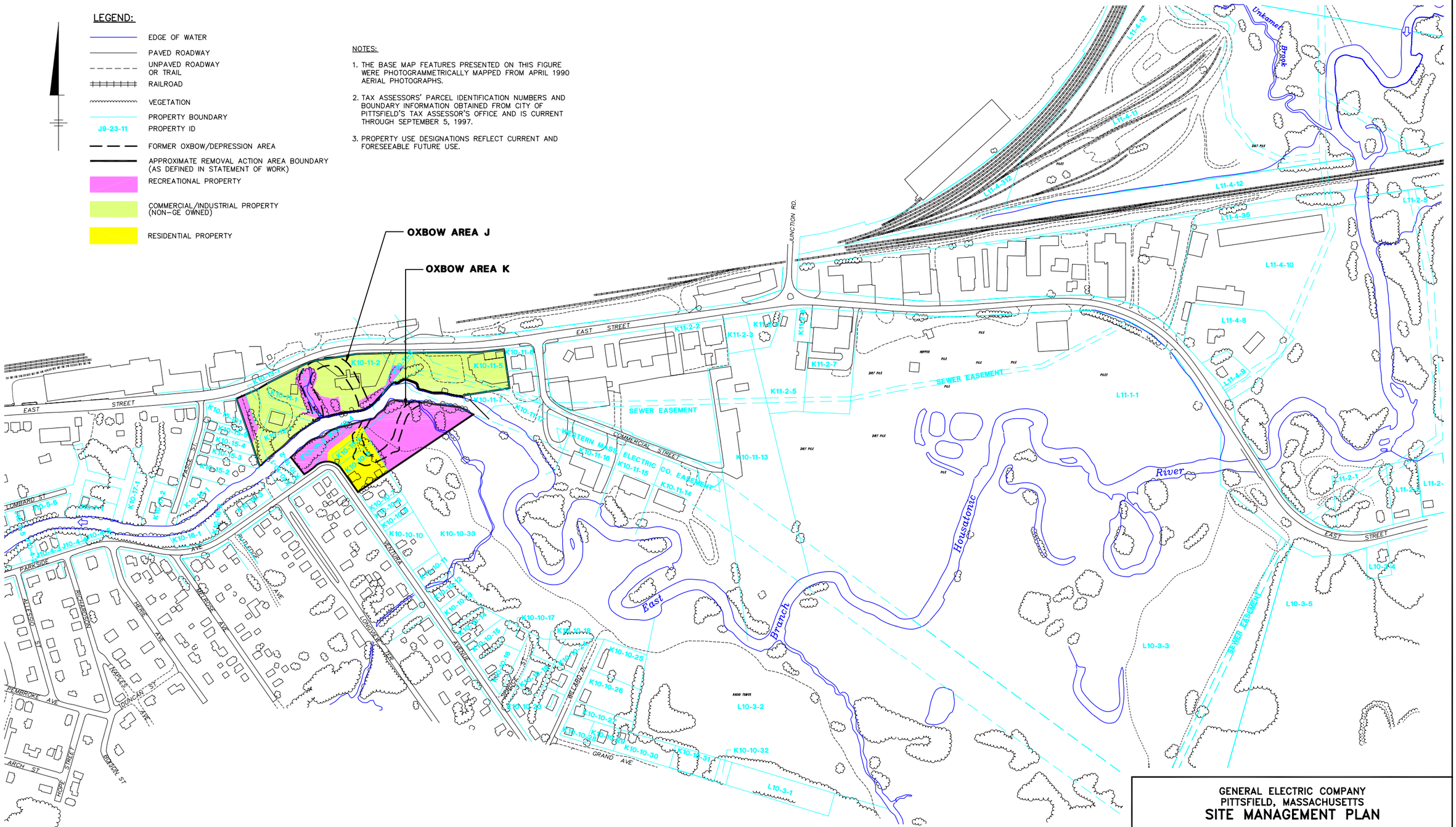

Silver Lake
Housatonic
River
East Branch
LYMAN STREET AREA
NEWELL STREET AREA I
NEWELL STREET AREA II
OXBOW AREAS A & C
Hibbard Playground
EAST STREET
NEWELL STREET
ELM STREET
LEGEND
EDGE OF WATER
PAVED ROADWAY
UNPAVED ROADWAY OR TRAIL
RAILROAD
VEGETATION
PROPERTY BOUNDARY
J9-23-11
PROPERTY ID
FORMER OXBOW/DEPRESSION AREA
APPROXIMATE REMOVAL ACTION AREA BOUNDARY (AS DEFINED IN STATEMENT OF WORK)
PAVED AREA
PAVED AREA OF GE PARKING LOT
RECREATIONAL PROPERTY (GE OWNED)
RECREATIONAL PROPERTY (NON-GE OWNED)
COMMERCIAL/INDUSTRIAL PROPERTY (NON-GE OWNED)
COMMERCIAL/INDUSTRIAL PROPERTY (GE OWNED)
NOTES:
1. THE BASE MAP FEATURES PRESENTED ON THIS FIGURE WERE PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. TAX ASSESSORS' PARCEL IDENTIFICATION NUMBERS AND BOUNDARY INFORMATION OBTAINED FROM CITY OF PITTSFIELD'S TAX ASSESSOR'S OFFICE AND IS CURRENT THROUGH SEPTEMBER 5, 1997.
3. PROPERTY USE DESIGNATIONS REFLECT CURRENT AND FORESEEABLE FUTURE USE.
0 150' 300'
GRAPHIC SCALE
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SITE MANAGEMENT PLAN
FORMER OXBOW AREAS
ARCADIS BBL
FIGURE
3

LEGEND:

- EDGE OF WATER
- PAVED ROADWAY
- UNPAVED ROADWAY OR TRAIL
- RAILROAD
- VEGETATION
- PROPERTY BOUNDARY
- J9-23-11 PROPERTY ID
- FORMER OXBOW/DEPRESSION AREA
- APPROXIMATE REMOVAL ACTION AREA BOUNDARY (AS DEFINED IN STATEMENT OF WORK)
- RECREATIONAL PROPERTY
- COMMERCIAL/INDUSTRIAL PROPERTY (NON-GE OWNED)
- RESIDENTIAL PROPERTY

NOTES:

1. THE BASE MAP FEATURES PRESENTED ON THIS FIGURE WERE PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. TAX ASSESSORS' PARCEL IDENTIFICATION NUMBERS AND BOUNDARY INFORMATION OBTAINED FROM CITY OF PITTSFIELD'S TAX ASSESSOR'S OFFICE AND IS CURRENT THROUGH SEPTEMBER 5, 1997.
3. PROPERTY USE DESIGNATIONS REFLECT CURRENT AND FORESEEABLE FUTURE USE.



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SITE MANAGEMENT PLAN

FORMER OXBOW AREAS J AND K

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
4

SYR-85-RLP SLM LAF LAYER: ON=*, OFF=*REF*
G:\CAD\GE-CAD\GE_ACTIVE\VN\20457020\20457B07.DWG SAVED:3/21/2007 8:37 AM LAYOUT:Layout1 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:3/23/2007 10:58 AM BY:KSARTORI
PROJECTNAME:----
XREFS:
20457704
20457702
IMAGES:

Attachment D

Ambient Air Monitoring Plan

ATTACHMENT D

AMBIENT AIR MONITORING PLAN

Table of Contents

ATTACHMENT D

AMBIENT AIR MONITORING PLAN

1.0 Introduction

1.1 General

This *Ambient Air Monitoring Plan* (AAMP) describes the air monitoring activities that will be conducted by the General Electric Company (GE) during certain response actions at the GE-Pittsfield/Housatonic River Site (Site) under a Consent Decree (CD) executed by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other government agencies. The CD was executed in October 1999 and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this AAMP applies to the Removal Actions that GE is obligated to perform under the CD at various Removal Action Areas (RAAs) at the Site, which exclude the response actions being taken and to be taken at the Housatonic River. Certain of the response actions undertaken as part of these Removal Actions will involve construction activities (e.g., soil removal) and other material handling activities to achieve Performance Standards that are specific to each individual Removal Action.

Depending on the type and duration of the construction-related response actions, such activities could result in the generation of airborne particulates originating from the RAA. To monitor the generation and potential migration (via wind) of such particulates, as well as, in some cases, airborne polychlorinated biphenyls (PCBs), GE will conduct an ambient air monitoring program during certain response actions. The primary objective of the program is to assess potential impacts to ambient air adjacent to the work area during construction activities and the need for dust control measures. Included in this AAMP is a discussion of sampling locations and frequencies, sampling parameters, sampling and analytical methodologies, various notification and action levels based on the monitoring results, and the activities that may be taken in response to exceedances of the applicable notification and action levels. This AAMP also incorporates Appendix J to GE's approved *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP), which describes the procedures to be used for ambient air sampling and analysis. For convenience, a copy of that appendix is attached to this plan as Exhibit D-1.

This plan, as approved by EPA, will be referenced as appropriate in future submittals relating to these Removal Actions. However, certain activities described in this AAMP may not be applicable to each Removal Action, and the corresponding type, scope, and magnitude of the response action activities.

Therefore, this plan is subject to modification based on the specific response actions for a given RAA and any site- or activity-specific considerations. Any modifications will be presented in the technical Removal Design/Removal Action (RD/RA) work plans or other submittals for that Removal Action, and will be subject to EPA review and approval. This plan was originally submitted to EPA in December 2000, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications set forth in the October 19, 2001 Addendum, as well as additional modifications agreed upon by GE and EPA since that time. In the future, this plan will be reviewed and updated as necessary on approximately an annual basis. Any changes to the AAMP will be subject to EPA review and approval.

1.2 Format of Document

The remainder of this document is presented in seven sections. Section 2.0 provides a general overview of the proposed ambient air monitoring program, including the general types of response actions for which ambient air monitoring will and will not be performed. Also presented in this section is general information related to the selection of monitoring locations, monitoring frequency, and constituents subject to monitoring. Sections 3.0 and 4.0 then present further details regarding the monitoring that will be performed for airborne particulates and PCBs, respectively. Included in those sections is information related to field and analytical activities for both types of monitoring. Section 5.0 of this AAMP references the quality assurance/quality control (QA/QC) procedures that will be implemented for field and analytical activities. Section 6.0 discusses how the results of ambient air monitoring will be evaluated with respect to various notification levels and action levels, while Section 7.0 describes the activities that may be implemented during the response actions to mitigate potential airborne particulate concerns. Finally, Section 8.0 describes the various documentation and reporting requirements associated with the monitoring program.

2.0 Overview of Monitoring Activities

During the performance of activities that could potentially produce airborne particulates, an air monitoring program will be conducted to assess potential impacts to ambient air and the need for dust control measures. The primary objective of this AAMP is to identify and assess the potential for migration of airborne

contaminants to areas outside of the RAA within which the response action(s) are being conducted. This ambient air monitoring is in addition to any other site or personal monitoring that may be performed by the on-site contractors as part of their separate health and safety monitoring.

The remainder of this section provides general information concerning the scope of ambient air monitoring that may be conducted during certain response actions within the RAAs, including the activities for which ambient air monitoring will be conducted, the locations subject to monitoring, and the typical monitoring parameters.

2.1 Response Actions Subject to Monitoring

The response actions that will be subject to ambient air monitoring generally include the following types of activities:

- Excavation, handling, and transporting of affected soils at the various RAAs;
- Placement of backfill and/or other soil cover materials;
- Placement and consolidation of waste materials within GE's On-Plant Consolidation Areas (OPCAs) or other areas of the Site; and
- Other activities that would likely result in the generation of airborne particulates within the RAAs.

Unless otherwise specified in the technical RD/RA submittals for a specific Removal Action, air monitoring will be performed when the activities identified above are actively being performed. For several types of response actions (i.e., pre-design soil investigations, mobilization, site preparation, final restoration and landscaping, and demobilization), there is a low potential for the generation of airborne particulates. Therefore, an ambient air monitoring program will not be conducted for these types of activities unless otherwise agreed between GE and EPA.

With respect to the monitoring activities at the OPCAs, PCB monitoring will be performed weekly (or at an alternative frequency agreed upon by GE and EPA) during periods when OPCA consolidation activities are being performed. PCB monitoring during all other periods will be conducted monthly (or as otherwise agreed

between GE and EPA) and when the notification level for particulates has been exceeded for two consecutive work days. Particulate monitoring will be performed as discussed in Section 3.

2.2 Monitoring Locations

As previously indicated, the ambient air monitoring program will be performed to assess potential off-site impacts related to the response actions within the RAAs. Unless otherwise provided in the specific RD/RA work plan, ambient air monitoring will be performed at a minimum of three locations around the work area. The specific locations for these stations will be identified in the technical RD/RA submittals for each Removal Action and will consider the EPA guidance document entitled *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)* (EPA-450/4-87-007, 1987) concerning the placement of monitors. For example, individual monitor placement will be based on the location and nature of the site activities, predominant wind direction, location of potential off-site receptors, site accessibility, site security, and any existing ambient air monitoring data. The sampling equipment will be installed to collect ambient air at a height of between 2 and 9 meters above ground surface to monitor ambient air that is representative of the breathing zone of potential off-site receptors. In most cases, when measuring ground-level sources, the height of the sampling inlet will be approximately 2 meters above ground level. In general, the three locations will be selected to form a triangular pattern around the area(s) subject to response actions. This pattern will facilitate upwind/downwind monitoring, and be adaptable to potential changes in wind direction. Based on specific circumstances concerning the RAA and the anticipated response actions, GE may propose additional air monitoring locations. For monitoring activities at the OPCAs, ambient air monitoring will be performed at a total of five locations, situated around the OPCAs at locations agreed upon between GE and EPA.

In addition to the RAA-specific monitoring described above, meteorological data from the Automated Surface Observation System (ASOS) Monitor operated at the Pittsfield Municipal Airport in Pittsfield, Massachusetts, will be included with the sampling results. This ASOS Monitor is operated by the National Weather Service, Federal Aviation Administration, and the U.S. Department of Defense. The ASOS Monitor measures and records wind speed, wind direction, precipitation, temperature, sky conditions, barometric pressure, and relative humidity.

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2.3 Monitoring Parameters

During the performance of response actions such as those identified in Section 2.1, the primary constituent subject to ambient air monitoring will be airborne particulates. Monitoring for airborne particulates provides a correlation to ambient dust levels (potentially related to response action activities) on a real-time basis and, as such, facilitates decision-making relative to potential off-site impacts, the need for dust control measures, and the relative success of such measures, if implemented. In addition, monitoring for airborne particulates provides a qualitative assessment regarding the potential for other airborne contaminants, such as PCBs. PCBs and the other primary constituents of interest associated with the RAAs are relatively non-volatile, so that the most likely route of migration for these constituents during the performance of response actions is via wind-blown airborne particulates. Therefore, daily monitoring for airborne particulates is generally sufficient to assess potential off-site migration of RAA-related contaminants.

Nevertheless, to supplement the performance of monitoring for airborne particulates, monitoring for airborne PCBs will be conducted at the OPCAs and for certain other response actions depending on the specific RAA and the nature and duration of response action activities. The technical RD/RA work plans or other submittals for a specific Removal Action will provide an assessment regarding the appropriateness of PCB ambient air monitoring for response actions during that Removal Action, and will include a proposal as to whether (and for which response actions) such monitoring will be performed.

Additional information concerning the performance of particulate and PCB monitoring is presented in Sections 3.0 and 4.0 of this AAMP, respectively.

3.0 Particulate Monitoring

Particulate monitoring will involve daily real-time monitoring performed using a MIE dataRAM Model DR-2000 or 4000 (DR), MIE dataRAM Model pDR-1000 (pDR), Met One E-BAM, or equivalent method for measuring airborne particulates. The pDR uses a passive sampling technique and light-scattering photometer to determine particulate concentrations. The DR uses an active pump sampling method and light-scattering photometer. The E-BAM uses an active pump sampling method and a detection system consisting

of beta attenuation and a scintillating photo-multiplier tube. At each station, real-time particulate monitoring will be performed following the procedures presented in Appendix J of GE's approved FSP/QAPP (Exhibit D-1 hereto). In general, each monitor will be equipped to monitor and record concentrations of particulate matter with a diameter less than 10 micrometers (PM_{10}). Monitoring will be conducted during construction-related activities for approximately 10 hours daily, from 7:00 am to 5:00 pm. Particulate data will be recorded by the instrument's datalogger. During its operation, the instrument will report, on a real-time basis, the instantaneous particulate reading, the highest discrete reading that has been recorded during the monitoring period, and the cumulative average for the current monitoring period. Barometric pressure will be measured and recorded manually on each day of monitoring. Both the DR and the pDR have an inherent measurement sensitivity to moisture and thus to humid conditions. The DRs are equipped with relative humidity indicators and air inlet heaters to both evaporate moisture and, if necessary, automatically adjust the particulate measurement for humidity. The pDR has no technique to adjust for humidity. The Met One E-BAM is also sensitive to moisture and is equipped with both a relative humidity sensor and in-line heater to evaporate moisture in order to prevent it from condensing on the filter tape. As a result of their sensitivity to moisture, the monitors are carefully observed during humid or rainy weather. GE or its contractor may, at times, use professional engineering judgment to determine the reliability of data collected during very high humidity conditions. Data summaries will exclude the time period when moisture is clearly a factor. The raw data file will be marked and maintained. Any such judgments will be noted appropriately on the pertinent data summary table.

4.0 PCB Monitoring

As previously indicated, the need for ambient air monitoring for PCBs during certain response actions will be determined by GE based on an evaluation of activity- and site-related considerations specific to the RAA and the required response actions. For activities involving placement of waste materials at the OPCAs, PCB monitoring will be conducted as described in Section 2.1. For other RAAs and response actions, GE will conduct evaluations of the need for PCB monitoring for those types of general response actions identified in Section 2.1. The technical RD/RA work plan or other submittals will present the results of that evaluation and a proposal regarding whether (and for which response actions) such monitoring will be conducted.

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For those response actions for which ambient air monitoring for PCBs will be performed, the objective of that monitoring program will be to obtain valid and representative data on PCB ambient air levels on the perimeter of the area(s) where the response actions are being conducted. For these response actions, unless otherwise provided in the Removal Action-specific work plans or otherwise agreed between GE and EPA, PCB air monitoring will be conducted during two 24-hour periods prior to the start of the response action and at a frequency of approximately one 24-hour monitoring event for every 4 weeks (determined on a cumulative basis) of active response action activities (or, if the total project duration is less than 4 weeks, one event during the project).

Ambient air monitoring for PCBs will be conducted following the procedures specified in Appendix J of the FSP/QAPP (Exhibit D-1 hereto). The sampling method for PCBs is USEPA Compendium Method TO-4A, *Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using High Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)*, Second Edition, January 1999. This method employs a high volume sampler and a sampling cartridge consisting of a glass fiber filter with a polyurethane foam (PUF) absorbent to sample ambient air at a rate of 0.20 - 0.28 m^3/minute. The filter and PUF cartridge are placed in clean, sealed containers and returned to the laboratory for analysis. The PCBs are recovered by Soxhlet extraction with a 10 percent diethyl ether/hexane solution. The extracts are reduced in volume using TurboVap evaporator concentration techniques and subjected to column chromatographic cleanup. The extracts are analyzed for PCBs using capillary gas chromatography with electron capture detection (GC/ECD), as described in Method TO-4A.

5.0 Quality Assurance and Quality Control Procedures

QA/QC procedures for the air sampling program will follow those described in Appendix J of GE's FSP/QAPP, and the PCB data will be validated in accordance with Validation Annex F of the FSP/QAPP. Specific QA/QC procedures for particulate sampling will be based on the sampling equipment manufacturer's recommendations.

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6.0 Notification and Action Levels

Notification levels and action levels will be used for both particulate monitoring and PCB monitoring (if conducted) to evaluate: 1) the levels of airborne particulates and/or PCBs originating from the RAA during construction-related response activities, and 2) the need for additional measures related to monitoring and/or dust control. For particulate matter, the notification level will be a 10-hour average PM_{10} concentration (at any on-site monitor) greater than 120 $\mu g/m^3$ (micrograms per cubic meter), as specified in Section 2.4 of Appendix J to the FSP/QAPP. The latter level represents 80% of the current 24-hour National Ambient Air Quality Standard (NAAQS) for PM_{10}, which is 150 $\mu g/m^3$. The action level for particulate matter will be a 10-hour average PM_{10} concentration of 150 $\mu g/m^3$ (equivalent to the level of the 24-hour NAAQS).

For PCBs, unless otherwise proposed in the applicable RD/RA work plan, the notification level will be a 24-hour average PCB concentration of 0.05 $\mu g/m^3$ and the action level will be a 24-hour average concentration of 0.1 $\mu g/m^3$. These PCB notification and action levels are consistent with the levels previously approved by EPA, and used by GE, for the Building 68 Area Removal Action, the Upper ½-Mile Reach Removal Action, a number of Removal Actions outside the River under the CD, and the operation of the OPCAs (although the action level at the OPCAs has since been reduced to 0.05 $\mu g/m^3$). These levels are discussed further in Sections 6.1 and 6.2 below.

6.1 Notification Levels

The notification levels will be utilized to assess site conditions and implement corrective actions in an effort to avoid exceedances of the action levels. For particulates, monitoring data will be compared to the notification level to determine if site-related activities are causing an unacceptable increase in airborne particulate concentrations. On a daily basis during the response actions, the particulate data from the downwind monitors will be compared with the data from the upwind (background) monitor(s) and with the notification level. If the 10-hour average PM_{10} concentration at any on-site monitor exceeds the notification level of 120 $\mu g/m^3$, the exceedance will be reported to EPA as soon as practical, but no later than 24 hours following receipt of data showing the exceedance. In addition, GE will provide written notice of the exceedance to EPA within 72 hours following receipt of the data showing the exceedance. GE will take

appropriate steps to prevent an exceedance of the action level and will discuss with EPA the need for and type of additional response measures. The actions to be considered in these circumstances will include those previously implemented by GE at other areas at the GE-Pittsfield/Housatonic River Site (e.g., increased frequency of monitoring, establishment of additional monitoring locations, increased use of dust suppression measures, modifications to dust-producing activities, and other appropriate response actions).

In the event that ambient particulate concentrations at any on-site monitor location consistently exceed the particulate notification level (i.e., 120 $\mu g/m^3$), the monitoring frequency for PCBs (if such monitoring is being performed) will be increased to one sampling event for every 2 weeks (cumulative basis) of active response action activities. Specifically, if the detected particulate levels at the monitoring location(s) exceed the notification level on three consecutive 10-hour days or 5 days in any 2-week period, the increased PCB monitoring frequency described above will be implemented. Thereafter, if PCB ambient air concentrations are less than the PCB action level described below for two consecutive bi-weekly events, then the PCB sampling frequency will revert to monthly.

For PCBs, any exceedance of the PCB notification level will be reported to EPA as soon as practical, but no later than 24 hours after receipt of the data showing the exceedance. In addition, GE will provide written notice of the exceedance to EPA within 72 hours following receipt of the data showing the exceedance. Additional response actions will be implemented, in consultation with EPA, to prevent exceedances of the action level. The actions to be considered in such circumstances include the same types of measures listed above for exceedances of the notification level for particulates.

6.2 Action Levels

In the event that any 10-hour average PM_{10} concentration or 24-hour average PCB concentration exceeds the action levels presented above, GE will: (a) immediately report such exceedance to EPA within 24 hours following receipt of data showing the exceedance; (b) temporarily cease ongoing excavation activities; (c) discuss with EPA appropriate immediate or short-term response actions to address the exceedance; and (d) provide written notice to EPA within 72 hours following receipt of the data showing the exceedance. In addition, GE will evaluate the cause of the exceedance and the need for additional engineering controls,

discuss that evaluation with EPA, and propose to EPA appropriate engineering controls or other corrective actions, as discussed further in Section 7 below. EPA approval of appropriate response actions and engineering controls, if proposed, will be required prior to GE resuming excavation activities.

7.0 Potential Dust Mitigation Activities

In the event that: (1) air monitoring notification or action levels are exceeded, (2) the monitoring data indicate a significant increase in downwind versus upwind readings, or (3) visible dust related to site operations is observed that could potentially cause the foregoing conditions, dust control measures will be implemented. Such measures may include water spray, use of vapor suppressive foams, use of tackifiers, modification of work procedures, and/or suspension of work (if not already suspended). If work is stopped due to an exceedance of the particulate or PCB action level, it will not be resumed until EPA has approved appropriate response actions, including engineering controls (if proposed).

Also, certain other site controls and practices will be implemented to limit the potential for and amount of dust generation. These include covering exposed soil areas when not in active use, covering soil stockpiles, reducing vehicle speeds, increasing the frequency of street sweeping, and utilizing water sprays as necessary (e.g. in roads, work areas, etc.).

8.0 Documentation and Reporting

Daily particulate and meteorological data will be summarized weekly in a written summary report to GE during the course of the response actions. All field data recorded during ambient monitoring will be documented according to the procedures in the FSP/QAPP and will include the following:

- Date and Time of Sampling;
- Sampling Locations;
- Calibration and Maintenance Activities;
- Parameters Monitored;
- Sampling Frequency;

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- Data Results;
- Quality Assurance Assessment (including a discussion of the items identified in Appendix J of the FSP/QAPP);
- Meteorological Data Summary; and
- Discussion of Problems or Disruptions.

The particulate and PCB monitoring data will be provided to EPA at a frequency agreed upon by GE and EPA. In addition, a report will subsequently be provided on the validation of the PCB data in accordance with Validation Annex F of the FSP/QAPP.

Once all of the response actions that comprise a Removal Action have been completed, GE will prepare a Final Completion Report for that Removal Action. That report will provide a summary of the ambient air monitoring data.

Exhibit D-1 – Appendix J of GE's Approved FSP/QAPP

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1. Project Description

1.1 General

Berkshire Environmental Consultants, Inc. (BEC) performs, on behalf of General Electric Company (GE), ambient air monitoring for particulate matter and polychlorinated biphenyls (PCBs) for numerous projects in Pittsfield, Massachusetts. Ambient air monitoring is performed as part of remediation or site assessment activities to address concerns about potential air pathway exposures to dust and/or PCBs. This Appendix presents the standard operating procedures (SOPs) to be used for particulate matter monitoring and for high-volume ambient air sampling for PCBs. Procedures for other types of air monitoring activities (e.g., low-volume sampling for PCBs, monitoring for other constituents) that may be required for a particular project will be presented in the project-specific work plan.

1.2 Project Objectives

The objective of the air monitoring program is to provide valid and representative data on ambient air levels of particulate matter and/or PCBs in order to ensure that remedial activities are not causing an unacceptable increase in ambient air concentrations of particulates and/or to assist in evaluating air pathway exposures to PCBs.

1.3 Format of Appendix

Section 2 of this Appendix presents the procedures to be followed for ambient air monitoring for particulate matter. Section 3 presents an overview of the ambient air monitoring program for PCBs. Sections 4 through 14 provide additional details regarding PCB air monitoring activities, including quality assurance objectives, sampling procedures, sample custody, analytical procedures, calibration procedures, data validation and reduction, internal quality control checks, preventative maintenance, routine quality assurance procedures, corrective action, and reporting.

1.4 Meteorological Monitoring

In connection with either particulate matter monitoring or PCB monitoring (or both), meteorological data from the Automated Surface Observation System (ASOS) Monitor operated at the Pittsfield Municipal Airport in Pittsfield, Massachusetts, will be included with the sampling results. This ASOS Monitor is operated by the National Weather Service, Federal Aviation Administration, and the U.S. Department of Defense. The ASOS Monitor measures and records wind speed, wind direction, precipitation, temperature, sky conditions, barometric pressure, and relative humidity.

The collected meteorological data are used to help evaluate receptor population exposures to ambient particulate matter and PCB levels.

2. Particulate Monitoring

Where called for in a project-specific work plan, real-time particulate monitoring will be conducted during the excavation portion of remedial action at a given area. Monitoring will be conducted daily during the hours of excavation. Approximately 10 hours a day of sampling data, from 7:00 a.m. to 5:00 p.m., are anticipated. Particulate monitoring will occur throughout the period of excavation or as otherwise provided in the work plan.

Particulate monitoring will be conducted using a real-time airborne particulate monitor, which may be any of the following: MIE Model pDR-1000, MIE Model DR-2000, MIE Model DR-4000, Met One E-BAM Mass Monitor, or equivalent monitor approved by EPA for air sampling of particulate matter with a diameter less than 10 micrometers (PM_{10}) or total suspended particulates (TSP).

The dataRAM Model pDR-1000 (pDR) uses a passive sampling technique and light scattering photometer to determine particulate concentrations. The dataRAM pDR has a measurement range of 0.001 to 400 mg/m^3.

The dataRAM DR-2000 or 4000 (DR) is a high-sensitivity nephelometric monitor. The DR samples the air at a constant, regulated flow rate by means of a built-in diaphragm pump. Like the pDR, the DR uses a light scattering photometer optimized for the measurement of airborne particle concentrations. The DR has a measurement range of 0.0001 mg/m^3 (0.1$\mu g/m^3$) to 400 mg/m^3.

The Met One E-BAM uses a Beta Attenuation technique for measuring particulate. The E-BAM samples the air at a constant regulated flow onto a continuous glass fiber filter tape. The density of particulate collected onto the filter tape is quantified based on the response of a scintillator photo multiplier tube to a C14 beta pulse on the filter tape. The Met One E-BAM has a measurement range of 0-10 mg/m^3.

For any of these instruments, particulate data will be logged by the instrument's datalogger and averaged and recorded for each 15-minute period hour and for each sampling day. During its operation, the instrument will report, on a real-time basis, the instantaneous particulate reading, the highest discrete reading that has been recorded during the monitoring period, and the cumulative average for the current monitoring period.

Both the DR and the pDR have an inherent measurement sensitivity to moisture and thus to humid conditions. The DRs are equipped with relative humidity indicators and air inlet heaters to both evaporate moisture and, if necessary, automatically adjust the particulate measurement for humidity. The pDR has no technique to adjust for humidity. The MET One E-BAM is also sensitive to moisture and is equipped with both a relative humidity sensor and in-line heater to evaporate moisture in order to prevent it from condensing on the filter tape. As a result of the sensitivity to moisture, the monitors are carefully observed during humid or rainy weather. GE or its contractor may, at times, use professional engineering judgment to determine the reliability of data collected during very high humidity conditions. Data summaries will exclude the time period when moisture is clearly a factor. The raw data file will be marked and maintained. Any such judgments will be noted appropriately on the data summary tables.

Calibrations and maintenance will be conducted at the frequency and in accordance with the procedures recommended by the manufacturer. All calibrations will be recorded.

2.1 Monitoring Locations

The monitoring locations at each area will be determined prior to the initiation of excavation activities. All areas will be monitored in at least three locations for areas subject to the Consent Decree and at least one location for other areas (with the specific number of monitoring locations to be determined on a project-specific basis). As required, additional monitors may be operated at a given area to adequately assess ambient particulate concentrations. The specific monitoring location(s) will be established based on the following: location of excavation, truck and vehicle traffic on-site, downwind receptors, obstructions, and accessibility. As excavation proceeds and conditions change, the monitoring locations may be moved.

A background particulate sampler will be installed at an upwind or at an off-site representative location, as specified in the project-specific work plan. Data from this site will be used to normalize ambient particulate concentrations during remedial action.

2.2 Quality Assurance and Quality Control Procedures

Specific quality assurance and quality control for the particulate sampling will be based on manufacturer's recommendations.

2.3 Documentation and Reporting

Particulate data will be summarized daily. Data which exceed the notification levels described below will be reported to the GE Project Manager and to EPA or the MDEP (as appropriate) in accordance with Section 2.4. Daily particulate and meteorological data will be summarized weekly and provided in a written summary report to the GE Project Manager on Monday for the previous week. All field data recorded during ambient monitoring will be documented according to the procedures in the *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP). The monitoring data will be provided to the regulating agency (EPA or MDEP, as appropriate) at a frequency agreed upon between GE and the agency. A written report summarizing the results will be provided to GE at the conclusion of sampling and will include the following:

Date and Time of Sampling
Sampling Locations
Calibration and Maintenance Activities
Pollutants Monitored
Sampling Frequency
Data Results
Quality Assurance Assessment
Meteorological Data Summary
Discussion of Problems or Disruptions

2.4 Notification and Action Levels

For each day of monitoring, the particulate data from the downwind monitor will initially be compared with the data from the background monitor. In addition, the average 10-hour PM_{10} concentrations at the on-site monitors will be compared with a notification level of 120 $\mu g/m^3$ – which represents 80% of the current 24-hour National Ambient Air Quality Standard (NAAQS) for PM_{10} (150 $\mu g/m^3$). This level has been selected to allow notice to GE before concentrations reach the level of the 24-hour NAAQS the action level). If the average 10-hour PM_{10} concentration at any on-site monitor exceeds the notification level of 120 $\mu g/m^3$, the exceedance will be reported to the regulating agency (EPA or MDEP) as soon as practicable, but no later than 24 hours following receipt of the data showing the exceedance. In addition, GE will provide written notice of the exceedance to the regulating agency within 72 hours after receipt of the data showing the exceedance.

Any exceedance of the NAAQS (the action level) will be reported to the regulating agency (EPA or MDEP) immediately after receipt of the data showing the exceedance, but within 24 hours after receipt of the data.. In addition, GE will provide written notice of the exceedance to the regulating agency within 72 hours after receipt of the data showing the exceedance.

In the event of any exceedance of the notification level or the action level, GE will take the response actions set forth for such exceedance in Section 6 of Attachment D (Ambient Air Monitoring Plan) to GE's *Project Operations Plan* (POP).

3. PCB Monitoring – General

Where PCB ambient air monitoring is called for in a project-specific work plan, BEC will install and operate General Metal Works Model PS-1 or equivalent samplers to monitor ambient PCB levels. Monitoring programs consist of one to several monitoring sites, depending on the scope of the specific remediation or site assessment activity. Each monitoring program includes downwind sites, at least one upwind or background site, and a co-located site. The samplers will typically operate for 24 hours from 7 a.m. to 7 a.m. during site remediation activity. The specific number of sampling sites and days will be determined on a project to project basis. Where PCB ambient air sampling is called for in a project-specific work plan, PCB air sampling will be performed on two occasions prior to the start of the remediation and no less frequently than once every 4 weeks (determined on a cumulative basis) during remediation activity for that area, unless otherwise provided in the work plan or otherwise agreed between GE and the pertinent regulatory agency (EPA or MDEP). For those cases where the total duration of the remediation project is less than 4 weeks and PCB ambient air sampling is called for in a project-specific work plan, PCB air sampling will be conducted at least one time during the remediation activity.

The sampling method for PCBs is USEPA Compendium Method TO-4A, Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using High Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD); Second Edition, January 1999. This method employs a high volume sampler and a sampling cartridge consisting of a glass fiber filter with a polyurethane foam (PUF) absorbent to sample ambient air at a rate of 0.20 - 0.28 m^3/minute. The filter and PUF cartridge are placed in clean, sealed containers and returned to the laboratory for analysis. The PCBs are recovered by Soxhlet extraction with 10% diethyl ether/hexane. The extracts are reduced in volume using Kuderna-Danish (K-D) concentration techniques and subjected to column chromatographic cleanup. The extracts are analyzed for PCBs using capillary gas chromatography with electron capture detection (GC/ECD), as described in Method TO-4A.

Analytical laboratories are required to follow quality assurance measures and performance criteria as described in Method TO-4A.

4. PCB Data Quality Assurance Objectives

4.1 Quality Assurance

The objective of this quality assurance plan is to ensure that the data collected on ambient levels of PCB are adequate to meet the objectives of the specific monitoring program and the intended uses of the data. The following objectives were used as guidelines to assuring quality in the design and implementation of the monitoring program.

- The sampling and analytical procedures should follow the EPA Compendium Method TO-4A and EPA recommended guidelines, where applicable. The EPA Compendium Methods are not standard EPA reference methods. Pursuant to conversations with Method TO-4A author, Robert G. Lewis, EPA, RTP, in October 1999, deviations from the compendium methods and procedures may be made on a case-by-case basis and, if required, will be presented in the project-specific work plan.

- All phases of the sampling program will be adequately documented. Documentation will be maintained to evidence the validity of calibrations, sample collection, flow calculations, sample custody, analytical performance, data reduction and audit procedures. Field records will be maintained to record and reconstruct sampling events, calibration procedures, maintenance and repair activity, and any other information pertinent to the assurance of quality in the sampling program.

- The GE Project Manager will be kept informed of sampling activity with update memoranda.

- Sampling and analytical data quality will be measured and reported, where applicable, in terms of completeness, precision, accuracy (bias), representativeness, and comparability.

4.2 Data Quality in Terms of Representativeness, Comparability, Completeness, Precision and Accuracy

Sample Validity - A valid collected sample is defined as an air sample that is collected over 24 hours, ±60 minutes, from approximately 7 a.m. to 7 a.m., at a flow rate of 0.20-0.28 m^3/min. For a sample to be valid, the minimum sample volume must be no less than 276 standard cubic meters (scm) and no greater than 420 scm. (The target flow rate and sample volume are 0.225 m^3/min and 325 scm, respectively.) The sample must be collected and analyzed under conditions which meet the specified objectives of precision, accuracy and, where applicable, representativeness.

Representativeness - The sampling network and frequency of sampling will be designed to provide data that are representative of the ambient levels of PCB. The sampling sites and the frequency and duration of sampling will be presented on a project by project basis with the rationale and procedures for sampling selection.

Comparability – Samples will be collected using the procedures set forth in Method TO-4A. Results for total PCB will be reported in $\mu g/m^3$ corrected to EPA standard conditions of 25°C and 760 mm Hg.

Completeness - The project completeness requirements are as follows:

- 90% validity of the total project samples (including co-located samples, background, and trip blanks);
- 90% validity at each sampling site over the course of the project (including co-located samples, background, and trip blanks); and
- No sampler site may have two or more invalid samples for consecutive sampling events.

Precision - Sampling precision will be measured by collecting a replicate sample at a co-located monitor at one monitoring site during each sampling event. Each compound with a detectable concentration at least two times greater than the practical quantitation limit (PQL) identified below must have a relative percent difference (RPD) value that is less than 50%.

Accuracy - Sampling accuracy is measured by auditing the flow rate of the samplers before and after each sampling event using a flow transfer standard. The accuracy criterion before and after using the flow transfer standard is +/-10% of the set point. The difference between the audit flow measurement and the calculated flow based on the sampler flow indicator (magnehelic gauge) and a calibration curve will be used to calculate accuracy.

Analytical accuracy or recovery is determined by the laboratory using an internal laboratory surrogate standard reflective of PCB. Sample recoveries ranging from 65 to 125% are considered acceptable.

4.3 Detection and Reporting Limits

The laboratory's Method Detection Limit (MDL) for PCBs in air samples, which was established for PCB Aroclor 1254, is 0.03 µg/PUF; and the target PCB practical quantitation limit (PQL) for this project, which is consistent with Method TO-4A, is 0.1 µg/PUF. (At the target air volume of 325 scm, these limits translate into PCB air concentrations of 0.00009 µg/m^3 and 0.0003 µg/m^3, respectively.) The target reporting limit (RL) based on the PQL of 0.1 µg/PUF and a target air volume of 325 scm is 0.0003 µg/m^3. This reporting limit may be higher or lower for individual samples based on the exact air volume that is collected for each sample. The PQL and RL were established in consideration of the following:

- Massachusetts Allowable Ambient Levels (AAL) for total PCBs in air, as used in the Air Toxics Program (which consist of a 24-hour average of 0.003 µg/m^3 and an annual average of 0.0005 µg/m^3); and

- Analytical detection capabilities as limited by sampling duration and sampling rate.

4.4 Sampling Flow Rate and Total Volume

Method TO-4A (Appendix I) recommends a sampling rate of 0.225 m^3/min with an acceptable flow rate range within +/- 10% (i.e. 0.20-0.28 m^3/min) and a target total volume of 325 scm. The anticipated operating rate is 0.225 m^3/min. At this sampling rate, a total flow volume of 324 m^3/air sample will be achieved over a 24-hour sampling period.

4.5 Summary of Project Detection Limits

Target Sampling Rate	0.225 m^3/min
Target Sample Volume	325 m^3/PUF
Lab MDL	0.03 µg/PUF
Lab PQL	0.1 µg/PUF
Allowable Project RL	0.0003 µg/m^3

5. PCB Sampling Procedures

5.1 Sampling Sites

Sampling sites for PCB air monitoring will be selected based on the physical site characteristics, receptor locations, source location and strength, site access, site security and the availability of electric power.

5.2 Sampling Frequency

PCB air samples will be collected over 24 hours from approximately 7 a.m. to 7 a.m. at the established frequency for each project.

5.3 Sampling Methods

The sample collection SOPs are based on the TO-4A Compendium Method.

5.4 Sampling Forms

A field data form is used to record all field data associated with the sampling event.

5.5 PUF and Filter Preparation and Cleanup

For initial cleanup, PUFs and filters (not necessarily at the same time) will be extracted and prepared in accordance with Method TO-4A, Section 10.2 (Preparation of Sampling Cartridge). Each PUF will be placed in a glass sampler cartridge, wrapped in hexane rinsed foil, placed in a labeled zip-loc bag and sealed. At least one PUF in each batch of 20 will be certified in accordance with Method TO-4A, Section 10.3 (Procedure for Certification of PUF Cartridge Assembly).

Glass cartridges will be cleaned and reused after each sampling event. New PUFs and filters will be used for each event. Used PUFs and filters will be discarded after each sampling event.

5.6 Sample Containers

The aluminum sample cylinders will be assembled in the office/lab with a PUF cartridge and glass fiber filter. A cover plate will be placed over the filter and a foil covering is placed over the coupler for transport of the module to the field. The assembled cylinders will be transported to and from the field in a hexane rinsed ice chest.

For transport to the laboratory, the filter and PUF cartridge will be removed from the sampler cartridge. The filter will be folded and placed in the glass sampling cartridge atop the PUF. The cartridge will be wrapped in hexane-rinsed aluminum foil. The samples are placed in zip-loc bags and labeled.

5.7 Sample Holding Times and Preservation Methods

For PCB samples collected Monday through Friday, delivery at the laboratory will be made no later than 10 a.m. on the day following sample collection. Samples collected on Saturday and/or Sunday will be packaged for shipment and refrigerated. These samples will be shipped on Monday morning for delivery by 10 a.m. on Tuesday. All samples will be shipped in an ice chest with adequate blue ice packs to maintain the temperature at 4^{o}C.

All samples will be extracted by the analytical laboratory within 7 days after sample collection. Concentrates will be stored refrigerated in vials until analyzed. Concentrates will be analyzed within 40 days.

5.8 Documentation

PCB sample numbers, sampling conditions and analyses, etc. will be recorded on a sampling data form. Original field copies of all sampling data forms will be maintained.

6. PCB Sample Custody

6.1 Field Sample Operations

6.1.1 PUF and Filter Receipt and Handling

Cleaned, labeled PUF cartridges will be received from the laboratory via a commercial carrier or courier. Upon receipt, each batch of PUF cartridges will be sorted by date of extract and logged. The PUFs with filters will be stored in ice chests. The batches will be used in order of extraction date. As the PUFs in each batch are used, the date and site where each is used will be logged. PUFs are considered clean and usable for 30 days after initial extractions.

6.1.2 Sample Collection

Each PUF and filter will be assembled into a sampling cylinder in the office/lab in accordance with procedures contained in Method TO-4A, Section 11.3.2 (Preparing Cartridge for Sampling) and assigned to a specific sampler. The sampler, PUF cartridge numbers, and all field sampling data will be recorded on a dedicated field data sheet. Equipment calibration and sampling procedures will follow those specified in Method TO-4A unless a specific variation is proposed in the project work-plan.

When sampling is completed, the PUF/filter will be kept together in the sampling cylinder for transport to the office. In the office/lab, the filter will be removed and placed in the glass sampling cylinder atop the PUF. The PUF will be taken from the sampling cylinder, wrapped in foil and bagged. The samples will be labeled and identified with sample numbers. The sample numbers will be logged. All information relating to date, time and conditions of sampling will be recorded on the field data sheet. Samples will be refrigerated for cooling prior to shipment.

6.1.3 Sample Shipment

Samples will be shipped in sealed ice chests on ice or blue ice with a chain-of-custody (COC) seal over the chest lid. Samples will be shipped under COC to the analytical laboratory.

The COC record will be completed, signed, and mailed inside the ice chest. Samples will be shipped by a commercial carrier or courier and require a delivery signature at the analytical laboratory.

6.2 PCB Laboratory Operations

At the analytical laboratory, the samples will be received, signed for, and inspected by a sample custodian. The COC record will be verified with the received samples. Any inconsistencies will be noted on the COC record. From that point on, the samples will be handled according to the laboratory's SOPs.

All sampling COC field records will be maintained in the sampling file at the BEC office in Pittsfield. All COC records and log sheets for the laboratory will be maintained at the analytical laboratory.

7. PCB Analytical Procedures

7.1 Extraction Method

The Compendium Method TO-4A procedure for extracting PCB from the PUF and filter will be followed. The PUFs will be extracted within 7 days after the sample is collected.

The laboratory SOP for the extraction method is included as Attachment J-1 to Appendix J.

7.2 Test Method

The analytical procedure to determine PCBs will be as described in Method TO-4A. and as specified in Section 4 of Attachment D (Ambient Air Monitoring Plan) to GE's POP. Any deviations from Method TO-4A, if required, will be proposed in the project-specific work plan.

To corroborate the results using GC/ECD, samples may be analyzed with high resolution GC/MS. Results of both methods will be reported.

The laboratory SOP for the test method is included as Attachment J-2 to Appendix J.

8. PCB Calibration Procedures

Calibration for all PCB sampling equipment will be conducted in accordance with the procedures specified in Method TO-4A or the EPA High Volume Reference Method (as applicable). All data and calculations for calibrations will be recorded on log sheets and maintained in a calibration log file. Method variations are noted.

8.1 Flow Rate Transfer Standard

Frequency of Calibration:	Annually
Reference Procedure:	Flow Rate Transfer Standard (NIST Primary Standard)
Variations From Reference:	None.
Accuracy:	±2%.

Summary: Calibrated against a positive displacement standard volume meter at various flow rates. Calculate the linear least squares slope and intercept of the line representing the relationship. The orifice calibration is performed by an independent contractor.

8.2 High Volume Sampler (Multi-Point Calibration)

Frequency of Calibration:	Upon receipt; every 6 months; following motor, ball valve, magnehelic gauge, or other major equipment repair or replacement; or any time the difference between a one-point audit and the sample flow rate deviates ±10%.
Reference Procedure:	Method TO-4A, Section 11.2.2
Variations From Reference:	None
Accuracy:	Correlation coefficient greater than 0.95.

Summary: The high volume sampler will be calibrated against a certified orifice flow transfer standard. A calibration curve will be drawn and a least square regression calculated. The equation will be used to determine standard flow during sampler operation. The calibrations for each monitor will be recorded on a worksheet and maintained in a calibration log.

9. PCB Data Reduction, Validation, and Notifications

9.1 Data Reduction

The PCB sampling data and analytical results will be combined to report an ambient concentration of PCBs in $\mu g/m^3$ for each sample.

Sampling Data

The sampling flow rate and the total volume of air sampled will be calculated from the pressure readings collected during sampling and the elapsed sampling time.

1. Using appropriate calibration tables for each sampler, Convert $P_1 \ldots P_n$ to $Q_1 \ldots Q_n$

   where: $P_1 \ldots P_n$ = magnehelic readings from sampling event recorded on the field data sheet

   $Q_1 \ldots Q_n$ = flow readings from calibration table corrected to standard conditions (m^3/min)

2. Determine the average flow rate:

   $$QSTD = \frac{Q_1 + Q_2 \ldots Q_n}{N}$$

   where: Q_{STD} = average flow rate in standard conditions (m^3/min)

   N = number of flow readings

3. Calculate the total elapsed time:

   $ETM_{Finish} - ETM_{Start} = ET$

   where: ETM_{Finish} = elapsed time meter reading at the end of sampling

   ETM_{Start} = elapsed time meter reading at the start of sampling

   ET = total elapsed time (hours)

4. Calculate the total volume of air sampled under ambient conditions:

   $$V_a = \sum_{i-1}^{n}(T_i \times F_i)/1000\ L/m^3$$

   where: V_a = total volume of air sampled (m^3)

   T_i = length of sampling segment between flow checks (min)

   F_i = average flow during sampling segment (L/min)

5. Correct the air volume to EPA standard temperature and standard pressure

$$V_s = V_a \times [(P_b - P_w)/760 \text{ mm Hg}] \times (298K/t_A)$$

where:
- V_s = volume of air at standard conditions (std. m^3)
- V_a = total volume of air sampled (m^3)
- P_b = average ambient barometric pressure (mm Hg)
- P_w = vapor pressure of water at calibration temperature (mm Hg)
- T_A = average ambient temperature, °C + 273

Analytical Data

The laboratory will reduce the analytical results for each sample to total PCBs measured in µg/PUF. The procedures for this determination and calculation are defined in the USEPA Method TO-4A.

Sample Concentrations Conversions

The analytical data provided by the laboratory will be reduced for comparison with standards.

$$CA = \frac{\mu g/PUF}{V_m/PUF}$$

where:
- CA = concentration of PCBs in sample ($\mu g/m^3$)
- V_s = total standard volume of air

9.2 Data Validation

All PCB air data will be validated in accordance with Validation Annex F to the FSP/QAPP.

9.3 Notifications

The notification and action levels for PCBs are specified in Section 6 of Attachment D (Ambient Air Monitoring Plan) to GE's POP. In the event of an exceedance of the notification or action level for PCBs, GE will make the notifications specified in that section and will take the other response actions set forth in that section for the type of exeedance in question.

10. PCB Internal Quality Control Checks

10.1 Sampler Flow Checks

In addition to the standard equipment calibration procedures identified in Section 7.0, routine quality control checks to verify flow will be conducted during PCB sampler operation.

Procedure	Frequency	Control Limit	Corrective Action
One-Point Audit	Before and After Each Sampling Event	$\pm$ 10% Deviation from Calculated Value	Note sample flow volume as estimated; Recalibrate
Magnehelic Zero Check	Before and After Each Sampling Event	$\pm$ 2" H_2O	Adjust
Leak Check	Before and After Each Sampling Event; at Each Calibration	No Leaks	Repair leak
Magnehelic Readings	Every 6 Hours During Sampling	$\pm$ 10" H_2O	Note reading; adjust instrument

10.2 Field Sampling Precision Check

As a precision check on field sampling for PCBs, two samplers are co-located at one sampling site. The samplers are located 2 - 4 meters apart. One sampler will be identified as the primary sampler and the other will be designated as the duplicate sampler. The calibration, sampling, and analysis procedure for the two samplers will be the same as for all samplers. The co-located sampler will be operated whenever the routine sampler operates.

The variation between the ambient PCB concentrations measured at the two samplers will be compared and observed. The target limit of variation (precision) is that each compound with a detectable concentration at least two times greater than the laboratory PQL of 0.1 µg/PUF must have an RPD value less than 50%.

10.3 Process and Field Blanks

10.3.1 Laboratory Process Blank

Prior to shipment to the field, one PUF cartridge and filter from each batch of approximately 20 clean PUFs and prepared filters will be analyzed for PCBs. (This will be called a laboratory process blank.) In order for the PUF batch to be considered acceptable for use, the blank level must be below the laboratory PQL of 0.1 µg/PUF.

10.3.2 Trip (Field) Blank

For each sampling event, one PUF cartridge and filter will be carried to the field and returned in a clean sample holder. (This will be called a trip blank, and is also referred to in Method TO-4A as a field blank.) The sample will be handled as any other sample except that no air will be drawn through the cartridge. The aluminum sample cartridge will be installed on the sampler at the beginning of the sampling event and immediately removed. The aluminum cartridge will remain in a hexane rinsed ice chest during sampling and will be recovered and prepared for shipment to the analytical laboratory for analysis in the same manner as the remaining project samples. The blank level for the trip (field) blank is a level that is less than the laboratory PQL of 0.1 µg/PUF.

10.3.3 Field Spike

Before each sampling episode, one PUF plug from each batch of approximately 20 will be spiked with a known amount of the standard solution. The spiked plug will remain in a sealed container and will not be used during the sampling period. The spiked plug will be extracted and analyzed with the other samples. This field spike will act as a quality assurance check to determine matrix spike recoveries and to indicate sample degradation.

10.3.4 Solvent Process Blank

During the analysis of each batch (approximately 20) of samples, one process blank from the laboratory stock will be carried through the procedure (all steps conducted but no filter/PUF cartridge included) and analyzed to assure that the extraction solvent is free from PCB contamination. (This will be referred to as a solvent process blank.) To provide such assurance, the result for this solvent process blank should be less than the laboratory PQL of 0.1 µg/PUF.

10.3.5 Analytical Spike Recovery

The procedures and QA limits for sample extraction, clean-up and analysis are specified in Method TO-4A.

11. Preventative Maintenance for PCB Samples

11.1 Schedule

Preventative maintenance on the PCB sampling equipment will be performed on a routine basis. Records of all maintenance activities will be maintained.

Sampling Unit

At least once quarterly, the sampler housing will be inspected for wear and tear, making sure all moving parts, doors, lids, etc. are in good order. The electrical cords and connections will be inspected for integrity. The coupler connection, digital timer, magnehelic gauge, and ETM will all be visually inspected.

Sampler Motor

The motor will be inspected quarterly and brushes replaced as needed according to the manufacturer's recommendations. All motor brushes are to be replaced between 500 and 1000 hours of operation. After the motor brushes are replaced, the motor will be recalibrated following a sufficient break in period. The top and bottom rubber gaskets on the sampler motor will be inspected quarterly and replaced as needed.

Sampling Cartridge and Gaskets

The sampling cartridges will be visibly inspected each time they are used. Prior to each sampling event, the cartridges will be completely disassembled, cleaned with hexane, and checked. Gaskets in the cartridge will be checked each time the cartridges are used. They will be cleaned and replaced as needed.

11.2 Spare Parts Inventory

A sufficient inventory of spare parts consisting of at least two (except where noted) of each of the following will be maintained for the high volume samplers:

Dual Sampling Modules
Filter Gaskets
Silicone Gaskets for Upper Module
Silicone Gaskets for Lower Module
Glass Cartridges with Support Screens and PUFs
Replacement Motors
Replacement Motor Brushes
Calibration Orifice (one spare calibration orifice)

12. Corrective Action for PCB Sampling

12.1 Responsibility

Corrective action may be initiated as a result of disruptions in PCB sampling or problems associated with the quality control checks; calibrations; or performance, system, and quality assurance audits. The responsibility for implementing corrective action lies with the BEC Project Manager. Any non-routine corrective actions will be discussed with the GE Project Manager before implementation.

12.2 Internal Quality Control Checks

Corrective actions for internal quality control checks are described in Section 13.1 of this plan.

12.3 Calibrations

The corrective action for problems in calibration is to recalibrate and, if necessary, repair, replace, or conduct a calibration audit using the designated audit orifice standard.

12.4 Performance and System Audits

Any sampler flow problems identified during the one-point audits require that data for that sampling event be checked for accuracy. Equipment calibration audits may indicate the need for recalibration, repair, or replacement.

12.5 Sampling Data Completeness and Validity

All samples must meet the criteria for sample validity identified in Section 4.2 of this plan. Samples which do not meet these criteria are invalid. For any sampling event where more than one sample is defined as invalid due to sampling error, the sampling event will be rerun on the next available day.

12.6 Laboratory Analyses

The sample extract volume will provide sufficient extract to complete at least two additional analyses if there is a problem in the initial analyses. Decisions for repeating any sampling events due to invalid data from the lab will be made on a case-by-case basis.

13. PCB Monitoring Reports to GE

At the end of each PCB air monitoring project, a report will be prepared and delivered to the GE Project Manager. The report will summarize the sampling activity for the project and include the following information:

- A summary of activities including a review of any sampling disruptions or problems which may have occurred, the corrective actions taken, and a discussion of what impact the problems may have on data quality.
- Sampling and analytical results.
- Summary of data quality in terms of the quality assurance objectives.
- Calibration, data validation, quality control, and audit activity.
- Meteorological data summary.

The final report will present a quantitative assessment of ambient PCB concentrations.

Bibliography

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3. Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. I - Principles. EPA-600-9-76-005, March 1976.

4. Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. II - Ambient Air Specific Methods. EPA-600-4-77-027a, May 1985.

5. Sampling and Analysis of Toxic Organics in the Atmosphere. ASTM Technical Publication 721, August 1979.

Attachment J-1
Laboratory SOP for Extraction Method

STANDARD OPERATING PROCEDURE

NORTHEAST ANALYTICAL, INC.

NE151_04.DOC

REVISION NUMBER: 04

STANDARD OPERATING PROCEDURE FOR THE EXTRACTION AND PREPARATION OF POLYURETHANE FOAM AIR CARTRIDGES (PUFS) FOR EPA METHOD TO-4A -POLYCHLORINATED BIPHENYLS IN AIR CASSETTE MEDIA

AUGUST 23, 2006

COPY #_____

STANDARD OPERATING PROCEDURE

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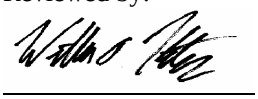
Northeast Analytical, Inc.
Issuing Section: Organic Extractions
SOP Name: NE151_04.DOC
Date Effective: 8/23/2006
Revision: 04

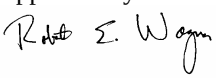
Reviewed by:



William A. Kotas
Quality Assurance Officer

NELAC Annual Review:
Date Last Reviewed: 8/23/06
Reviewed by: W. Kotas

Approved by:



Robert E. Wagner
Laboratory Director

1.0 TITLE Standard Operating Procedure for the extraction and cleanup of High Volume Polyurethane Foam (PUF) air cassette samples for Polychlorinated Biphenyl (PCB) analysis using the Soxhlet extraction technique (Modified SW-846 Method 3540C/EPA Method TO-4A for subsequent analysis by SW-846 Method 8082. Note: The Determinative Method (EPA Method 8082) requires secondary GC column analysis on dissimilar column for PUF samples.

2.0 PURPOSE The purpose of this SOP is to provide to the chemist the procedures required to perform extractions of PCBs in PUF (air cassette) samples, using the soxhlet extraction technique and to perform the subsequent extract volume reduction and cleanup.

3.0 SCOPE The following procedure is utilized by Northeast Analytical, Inc. for the extraction and cleanup of PCBs from PUF (air) samples using the soxhlet extraction method as per Method TO-4A for subsequent analysis by SW-846 Method 8082.

4.0 COMMENTS

4.1 All PUFs must be pre-cleaned using SOP NE0153 (PUF Preparation). All blanks and QC samples use pre-cleaned PUFs.

4.2 Interferences: Laboratory contaminants including phthalate esters may be introduced during extraction and subsequent cleanup procedures. The extraction technician should exercise caution that scrupulously cleaned glassware is used and that plastic tubing and other plastic materials do not contact samples or extracts.

5.0 SAFETY The chemist should have received in-house safety training and should know the location of first aid equipment and the emergency spill/clean-up equipment, before handling any apparatus or equipment. Safety glasses and gloves must be worn when handling glassware and samples.

Polychlorinated biphenyls have been tentatively classified as known or suspected carcinogens. The chemist must review the Material Safety Data Sheets (MSDS) for PCBs and all reagents used in the procedure before handling them. All equipment and solvents should be handled within a lab fume hood.

6.0 REQUIREMENTS The chemist must have an understanding of the methods and requirements of USEPA-SW- 846A "Test Methods for Solid Wastes" Volume 1B: Lab Manual, 3rd edition. Methods 3540, 3500. The chemist must also be certified to perform the procedure by an approved instructor. The chemist should have completed an acceptable demonstration of precision and accuracy before performing this procedure without supervision.

7.0 EQUIPMENT

7.0.1 Water Cooled Condenser: Pyrex 45/50 #3840-MCO.

7.0.2 250ml Round Bottom Flask: Pyrex #4100.

7.0.3 Soxhlet Repetitive Flushing (reflux) Unit: 45/50 Pyrex #3740-M.

7.0.4 Heating Mantle: Type "VF" laboratory heating mantle #HM0250VF1. (or equivalent)

7.0.5 Heating Mantle Controller: Glass-Col #PL3122 Minitwin (or equivalent) regulates temperature control of the mantle.

7.0.6 Boiling Chips: Hengar #5785 Alltech Associates, Inc. (or equivalent)

7.0.7 Chiller: Pump driven water circulating cooling system cool flow #75 NESLABS Instruments, Inc. (or equivalent)

7.0.8 Hexane: High Purity Solvent Baxter (Burdick/Jackson) #UN1208. (or equivalent)

7.0.9 Diethyl Ether: Nanograde Mallinckrodt #3434-08

7.0.10 Turbo Vap Evaporator: Zymark #ZW640-3.

7.0.11 Turbo Vap Evaporator concentrator tubes: Zymark 250ml, 0.5ml 1ndpoint.

7.0.12 Beakers: Assorted Pyrex: 250ml, 600mL, and 1000mL, used for liquid containment and pipet storage.

7.0.13 Hexane 90%/10% Ether: 90% Hexane/10% Ether by volume solvent mixture prepared in the lab.

7.0.14 Vials: glass, 4 dram (with Polyseal sealed cap) (20 ml & 10 ml) capacity, for sample extracts.

7.0.15 Vial Rack: Plastic rack used to hold vials, during all phases of the extract processing.

7.0.16 Centrifuge: International Equipment Co., Model CL. (or equivalent)

7.0.17 Wrist Shaker: Burrell wrist action shaker, Model 75 and 88. (or equivalent)

7.0.18 Florisil: deactivated, solvent washed with 1:1 hexane/ether, baked at 130 C for 16 hours. Deactivated with D.I. water. EM Science #FX0282-1.

7.0.19 Replacement PUFs: 75mm, pre-cleaned and tested. CAT# P226131

7.0.20 Mercury: Triple distilled Mercury Refining Co, Albany, NY #328502. (or equivalent)

7.0.21 Sulfuric Acid: Na_2SO_4 (concentrated) Mallinkrodt #2468 #UN1830. (or equivalent)

7.0.22 Pipets: S/P Disposable Serological Borosilicate Pipets.

1. 1mL X 1/10 #P4650-11X
2. 5mL X 1/10 #P4650-15
3. 10mL X 1/10 #P4650-110

Kimble Pasteur Borosilicate glass pipet 9" #72050 (or equivalent)

7.0.23 Quartz Microfiber Filters(QMF): 10.16 cm Dia., 100 circles(Whatman Cat# 1851-101) or equivalent Baked at 450 degrees Celsius for 3 hours.

7.0.24 Surrogate Spike Solution: Laboratory prepared from primary stock solution Tetra-Chloro-meta-Xylene and Decachlorobiphenyl at 0.500 ug/mL.

7.0.25 Laboratory Control Spike Solution: Laboratory prepared from primary stock solution of PCB Aroclor at 0.500 ug/mL

8.0 PROCEDURES:

8.1 Sample Preparation

8.1.1 Throughout the entire process it should be noted that if the chemist encounters any problems or difficulties with any samples or steps involved, all work should STOP! Any problems should be brought to the attention of the supervisor and documented in the extraction logbook.

8.1.2 Before any steps are taken, the chemist should first review the sample job folder and fill in the appropriate spaces on the internal sample tracking form and initial.

8.1.3 Prior to extraction all surfaces and fume hoods used must be cleaned and wiped down with hexane. It is also advisable to remove any PCB solid or liquid waste containers from the fume hood

8.1.4 PUF samples require all glassware to be pre-rinsed with hexane. PUF samples are for extremely low level PCB concentrations and require clean; hexane rinsed glassware.

8.1.5 Use extreme caution using Ether during this extraction. Ether and its vapors are extremely flammable and must be used in a fume hood.

8.2 Procedure: Sample Extraction

8.2.1 Rinse enough 250 mL round bottoms and soxhlets for each sample, blank, and QC sample. Place in fume hood and let dry.

8.2.2 After the glassware dries, add a few boiling chips to each round bottom and add approximately 200 mL of Hexane 10% Ether mixture to each round bottom. Label them with a sample ID.

8.2.3 Blank, QC PUFs, and baked QMF filters should be prepared prior to extraction using the PUF preparation SOP (NE153). Each sample must be handled using a clean pair of gloves. Use the pre-cleaned replacement PUFs and pre-baked QMF filters for the Blank and QC samples.

8.2.3.1 For each sample, use a pair of tweezers to pull the PUF out of its PUF tube and push it into the appropriate soxhlet. Try to handle as PUF as little as possible. Using pair of tweezers depress both sides of the PUF and push the PUF to the bottom of the soxhlet.

8.2.3.2 Using tweezers, fold the glass fiber filter that came with the sample and push it into the soxhlet. Use the tweezers topush the filter down to the PUF. Be sure that both the PUF and the filter are below the capillary tube on the soxhlet to ensure proper drainage of the soxhlet.

8.2.3.3 Place the soxhlet onto the appropriate round bottom. Put clean gloves on and repeat with each sample.

8.2.4 Add Spike and Surrogate mixture to appropriate samples. See table below.

Table 8.4.2

Fortification Mixture	**Concentration**	**Volume added to Samples**
TCMX/DCBP Surrogate mix in hexane	0.05 ug/mL TCMX/ 0.5 ug/mL DCBP	0.500 mL
Aroclor 1016 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1221 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1232 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1242 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1248 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1254 Spike mix in hexane	0.500 ug/mL	0.500 mL
Aroclor 1260 Spike mix in hexane	0.500 ug/mL	0.500 mL

8.2.5 Rinse the inside and the outside connecting joints of the condenser units that will be used to condense the extraction solvent during the soxhlet extraction of the sample. Turn on chiller to cool the condensers.

8.2.6 Place the round bottom flask with attached soxhlet extractor onto a heating mantle and attach condenser unit. Turn corresponding thermostats on to setting 5.
Double check soxhlets at this time for any cracks or chips which may leak solvent. Once the solvent begins to boil, a flushing action of three or more flushes per hour should be achieved.

8.2.7 The samples should be extracted overnight for a minimum of 18 hours. Once the sample has finished extracting (usually in the morning), turn the heating mantle off and allow samples to cool to room temperature. Once cool, rinse the inside of the condenser with several pipet volumes of hexane. Disengage the soxhlet and condenser unit and rinse the joint off as well into the soxhlet.

8.2.8 Move all round bottom and soxhlet units to the fume hood. The diethyl-ether in the samples will continue to release vapors. Using 10 mL pipets push the PUF down to release solvent from the PUF and allow the unit to drain into the round bottom.

8.2.9 Rinse the connecting joint into the round bottom. Set the soxhlet aside at this time and leave it in the hood to evaporate the remaining diethyl -ether. Procure the same number of turbo tubes as there are samples. Rinse all the turbotubes with hexane and let dry. Using an individual turbotube stand, label a turbotube with the corresponding sample ID number and place in the holder. Pour the contents of the round bottom into the turbotube, using a pipet and hexane to rinse the last drop out of the mouth of the round bottom. Rinse the round bottom with several pipetfuls of hexane, swirl gently, and decant into same turbo tube. Repeat this step twice for same sample, then repeat all preceding steps for all other samples.

8.2.10 All glassware must be rinsed with technical grade (tech)-acetone or a "for rinsing-only" labeled solvent, and dried in the hood before other cleaning steps.

8.3 Solvent Reduction: TurboVap Evaporator System

8.3.1 The TurboVap evaporator system is used in place of the Kuderna Danish (KD)-concentrator apparatus. The turbovap uses a heated water bath and positive pressure nitrogen flow/vortex action. The unit maintains a slight equilibrium imbalance between the liquid and gaseous phase of the solvent extract which allows fractional reduction of the solvents without loss of higher boiling point analytes.

8.3.2 Turn the unit on (switch is located on the back side of the unit) and allow to heat up to the specified temperature for individual solvent use. This is indicated by the "Heating" display light, located above the temperate control knob on the right side of the unit. The system is at the proper temperature when the "At Temperature" light is lit. This is located above the "Heating" display light.

8.3.3 As a precaution the TurboVap system regulators should be checked to assure that no residual gas pressure remains within the system and that the gas cylinder valve and gas pressure regulators are both off before placing samples in the apparatus. Residual gas pressure may cause splashing and cross contamination of samples. To bleed the system of residual gas pressure place an empty turbo tube into the water bath and close the lid. Make sure that the nitrogen gas cylinder valve is turned off and slowly turn on the gas pressure regulator. Bleed any residual gas until the regulator output pressure gauge reads "0" psi. Proceed to 8.3.4. Make sure to wipe down all surfaces with hexane before concentration samples.

8.3.4 Place the turbo tube containing the samples into the Turbovap and close the lid. Turn on the gas cylinder valve first and then begin slowly turning the pressure regulator on. Keep the gas pressure very low, until the solvent level is decreased, to avoid splashing. Increase the gas pressure as the sample reduces maintaining uniform flow throughout the reduction.

8.3.5 The process for solvent (hexane/ether) reduction takes approximately 20-30 minutes. Do not leave the unit unattended as extracts may be blown to dryness and PCB loss may occur. Immediately notify a supervisor if an extract is blown to dryness.

8.3.6 Concentrate the solvent to approximately 1.0 mL. Remove the samples from the turbovap and place in the rack. The remaining solvent will consist largely of hexane since the ether component is fractionally removed at a faster rate than hexane; however, a solvent exchange with hexane should be completed 3x to ensure the ether has been entirely removed. NOTE: Not all samples will evaporate at the same rate; sample extracts containing large amounts of petroleum or other non-volatile liquids may stop reducing before the 1.0 mL point is achieved. Samples which stop reducing should be removed as soon as possible.

8.3.7 Quantitatively transfer the sample extract with a disposable transfer pipette into an appropriate volumetric flask (5mL for PUF extracts). Rinse Turbotube with 2 pasteur pipets of hexane, then transfer the rinse to the volumetric. After the sample has been transferred, rinse the disposable transfer pipet with 0.5mL of hexane into the volumetric flask. Add hexane to the volumetric meniscus mark. Invert the volumetric flask at least three times to mix completely. Decant the contents into a pre-labeled 4 dram vial.

8.3.8 All dirty glassware must be rinsed with tech-acetone or a "For Rinsing-Only" labeled solvent and dried in the fume hood before being washed.

8.4 Sample Extract Cleanup

Most extracts of environmental samples that are to be analyzed for PCBs by gas chromatography with electron capture detection contain co-extracted xenobiotics and other interfering substances which must be removed before accurate chromatographic analysis can be performed.

Not all clean-up procedures need to be performed on every sample and several are sample matrix specific. The experience of the analyst combined with the sampling site history should guide the selection of which clean-up procedures are necessary. The sequence and number of repeats of cleanup steps performed are recorded by the sample preparation chemist in the extraction logbook.

Sample extract cleanups are performed on set volume extracts. The final concentrated extract volume is 5 mL for PUF samples.

8.4.1 Sulfuric Acid Wash

8.4.1.1 The concentrated sulfuric acid treatment removes hydrocarbons and other organic compounds which are co-extracted with the PCB residues.

8.4.1.2 Chill the sample to approximately 0^0C. Add 2.0 mL concentrated H_2S0_4 and shake for 30 seconds by hand, centrifuge for approximately 1 minute on a setting of #4, transfer the hexane upper layer to 4 dram vial.

8.4.1.3 Repeat 8.4.2 if the sample extract appears to be heavily loaded (opaque) with colored material. Two to three acid washes may be required. Note: it is entirely possible that all colored material will not be removed from the extract.

8.4.2 Elemental Sulfur Clean-up

8.4.2.1 Elemental sulfur is soluble in the extract solvents used for sediment and soil samples. It is commonly found in many PUF/sediment/soil samples, decaying organic material, and some industrial wastes. Large amounts of sulfur can cause the electron capture detector (ECD) to signal saturate for long periods during the elution envelope of PCBs. Even small amounts of sulfur can interfere with PCB measurement as a co-eluting chromatographic peak. PUF samples normally have less sulfur than sediment/soil samples.

8.4.2.2 Two techniques exist for the elimination of elemental sulfur in PCB extracts. Mercuric precipitation (Mercury Shake) and the Tetrabutylammonium (TBA) sulfite procedure. Tetrabutylammonium sulfite causes the least amount of degradation of a broad range of pesticides and organics compounds, while mercury may degrade organophosphorus and some organochlorine pesticides. The TBA procedure also has a higher capacity for samples containing high concentrations of elemental sulfur.

8.4.3 Removal of Sulfur Using Mercury

Note: Mercury is a highly toxic metal. All operations involving mercury should be performed within a hood. Prior to using mercury, the chemist should become acquainted with proper handling and emergency spill/clean-up procedures associated with this metal and must have reviewed the material safety data sheet MSDS.

8.4.3.1 Add 1-3 drops of mercury to the sample extracts, cap, and place on the wrist shaker for 30 mins. The sulfur is converted to mercuric sulfide and precipitates out of the sample extract. A black precipitate may be seen in sample extracts containing elemental sulfur.

8.4.3.2 Remove the sample extracts from the wrist shaker and place in the centrifuge for 2 minutes on speed setting on #4.

8.4.3.3 Transfer the sample extract to a clean 4 dram vial.

8.4.3.4 The precipitated sulfur can be removed from the extract by performing a sulfuric acid clean-up or a Florisil slurry.

8.5 Florisil Adsorption (Slurry)

8.5.1 The florisil slurry removes co-extracted polar compounds, residual water, and residual acid and is recommended as the final cleanup step before the extract is submitted for GC analysis.

8.5.2 Add approximately 0.5 grams of tested and approved deactivated florisil to each vial containing

the sample extract. **SEE EXTRACTION SUPERVISOR FOR THE APPROPRIATE DEACTIVATION CONCENTRATION TO BE USED.**

8.5.3 Vigorously shake the vial for approximately 1 min by hand or on the wrist shaker.

8.5.4 Place the vial(s) into the centrifuge for 2 minutes on setting #4.

8.5.5 Transfer the extract to a clean 4 dram vial.

8.6 Extract Screening and Dilution:

8.6.1 PCB extracts are ordinarily screened by GC initially to determine the approximate concentration before final analysis. Prior site history and client supplied estimates of sample concentration may be used to determine what, if any, extract dilution is necessary. Extracts of unknown concentration are generally screened at a 10 to 100 fold dilution.

8.6.2 The supervising chemist is responsible for determining initial screening dilutions. Extract dilutions are prepared by transferring an aliquot of the original sample extract into a vial containing the correct amount of "make up" volume of hexane. For example, a 1 to 10 dilution is performed by adding 1.0 mL of the extract to 9.0 mL hexane. The vial containing the diluted extract is labeled denoting the equivalent extract volume after the dilution; e.g. a 5mL extract diluted 1 to 10 is labeled "250X", an undiluted 25mL extract is labeled "25X".
When high dilutions are prepared, secondary (serial) dilutions of the initial diluent are prepared; e.g. a 100 fold dilution is prepared by a 1 to 10 dilution of the initial extract,then a 1 to 10 dilution of the resulting diluent.

8.6.3 Perform the dilution using an appropriate class A disposable volumetric pipet to transfer the extract and a calibrated volumetric autodispensette to dispense the make-up volume of hexane. Make sure that the vial is properly labeled. Cap and invert the vial at least three times to thoroughly mix the extract with the solvent.

8.6.4 Transfer 1 mL of the extract to a labeled 1.5 mL GC autosampler vial. Record the screening dilution and Set Volume in the Log Book, enter data into the LIMS. Create a Access Report Sheet prepared in LIMS. Submit the Access Report Sheet, a photocopy of the logbook, and completed internal chain of custody tracking form with the sample extracts to the GC analyst.

9.0 Quality Assurance/Quality Control

9.1 Verification PUF sample:

Averification (a.k.a. certification) PUF sample is a cartridge and filter assembly that has been pre-cleaned as described in SOP NE_153 before delivery to field personnel or laboratory client

9.1.1 Extract and prepare one pre-cleaned PUF cartridge/filter assembly at a batch frequency described in the client's sampling/analytical plan. Note: Method TO-4A requires one verification PUF/Filter per extraction batch (or of 10 % of batch whichever greater).

9.1.2 Submit extract for analysis by GC-ECD (EPA Method 8082) as described in 8.6.4.

9.1.3 GC analysis of verification PUF must exhibit chromatogram free of PCB Aroclors (< Practical Quantitation Limit) and also be free of interfering non-target co-eluting contaminants. If PUF exhibits either contamination, re-prepare batch according to SOP NE_153. The default Practical Quantitation Limit for Method TO-4A is 0.100 ug total PCB.

9.2 Laboratory Method Blank

9.2.1 A Laboratory method blank sample is prepared and extracted with each site sample extraction batch of up to 20 samples. A pre-cleaned PUF and filter is spiked with surrogate solution and extracted and prepared identically to project samples. The analyte concentration must be less than the Practical Quantitation Limit. If the blank concentration exceeds the PQL the laboratory client is notified and data is qualified (B-flagged) and a case narrative is generated. All analysis must cease until the source of contamination is isolated and the problem is resolved. The default Practical Quantitation Limit for Method TO-4A is 0.100 ug total PCB.

9.3 Laboratory Control Spike/ Laboratory Control Spike Duplicate Sample

9.3.1 A laboratory control spike(LCS)/ laboratory control spike duplicate (LCSD) sample is prepared by spiking a pre-cleaned PUF cassette and filter with an Aroclor of interest applicable to the project. If the aroclor of interest is unknown rotate the spike between the 7 common Aroclors: Aroclor 1016, 1221, 1232, 1242, 1248 1254 and 1260. See table 8.2.4 for spike information. The percent recovery must meet project specified or laboratory established limits. The default Recovery Limit is 60-140 %.

9.3.2 Prepare LCS and LCSD samples at frequency specified in the clients sampling and analysis plan. The laboratory default is one LCS, LCSD per batch or 20 site samples whichever is greater.

9.3.3 IF the LCS/LCSD does not meet recovery limits the extraction of samples must stop until the problem is identified and corrected. The client is notified and a case narrative is issued to the client along with the affected data describing the LCS failure. Re-extraction of PUF samples is not possible.

9.4 Field Spike Sample

9.4.1 A field spike sample is prepared for each 20 PUF cartridges supplied to field personnel or as the client's field sampling analysis plan requires. The spike is prepared in the same fashion as an LCS sample and is shipped to the field and then returned to the laboratory unopened. The Field Spike sample is extracted and analyzed with the sample batch. The percent recovery criteria and corrective action are the same as the LCS/LCSD sample described in section 9.3.

9.5 Surrogate Spike

9.5.1 Every site sample and QC sample is spiked with the TCMX/DCBP surrogate solution described in table 8.4.2. The Surrogate recovery must meet project specified limits or default limits (60-120%). If the surrogate recovery does not meet specified limits then identify the problem, re-analyze extract by GC if necessary and provide case narrative describing the problem along with associated sample concentration results.

9.6 Field Blank Sample

9.6.1 A Field blank sample consists of a pre-cleaned cartridge assembly that as packaged and shipped to field personnel un-opened. The un-opened PUF is returned to the laboratory and analyzed with the sample batch. The PCB concentration should be less than the Practical Quantitation Limit. If PCBs are observed greater than the PQL compare results with laboratory method blank. Notify the client/field personnel of the problem and generate a case narrative that is issued with the analytical results.

10.0 Sample Collection, Preservation and Holding Times

10.1 Samples are collected as per EPA method TO-4A and the client's Field Sampling and Analysis Plan. Northeast Analytical does not provide field sample collection services for air monitoring projects. Samples should be stored at < 4 degrees Celsius until shipping to laboratory.

10.2 Field samples are shipped to the laboratory in a cooler chilled with Ice (<4 Degrees Celsius).

10.3 Upon receipt samples are stored in laboratory under refrigeration at < 4 degrees Celsius until extraction.

10.4 Samples must be extracted within 7 days of collection and analysis must be performed within 40 days of extraction.

11.0 References

1. US-EPA SW-846 Test Methods for Solid Waste; Soxhlet Extraction Method 3540C; United States Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Vol.1B, Cincinnati, OH 45268. December 1996

2. US-EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Second Edition Compendium Method TO-4A Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using High Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MS) 3/18/99

3. Guide to Environmental Analytical Methods, Genium Publishing Corporation, Schenectady, NY 12304. 1997

12.0 Attachments

A. Method Outline Summary

METHOD OUTLINE FOR PUF EXTRACTION USING SOXHLET TECHNIQUE

1. PREPARE FUME HOOD AND SAMPLES FOR EXTRACTION
2. RINSE GLASSWARE AND LET DRY
3. SET UP SOXHLET EXTRACTOR APPARATUS
4. ADD SURROGATES AND/OR MATRIX SPIKE
5. EXTRACT SAMPLE FOR APPROXIMATELY 16 HOURS
6. BREAKDOWN SOXHLET EXTRACTOR APPARATUS
7. TRANSFER SOLVENT TO TURBO TUBE
8. SOLVENT REDUCTION, USING THE ZYMARK TURBOVAP EVAPORATION SYSTEM
9. TRANSFER AND SET VOLUME
10. EXTRACT CLEANUP (ACID, MERCURY OR TBA, FLORISIL)
11. EXTRACT DILUTION
12. GC SCREENING/ ANALYSIS

Attachment J-2
Laboratory SOP for Test Method

STANDARD OPERATING PROCEDURE

NORTHEAST ANALYTICAL, INC.

NE148_05.DOC
REVISION NUMBER: 05

Standard Operating Procedure for the Determination of Polychlorinated Biphenyl (PCB) Aroclors by US-EPA SW-846 Method 8082

AUGUST 24, 2006

COPY

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Issuing Section: GC Organics
SOP Name:NE148_05.DOC
Date Effective:24-August-2006
Revision: 05

Reviewed by

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NELAC Annual Review:
Date last reviewed: 24-August-2006
Reviewed by: W. Kotas

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1.0 Title: EPA SW 846 Method 8082- Polychlorinated Biphenyl (PCB) Aroclors by Capillary Column GC

Standard operating procedure for the analysis of Polychlorinated Biphenyls by Gas Chromatography with Electron Capture Detection and Total Aroclor Quantification.

2.0 Purpose

The purpose of this SOP is to provide a detailed written document for measurement of Polychlorinated Biphenyls (PCBs) according to SW-846 Method 8082 specifications.

3.0 Scope

3.1 This SOP is applicable in the determination and quantification of PCBs as outlined in EPA SW-846 Method 8082. It is applicable to the following matrices: water, soil, sediment, sludge, oil, fuel oil, waste solvent, fish, other aquatic animals, and tissue samples, air cassette samples including polyurethane foam (PUF) and associated filters for EPA Methods TO-4A and TO-10.

3.2 The following analytes can be determined by this method:

Analyte	CAS Number
Aroclor 1016	12674-11-2
Aroclor-1221	11104-28-2
Aroclor-1232	11141-16-5
Aroclor-1242	53469-21-9
Aroclor-1248	12672-29-6
Aroclor-1254	11097-69-1
Aroclor-1260	11096-82-5

3.3 In general, samples are extracted, or in the case of oils and waste solvents diluted, with a pesticide grade solvent. The extracts are further processed by concentrating or diluting, depending on the PCB concentration, and carried through a series of clean-up techniques. The sample is then analyzed by injecting onto a gas chromatographic system and detected by an electron capture detector.

3.4 This SOP provides detailed instructions for gas chromatographic conditions, calibration, and analysis of PCBs by gas chromatography. Each matrix requires different sample handling or special preparation procedures before analysis can be performed. Each sample will be covered separately in the extraction standard operating procedures.

4.0 Comments

4.1 One of the major sources of interference in the analysis of PCBs is that organochlorine pesticides are co-extracted from the samples. Several of the commonly found pesticides and associated degradation products (DDT, DDE, DDD) overlap the PCB profile envelope and co-elute with several PCB GC peaks and therefore cannot be accurately measured. The analyst must be careful in chromatographic pattern review and flag peaks that are suspected of being contaminated so that they are not included in the total PCB values generated.

4.2 Laboratory contamination can occur by introduction of plasticizers (phthalate esters) into the samples through the use of flexible tubing. Samples and extracts should not be exposed to plastic materials. Phthalate esters respond on electron capture detectors, usually as late eluting peaks, and can interfere in PCB quantification.

5.0 Safety

5.1 Safety glasses and disposable gloves must be worn when handling samples and extracts.

5.2 All manipulations of sample extracts should be conducted inside a chemical fume hood. The analyst should minimize manipulation of sample extracts outside of a fume hood.

5.3 Safe laboratory practices should be followed by the analyst at all times when conducting work in the lab. The analyst should refer to the reference file of material safety data sheets to familiarize themselves with the precautions of handling applicable solvents and chemicals used to process

samples. The analyst should refer to the laboratory chemical hygiene plan for further safety information.

5.4 Samples remaining after analysis should be either returned to the customer for disposal or disposed of through the laboratory's disposal plan. Refer to the sample custodian for

assistance in this matter and also standard operating procedure NEO54, disposal of laboratory waste.

6.0 Requirements

6.1 Extensive knowledge of this standard operating procedure and EPA SW-846 Method 8082 is required.

6.2 The analysis portion of this method should be performed by a skilled chemist or by an analyst trained in the quantification of trace organics by gas chromatography.

7.0 Equipment

7.1 Instrumentation

7.1.1 Gas chromatograph: Varian Model 3400, equipped with Model 1077 split/splitless injector, temperature programmable oven, electron capture detector, Model 8100 autosampler.

7.1.2 Dual Column Gas Chromatograph: Varian CP-3800, Dual Injector System split/splitless, Varian CP-8400 autosampler, Dual Electron Capture Detectors. Column 1- 30 Meter 0.25 uM I.D. Phenomenex ZB-1 Column, Column2 -30 Meter 0.25 uM I.D. Phenomenex ZB-5 Column

7.1.3 Chromatograph Data System: A data system for measuring peak height and peak area. A Millennium_32 computer network based workstation (Waters Associates), will be employed to capture detector response and digitally store the chromatographic information. This system will allow for chromatographic review of data from the gas chromatograph, electronic peak integration for precise calculations, database structuring of the analytical information, and archival capabilities.

7.2 Glassware and Accessories:

7.2.1 25 mL volummetric flasks, Class A, acid washed, (Baxter Cat. No. F4635-25)

7.2.2 5 mL volummetric flasks, Class A, acid washed (Baxter Cat. No. F4635-5)

7.2.3 10 mL volummetric flasks, Class A, acid washed (Baxter Cat. No. F 4635-10)

7.2.4 50 mL volummetric flasks, Class A, acid washed (Baxter Cat. No. F4635-50)

7.2.5 100 mL volummetric flasks, Class A, acid washed (Baxter Cat. No. F4635-100)

7.2.6 4 dram vials for sample extract storage
(Kimble Opticlear, part no. 60910, code no. 60910-4)

7.2.7 8 dram vials for sample extract storage (Kimble Opticlear, part no. 60910, code no. 60910-8)

7.2.8 Pasteur pipettes (Kimble, part no. 72050)

7.2.9 250 mL beakers, glass (Baxter Cat. No. B2650-250)

7.2.10 100 mL beakers, glass (Baxter Cat. No. B2650-100)

7.2.11 Disposable 10 mL pipettes (Baxter P4650-110)

7.2.12 Disposable 5 mL pipettes (Baxter P4650-15)

7.2.13 Disposable 1.0 mL pipette (Baxter P4650-11X)

7.3 Chemicals:

7.3.1 Hexane, Burdick and Jackson, (Cat.No. 216-4)

7.3.2 Acetone, Burdick and Jackson, (Cat.No.010-4)

7.3.3 Toluene, Baker, (Cat.No. 9336-03)

7.3.4 Methylene Chloride, Burdick and Jackson, (Cat. No. 300-4)

7.4 Analytical Standard Solutions:

7.4.1 Aroclor Stock Standard Solutions

7.4.1.1 Polychlorinated Biphenyls - Neat commercial material for standard preparation. These materials are multi-component mixtures of PCB congeners and are the actual materials that were used in products such as electric power transformers and capacitors.

7.4.1.2 Stock standards are prepared from individual Aroclor formulations by weighing an exact amount of the neat material to the nearest 0.1 mg, and dissolving and diluting to volume in a 100 mL volumetric flask with hexane. See Attachment A, Table 1 for exact weights of each compound. For DCBP, dissolve neat formulation in 10 mL of toluene and then transfer to a 100 mL volumetric flask bringing to volume with hexane.

7.4.1.3 The stock standards are transferred into Boston bottles and stored in a refrigerator at 0-6°C, protected from light.

7.4.1.4 Stock PCB standards must be replaced after one year, or sooner if comparison with certified check standards indicate a problem. See 8.5.3 for limits.

7.4.1.5 For quality control and general labeling requirements refer to standard operating procedure NE050, Preparation of Standards.

7.4.2 Calibration Standards:

7.4.2.1 Calibration standards are prepared at five concentration levels using a prepared working standard. See Attachment A, Table 2 for the preparation and exact concentrations of the working standards. The following five standards make up the initial calibration curve standard set: 20 ng/mL, 100 ng/mL, 250 ng/mL, 500 ng/mL, 1000 ng/mL.

7.4.2.2 The two surrogates TCMX and DCBP are included in the A1254 calibration standards. The stock standard for TCMX is prepared by diluting 1 mL of TCMX solution (ULTRA, cat. #IST-440, at 2000 ug/mL) into a 100 mL volumetric flask resulting in a solution of TCMX at 20 PPM.

7.4.2.3 To prepare the working surrogate standard, pipet 5.0 mL of the 100ppm DCBP stock standard and 2.5 mL of the 20ppm TCMX stock standard into a 100 mL volumetric flask and bring to volume with hexane.
The final concentration of this solution will be 5.0ppm of DCBP and 0.5ppm of TCMX.

7.4.2.4 Refer to Attachment A, Table 4 for instructions on preparation of the calibration standards containing A1254 and the surrogates. Refer to Attachment A, Table 3 for instructions on preparing the remaining calibration standards.

7.4.2.5 Transfer all calibration standards to 8 dram vials and store in a refrigerator at 0-6°C, protected from light. Calibration standards must be replaced after six months, or sooner, if comparison with check standards indicates a problem. See 8.5.3 for limits.

7.4.3 Continuing Calibration Standards:

7.4.3.1 Continuing calibration check standards are prepared independently from calibration standards, by using an alternate source purchased from standard vendors. Refer to Attachment B, Tables 1-3 for instructions on preparation of these standards.

8.0 Procedure

8.1 Gas Chromatographic Operating Conditions

8.1.1 Establish the gas chromatograph (GC) operating parameters as follows:

Autosampler parameters: Multi-vial mode, ECD Attenuation and range are 1.

Refer to Attachment C for all other GC operating procedures.

Note: GC helium gas flow is optimized after instrument maintenance by adjusting nitrogen flow to elute a PCB calibration standard to a known retention time.

8.2 Data Acquisition:

8.2.1 Chromatographic information will be collected and processed utilizing a computer based data acquisition workstation (Waters Associates, Millennium_32 computer network based workstation) The GC workstation acquires the millivolt detector signal, performs an analog to digital conversion and stores the digital chromatogram on the computer network's disk. The chromatography software performs all data reduction including, long term data storage on magnetic media, chromatographic peak integration, all calculations, report generation, chromatogram plots, and calibration functions.

8.3 Initial GC Calibration:

8.3.1 GC calibration will be performed by the external calibration procedure. Prior to running samples the system must be calibrated and system performance must be verified.

8.3.2 Establish the gas chromatographic operating parameters outlined in Section 8.1 and prepare the calibration standards at the five concentrations outlined in Section 7.4.2.

8.3.3 Inject each calibration standard using the GC autosampler and the parameters outlined in section 8.1, which are those used for actual samples.

8.3.4 For each Aroclor, 5 peaks are selected to prepare calibration curves. The peaks selected from the multi-component Aroclor formulations were based on maximizing the separation for each Aroclor (i.e., minimizing peak overlap in retention time). Consideration was also given to selecting peaks that normally did not have problems with co-elution with interfering peaks or possible co-elution with organochlorine pesticides. The determined area of the five peaks selected for calibration is processed by the data workstation as a group, combining the area for calculations of the calibration factors. The following table lists the Aroclors that are included in the initial calibration and group number for calibration purpose.

Aroclor	Group Number
A1221	1
A1232	2
A1016	3
A1242	4
A1248	5
A1254	6
A1260	7

8.3.5 Attachment D is an example of chromatograms of standards of each Aroclor for a DB5-MS column with peaks selected for calibration labeled.

8.3.6 For the initial calibration curve to be considered valid, the percent relative standard deviation must be less than 20% over the working range. The calibration curve is used for quantification in every case and is not replaced with the average calibration factor. See attachment E for an example of response factors and the calculation of the percent relative standard deviation.

8.4 Retention Time Windows:

8.4.1 The GC system should be checked by the analyst to make sure it is functioning properly before establishing retention time windows. Make three injections of each Aroclor at a midlevel concentration throughout a minimum 72-hour time period.

8.4.2 For the 5 peaks selected for calibration of each Aroclor, calculate the standard deviation resulting from the variation in the three retention times for that peak.

8.4.3 The retention time window is defined as plus or minus three times the standard deviation of the three retention time determinations.

8.4.4 If the standard deviation of the selected peak is zero, the standard deviation of the peak eluting after it is used. If it is the last eluting peak that has zero for the standard deviation, then substitute the standard deviation of the peak eluting before the last peak.

8.4.5 Retention time windows established in section 8.4.3 to 8.4.4 may not be practical when samples containing matrix interferences are injected onto the GC column. The default R.T. Window of +/- 0.07 minutes is employed when the established windows are too narrow. Besides using retention time windows to assign peaks for quantification, the analyst should rely on their experience in pattern recognition of multi-response chromatographic response exhibited by PCB Aroclors.

8.4.6 Attachment F provides examples of calculated retention time windows generated by the above outlined procedures.

8.5 Gas Chromatographic Analysis:

8.5.1 Prior to conducting any analyses on samples, calibrate the system as specified in Section 8.3

8.5.2 To start an analytical sequence, the 500 ppb calibration standard is injected and analyzed for the seven Aroclors that the system is calibrated for, if more than 24-hours has elapsed since the last valid continuing calibration check standard. If less than 24-hours has elapsed since the last valid continuing calibration check standard, select one 500 ppb continuing calibration check standard. Selection of the continuing calibration check standard should be based on anticipated Aroclor contamination that the samples may exhibit. Selection of the continuing calibration check standard should also be alternated among the seven Aroclors.

8.5.3 The calculated value for the continuing calibration check standard must be $\pm$15% for it to be valid and analysis to proceed. If this criterion is exceeded, the analyst should inspect the system to determine the cause and perform maintenance as necessary. The system can then be recalibrated and sample analysis can proceed. Note that all samples which are not bracketed by valid check standards must be re-analyzed when the system is in-control.

8.5.4 The daily retention time windows must be established. Use the retention time for the selected 5 peaks of the continuing calibration check standard as the midpoint of the window for that day. If all seven Aroclors were analyzed as the initial continuing calibration check standard, then establish retention time windows using the retention time plus or minus the windows established in Section 8.4. If only one Aroclor was analyzed as the continuing calibration check standard (i.e., less than 24-hours had elapsed), use the retention time from this standard as the midpoint plus or minus the windows established in Section 8.4. to establish the daily retention time windows. For the remaining six Aroclors, go back to the previous time all seven Aroclors were analyzed as the initial calibration check standards and use those retention times plus or minus the windows established in Section 8.4 to develop daily retention time windows.

8.5.6 All succeeding continuing calibration check standards analyzed during an analysis sequence must also have a percent difference of 15% or less when compared to the initial calibration generated from the 5 point calibration curve.

8.5.7 All succeeding standards in an analysis sequence should exhibit retention times that fall within the daily retention time window established by the first continuing calibration check standard(s) of that analytical sequence. If the retention times are outside the established windows instrument maintenance must be performed and recalibration may be required.

8.5.8.1 The following is the order that initial calibration standards, continuing calibration check standards, method blanks, QC samples, and samples are placed in an analytical sequence. A continuing calibration check standard is run every tenth injection in the

analytical sequence. All analytical sequences must end with a continuing calibration check standard regardless of the number of samples analyzed.

ANALYTICAL SEQUENCE

INJECTION	MATERIAL INJECTED
1	Hexane Blank
2-36	Initial Calibration Standards
37-43	Continuing Calibration Check Standard
44-52	Samples analyses, including method blanks, matrix spikes, matrix duplicates, matrix spike duplicates, and QC reference check standard. A maximum of 9 samples between continuing calibration check standards.
53	Continuing calibration check standard
54 and higher	repeat inject. 44-53 sequence

8.6 Quality Control:

8.6.1 This section outlines the necessary quality control samples that need to be instituted at the time of sample extraction. The data from these quality control samples is maintained to document the quality of the data generated.

8.6.2 Each analyst must demonstrate competence in accuracy and precision on quality control samples before beginning analysis on samples. This demonstration must be on-going and be repeated if there is any modification to the method.

8.6.3 With each batch of samples to be extracted a method blank is processed. The method blank is carried through all stages of sample preparation and measurement steps. For water samples organic-free reagent water blank is processed. For soil, sediment, and solid waste samples, a laboratory sodium sulfate blank is processed. For fish and other biota samples, a sodium sulfate blank is processed. For oil samples, a PCB-free blank control oil is processed. For Air Cassette samples a pre-cleaned PUF and PUF filter are extracted for the method blank.

8.6.4 The method blank must exhibit PCB levels less than the matrix defined practical quantification limit (PQL). If the method blank exhibits PCB contamination above the reportable PQL, the samples associated with the contaminated blank should be re-extracted and analysis repeated. If there is no original sample available for re-extraction, then the results should be flagged with a "B" indicating blank contamination. The value

measured in the blank is reported for those samples associated with the particular blank out of criteria.

8.6.5 A matrix spike is to be analyzed at a rate of 1 matrix spike per every 20 samples. Also a matrix spike duplicate or duplicate sample is to be analyzed at a rate of 1 per every 20 samples. Duplicate samples may be appropriate in place of matrix spike duplicates, for soil and waste samples, where detectable amounts of organics are present.

8.6.6 Analyze one unspiked and one spiked sample. Calculate the percent recovery based on Aroclor concentration of both samples as follows:
A = concentration of spiked sample
B = concentration of unspiked sample (background)
T = known true value of the spike
Percent Recovery (p) = 100 (A-B) %/T

Compare the percent recovery calculated with the lab established limits or the default limits of 70-130% if lab limits are not available. If the concentrations of the matrix spikes are *greater* than five times the calculated sample amount then the quality control limits should be applied. If the concentrations of the matrix spikes are *less* than five times the sample than there are no established limits applicable. If the percent recovery falls outside the acceptance range for the given Aroclor used as the spiking analyte, then the matrix spike recovery failed the acceptance criteria. Inform quality control manager and document matrix spike recoveries.

A relative percent difference (RPD) must also be calculated on the matrix spike set recoveries. This is calculated as follows:

A = % recovery of matrix spike sample
B = % recovery of matrix spike duplicate sample

RPD = [(A-B)/{(A+B)/2}] x 100
where (A-B) *is taken as an absolute value*

If the concentrations of the matrix spike set are *greater* Than five times the calculated PQL then an RPD of twenty percent or less is acceptable. If the concentrations of the matrix spike set are *less* than five times the PQL than there are no established limits applicable to the RPD.

8.6.7 A QC reference check standard (laboratory control spike sample) is also prepared and analyzed. Spike one liter of laboratory organic free water, extract, and analyze. Calculate the percent recovery for the Aroclor spike and compare to the lab established limits or the default limits of 70-130% if lab limits are not available. If the percent recovery for the QC reference check standard (laboratory control spike sample) is out of criteria, the analysis is out of the control for

that analyte and the problem should be immediately corrected. The entire batch of samples will need to be re-extracted and re-run.

8.6.8 Method accuracy, based on matrix spike data, is maintained by the laboratory as part of the QC program. For each sample matrix, upper and lower warning and control limits for method performance are established.

8.6.9 Surrogate compounds are added to each sample, matrix spike, matrix spike duplicates, duplicate, method blank, and QC reference check standard (laboratory control spike sample) at time of extraction. Surrogate compounds chosen for this method are tetra-chloro-meta-xylene (TCMX) and decachlorobiphenyl (DCB). The following are typical surrogate amounts added to normal encountered matrices. These amounts may be adjusted by the analyst, if PCB background levels are high and surrogates are being diluted out of analysis range.

Water: 1.0 mL of 0.05ppm TCMX/0.5ppm DCB
Soil & Sediment: 0.5 mL of 0.5ppm TCMX/5.0ppm DCB
Oil: 0.5 mL of 0.5ppm TCMX/5.0ppm DCB
Wipes: 0.5 mL of 0.5ppm TCMX/5.0ppm DCB
PUF cassettes: 0.5 mL of 0.5ppm TCMX/5.0ppm DCB

8.6.10 Surrogate percent recovery data for each matrix is tabulated as part of the on-going laboratory QC program. The standard deviation is calculated once enough surrogate data is available for each matrix, typically based on 25 to 30 samples. Upper and lower warning limits ($p \pm 2SD$) and upper and lower control limits ($p \pm 3SD$) are established.

8.6.11 Only one surrogate analyte needs to meet established control limits for the analysis to be valid. The data is compared to the lab established limits or the default limits of 70-130% if lab limits are not available. If percent surrogate recovery is not within limits for either surrogate, the following steps are required:

8.6.11.1 Review calculations that were used to generate surrogate percent recovery values to make certain there are no errors.

8.6.11.2 Check by GC analysis surrogate solutions used during sample extraction steps to ensure that no problems exist with spiking solutions.

8.6.11.3 Re-analyze the extracts that did not meet control limits, either at the previously analyzed dilution or at a more dilute level to assess if the sample matrix interfered with surrogate measurement.

8.6.11.4 If the above steps do not give satisfactory results, re-extract and re-analyze the sample. Report this data if surrogate recovery is within limits. If surrogate percent recovery is out of limits for the re-extracted samples, low or high surrogate recovery is due to matrix affects and the data can be reported as estimated and the data user is notified in the form of a case narrative.

8.6.12 PCB Aroclor Qualitative Identification and Secondary GC Column Confirmation:

Positive identification of PCB Aroclors is based on comparison of retention time of the five selected quantitation peaks and major non-quantitation peaks for the unknown sample with retention time of reference standards (continuing calibration verification standards). Additionally pattern recognition is used for comparison of unknown samples with reference standards for positive identification. Confirmation of Aroclor presence by secondary GC column analysis may be necessary for highly altered/degraded PCB patterns or for programs including PCB air monitoring, US-EPA CLP protocol and other projects as specified in the site sampling and analysis quality assurance plan.

8.6.12.1 Dual Column/Confirmatory Column Analysis by GC:

Inject samples under same operating conditions and analytical run QA/QC parameters as described in section 8.5. on a secondary GC column of dissimilar phase (e.g DB-1 and DB-5). Note: If using dual injection dual GC column system samples are injected simultaneously onto both columns. Analyze and report concentration results.

8.6.12.2 Dual Column/Confirmatory column analysis data reporting

Report concentration results to client based on project specific protocols.

Possible Protocols:

i) Report highest concentration of the two column analysis with note that analysis was confirmed (C- qualifier).

ii) Report all results from lab-designated primary GC column with note that analysis was confirmed (C -qualifier).

iii) Report both concentration results (as per US-EPA CLP program requirement)

8.6.12.3 Dual Column/Confirmatory column RPD % requirement

Calculate the relative percent difference (RPD%) of the 2 GC column results. For EPA Method 8082 protocol the RPD should be less than 40 %. If the RPD exceeds 40 % and both concentration results are greater than the practical quantitation limit inspect chromatograms for possible co-eluting interference. Re-inject samples if injection problem is indicated. Report data with flag (P-qualifier) and case narrative describing the RPD excursion.

9.0 References

9.1 U.S. EPA SW-846 "Test Methods for Evaluating Solid Waste; Volume 1B Laboratory Manual Physical/Chemical Methods", Office of Solid Waste and Emergency Response, Third Edition, Final Update, December 1996.

9.2 U.S. EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants", July 1988.

9.3 Standard Methods for the Examination of Water and Waste Water, 18th Edition 1992, American Public Health Association, American Water Works Association, Water Pollution Control Federation.

9.4 New York State Department of Health, "Environmental Laboratory Approval Program Certification Manual", Wadsworth Center for laboratories and Research, 1988, updated 1998.

9.5 "Guide to Environmental Analytical Methods", fourth edition, Genium Publishing Corporation, 1998.

10.0 Attachments

10.1 Attachment A: PCB Standards Preparation Tables

10.2 Attachment B: PCB Continuing Calibration Tables

10.3 Attachment C: GC Operating Procedures

10.4 Attachment D: Chromatograms of PCB standards.

10.5 Attachment E: Response Factor Calculation.

10.6 Attachment F: Retention Time Windows

11.0 Glossary

Accuracy: Accuracy means the nearness of a result or the mean (±) of a set of results to the true value. Accuracy is assessed by analysis of reference samples and percent recoveries.

Analytical Batch: The basic unit for analytical quality control is the analytical batch. The analytical batch is defined as samples which are analyzed together whereas the sample method sequence, the reagent lots, and manipulations are common to each sample within the same time period or in continuous sequential time periods. Samples in each batch should be of similar composition (e.g. ground water, sludge, ash, etc.).

Aroclor: Polychlorinated biphenyls (PCBs) were commercially produced for a variety of uses

including, transformers, capacitors, inks, paints, dedusting agents, and pesticides to list several. Monsanto Corporation was a major producer and sold PCBs under the trade name Aroclor.

Blank: A blank is an artificial sample designed to monitor the introduction of artifacts into the process. For aqueous samples, reagent water is used as a blank matrix, however, a universal blank matrix does not exist for solid samples so sodium sulfate is used as a blank matrix. The blank is taken through the appropriate steps of the process. A reagent blank is an aliquot of analyte-free water or solvent analyzed with the analytical batch. Field blanks are aliquots of analyte-free water or solvents brought to the field in sealed containers and transported back to the laboratory with the sample containers. Trip blanks and equipment blanks are two specific types of field blanks. Trip blanks are not opened in the field. They are a check on sample contamination originating from sample transport, shipping and from site conditions. Equipment blanks are opened in the field and the contents are poured appropriately over or through the sample collection device, collected in a sample container, returned to the laboratory as a sample. Equipment blanks are a check on sampling device cleanliness.

Calibration Check Standard: Standard used to determine the state of calibration of an instrument between periodic recalibration. A calibration check is done by analyzing for analyte standards in an appropriate solvent. Calibration check solutions are made from a stock solution which is different from the stock used to prepare standards.

CAS Number: An assigned number used to identify a chemical. CAS stands for Chemical Abstracts Service, an organization that indexes information published in Chemical Abstracts by the American Chemical Society and that provides index guides by which information about particular substances may be located in the abstracts. Sequentially assigned CAS numbers identify specific chemicals, except when followed by an asterisk (*) which signifies a compound (often naturally occurring) of variable composition. The numbers have no chemical significance. The CAS number is a concise, unique means of material identification. (Chemical Abstracts Service, Division of American Chemical Society, Box 3012, Columbus, OH 43210:[614] 447-3600.)

Laboratory Control Spike: A blank which has been spiked with the analyte(s) from an independent source in order to monitor the execution of the analytical method is called a check sample. The level of the spike shall be at the regulatory action level when applicable. Otherwise, the spike shall be at 5 times the estimate of the quantification limit. The matrix used shall be phase matched with the samples and well characterized: for example, reagent grade water is appropriate for an aqueous sample.

Duplicate: A second aliquot of a sample that is treated the same as the original sample in order to determine the precision of the method.

Environmental Sample: An environmental sample or field sample is a representative sample of any material (aqueous, nonaqueous, or multimedia) collected from any source for which determination of composition or contamination as requested or required. Environmental samples are normally classified as follows:

Drinking Water--delivered (treated or untreated) water designated as potable water;
Water/Wastewater--raw source waters for public drinking water supplies, ground waters, municipal influents/effluents, and industrial influents/effluent;
Sludge--municipal sludges and industrial sludges;
Waste--aqueous and nonaqueous liquid wastes, chemical solids, contaminated soils, and industrial liquid and solid wastes.

Initial Calibration: Analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the analytical detector or method.

Instrument Calibration: Analysis of analytical standards for a series of different specified concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument to target analytes.

Matrix: The predominant material of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid).

Matrix Spike: Aliquot of a sample (water or soil) fortified (spiked) with known quantities of specific compounds and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery.

Matrix Spike Duplicate: A second aliquot of the same matrix as the matrix spike (above) that is spiked in order to determine the precision of the method.

Method Blank: An analytical control consisting of all reagents, internal standards and surrogate standards, which is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination.

MSDS: Material safety data sheet. OSHA has established guidelines for the descriptive data that should be concisely provided on a data sheet to serve as the basis for written hazard communication programs. The thrust of the law is to have those who make, distribute, and use hazardous materials responsible for effective communication. See the Hazard Communication Rule, 29 CFR, Part 1910, 1200, as amended, Sec. g. See Schedule I, Sec. 12, of the Canadian Hazardous Products Act.

PCB: Polychlorinated biphenyls (PCBs) are a class of 209 individual chemical compounds (congeners), in which one to ten chlorine atoms are attached to biphenyl. Use of PCBs has made them a frequent environmental pollutant.

Precision: Precision is the agreement between a set of replicate measurements without assumption of knowledge of the true value. Precision is assessed by means of duplicate/replicate sample analysis.

Quality Control: Set of measures within a sample analysis methodology to assure that the

process is in control.

Standard Curve: A standard curve is a curve which plots concentrations of known analyte standards versus the instrument response to the analyte. Calibration standards are prepared by diluting the stock analyte solution in graduated amounts which cover the expected range of the samples being analyzed. Standards should be prepared at the frequency specified in the appropriate section. The calibration standards must be prepared using the same type of acid or solvent and at the same concentration as will result in the samples following sample preparation. This is applicable to organic and inorganic chemical analyses.

Stock Solution: Standard solution which can be diluted to derive other standards.

Surrogate: Surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all blanks, calibration and check standards, samples (including duplicates and QC reference samples) and spiked samples prior to analysis. Percent recoveries are calculated for each surrogate.

Surrogate Standard: A pure compound added to a sample in the laboratory just before processing sc that the overall efficiency of
a method can be determined.

Table 1
PCB Stock Standard Preparation Table

PCB Formulation	Supplier	Catalog #	Std. weight(mg)	Conc.(PPM)
A1016	GE Archive	NA	93.2	932.0
A1221	GE Archive	NA	106.8	1068.0
A1232	GE Archive	NA	103.3	1033.0
A1242	GE Archive	NA	99.0	990.0
A1248	GE Archive	NA	101.9	1019.0
A1254	GE Archive	NA	99.6	996.0
A1260	GE Archive	NA	99.2	992.0
DCBP	Chem Service	F2170	10	100.0

Unless otherwise noted hexane is the solution used to make all dilutions.

Table 2
PCB Working Standard Preparation Table

PCB Stock Standards	Init. Volume(mL)	Final Volume(mL)	Conc.(PPM)
A1016	1.0	100	9.32
A1221	1.0	100	10.68
A1232	1.0	100	10.33
A1242	1.0	100	9.90
A1248	1.0	100	10.19
A1254	1.0	100	9.96
A1260	1.0	100	9.92

Table 3
PCB Calibration Standard Preparation Table

Init. Volume(mL)	Final Volume(mL)	Final Concentration (PPM)					
		A1016	A1221	A1232	A1242	A1248	A1260
5.0	50	0.932	1.068	1.033	0.990	1.019	0.992
2.5	50	0.466	0.534	0.5165	0.495	0.5095	0.496
1.25	50	0.233	0.267	0.25825	0.2475	0.2548	0.248
1.00	50	0.1864	0.2136	0.2066	0.198	0.2038	0.1984
0.500	50	0.0932	0.1068	0.1033	0.0990	0.1019	0.0992
5.0*	50	0.01864	0.02136	0.02066	0.0198	0.02038	0.01984

*This initial volume is of the nominal 0.200 ppm standard. All others are from the nominal 10 ppm standard.

Table 4
PCB A1254 Calibration Standard Preparation Table

Init. Volume(mL) A1254	Init. Volume(mL) Surrogate	Final Volume(mL)	Final Concentration(PPM)		
			A1254	TCMX	DCBP
5.0	0	50	0.996	0	0
10.0	4.0	100	0.996	0.020	0.200
25.0*	0	50	0.498	0.010	0.100
1.25	0.800	50	0.249	0.008	0.080
0.500	0.500	50	0.0996	0.005	0.050
0.100**	0.200	50	0.01992	0.002	0.020

*This initial volume is of the A1254 0.996 ppm solution with surrogates.
**This initial volume is of the A1254 9.96 ppm solution without surrogates.
All others are from the A1254 9.96ppm working standard.

Table 1
PCB Continuing Calibration Stock Standards

PCB	Supplier	Catalog #	Conc. (ug/mL)
A1016	Chem Service	F107AS	1000
A1221	Chem Service	F108AS	1000
A1232	Chem Service	F113AS	1000
A1242	Chem Service	F109AS	1000
A1248	Chem Service	F110AS	1000
A1254	Chem Service	F111AS	1000
A1260	Chem Service	F112BS	1000

Table 2
PCB Continuing Calibration Working Standards

PCB	Initial Volume(mL)	Final Volume(mL)	Concentration(PPM)
A1016	1.0	100	10
A1221	1.0	100	10
A1232	1.0	100	10
A1242	1.0	100	10
A1248	1.0	100	10
A1254	1.0	100	10
A1260	1.0	100	10

Table 3
PCB Continuing Calibration Standards

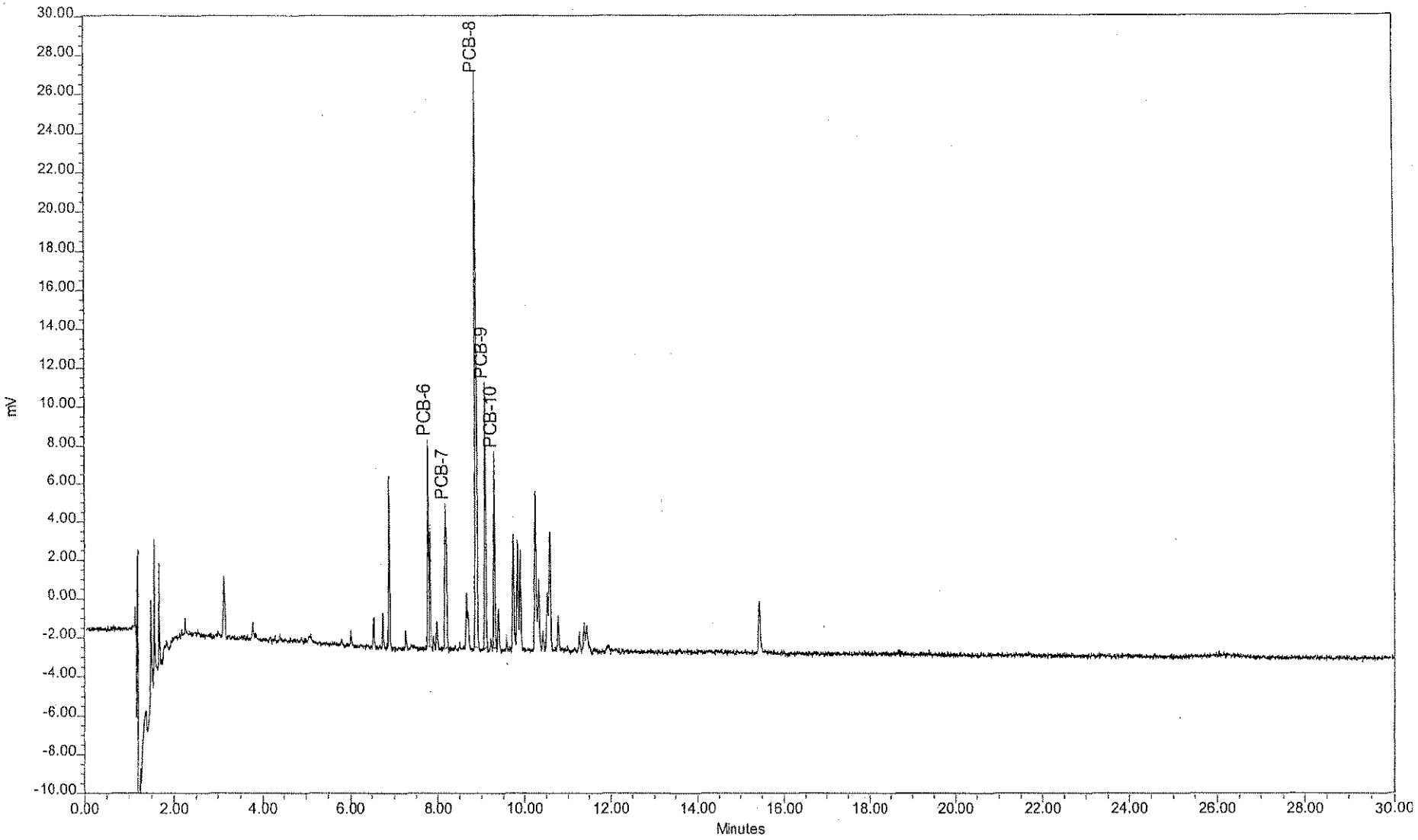
PCB	Initial Volume(mL)	Final Volume(mL)	Concentration (PPM)
A1016	2.5	50	0.500
A1221	2.5	50	0.500
A1232	2.5	50	0.500
A1242	2.5	50	0.500
A1248	2.5	50	0.500
A1254	2.5	50	0.500
A1260	2.5	50	0.500

Column Type	Capillary	Capillary
Column ID	DB5-MS	DB-1
Vendor	J&W	J&W
Part Number	122-5532	122-1032
Column Length(m)	30	30
ID(mm)	0.25	0.25
Film Thick.(um)	0.25	0.25
1)Initial Col. Temp. (°C)	140	140
1)Col. Hold Time (min.)	1.0	1.0
1)Col. Temp. Rate (°C/min.)	10	10
1)Final Col. Temp. (°C)	200	200
1)Col. Hold Time (min.)	NA	NA
2)Col. Temp. Rate (°C/min.)	5	5
2)Final Col. Temp. (°C)	245	245
2)Col. Hold Time (min.)	14.50	14.50
GC Col. gas flow rate (mL/min.)	17-24	17-24
ECD autozero	Yes	Yes
Detector Temp.(°C)	300	300
Init. Injector Temp. (°C)	300	300
A/S Vial Needle Depth	85	85
A/S Solvent Select	3	3
A/S Upper Air Gap	Yes	Yes
A/S Lower Air Gap	Yes	Yes
A/S Viscosity Factor	4	1
A/S Hot Needle Time (min.)	0.05	0.05

Autosampler(A/S) Model Number	8100	8100
A/S Injection Volume (uL)	1.3	1.3
A/S Injection Time (min.)	0.01	0.01
A/S Injection Rate (uL/sec.)	Fast 4.0	Fast 4.0
A/S Solvent Inj. plug size (uL)	0.2	0.2

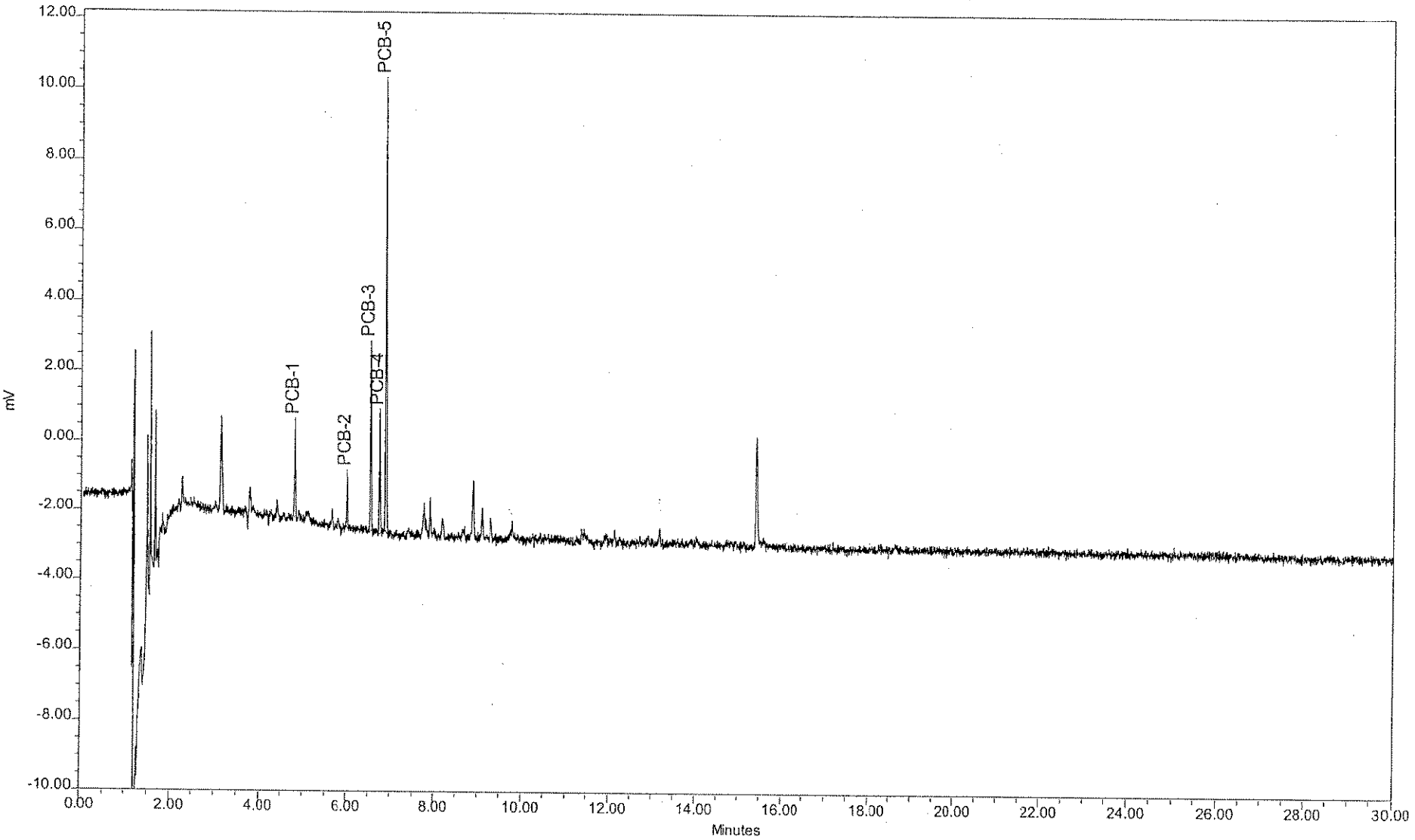
ATTACHMENT D
DB5-MS Chromatograms

Chromatogram Report, PCB by SW846 Method 8082
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS160818	Sample Amount:	1
Sample ID:	A1016 500 PPB	Dilution:	1
Date Acquired:	08/18/1999 10:21:00	Processing Method:	GC5_8082_081399

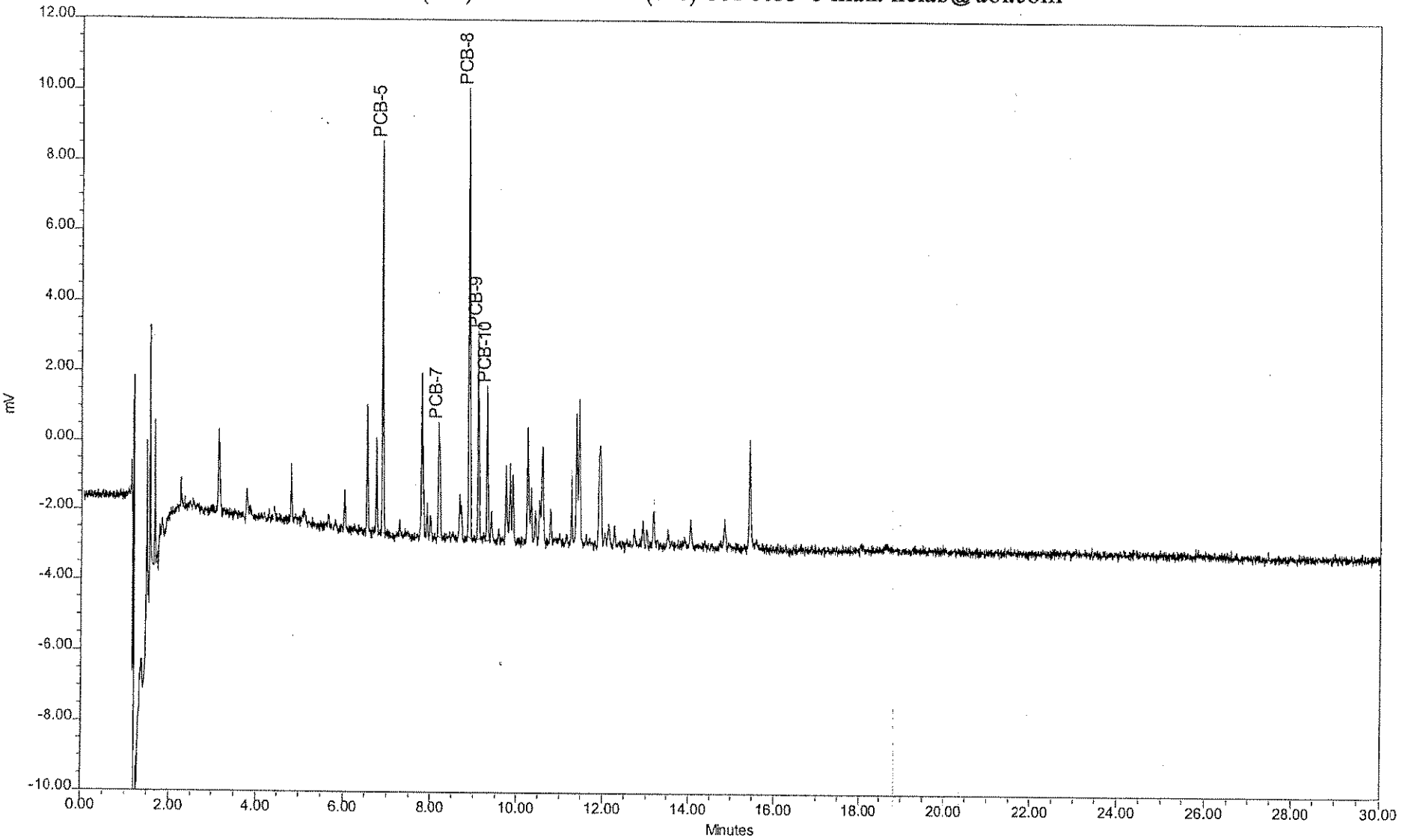
Chromatogram Report, PCB by SW846 Method 8082
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name: CS210818
Sample ID: A1221 500 PPB
Date Acquired: 08/18/1999 10:56:10

Sample Amount: 1
Dilution: 1
Processing Method: GC5_8082_081399

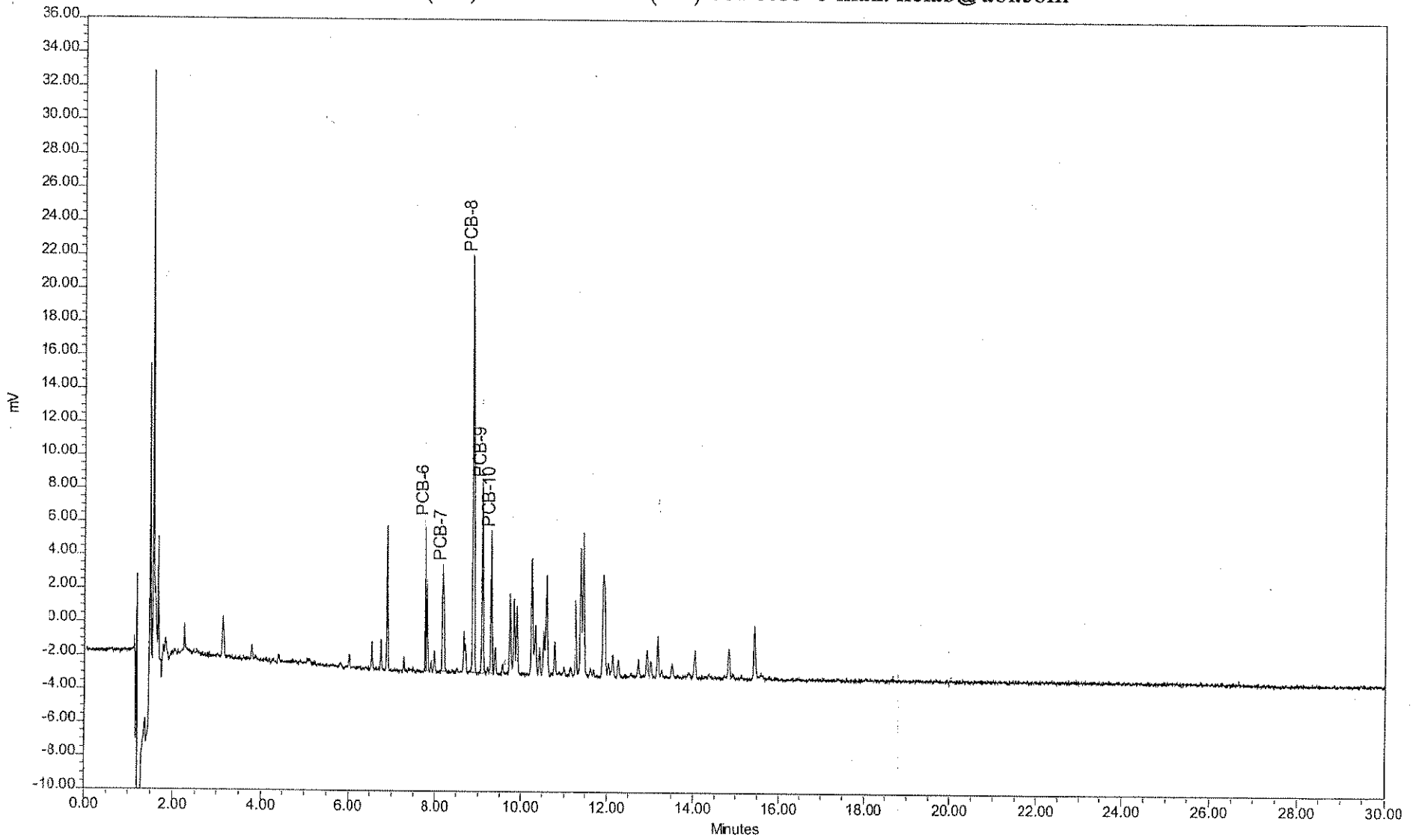
Chromatogram Report, PCB by SW846 Method 8082
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS320818	Sample Amount:	1
Sample ID:	A1232 500 PPB	Dilution:	1
Date Acquired:	08/18/1999 11:31:22	Processing Method:	GC5_8082_081399

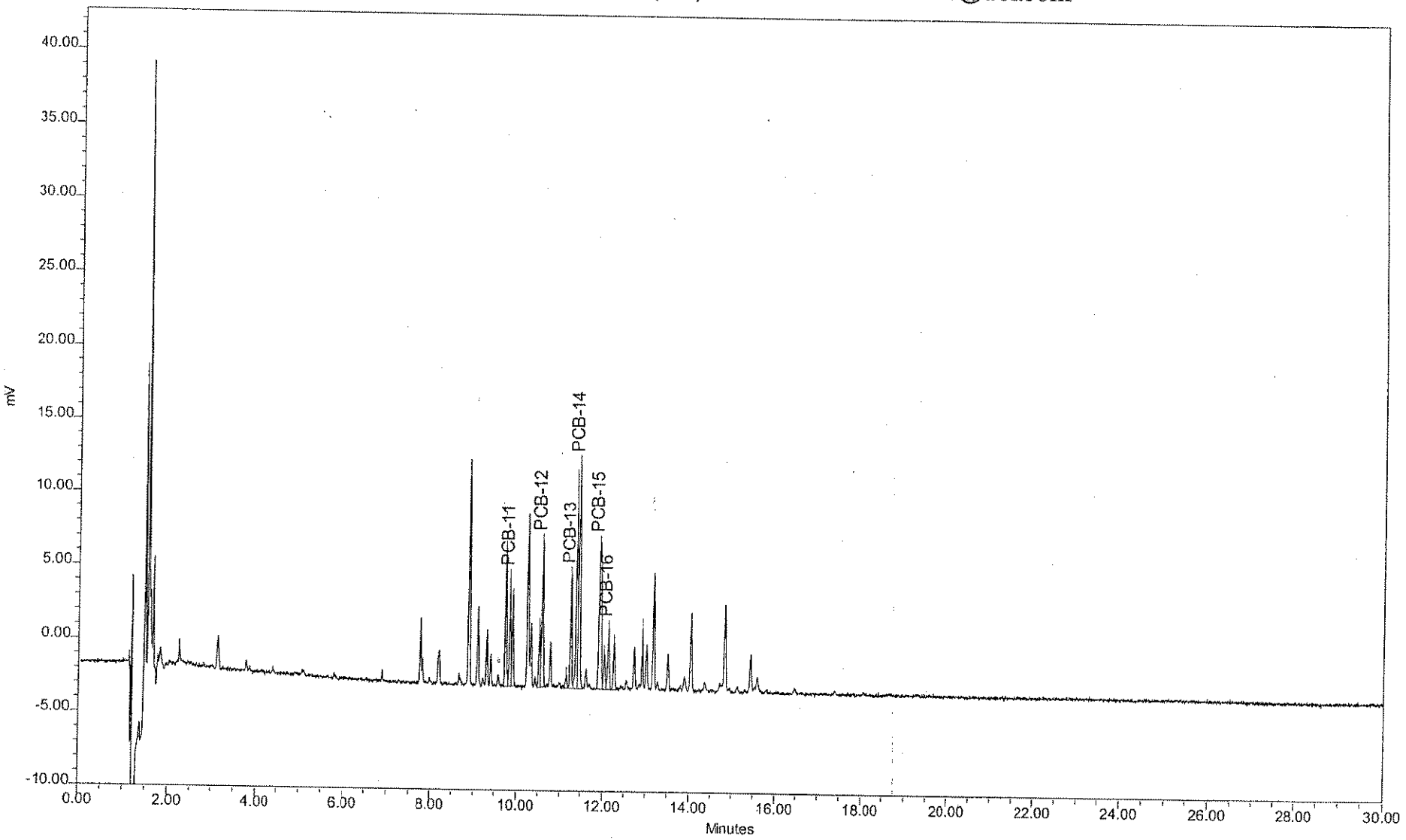
Chromatogram Report, PCB by SW846 Method 8082

Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS420818	Sample Amount:	1
Sample ID:	A1242 500 PPB	Dilution:	1
Date Acquired:	08/18/1999 12:06:31	Processing Method:	GC5_8082_081399

Chromatogram Report, PCB by SW846 Method 8082
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com

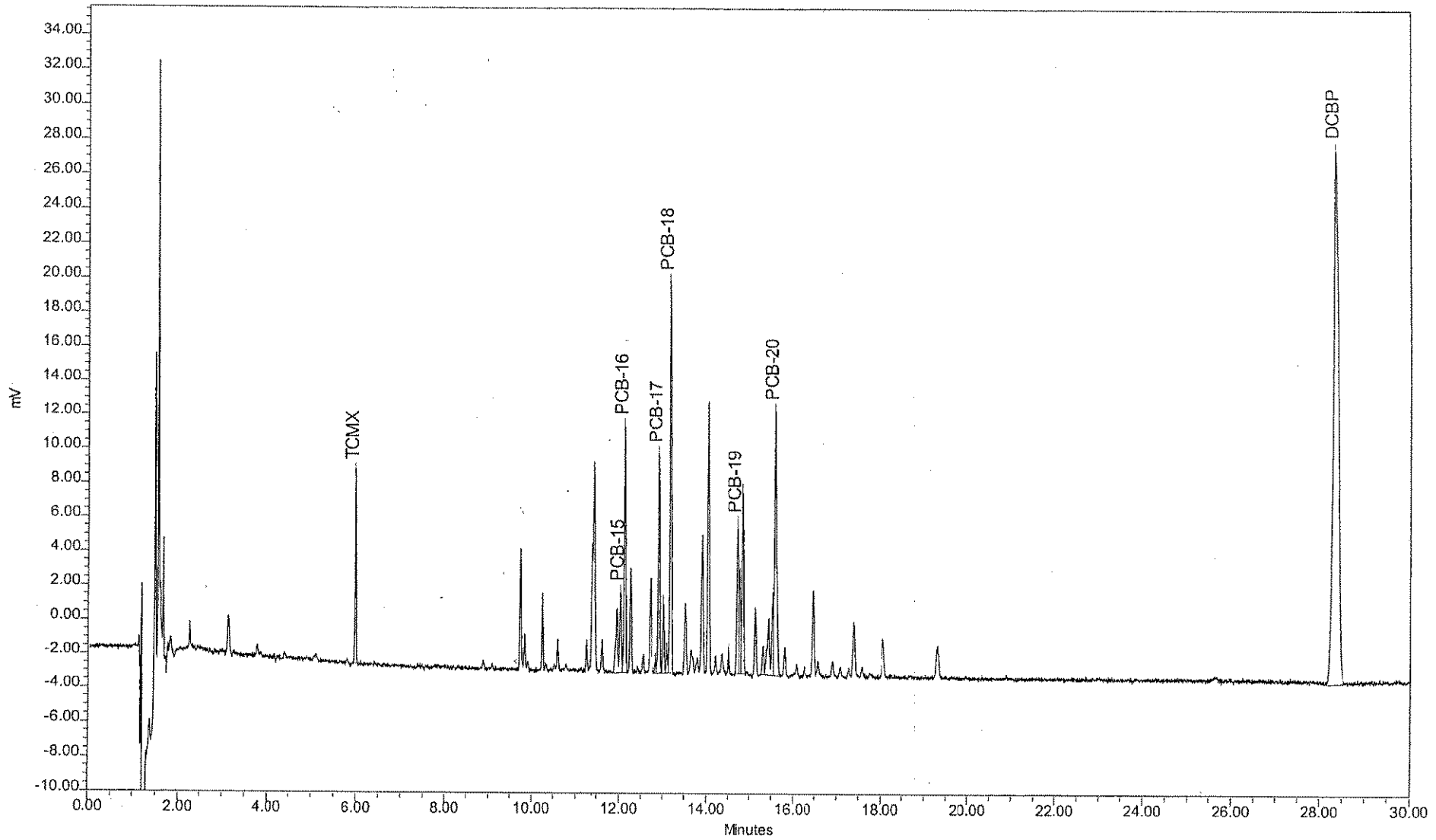


Sample Name: CS480818
Sample ID: A1248 500 PPB
Date Acquired: 08/18/1999 12:41:43

Sample Amount: 1
Dilution: 1
Processing Method: GC5_8082_081399

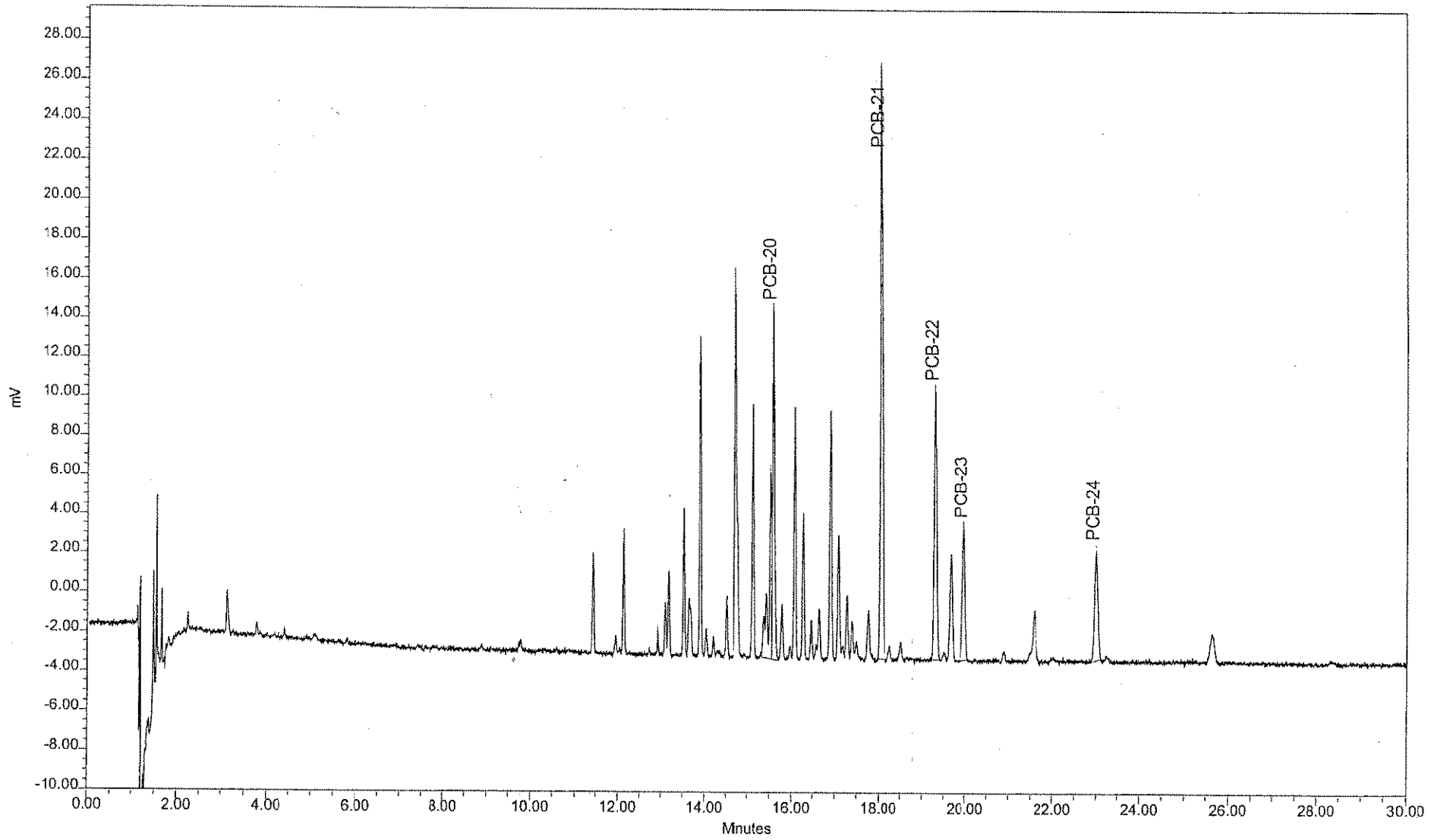
Chromatogram Report, PCB by SW846 Method 8082

Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS540818	Sample Amount:	1
Sample ID:	A1254 500 PPB	Dilution:	1
Date Acquired:	08/18/1999 1:16:54	Processing Method:	GC5_8082_081399

Chromatogram Report, PCB by SW846 Method 8082
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com

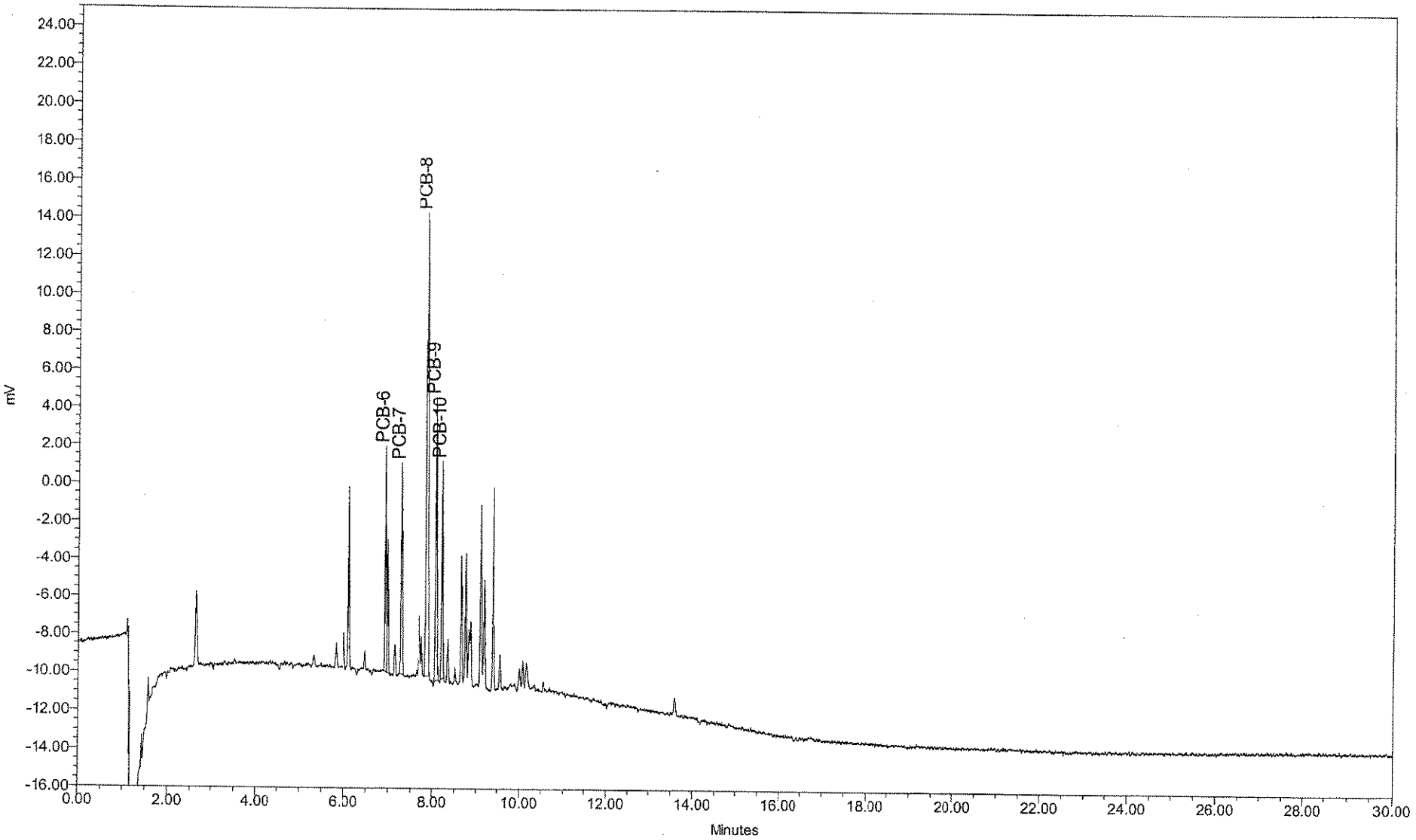


Sample Name:	CS600818	Sample Amount:	1
Sample ID:	A1260 500 PPB	Dilution:	1
Date Acquired:	08/18/1999 1:52:08	Processing Method:	GC5_8082_081399

ATTACHMENT D
DB-1 Chromatograms

Chromatogram Report, PCB by SW846 Method 8082

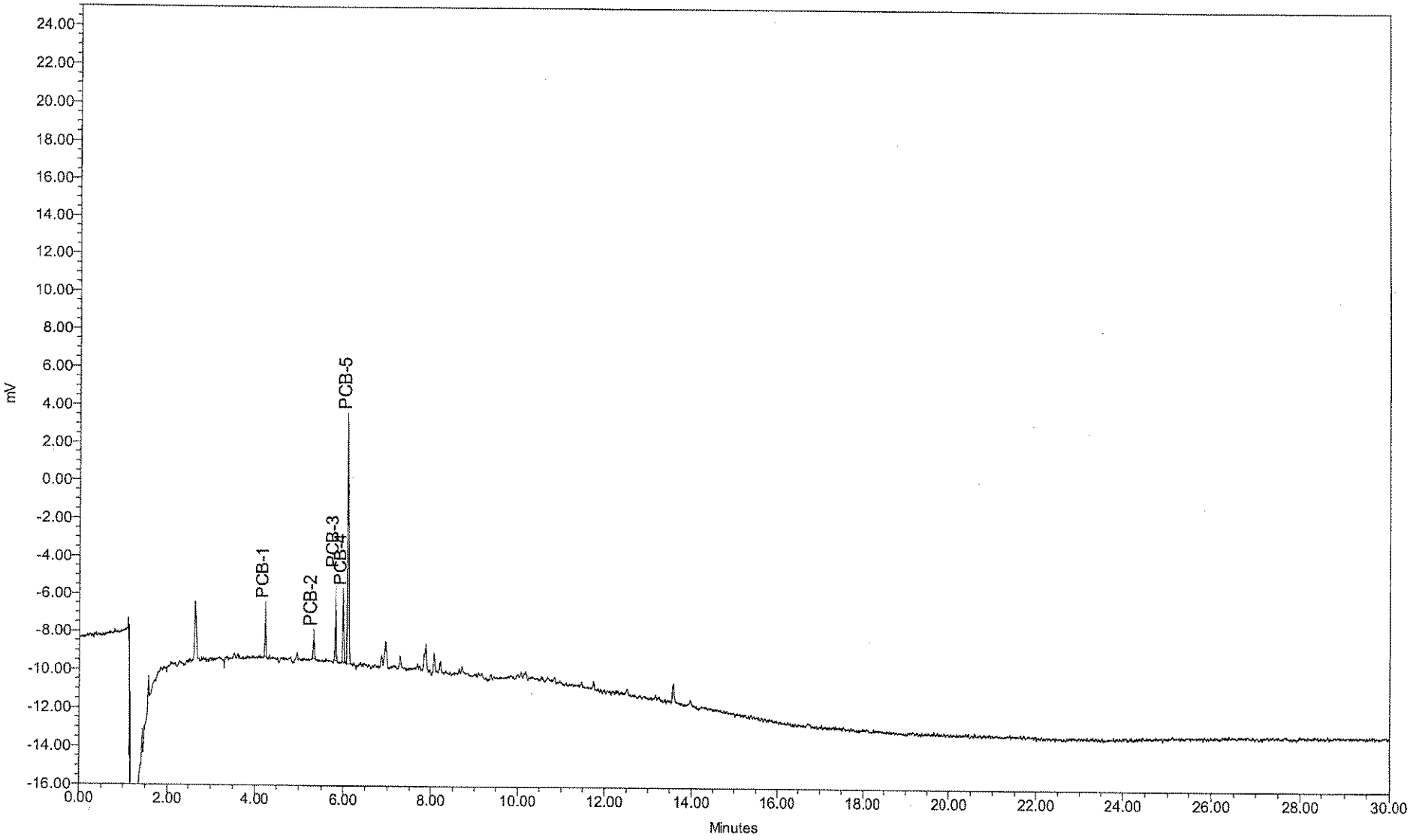
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS160725	Sample Amount:	1
Sample ID:	A1016 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 09:32:16	Processing Method:	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

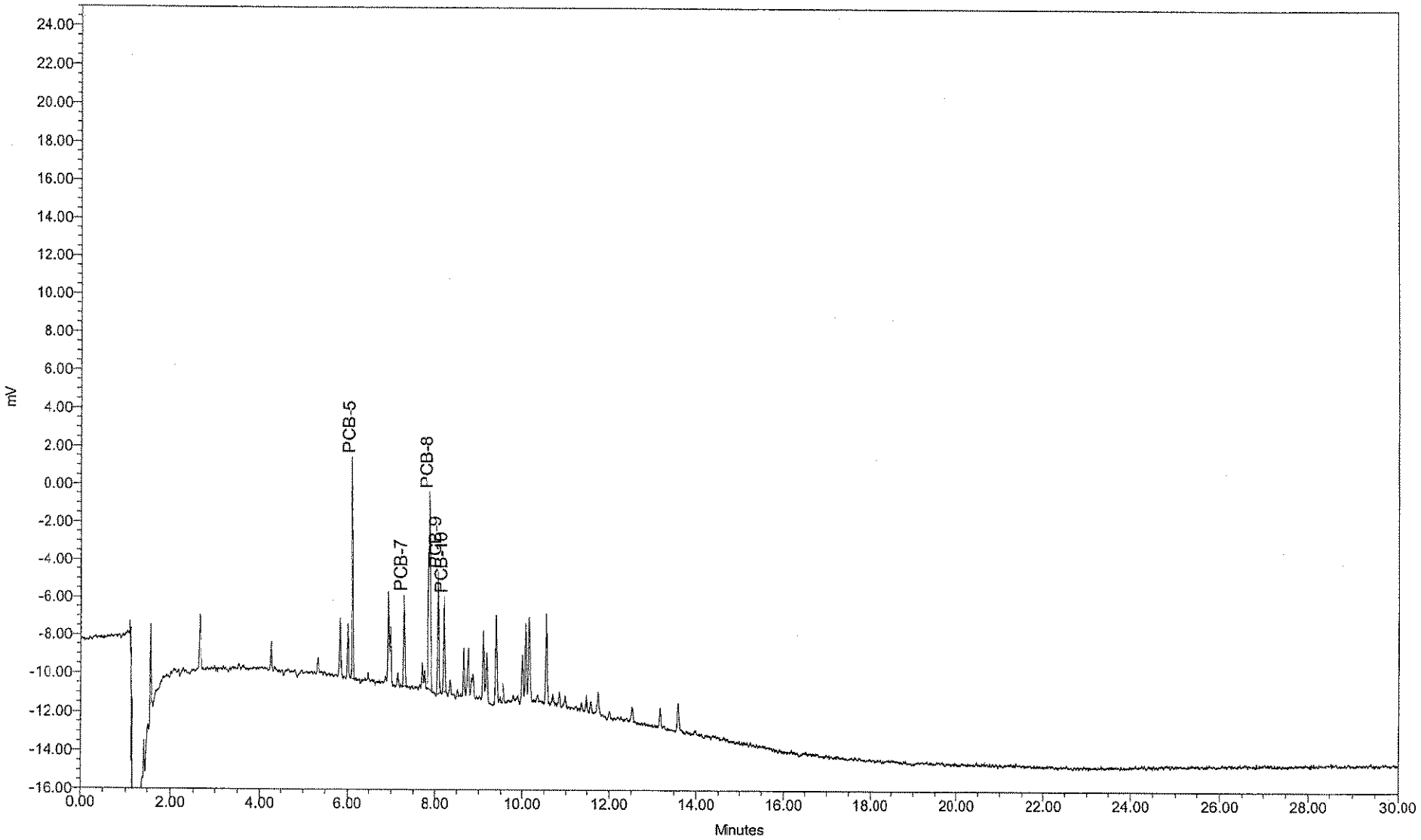
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS210725	Sample Amount:	1
Sample ID:	A1221 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 10:08:26	Processing Method:	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

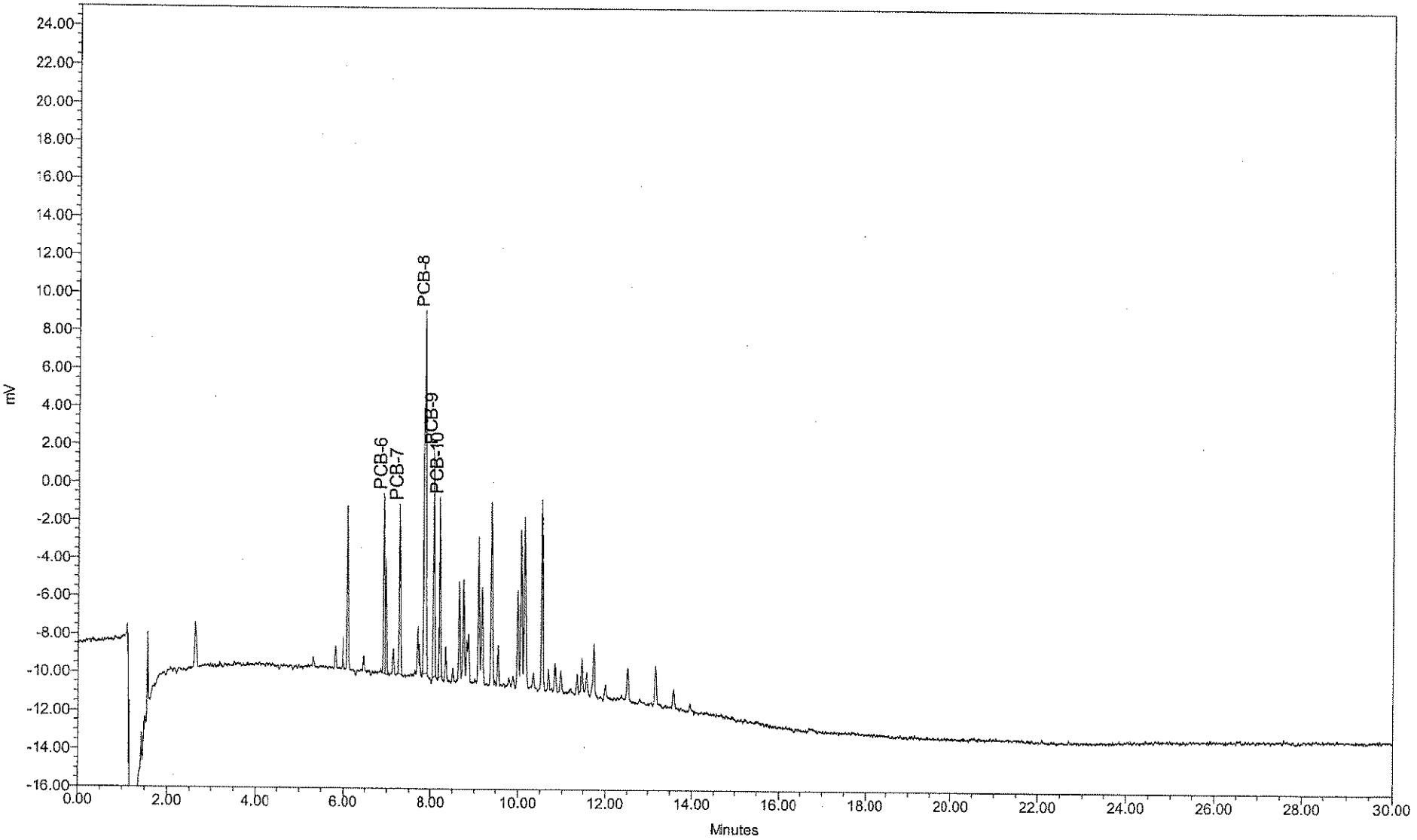
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS320725	**Sample Amount:**	1
Sample ID:	A1232 500 PPB	**Dilution:**	1
Date Acquired:	07/26/1999 11:09:59	**Processing Method:**	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

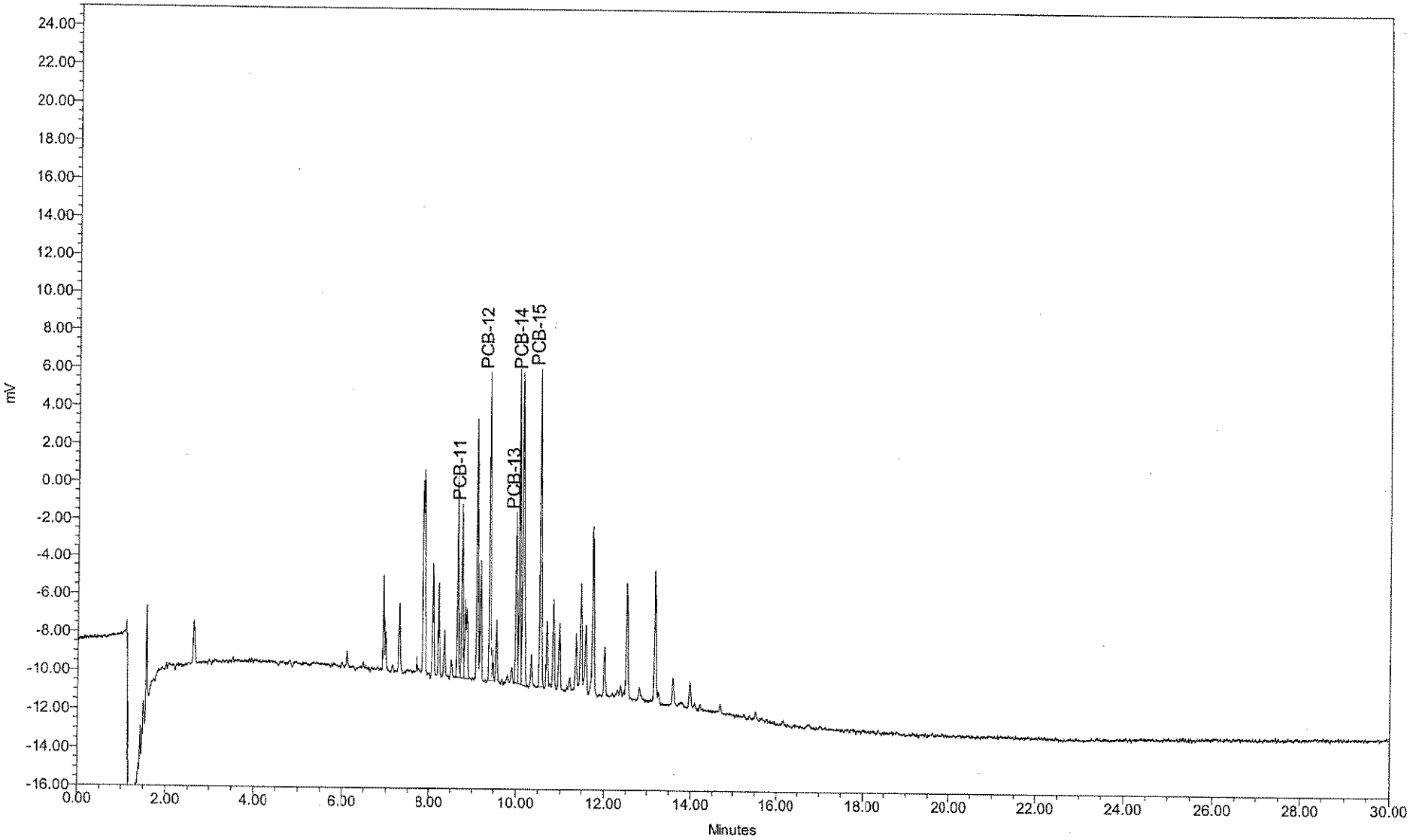
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS420725	Sample Amount:	1
Sample ID:	A1242 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 11:46:07	Processing Method:	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

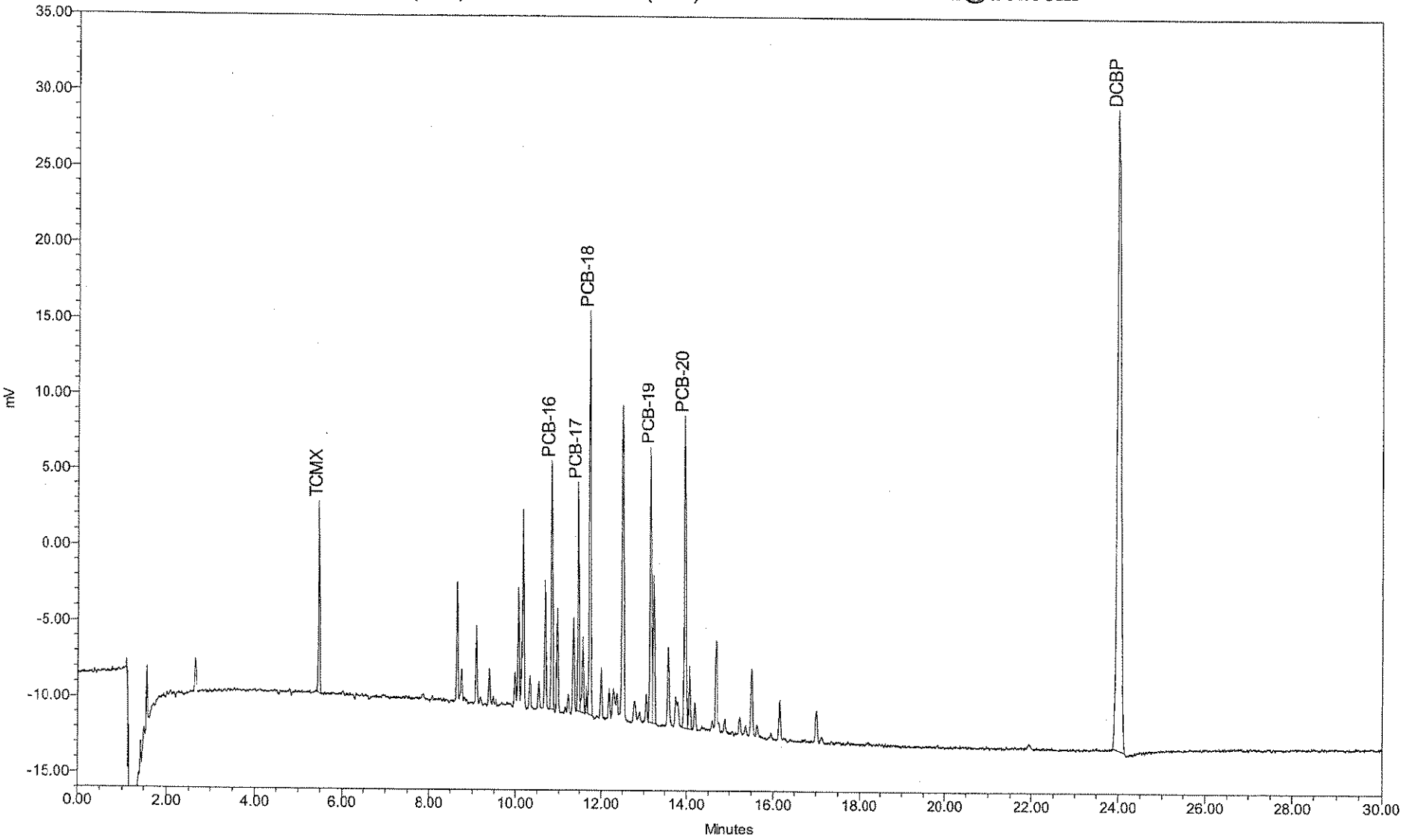
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS480725	Sample Amount:	1
Sample ID:	A1248 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 12:22:14	Processing Method:	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

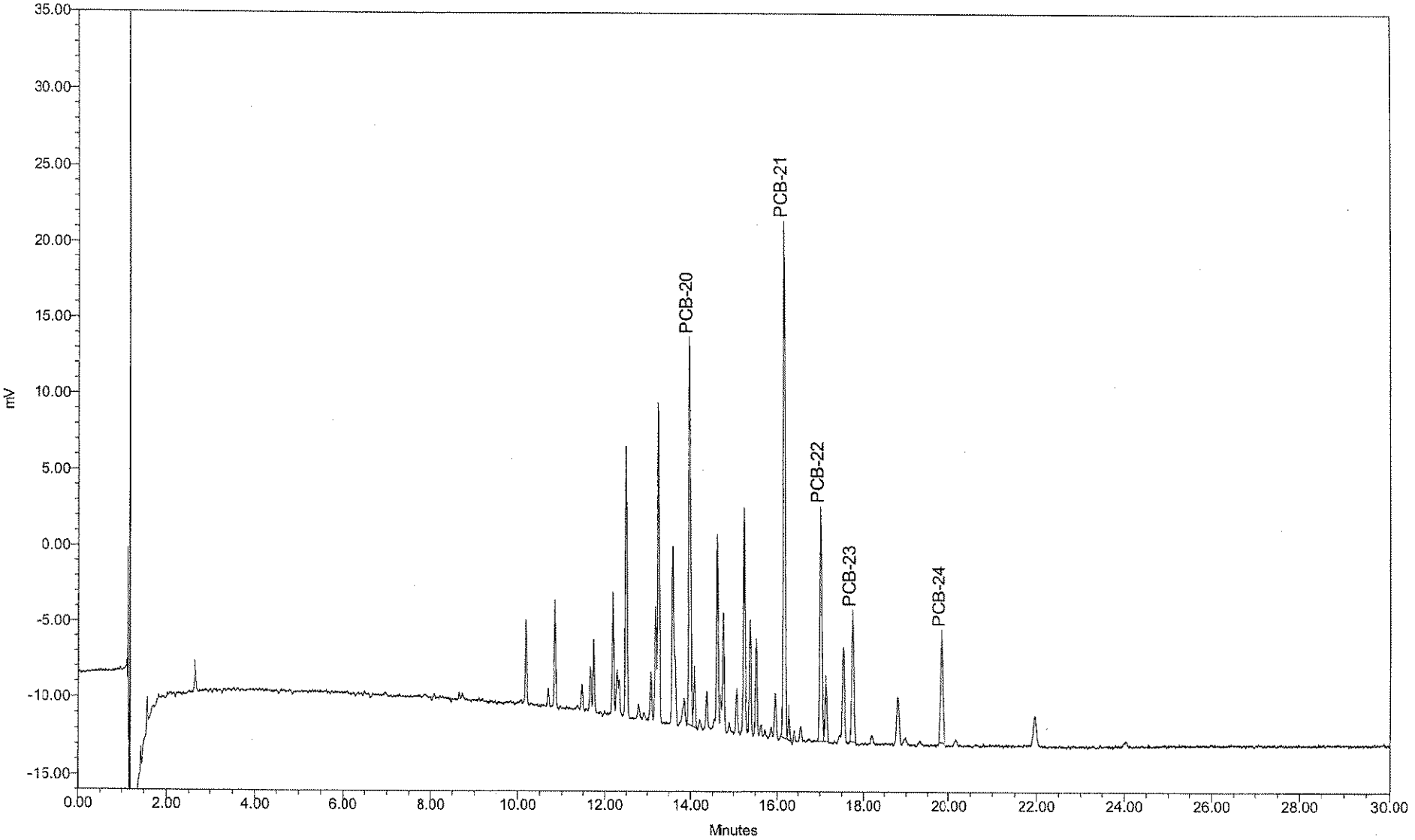
Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS540725	Sample Amount:	1
Sample ID:	A1254 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 12:58:21	Processing Method:	GC7_8082_060899

Chromatogram Report, PCB by SW846 Method 8082

Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com



Sample Name:	CS600725	Sample Amount:	1
Sample ID:	A1260 500 PPB	Dilution:	1
Date Acquired:	07/26/1999 13:34:27	Processing Method:	GC7_8082_060899

ATTACHMENT E

Calibration Report: PCB by SW-846 Method 8082

Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com

System Name: Instrument 05 Sample Set Date: 08/13/1999 3:35:46 PM
Sample Set Name: GC5_8082CC_081399 Date Calibrated: 08/16/1999 2:13:22 PM
User Name: KristenV Processing Method: GC5_8082_081399
Report Method Name: 8082 CalCurve Summary by RF 01

Calibration Component Summary Table
Component Summary For RF

	Sample Name	A1254-20	A1254-16/20	A1254	A1248
1	081254A	289.400	233.718	392.161	
2	081254B	307.665	239.346	418.651	
3	081254C	309.076	237.264	412.930	
4	081254D	299.203	229.949	402.504	
5	081254E	305.003	233.686	410.308	
Mean		302.069	234.793	407.311	
Std. Dev.		8.027	3.629	10.269	
% RSD		2.7	1.5	2.5	

Calibration Component Summary Table
Component Summary For RF

	Sample Name	TCMX	PCB-15	PCB-16	PCB-17	PCB-18	DCBP
1	081254A	1743.600					2464.880
2	081254B	1905.680					2607.388
3	081254C	1838.488					2539.036
4	081254D	1852.060					2498.834
5	081254E	1873.950					2528.173
Mean		1842.756					2527.662
Std. Dev.		60.970					53.053
% RSD		3.3					2.1

Calibration Report: PCB by SW-846 Method 8082

Northeast Analytical, Inc., 2190 Technology Drive, Schenectady, NY 12308
Phone: (518)-346-4592 Fax: (518)-381-6055 e-mail: nelab@aol.com

System Name: Instrument 07
Sample Set Name: GC7_8082_Calibration_042
User Name: System
Report Method Name: 8082 CalCurve Summary by RF 01

Sample Set Date: 04/22/1999 14:27:01
Date Calibrated: 05/14/1999 11:19:00
Processing Method: GC7_8082_051499

Calibration Component Summary Table
Component Summary For RF

	Sample Name	A1254-16/20	A1254-20	A1260	A1260-23	A1254
1	042354A	299.563	361.997			455.381
2	042354B	273.188	342.796			450.960
3	042354C	275.873	344.896			454.235
4	042354D	272.145	342.847			452.535
5	042354E	273.574	344.877			454.616
Mean		278.868	347.483			453.545
Std. Dev.		11.648	8.179			1.782
% RSD		4.2	2.4			0.4

Calibration Component Summary Table
Component Summary For RF

	Sample Name	TCMX	PCB-17	PCB-18	PCB-19	PCB-20	DCBP
1	042354A	1954.700					2445.172
2	042354B	1969.361					2455.106
3	042354C	1991.331					2494.547
4	042354D	1933.980					2433.796
5	042354E	2000.251					2446.710
Mean		1969.925					2455.066
Std. Dev.		26.936					23.339
% RSD		1.4					1.0

ATTACHMENT F

Northeast Analytical Inc

07/06/99

Retention Time Window Study
for Aroclors (PCB) by GC/ECD
EPA Method 8082

Instrument: GC 5
Column: DB5-MS 30Meter

Analyte	PEAK	Standard 1 500 PPB R.T. Min CS__0426	Standard 2 500 PPB R.T. Min CS_0503	Standard 3 500 PPB R.T. Min CS_0511	STD. DEV Min	%RSD	Window +/- Min.
Aroclor 1016	1	7.798	7.797	7.798	0.0006	0.01	0.002
	2	8.216	8.215	8.217	0.0010	0.01	0.003
	3	8.918	8.916	8.919	0.0015	0.02	0.005
	4	9.122	9.120	9.123	0.0015	0.02	0.005
	5	9.325	9.323	9.326	0.0015	0.02	0.005
Aroclor 1221	1	4.838	4.841	4.844	0.0030	0.06	0.009
	2	6.039	6.043	6.044	0.0026	0.04	0.008
	3	6.569	6.572	6.574	0.0025	0.04	0.008
	4	6.776	6.779	6.781	0.0025	0.04	0.008
	5	6.916	6.920	6.922	0.0031	0.04	0.009
Aroclor 1232	1	6.917	6.920	6.922	0.0025	0.04	0.008
	2	8.216	8.222	8.220	0.0031	0.04	0.009
	3	8.919	8.923	8.924	0.0026	0.03	0.008
	4	9.123	9.127	9.129	0.0031	0.03	0.009
	5	9.326	9.329	9.332	0.0030	0.03	0.009
Aroclor 1242	1	7.800	7.803	7.803	0.0017	0.02	0.005
	2	8.216	8.221	8.220	0.0026	0.03	0.008
	3	8.920	8.924	8.925	0.0026	0.03	0.008
	4	9.124	9.128	9.128	0.0023	0.03	0.007
	5	9.327	9.330	9.331	0.0021	0.02	0.006
Aroclor 1248	1	9.869	9.872	9.875	0.0030	0.03	0.009
	2	10.616	10.620	10.624	0.0040	0.04	0.012
	3	11.291	11.295	11.296	0.0026	0.02	0.008
	4	11.481	11.484	11.486	0.0025	0.02	0.008
	5	11.950	11.964	11.958	0.0070	0.06	0.021
Arolcor 1254	1	12.160	12.162	12.162	0.0012	0.01	0.003
	2	12.945	12.947	12.948	0.0015	0.01	0.005
	3	13.211	13.214	13.215	0.0021	0.02	0.006
	4	14.752	14.753	14.754	0.0010	0.01	0.003
	5	15.614	15.616	15.616	0.0012	0.01	0.003
Arolcor 1260	1	15.613	15.615	15.616	0.0015	0.01	0.005
	2	18.079	18.083	18.084	0.0026	0.01	0.008
	3	19.336	19.342	19.344	0.0042	0.02	0.012
	4	20.003	20.009	20.013	0.0050	0.03	0.015
	5	23.038	23.040	23.047	0.0047	0.02	0.014
TCMX (SURROGATE)	Surr.	6.02	6.021	6.023	0.0015	0.03	0.005
DCB (SURROGATE)	Surr.	28.389	28.40	28.41	0.0093	0.03	0.028

Northeast Analytical Inc

04/04/02

Retention Time Window Study
for Aroclors (PCB) by GC/ECD
EPA Method 8082 (Short Method)

Instrument: GC 7
Column: DB1-30Meter

Analyte	PEAK	Standard 1 50 PPB R.T. Min	Standard 2 50 PPB R.T. Min	Standard 3 50 PPB R.T. Min	STD. DEV Min	%RSD	Window +/- Min.
Aroclor 1016		C__0401B	CS_0403	CS_0404			
	6	10.431	10.434	10.430	0.0021	0.020	0.006
	7	10.777	10.780	10.775	0.0025	0.023	0.008
	8	11.321	11.325	11.320	0.0026	0.023	0.008
	9	11.498	11.502	11.496	0.0031	0.027	0.009
	10	11.616	11.619	11.613	0.0030	0.026	0.009
Aroclor 1221		C__0401B	C__0403A	CS__0404			
	1	7.705	7.707	7.706	0.0010	0.013	0.003
	2	8.833	8.837	8.835	0.0020	0.023	0.006
	3	9.334	9.335	9.333	0.0010	0.011	0.003
	4	9.508	9.512	9.510	0.0020	0.021	0.006
	5	9.619	9.621	9.619	0.0012	0.012	0.003
Aroclor 1232		CS__0401	CS__0403	CS__0404			
	5	9.622	9.619	9.622	0.0017	0.018	0.005
	7	10.779	10.776	10.779	0.0017	0.016	0.005
	8	11.325	11.321	11.323	0.0020	0.018	0.006
	9	11.501	11.498	11.499	0.0015	0.013	0.005
	10	11.619	11.615	11.617	0.0020	0.017	0.006
Aroclor 1242		CS__0401	CS__0403	CS__0404			
	6	10.431	10.432	10.430	0.0010	0.010	0.003
	7	10.777	10.778	10.774	0.0021	0.019	0.006
	8	11.322	11.322	11.320	0.0012	0.010	0.003
	9	11.498	11.498	11.496	0.0012	0.010	0.003
	10	11.616	11.617	11.614	0.0015	0.013	0.005
Aroclor 1248		CS__0401	CS__0403	CS__0404			
	11	12.074	12.071	12.070	0.0021	0.017	0.006
	12	12.582	12.579	12.578	0.0021	0.017	0.006
	13	13.052	13.048	13.047	0.0026	0.020	0.008
	14	13.168	13.165	13.163	0.0025	0.019	0.008
	15	13.454	13.451	13.450	0.0021	0.015	0.006
Arolcor 1254		CS__0401	CS__0403	CS__0404			
	16	13.655	13.651	13.651	0.0023	0.017	0.007
	17	14.099	14.097	14.098	0.0010	0.007	0.003
	18	14.291	14.289	14.288	0.0015	0.011	0.005
	19	15.383	15.382	15.381	0.0010	0.007	0.003
	20	16.042	16.041	16.039	0.0015	0.010	0.005
Arolcor 1260		CS__0401	CS__0403	CS__0404			
	20	16.045	16.045	16.041	0.0023	0.014	0.007
	21	18.212	18.210	18.207	0.0025	0.014	0.008
	22	19.183	19.182	19.179	0.0021	0.011	0.006
	23	20.016	20.016	20.007	0.0052	0.026	0.016
	24	22.425	22.420	22.410	0.0076	0.034	0.023
TCMX (SURROGATE)	Surr.	8.988	8.986	8.987	0.0010	0.011	0.003
DCB (SURROGATE)	Surr.	27.277	27.273	27.270	0.0035	0.013	0.011

Attachment E

Construction Quality Assurance Plan

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

Table of Contents

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

Exhibits

E-1 Technical Specifications
E-2 Quality Assurance/Quality Control Guidelines

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

1.0 Introduction

1.1 General

This *Construction Quality Assurance Plan* (CQAP) establishes quality assurance/quality control (QA/QC) activities, requirements, and procedures for construction-related response actions to be conducted by the General Electric Company (GE) at the GE-Pittsfield/Housatonic River Site (Site) pursuant to a Consent Decree (CD) executed in October 1999 by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other government agencies, and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this CQAP applies to Removal Actions that GE is obligated to perform under the CD at several Removal Action Areas (RAAs) at the Site, excluding the response actions being taken and to be taken at the Housatonic River. Additional information regarding these Removal Actions and the Performance Standards for them are set out in the *Statement of Work for Removal Actions Outside the River* (SOW), which is Volume I of Appendix E to the CD. Certain of the response actions to be performed as part of these Removal Actions will involve construction activities (e.g., soil removal) to achieve Performance Standards that are specific to each individual Removal Action. By establishing QA/QC procedures and requirements for these construction-related response actions, the overall objective of the CQAP is to ensure, with reasonable certainty, that a completed response action meets or exceeds its design criteria, plans, and specifications, and thus supports the achievement of the applicable Performance Standards.

This plan is one of several plans that comprise GE=s *Project Operations Plan* (POP). The requirements of this CQAP, as approved by EPA, will be incorporated as appropriate into future response actions. Certain of the activities described in this CQAP may not be applicable to each RAA based on the type, scope, and magnitude of the response action activities. Therefore, the contents of this plan may be modified based on site- or activity-specific considerations associated with a specific Removal Action. Any such modifications or additions will be identified in the Removal Design/Removal Action (RD/RA) work plans and/or other technical RD/RA submittals to EPA for that Removal Action (referred to collectively in this CQAP as the Atechnical RD/RA documentation@), and will be subject to EPA review and approval. This plan was originally submitted to EPA in January 2001, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications

set forth in the October 19, 2001 Addendum. In the future, this plan will be reviewed and updated as necessary on approximately an annual basis. Any changes will be subject to EPA review and approval.

This CQAP is only one of several plans within the POP that address various construction-related response actions that will be conducted at the RAAs. These other plans include the *Site Health and Safety Plan,* the *Site Management Plan,* the *Ambient Air Monitoring Plan,* and the *Contingency and Emergencies Procedures Plan.* As appropriate, references to these plans will be provided herein.

1.2 Format of CQAP

The remainder of this CQAP is presented in four sections. Section 2.0 lists and describes the general responsibilities of the parties involved in implementing the Construction Quality Assurance (CQA) activities. Section 3.0 describes the typical CQA procedures and activities that will be implemented prior to the initiation of construction activities at an RAA. Then, Section 4.0 discusses the CQA activities to be performed during construction activities, while Section 5.0 describes the CQA procedures that will be conducted following construction activities.

This CQAP contains two exhibits that provide additional information on certain types of CQA activities that will be performed during the Removal Actions at the RAAs. Exhibit E-1 includes technical specifications for several types of construction-related materials and activities. These technical specifications are modified versions of technical specifications that were previously developed and submitted to EPA to support construction of the On-Plant Consolidation Areas (OPCAs) at the GE Plant Area. Those previously submitted specifications have been modified for inclusion in this CQAP to be more general in nature and to remove certain contractual language (between GE and its contractors) that was previously included in the specifications. It is anticipated that these technical specifications will be utilized, with appropriate refinements and/or modifications for the specific Removal Action (subject to EPA review and approval), during the performance of these Removal Actions. Exhibit E-2 describes the general QA/QC procedures and guidelines for the performance of survey activities during construction on these Removal Actions. In addition, as further CQA information is developed during the course of RD/RA activities on Removal Actions (e.g., additional technical specifications), such information will be included in this CQAP as additional exhibits.

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

2.0 CQA Responsibilities

From an overall perspective, GE is responsible for coordinating, performing, managing, and documenting all of the Removal Actions that are required by the CD and the SOW. In addition, as provided in Paragraph 17.a of the CD, the Removal Actions will be performed under the direction and supervision of the Supervising Contractor(s) identified by GE and approved by EPA. One specific component of these responsibilities -- as addressed by this document -- is the performance of CQA activities for construction-related response actions. As discussed below, CQA activities will be performed by a number of entities, but all such activities will be under the overall direction and supervision of GE and the Supervising Contractor.

The type and magnitude of a specific response action will dictate the need for and scope of CQA activities that will be conducted by GE. Given the potential range of response actions that may be conducted, and the corresponding CQA activities, this CQA Plan establishes several procedures and requirements that can be applied to a variety of response actions. In addition, as previously discussed, the contents of this plan are necessarily general and subject to further definition (as needed) within the technical RD/RA documentation prepared for each individual Removal Action.

In general, all of the activities and responsibilities associated with a construction-related response action will be performed by a combination of three entities -- GE, the Design Engineer, and the Remediation Contractor(s). However, in the course of performing various CQA activities, GE may enlist the services of one or more other personnel or organizations to assist in managing, observing, testing, and/or documenting the performance of construction activities performed by the Remediation Contractor. Such personnel or organizations may include consultants to GE or, for particular tasks, specific testing laboratories or other specialty organizations. Such personnel or organization(s) are referred to in this CQAP as AGE=s Representative,@ and the CQA responsibilities and activities to be performed by GE or GE=s Representative are referred to herein as to be performed by "GE/GE=s Representative."

Further information regarding the roles of the CQA personnel/organizations is provided below. In addition, all contractors, consultants, and other organizations retained by GE to assist in performing CQA functions will be subject to GE review. GE will conduct this review to ensure that each organization is capable of and

experienced at performing the specific project component. In determining the qualifications of a particular organization, GE will consider several factors, including experience, possession of required certifications, and licensing, and project team individuals. In addition, depending on the specific project, GE may also review the qualifications of the key individuals of an organization, considering the individual's experience, licensing, education, etc. As noted above, all such personnel/organizations performing CQA functions will be under the supervision of GE and the Supervising Contractor.

2.1 GE/GE=s Representative

For each Removal Action within the Site, GE will assign a Project Manager who will serve as the primary point of contact for all phases of the Removal Action and various response actions performed as part of that Removal Action. The GE Project Manager will have knowledge of the scope, magnitude, and Performance Standards related to the construction activities to be performed at the RAA.

With respect to the CQA aspects of a construction-related response action, the general responsibilities of the GE Project Manager include the following:

- Define project objectives, considering the applicable requirements of the CD and SOW;
- Manage the development of technical work plans and other deliverables prior to their submission to the EPA;
- Coordinate the CQA activities described in this CQAP and as required in the technical RD/RA documentation for the specific Removal Action; and
- Review and evaluate the performance and results of CQA activities with respect to planned requirements.

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

When additional GE personnel or non-GE personnel or organizations (i.e., GE=s Representative) assist the GE Project Manager in the CQA activities, such parties will be knowledgeable and experienced in the activities that they will be performing (e.g., sampling, testing, construction oversight, etc.). They will also be familiar with the requirements of this CQAP and the response action requirements and Performance Standards set forth in the CD, the SOW, and the applicable technical RD/RA documentation. Based on the response actions previously completed at the Site, as well as the anticipated scope of future response actions, several CQA activities may be performed by GE/GE=s Representative, including:

- Coordinate the performance of construction activities with the Design Engineer and Remediation Contractor;

- Review the technical RD/RA documentation for the specific Removal Action and the specific construction-related response actions;

- Prepare, with the Design Engineer, a comprehensive list of required technical submittals and a scheduled for submittal/approval;

- Review technical submittals from the Remediation Contractor with the Design Engineer for conformance with the technical RD/RA documentation;

- Review with the Design Engineer any significant revisions to the technical RD/RA documentation and/or this CQAP;

- Implement the CQA procedures contained in the CQAP and the technical RD/RA documentation for the specific Removal Action;

- Observe the performance of construction activities conducted by the Remediation Contractor for general conformance with the technical RD/RA documentation developed for the Removal Action;

- Perform testing for soils, geosynthetic materials, and other construction materials during the implementation of the response actions;

- Review field and laboratory QA/QC testing results for conformance with the technical RD/RA documentation;

- Conduct periodic site visits to review progress and QA/QC procedures;

- Conduct surveys for the establishment of benchmarks and baselines necessary for construction, testing, and sampling, and for the collection of as-built information;

- Review and identify any deficiencies in quality control testing results or procedures so corrective actions can be taken;

- Retain and manage CQA data generated during the construction activities (as described in Section 4.6.4);

- Prepare project status reports as appropriate; and

- Prepare a Completion of Work Report documenting that the construction has been completed in conformance with the CD, the SOW, and the applicable technical RD/RA documentation.

2.2 Design Engineer

As appropriate, GE will retain a Design Engineer to provide remedial design services for a given Removal Action. The Design Engineer will possess experience on remedial projects of similar magnitude and complexity to the activities being undertaken at the RAA. Additionally, the Design Engineer must be knowledgeable about the project requirements and Performance Standards, and must be familiar with the contents of this CQAP. The Design Engineer will assist GE in reviewing the applicable Performance Standards, evaluating pre-design information collected at the Removal Action, and preparing the technical

RD/RA documentation for each Removal Action. As needed, the Design Engineer, in consultation with GE/GE=s Representative, will develop technical specifications which, as described in Section 3.1 below, serve as a component of the technical RD/RA documentation that is provided to EPA. The Design Engineer will also assist GE/GE=s Representative in preparing a list of required technical submittals and a schedule for submittal/approval. During the response action activities, the Design Engineer will be responsible for reviewing various technical submittals prepared by the Remediation Contractor, as described in Section 3.3 below. During construction activities, the Design Engineer will also be involved in the review of any significant revisions to the technical RD/RA documentation and/or this CQAP in accordance with Section 4.6.2 of this CQAP.

2.3 Remediation Contractor

GE will use qualified Remediation Contractors to implement the required response actions. The process of selecting a qualified Remediation Contractor is described in Section 3.2. The Remediation Contractor will be responsible for performing the work activities in accordance with the technical RD/RA documentation developed for the response actions, including technical drawings and specifications and other information contained in the RD/RA documentation. When necessary, the Remediation Contractor will subcontract with qualified organizations to perform certain aspects of the response actions (e.g., surveys, geosynthetics installation, testing, etc.).

2.4 Other CQA Organizations

During the course of the response action, it may be necessary to use other qualified organizations to implement the CQA activities, such as a testing laboratory and a Licensed Surveyor. The qualifications and responsibilities of each party are described below.

Laboratory - The CQA laboratory will be an independent materials testing laboratory. The laboratory will be responsible for testing soils, geosynthetic materials, and other construction materials during the implementation of the response actions as directed by GE/GE=s Representative and as required by this CQAP. Test data and reports completed by the CQA laboratory will be submitted directly to GE/GE=s Representative.

Licensed Surveyor - Surveying activities will be performed as needed prior to, during, and at the completion of the response actions that constitute each Removal Action. These surveying activities are discussed in Exhibit E-2 to this CQAP. As set forth in Exhibit E-2, certain of these activities -- including the preparation of a baseline pre-construction survey of the RAA, verification of removal limits (vertical and horizontal), and preparation of a survey of final site conditions (including excavation and backfilling limits) -- will be performed by a Professional Land Surveyor licensed in the Commonwealth of Massachusetts. This Licensed Surveyor may be retained by the Remediation Contractor or GE/GE=s Representative.

3.0 Pre-Construction CQA Activities

Prior to the implementation of construction-related response actions, GE will perform several QA/QC activities to ensure that the response actions are conducted in accordance with the technical RD/RA documentation. The primary purpose of such pre-construction activities is to facilitate communications among the involved parties related to the technical and implementation aspects of the construction activities. While the type and scope of the pre-construction activities may vary depending on the specific response actions, it is anticipated that most response actions will involve certain common pre-construction QA/QC activities, as described below.

3.1 Technical Specifications

For several construction-related response actions, technical specifications will be developed by the Design Engineer in consultation with GE/GE=s Representative, and will be provided to the Remediation Contractor. These specifications will be a component of the technical RD/RA documentation that is provided to EPA and will define the acceptable construction materials and equipment, and the expected performance level of the Remediation Contractor. Additionally, the specifications may, depending on the activity, identify the quality control testing required of the Remediation Contractor.

Several illustrative technical specifications are included in Exhibit E-1 to this CQAP. As noted above, these technical specifications are modified and generalized versions of technical specifications that were previously developed and submitted to EPA to support construction of the OPCAs. These technical specifications relate

to: (1) topsoil, seeding, and mulch; (2) soil materials; (3) geotextile fabric; (4) geomembrane; and (5) geosynthetic drainage composite. It is anticipated that these technical specifications will be utilized during the remedial design for the Removal Actions, with appropriate refinements and/or modifications by the Design Engineer, in consultation with GE/GE=s Representative, for the specific Removal Action in question. In addition, further technical specifications will be added as necessary for each Removal Action. Any modified or new technical specifications will be included in the technical RD/RA documentation for the specific Removal Action, which will be submitted to EPA for review and approval.

3.2 Contractor Qualification

Prior to the selection of a Remediation Contractor, GE will perform a contractor qualification process to ensure that the Remediation Contractor is qualified to perform the proposed construction-related activities. This qualification process will include a review of the Remediation Contractor=s experience (and that of any subcontractors, as appropriate) on projects of similar scope and magnitude. The Remediation Contractor will also be required to demonstrate that, at a minimum, the field foreman has experience with similar type construction projects and is familiar with the activities required as part of the response actions.

3.3 Technical Submittals

For several elements of construction, the Remediation Contractor will be required to prepare technical data (e.g., proposed equipment, material test results, etc.) and plans for review by GE/GE=s Representative and the Design Engineer. This requirement is intended to document the Remediation Contractor's understanding of the remedial design and thus minimize the potential for misinterpretation that could impact the outcome of the Removal Action. The submittal of technical data (also referred to as shop drawing submittals) encompasses many elements of the construction activity. In general, technical submittals that will be required as part of the response actions may include the following:

- Implementation-related plans and procedures, including proposed methods/techniques to meet the design requirements;

- Performance data;
- Technical drawings;
- Operating descriptions;
- Layout drawings; and
- Detail drawings.

Each of the technical specifications included in Exhibit E-1 identifies the technical submittals that will be required in connection with the topic covered by that specification. Any modified or new technical specification will likewise identify the required submittals. Any proposed modifications to the scope of work as outlined in the technical RD/RA documentation related to a specific response action, or any deviations from the information contained in this CQAP, must be identified within these submittals for review and acceptance by GE/GE=s Representative and the Design Engineer. Any significant modifications will be subject to EPA review and approval.

The technical submittal review process will be an essential activity for monitoring QA/QC before construction is initiated. The Design Engineer and/or GE/GE=s Representative will prepare a register of technical submittals required from the Remediation Contractor. This register will be used to monitor the status of contractor submittals and corresponding review by the Design Engineer. This register will also identify which of these submittals from the Remediation Contractor are to be approved by the GE Project Manager and/or the Supervising Contractor. The Remediation Contractor's submission of a technical submittal will constitute its representation that the Remediation Contractor has determined and verified all quantities, dimensions, field construction criteria, materials, model numbers, and similar data set forth in that submittal. In addition, the Remediation Contractor's submittal will demonstrate that it has reviewed and/or coordinated that submittal with the applicable requirements of any technical drawings prepared by the Design Engineer (including QA/QC requirements, as appropriate). The review of technical submittals will include determining general compliance with the RD/RA documentation, as appropriate. Technical submittals will be reviewed and stamped by the Design Engineer as follows:

- AReviewed@ if no objections are observed or comments made;

- AReviewed and Noted@ if minor objections, comments, or additions are made but resubmittal is not considered necessary;

- AResubmit@ if the objections, comments, or additions are extensive, or if transmittal to another party is required; and

- ARejected@ if the submittal under consideration is not, even with reasonable revision, acceptable, or when the data submitted are not sufficiently complete to establish compliance with the technical specifications or drawings. In this case, the Remediation Contractor must resubmit a new or modified submittal which meets the scope and intent of the work specified in the technical specifications or drawings.

The Remediation Contractor will not be permitted to perform any activity that directly or indirectly involves the item covered by the technical submittal until a AReviewed@ or AReviewed and Noted@ stamp is provided by the Design Engineer.

3.4 Site Inspections/Reviews

Prior to the start of construction activities, a pre-construction meeting will be held among GE/GE=s Representative, the Remediation Contractor, and possibly the Design Engineer, depending on the response action. The topics covered at this meeting may include some or all of the following:

- Familiarizing each organization with current site conditions, the site-specific QA/QC procedures, and this Plan's role relative to the design criteria, plans, and specific information;

- Discussing other applicable components of the POP (e.g., the *Site Health and Safety Plan*, the *Site Management Plan*, the *Ambient Air Monitoring Plan*, and/or the *Contingency and Emergency Procedures Plan*, etc.);

- Discussing the established procedures and protocols for any construction change orders, deficiencies, repairs, and retesting;

- Reviewing methods of documenting and reporting data;

- Reviewing work area security and safety protocols;

- Discussing procedures for the location and protection of construction equipment and materials, and for the prevention of damage of equipment and materials from inclement weather or other adverse conditions; and

- Conducting a site walk-through to review site conditions, including work areas and approximate limits of work, as well as staging and storage location.

4.0 CQA Activities During Construction

During the active construction phase(s) of the project, several QA/QC mechanisms will be implemented to monitor the progress of the response actions, assess the activities as they relate to the attainment of the applicable Performance Standards, and identify, as early as possible, any issues that may affect the performance and schedule of the construction activities.

4.1 Mobilization/Site Preparation

The Remediation Contractor will mobilize to the RAA and conduct site preparation activities in accordance with the technical RD/RA documentation. Site preparation activities conducted by the Remediation Contractor will include the following:

- Coordinating with local utilities, as necessary, for relocation of utilities, access to potable water, etc.;

- Verifying existing site conditions;

- Mobilizing labor, equipment, and materials to the RAA;

- Obtaining any federal, state, and/or local permits or approvals that may be necessary to perform the response action activities;

- Constructing remediation support areas, as needed, such as material staging areas; storage areas; and equipment, material, and personnel decontamination areas; and

- Establishing work area(s) and installing temporary fencing around the perimeter of the work area.

During mobilization/site preparation activities, GE/GE=s Representative will conduct the following QA/QC activities:

- Monitor the Remediation Contractor=s progress in obtaining all necessary approvals to perform the response actions;

- Review equipment brought to the RAA by the Remediation Contractor in terms of general cleanliness and working condition; and

- Review soil erosion and sediment control measures installed by the Remediation Contractor.

4.2 Site Management

The Remediation Contractor will provide and maintain site management throughout the implementation of the response actions, as directed by GE/GE=s Representative. These site management activities include the security/control measures described in GE=s *Site Management Plan* (Attachment C to the POP). They also include appropriate dust control measures during construction activities (as needed) and soil erosion and sedimentation control measures. Dust control measures are discussed in GE=s *Ambient Air Monitoring Plan* (Attachment D to the POP), and soil erosion and sedimentation control measures will be described in the

technical RD/RA documentation for each Removal Action. GE/GE=s Representative will be responsible for ensuring that the appropriate site management measures are implemented and maintained in accordance with the applicable plan(s).

4.3 Survey Control

As part of the Removal Actions, construction surveys will be performed to ensure/document consistency with the technical RD/RA documentation. The survey activities will generally include performing periodic surveys during the construction activities to verify lines, grades, and levels; documenting testing and sampling locations; and surveying final site conditions for preparation of as-built documentation. The survey activities will be conducted in accordance with Exhibit E-2 (QA/QC Procedures for Survey Activities) of this plan. As set forth in Exhibit E-2, certain of these activities (including verification of removal limits and preparation of a final survey of site conditions) will be performed by a Licensed Surveyor retained by the Remediation Contractor or GE/GE=s Representative. The other survey activities, where conducted, may be performed by the Remediation Contractor or GE/GE=s Representative.

4.4 QA/QC Requirements for Soil Removal and Backfilling

Many Removal Actions will involve the removal of existing soils, sediments, and other materials, and replacement with acceptable backfill soils. QA/QC procedures for these activities will be implemented prior to and during the excavation and backfilling activities to ensure that the applicable Performance Standards are achieved. Specific technical requirements for the earthwork activities will be developed by the Design Engineer for each Removal Action.

The QA/QC testing and observation activities that will be performed by GE/GE=s Representative during the excavation and backfilling activities will be identified in the technical RD/RA documentation for each Removal Action. These QA/QC activities will include the procedures and requirements described in the technical specifications provided in Exhibit E-1 for Soil Materials and (as applicable) Topsoil, Seeding, and Mulch, with appropriate refinements and/or modifications for the specific Removal Action.

4.5 QA/QC Requirements for Soil Covers, Engineered Barriers, and Landfill Caps

Certain response actions may involve the installation of an engineered barrier, landfill cap, or soil cover. Depending on the purpose of each, as well as the applicable Performance Standards, construction of the engineered barrier/cap/cover may include a combination of soils, geosynthetics, and/or asphalt pavement. The QA/QC activities pertaining to these construction materials are discussed below.

4.5.1 Soils

Soil layers that could be installed in an engineered barrier/cap/cover include a subgrade/subbase layer, a drainage layer, a barrier protection layer, and a topsoil layer. The QA/QC activities pertaining to these soil material types (e.g., compaction testing, particle size requirements, etc.) will be identified in the technical RD/RA documentation for each Removal Action. These activities will include the procedures and requirements described in the technical specifications provided in Exhibit E-1 for Soil Materials and for Topsoil, Seeding, and Mulch, with appropriate refinements and/or modifications for the specific Removal Action.

4.5.2 Geosynthetics

For response actions that require a low permeability barrier system to meet the applicable Performance Standards for a given Removal Action, a geosynthetic material will be used as the barrier layer. The material will consist of a high density polyethylene (HDPE) liner and/or a geosynthetic clay liner (GCL). Other geosynthetic materials that may be utilized within an engineered barrier/cap/cover include a geotextile, and a geosynthetic drainage composite (GDC). The geotextile will be used as a cushioning and/or a filtration layer, while the GDC will be used as a drainage layer. The QA/QC activities required for the testing and installation of the geosynthetics will be identified in the technical RD/RA documentation for each Removal Action. These activities will include the procedures and requirements described in the technical specifications provided in Exhibit E-1 for Geomembranes, Geotextile Fabric, and Geosynthetic Drainage Composite, with appropriate refinements and/or modifications for the specific Removal Action.

4.5.3 Asphalt

An asphalt layer will be installed at some RAAs as the uppermost component of the barrier/cap/cover system. The asphalt cover will be installed on a prepared subbase layer, and will serve as a low permeability barrier, promoting stormwater run-off and limiting infiltration. The QA/QC activities associated with installing the asphalt cap (e.g., compaction testing, material requirements, etc.) will be described in the RD/RA documentation for each RAA involving the installation of an asphalt cap.

4.6 Documentation

The documentation of CQA activities will support the demonstration that the construction activities were carried out in accordance with the technical RD/RA documentation. The documentation process includes identification of construction tasks that should be observed, tested, and documented; assignment of responsibilities for the observation, testing, and documentation of these tasks; and finally, the completion of the reports, data sheets, forms, and check lists as necessary to provide an accurate record of the work performed during construction.

GE/GE=s Representative will prepare the appropriate reports, data sheets, forms, and check lists, as described below, to document that the appropriate CQA activities have taken place.

4.6.1 Construction Summary Records

Construction summary records will be maintained by GE/GE=s Representative to document the construction activities. The construction summary records will typically contain the following information:

- Date, project name, location, and the names of any visitors;
- Description of weather conditions;
- Remediation Contractor=s personnel, equipment, and materials delivered to or removed from the work area;
- Description of work in progress;
- Results of any CQA testing; and

- Problem/deficiency identification and documentation describing any corrective actions performed for field problems and non-conformance with the technical RD/RA documentation and/or this CQAP.

4.6.2 Deficiency Identification and Correction

Construction summary records will include documentation of problems and/or deficiencies noted during construction (e.g., when construction material or activities are observed or tested that do not meet the requirements established in this plan) and corrective action employed to address the problems or deficiencies. Problem and deficiency identification and corrective action documentation may include the following information:

- A description of the problem or deficiency, including any references to supplemental data or observations related to the problem or deficiency;

- Location of the problem or deficiency, including how and when the problem or deficiency was discovered; and

- The corrective action taken or to be taken to resolve the problem or deficiency.

GE/GE's Representative will determine if the problem or deficiency is an indication of a situation that might require changes to the technical RD/RA documentation and/or the CQAP. If this situation develops, a meeting will be held with GE/GE's Representative and the Design Engineer, to determine if revisions to the technical RD/RA documentation and/or this CQAP should be made. Any significant revisions to the technical RD/RA documentation and/or CQAP will be reviewed by GE/GE's Representative with the Design Engineer and submitted for review and approval by EPA.

4.6.3 Photographic Documentation

Photographs may be taken to supplement written CQA information and to document observations, problems, deficiencies, and work in progress. Pertinent information related to the photographs (e.g., date, time, location of photographs, etc.) will be documented in the construction summary record or a log book.

4.6.4 CQA Data Management

The management of CQA data generated throughout the response actions will be the responsibility of GE/GE=s Representative. These data may include:

- Data sheets;
- Photographic logs;
- Field sampling and testing results;
- Laboratory analytical results;
- Health and safety monitoring results;
- Equipment calibration and testing results;
- Construction summary records; and
- Documentation identifying corrective measures taken to resolve any problems or deficiencies, including any significant revisions to the technical RD/RA documentation, CQAP, or the technical submittals to resolve such problems or deficiencies.

Pertinent data will be compiled and presented in the Final Completion Report, as discussed in Section 5.

4.7 Site Inspections/Reviews

Site inspections/reviews will be conducted by GE/GE=s Representative at various times during the response action activities. A brief description of the site inspections/reviews that may be conducted is provided below.

4.7.1 Pre-Excavation Inspection

Prior to the start of active excavation activities, and possibly in conjunction with the pre-construction meeting described in Section 3.4, GE/GE=s Representative and the Remediation Contractor will conduct a pre-excavation site inspection to determine that procedures and equipment necessary to perform the response actions are in place and operational, that the Remediation Contractor is prepared to efficiently manage the various waste streams to be generated during the remedial activities, and that the Contractor has taken steps to comply with the requirements of the *Site Health and Safety Plan, Contingency and Emergency Procedures Plan, and Site Management Plan*.

If deficiencies are noted during the pre-excavation inspection, the Remediation Contractor will be required to take corrective actions. Once approved by GE, construction activities may proceed.

4.7.2 Project Progress Meetings

As appropriate, project progress meetings will be held periodically and will be attended by GE/GE=s Representative and the Remediation Contractor. The purpose of the meetings will be to:

- Discuss the Remediation Contractor=s personnel and equipment assignments for the near-term future;
- Review recent work activities;
- Review any health and safety issues;
- Review the upcoming work schedule and overall project schedule;
- Discuss any design/construction problems and possible solutions;
- Review test data; and

- Discuss any outstanding issues.

The project progress meetings may be documented by GE/GE=s Representative, and minutes transmitted as needed to the attending parties.

4.7.3 Pre-Final Inspection

Near the completion of the construction-related response action, GE/GE=s Representative and the Remediation Contractor will conduct a pre-final inspection. The pre-final inspection will consist of a site walk-through to evaluate the completeness of the construction and its consistency with the technical RD/RA documentation.

Following the pre-final inspection, GE/GE=s Representative will either specify activities to address any deficiencies or deviations from the RD/RA documentation, as appropriate, or will determine that construction of the response actions is complete. If additional construction activities are required, GE/GE=s Representative will prepare a Apunch list@ and corresponding schedule to complete the activities for review by the Remediation Contractor. The Remediation Contractor will then complete the additional activities within the timeframe set forth in the agreed-upon schedule.

5.0 Post-Construction CQA Activities

At the completion of each Removal Action, all QA/QC information obtained throughout the construction period (including pre-construction activities) will be compiled and summarized in a Final Completion Report. It is anticipated that the Final Completion Report will contain the following types of information, as relevant and necessary.

- A summary describing the construction activities completed and QA/QC testing performed prior to and during the Removal Action;

ATTACHMENT E

CONSTRUCTION QUALITY ASSURANCE PLAN

- Record drawings documenting the completed construction as it relates to the technical drawings, sampling locations, etc.;

- A summary of field observations and tests performed (including topographic surveys), laboratory samples collected, and test results reported;

- A summary of problems and deficiencies encountered during construction and the solutions; and

- Documentation that acceptance QA/QC criteria were met, including a comparison of documented procedure data with proposed technical RD/RA documentation and requirements set forth in this CQAP.

The Final Completion Report will also include a certification that the Removal Action was performed in accordance with the requirements of the CD and that the applicable Performance Standards were met, as stipulated in the CD.

Exhibit E-1 – Technical Specifications

EXHIBIT E-1

TECHNICAL SPECIFICATIONS

This Exhibit E-1 provides technical specifications for use of certain construction-related materials. These technical specifications are modified versions of technical specifications that have previously been developed and submitted to EPA to support construction of the OPCAs. Those previously submitted specifications have been modified for inclusion in the CQAP to be more general and to omit certain contractual provisions between GE and its contractors. These specifications define acceptable construction materials, as well as the expected performance level of the Remediation Contractor. The specifications also identify the quality control testing required of the Remediation Contractor. These specifications will be refined and/or modified as appropriate by the Design Engineer, in consultation with GE/GE=s Representatives, during the remedial design of a given Removal Action to include RAA-specific design and construction information. All modifications or additions, as well as any new specifications, will be included in the appropriate technical RD/RA documentation for EPA review and approval.

Section 02212 - Topsoil, Seeding, and Mulch

Section 02221 - Soil Materials

Section 02232 - Geotextile Fabric

Section 02234 - Geomembrane

Section 02236 - Geosynthetic Drainage Composite

MATERIALS AND PERFORMANCE - SECTION 02212

TOPSOIL, SEEDING, AND MULCH

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work under this section consists of furnishing and placement of topsoil, fertilizer, seed, mulch, and maintenance of seeded areas until final acceptance.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Soil Cover/Backfill Characterization Plan
B. Exhibit E-2 (QA/QC Procedures for Survey Activities)

1.03 SUBMITTALS

A. Analysis of the seed (to demonstrate compliance with the seed mix identified in the RD/RA documentation) and fertilizer (to identify chemical composition), and proposed application rates (to demonstrate compliance with the fertilizer application rate identified in the RD/RA documentation).

B. Should hydroseed be used, the Remediation Contractor shall submit all data including material and application rates.

C. Location of source, and pH and organic content testing of off-site topsoil (if required).

D. Sample of topsoil to be tested by GE for chemical contaminants as discussed in the RD/RA documentation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Any off-site topsoil shall be unfrozen, friable, natural loam and shall be free of clay lumps, brush needs, litter, stumps, stones, and other extraneous matter. The topsoil shall have an organic content between 5% and 20%, and a pH between 5.5 and 7.5.

B. Fertilizer shall be a complete prepared and packaged material from a standard quality commercial carrier containing a minimum of 5% nitrogen, 10% phosphoric acid and 10% potash.

1. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

C. Seed mixtures shall be of commercial stock of the current season's crop and shall be delivered in unopened containers bearing the guaranteed analysis of the mix.

1. All seed shall meet the State standards of germination and purity.

MATERIALS AND PERFORMANCE - SECTION 02212

TOPSOIL, SEEDING, AND MULCH

D. Seed Mix:

To be determined based on specific application at each RAA.

E. Mulch shall be stalks of oats, wheat, rye or other approved crops free from noxious weeds and coarse materials.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The topsoil shall be applied in a single loose lift of not less than six inches. No compaction is required or allowed.

1. Following placement of topsoil and prior to fertilizer application, all large stones, sticks, and other deleterious material shall be removed.

B. The fertilizer shall be applied to the surface uniformly at the rate of 20 pounds per 1,000 square feet.

C. After the soil surface has been fine graded, the seed mixture shall be uniformly applied upon the prepared surface with a mechanical spreader at a rate specified by the seed manufacturer.

1. The seed shall be raked lightly into the surface.

2. Seeding and mulching shall not be done during windy weather.

D. Mulch (where needed) shall be hand or machine spread to form a continuous blanket over the seed bed, approximately 2 inches in uniform thickness at loose measurement with a minimum of 90% surface coverage. Excessive amounts or bunching of mulch shall not be permitted. Unless otherwise specified, mulch shall be left in place and allowed to decompose.

E. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory sod growth. Watering shall be performed in such a manner as to prevent washing out of seed and mulch.

F. Hydroseeding may be accepted as an alternative method of applying fertilizer, seed, and mulch. The Remediation Contractor must submit all data regarding materials and application rates to GE or GE's Representative for review.

G. Temporary and permanent erosion control matting shall be installed in accordance with the RD/RA documentation.

MATERIALS AND PERFORMANCE - SECTION 02212

TOPSOIL, SEEDING, AND MULCH

3.02 MAINTENANCE

A. All erosion rills or gullies within the topsoil layer shall be filled with additional approved topsoil and graded smooth, and reseeded and mulched.

B. The Remediation Contractor shall also be responsible for repairs to all erosion of the seeded areas until all new grass is firmly established and reaches a height of not less than 4 inches. All bare or poorly vegetated areas must be reseeded and mulched.

- END OF SECTION -

MATERIALS AND PERFORMANCE - SECTION 02221

SOIL MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Specified

1. Includes, but is not necessarily limited to, supplying all labor, materials, and equipment necessary to excavate, transport, dump, spread, and compact soil materials in the locations and to the depth shown on the technical drawings and/or as directed.

2. Soil materials include general fill, select fill, and riprap.

B. Applicable Standards and Specifications

1. American Society for Testing Materials (ASTM).

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-02232 - Geotextile Fabric
B. Waste Characterization Plan
C. Soil Cover/Backfill Characterization Plan
D. Exhibit E-2 (QA/QC Procedures for Survey Activities)

1.03 TECHNICAL SUBMITTALS

A. Proposed sources (names and addresses) of soil materials and quantity of material available from each source if such source is not pre-determined by GE.

B. Samples of each proposed soil material to be submitted for laboratory analysis for chemical constituents and, if applicable, geotechnical parameters (e.g., grain size distribution, compaction testing, etc.). Volume and collection methods shall be coordinated with GE. Samples will be analyzed by GE.

PART 2 - PRODUCTS

2.01 GENERAL FILL MATERIALS

A. General Backfill

1. Material to be used for general backfill in excavations will be free of objects larger than 6-inches in any dimension, sticks, roots, or any other deleterious materials. Materials must be capable of achieving the minimum compaction requirements specified in the RD/RA documentation, as determined by laboratory and field testing.

MATERIALS AND PERFORMANCE - SECTION 02221

SOIL MATERIALS

B. Earthen Berms

1. Material to be used for construction of the earthen berms will be free of objects larger than 3-inches in any dimension, sticks, roots, or any other deleterious materials. Materials must be capable of achieving the minimum compaction requirements specified in the RD/RA documentation, as determined by laboratory and field testing.

C. Soil Cover Layer

1. Material used as a soil cover layer will be free of objects larger than 3 inches in any dimension, sticks, roots, or any other deleterious materials. Alternatively, Type 3 select fill may be used as the soil cover layer.

D. General fill material to be placed within 1 foot of any subsurface piping or other structures will be free of objects larger than 2 inches in any dimension.

2.02 SELECT FILL MATERIALS

A. Type 1: Pipe and Manhole Bedding

1. Pipe and manhole bedding material will be M1.04.0 Type A, as specified in the Massachusetts Highway Department Standard Specifications for Highways and Bridges. Materials must be capable of achieving the minimum compaction requirements specified in the RD/RA documentation.

B. Type 2: Asphalt Subbase

1. Asphalt subbase will be M2.01.7 dense graded crushed stone, as specified in the Massachusetts Highway Department Standard Specifications for Highways and Bridges. Materials must be capable of achieving the minimum compaction requirements specified in the RD/RA documentation.

C. Type 3: Drainage Soil Layer

1. Material will be sand having no particles greater than 2-inch and a hydraulic conductivity of between 1×10^{0} and 1×10^{-3} cm/s, depending on the application.

D. Type 4: Grading Layer

1. Grading layer will be material having no particles greater than 2-inch. Additionally, the particles will be rounded to minimize potential damage to the overlying geosynthetic material.

E. Type 5: Riprap

1. Stone used for riprap will be hard, durable, angular in shape, resistant to weathering and to water action, free from overburden, spoil, shale and organic material, and will meet the gradation requirements for the type specified. Neither breadth nor thickness of a single stone should be less than one-third its length. Rounded stone or boulders will not be accepted unless specified. Shale and stone with shale seams are not acceptable.

MATERIALS AND PERFORMANCE - SECTION 02221

SOIL MATERIALS

2. Riprap sources will be selected and approved in advance of the time the stone will be required in the work. The acceptability of the stone material will be determined by service records and/or by suitable tests.

3. The size of riprap to be provided will be as indicated in the technical RD/RA documentation. Each load of riprap will be reasonably well graded from the smallest to the maximum size specified.

PART 3 - EXECUTION

3.01 PLACEMENT

A. General Fill and Type 1 through Type 4 Select Fill Materials

1. In general, soil fill material will be placed and compacted in horizontal layers not exceeding those thicknesses indicated in the RD/RA documentation. Soil fill material will not be placed on snow, ice, or soil that was permitted to freeze prior to compaction, or on ground which cannot support the weight of construction equipment.

2. Each layer of soil fill material will be thoroughly compacted in accordance with the RD/RA documentation. Successive layers will not be placed until the layer under construction has been compacted to the satisfaction of GE/GE=s Representative.

3. Trucks or other heavy equipment will not be operated over pipelines until the minimum depth of backfill above the crown of the trenched pipe has been placed and properly compacted.

4. If, due to rain or other causes, the material is too wet for satisfactory compaction, it will be allowed to dry or be removed as required, before compaction.

5. Unless indicated otherwise, asphalt subbase material will be underlain with a single layer of woven geotextile (refer to Section 02232 [Geotextile Fabric]).

B. Type 5 Select Fill (Riprap)

1. Surfaces to be protected by riprap will be free of brush, topsoil, trees, stumps, and other objectionable material and will be dressed to a smooth surface. Type 5 Select Fill (riprap) will not be placed on snow, ice, or soil that was permitted to freeze prior to compaction, or on ground that cannot support the weight of construction equipment.

2. Stone for riprap will be placed on the prepared slopes and surfaces in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone will be placed so as to be in conformance with the lines, grades, and thicknesses shown on the technical drawings. Riprap will be placed to its full course thickness in one operation and in such a manner as to avoid displacing the underlying material.

3. Larger stones will be well distributed throughout the mass. All material will be placed and distributed such that there is no large accumulation of either the larger or smaller sizes of stone.

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SOIL MATERIALS

4. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the results specified.

5. Unless otherwise specified, riprap will be placed as soon as possible following preparation of underlying subbase in order to minimize the potential for erosion of unprotected soil.

6. Riprap will be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones will be placed at the bottom of the slope. The riprap will be properly aligned and placed so as to minimize void spaces between adjacent stones. The spaces between the stones will be filled with spalls of suitable size.

7. Unless indicated otherwise on the Technical Drawings, riprap will be underlain with a sand bedding and/or layer of non-woven geotextile (refer to Section 02232 [Geotextile Fabric]).

3.02 FIELD TESTING AND QUALITY CONTROL

A. In-place nuclear density testing (ASTM D2922 and D3017) of compacted general fill (excluding soil cover layer) and Type 1 through Type 4 select fill will be performed by an independent testing laboratory at the frequency specified in the RD/RA documentation.

3.03 CRITERIA AND TOLERANCES

A. Soil materials will be constructed to such heights as to make allowance for post-construction settlement. Any settlements which occur will be corrected to make the fill conform to the design lines and grades.

- END OF SECTION -

MATERIALS AND PERFORMANCE - SECTION 02232

GEOTEXTILE FABRIC

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes, but is not necessarily limited to, all labor, materials, tools, and equipment required to furnish and install geotextile fabric.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-02221 - Soil Materials
B. Exhibit E-2 (QA/QC Procedures for Survey Activities)

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D4632-91 (Rev. 1997), Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

2. ASTM D4833-00, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

3. ASTM D4533-91 (Rev. 1996), Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

4. ASTM D4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

5. ASTM D4491-99a, Standard Test Method for Water Permeability of Geotextiles by Permittivity.

1.04 TECHNICAL SUBMITTALS

A. Manufacturer’s data for geotextile including, at a minimum, physical properties, packaging, and installation techniques.

B. Manufacturer's quality assurance/quality control program.

C. Certified results of all quality control testing.

D. Proposed transportation, handling, storage, and installation techniques.

E. Shop drawings.

F. Manufacturer’s standard warranty provided for the geotextiles.

MATERIALS AND PERFORMANCE - SECTION 02232

GEOTEXTILE FABRIC

PART 2 - PRODUCT

2.01 MATERIALS

A. For the purpose of these specifications, and the technical drawings, the terms "geotextile," "geotextile fabric," and "filter fabric" will be considered synonymous.

B. Geotextile fabric used will be of the types listed below:

Type 1 - non-woven geotextile for general use as a separation layer between dissimilar soil materials and beneath riprap.
Type 2 - woven geotextile to be used in road bed construction.

C. Type 1 Geotextile

1. Type 1 geotextile will be of needle-punched construction and consist of long-chain polymeric fibers or filaments composed of polypropylene, will be free of any chemical treatment which reduces permeability, and will be inert to chemicals commonly found in the site soils.

2. Type 1 geotextile will have the minimum physical properties listed below (based on minimum average roll values):

Property	Unit of Measure	Test Method	Minimum Test Value[1]
Nominal Unit Weight	oz./sq. yd.	-	-
Grab Tensile	lbs.	ASTM D4632	-
Grab Elongation	%	ASTM D4632	-
Puncture	lbs	ASTM D4833	-
Trapezoid Tear	lbs	ASTM D4533	-
Apparent Opening Size (AOS)	US Sieve Number	ASTM D4751	-
Permittivity	sec^{-1}	ASTM D4491	-

1 Minimum test values will be provided in the technical RD/RA documentation.

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GEOTEXTILE FABRIC

D. Type 2 Geotextile

1. Type 2 geotextile will be woven from a monofilament or monofilament yarn made from polymeric fibers, will be free of any chemical treatment, and will be inert to chemicals commonly found in soil.

2. Type 2 geotextile will have the minimum physical properties indicated below (based on minimum average roll values):

Property	Unit of Measure	Test Method	Minimum Test Value[1]
Nominal Unit Weight	oz/yd.^{2}	-	-
Grab Tensile	lbs.	ASTM D4632	-
Grab Elongation	%	ASTM D4632	-
Puncture	lbs	ASTM D4833	-
Trapezoid Tear	lbs	ASTM D4533	-
1 Minimum test values will be provided in the technical RD/RA documentation.			

2.02 DELIVERY, STORAGE, AND HANDLING

A. Geotextiles will be furnished in a protective wrapping which will be labeled with the following information: Manufacturer's name, product identification, lot #, roll #, and dimensions.

B. The geotextile will be protected from ultraviolet light, precipitation, mud, soil, excessive dust, puncture, cutting, and/or other damaging conditions prior to and during delivery. The geotextile will be capable of withstanding 30 days of sunlight without measurable deterioration. The geotextile will be stored onsite at a specified location.

2.03 QUALITY ASSURANCE

A. The field-delivered material will meet the specification values according to the Manufacturer's specification sheet. Written certification will be submitted that states that the delivered material meets the Manufacturer's specifications. Quality control test results conducted by the Manufacturer during the manufacturing of the geotextile fabric delivered to the project site will be prepared. The results will identify the sections/panels of field delivered fabric they represent.

B. The Manufacturer will have developed and adhere to its own quality assurance program in the manufacture of the geotextile.

C. Prior to installation, it will be verified that the geotextile fabric has not been damaged due to improper transportation, handling, or storage.

MATERIALS AND PERFORMANCE - SECTION 02232

GEOTEXTILE FABRIC

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to installation of the geotextile, placement surfaces will be leveled and uniformly compacted, as necessary, to provide a stable interface for the geotextile that is as smooth as possible.

3.02 GEOTEXTILE INSTALLATION

The following procedures and requirements will be followed during the installation of geotextile.

A. Placement

1. At critical areas, survey verification shall be performed to ensure that the proposed lines, grades, and levels have been attained.

2. The placement of the geotextile will not be conducted during adverse weather conditions. The geotextile will be kept dry during storage and up to the time of deployment. During windy conditions, all geotextiles will be secured with sandbags or an equivalent anchoring system. Removal of the sandbags or an equivalent approved anchoring system will only occur upon placement of an overlying soil layer.

3. During the placement of geotextiles, care will be taken to keep dirt, dust, sand, and mud off the geotextiles to minimize the potential for clogging. If excessive soil materials are present on the geotextile, it will be cleaned or replaced as necessary.

4. The geotextile will be covered within the time period recommended by the Manufacturer.

5. When installed on slopes exceeding 10%, the upgradient edge(s) of the geotextile will terminate in an anchor trench sufficient to resist downgradient slippage of the material.

B. Seaming and Repairing

1. Adjacent geotextiles will be installed using a 12-inch overlap.

2. Repair of tears or holes in the geotextile will require the following procedures:

a. On Slopes: A patch made from the same geotextile will be double-seamed into place, with each seam 1/4-inch to 3/4-inch apart and no closer than 1 inch from any edge. Should any tear exceed 10% of the width of the roll, that roll will be removed from the slope and replaced.

b. Non-Slopes: A patch made from the same geotextile will be spot-seamed in place with a minimum of 12-inch overlap in all directions.

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GEOTEXTILE FABRIC

3.03 POST-CONSTRUCTION

A. Upon completion of the installation, the following will be prepared and filed:

1. All quality control documentation.

- END OF SECTION -

MATERIALS AND PERFORMANCE - SECTION 02234

GEOMEMBRANE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Specified

1. This section includes all labor, materials, equipment, and QA/QC testing necessary to furnish and install high density polyethylene (HDPE) flexible membrane liner (FML) material.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-02221 - Soil Materials
B. Section MP-02232 - Geotextile Fabric
C. Section MP-02236 - Geosynthetic Drainage Composite
D. Exhibit E-2 (QA/QC Procedures for Survey Activities)

1.03 APPLICABLE CODES, STANDARDS, SPECIFICATIONS, AND PUBLICATIONS

A. American Society for Testing and Materials (ASTM)

1. ASTM D413-98, Standard Test Method for Rubber Property - Adhesion to Flexible Substrate.

2. ASTM D638-99, Standard Test Method for Tensile Properties of Plastics.

3. ASTM D746-98, Standard Test Method for Brittleness Temperature of Plastics and Elastometers by Impact.

4. ASTM D751-00, Standard Test Methods for Coated Fabrics.

5. ASTM D792-98, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

6. ASTM D882-97, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

7. ASTM D1004-94a, Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

8. ASTM D1203-94 (Rev. 1999), Standard Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods.

9. ASTM D1204-94, Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.

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10. ASTM D1238-99, Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

11. ASTM D1505-98, Standard Test Method for Density of Plastics by the Density-Gradient Technique.

12. ASTM D1603-94, Standard Test Method for Carbon Black in Olefin Plastics.

13. ASTM D5397-99, Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.

14. ASTM D1790-99, Standard Test Method for Brittleness Temperature of Plastic Sheeting by Impact.

15. ASTM D4833-00, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

16. ASTM D5199-99, Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

17. ASTM D5596-94, Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

B. Geosynthetic Research Institute (GRI)

1. GRI Test Method GM 13 - Test Properties, Testing Frequencies and Recommended Warrant for High-Density Polyethylene (HDPE) Smooth and Textured Geomembranes.

C. Where reference is made to one of the above codes, standards, specifications, or publications, the revisions in effect at the time of bid shall apply.

1.04 TECHNICAL SUBMITTALS

A. In addition to the Manufacturer and Installer qualifications presented in Subsection 1.05 of this specification, the following information will be submitted to GE/GE's Representative for approval at least one week prior to installation:

1. Panel layout plan.

2. Quality control program manuals covering all phases of manufacturing and installation.

3. Complete and detailed written instructions for the storage, handling, installation, seaming, inspection plan fail criteria for liner inspections, and QA/QC testing procedures of the liner in compliance with these specifications and the condition of its warranty.

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B. Upon shipment, the Manufacturer's quality control certifications will be submitted to verify that the materials supplied for the project are in accordance with the requirements of this specification.

1.05 QUALIFICATIONS

A. FML Manufacturer

1. The following information regarding the FML Manufacturer will be used to determine Manufacturer qualifications:

a. Corporate background and information.

b. Manufacturing capabilities including:

1) Quality control procedures for manufacturing.

2) List of material properties including certified test results, to which FML samples are attached.

c. A list of at least 10 completed facilities, totaling a minimum of 10,000,000 ft^2, for which the Manufacturer has manufactured FMLs. For each facility, the following information shall be provided:

1) Name and purpose of facility, its location, and date of installation.

2) Name of owner, Project Manager, Designer, Fabricator (if any), and Installer.

3) Thickness of FML, surface area of FML manufactured.

d. Origin (resin supplier's name, resin production plan) and identification (brand name and number) of the resin.

B. Installer

1. The Installer must be trained and approved and/or licensed by the FML Manufacturer for the installation of FML.

2. The following written information regarding the Installer will be used to determine Installer qualifications.

a. Copy of Installer's letter of approval or license by the Manufacturer.

b. Resume of the "master seamer" to be assigned to this project, including dates and duration of employment.

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3. All personnel performing seaming operations will be qualified by experience or by successfully passing seaming tests. At least one seamer will have experience seaming a minimum of 1,000,000 ft^2 of FML of the type for this project, using the same type of seaming apparatus in use at the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. HDPE Lining Material Specifications

1. HDPE FML material will meet the following minimum specification values listed below and as listed in GRI GM13.

Property	Test Method	Minimum Test Value[1]
HDPE FML Resin		
Specific Gravity (min.)	ASTM D1505/D792	-
Carbon Black Content	ASTM D1603	-
Carbon Black Dispersion	ASTM D5596	-
HDPE FML Rolls		
Mechanical		
Thickness (± 10%)	ASTM D5199	-
Specific Gravity (min.)	ASTM D1505/D792	-
Tensile Properties		
Tensile Strength at Break (min.)	ASTM D638 Type IV	-
Tensile Strength at Yield (min.)		-
Elongation at Break (min.)		-
Elongation at Yield (min.)		-
Tear Resistance (min.)	ASTM D1004	-

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Property	Test Method	Minimum Test Value[1]
Puncture Resistance (min.)	ASTM D4833	-
Stress Crack Resistance	ASTM D5397	-
1 Minimum test values will be provided in the technical RD/RA documentation		

B. Welding Material

1. The resin used in the welding material will be identical to the liner material.

2. All welding materials will be of a type recommended and supplied by the Manufacturer and will be delivered in the original sealed containers, each with an indelible label bearing the brand name, Manufacturer's mark number, and complete directions as to proper storage.

C. Labeling FML Rolls

1. Labels on each roll or factory panel will identify the following:

a. The thickness of the material.
b. The length and width of the roll or factory panel.
c. The Manufacturer.
d. Directions to unroll the material.
e. Product identification.
f. Lot number.
g. Roll or field panel number.

2.02 DELIVERY, HANDLING, AND STORAGE

A. Care will be exercised when handling and storing the FML to minimize the potential for damaging the material.

2.03 CONFORMANCE TESTING

A. Within one week of delivery, the FML will be sampled at the specified frequency and forwarded to an approved testing laboratory for testing to ensure conformance to both the design specifications and the list of guaranteed properties.

B. At a minimum, tests to determine the following characteristics will be performed on the FML:

1. Density, ASTM D1505
2. Carbon black content, ASTM D1603
3. Carbon black dispersion, ASTM D5596
4. Thickness, ASTM D5199
5. Tensile characteristics, ASTM D638

C. FML samples will be taken across the entire width of the roll. Unless otherwise specified, samples will be 3-feet long by the roll width.

D. Unless otherwise specified, FML samples will be taken at a rate of one per lot or one per 100,000 ft^2 of FML.

PART 3 - EXECUTION

3.01 FML INSTALLATION

A. Related Earthwork

1. The Remediation Contractor will insure that all related earthwork requirements under this section are complied with:

a. The FML installations will be performed on a firm, smooth, soil, or geotextile-covered surface free from stones or protruding objects. The lines, grades, and levels of the surface must be verified by survey.

b. No FML will be placed onto an area which has become softened by precipitation.

c. No FML will be placed on frozen soil material. Such material will be removed and replaced with new soil fill as specified in Section MP-02221 (Soil Materials).

d. The FML Installer will certify in writing that the final surface on which the FML is to be installed is acceptable.

e. All surfaces on which the FML are to be installed will be acceptable to GE/GE's Representative prior to FML installation.

f. Free edges of FML will be secured in such a manner as to prevent uplift by wind or the intrusion of water under the liner. Edge protection will include sandbags, polyethylene sheeting, or other approved methods as deemed necessary.

g. The FML will be anchored within an anchor trench constructed to the dimensions shown in the technical drawings. Care will be taken while backfilling the trenches to prevent damage to the FML.

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B. FML Deployment

1. FML will be deployed according to the following procedures:

a. Placement of the FML panels will be according to the approved location and panel layout drawing provided by the Installer. Placement will follow all instructions on the boxes or wrapping containing the FML materials which describe the proper methods of unrolling panels.

b. The method of placement will ensure that:

1) Deployed FML is visually inspected for uniformity, tears, punctures, blisters, or other damage or imperfections. Any such imperfections will be immediately repaired and re-inspected.

2) No equipment used will damage the FML by handling, trafficking, leakage of hydrocarbons, or other means.

3) The prepared surface underlying the FML will not be allowed to deteriorate after acceptance and will remain acceptable up to the time of FML placement and until completion of the project.

4) Adequate temporary loading and/or anchoring (e.g., sand bags), not likely to damage the FML, will be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels).

5) Direct contact with the FML will be minimized; i.e., the FML in excessively high traffic areas will be protected by geotextiles, extra FML, or other suitable materials.

c. Any damage to the FML panels or portions of the panels as a result of placement will be replaced or repaired.

d. The Installer will assign an “identification number” to each FML panel placed. The number system used will be simple, logical and identify the relative location in the field.

C. Seaming

1. The seaming procedures below will be implemented, where applicable, during installation of the FML. The seaming procedures are as follows:

a. Generally all seams, whether field or factory, will be oriented parallel to the line of slope, not across the slope. At liner penetrations and corners, the number of seams will be minimized.

b. The area of the FML to be seamed will be cleaned and prepared according to the procedures specified by the material Manufacturer. Any abrading of the FML will not extend more than 2-inch on either side of the weld. Care will be taken to eliminate or minimize the number of wrinkles and "fishmouths" resulting from seam orientation.

c. Field seaming will be prohibited when either the air or sheet temperature is below 32°F or when the sheet temperature exceeds 122°F or when the air temperature is above 104°F. Ambient temperatures will be measured in the area in which the panels are to be placed, then the decision if installation is to be stopped or special procedures are to be used will be made. At air or sheet temperatures between 32°F and 40°F, seaming will be conducted directly behind a preheating device. In addition, seaming will not be conducted when FML material is wet from precipitation, dew, fog, etc., or when winds are in excess of 20 miles per hour.

d. Seaming will not be performed on frozen or excessively wet underlying soil surfaces.

e. Seams will have an overlap beyond the weld large enough to perform destructive peel tests, but not exceeding 5 inches.

f. Trial seams will be performed on excess FML material. A 1-foot by 3-foot seamed liner sample will be fabricated with the seam running down the 3-foot length in the center of the sample. Such trial seaming will be conducted prior to the start of each seaming succession for each seaming crew, change in machine or every 4 hours, after any significant change in weather conditions or FML temperature, or after any change in seaming equipment (e.g., generator, heaters, etc.). Each seamer will make at least one trial seam each day. Trial seams will be made under the same conditions as actual seams. From each trial seam, two field test specimens will be taken. The test specimens will be 1-inch by 12-inch strips cut perpendicular to the trial seam. These specimens will be peel tested using a field tensiometer capable of maintaining a constant jaw separation rate of two inches per minute, and recorded as pass (failure of liner material) or fail (failure of seam). Upon initial failure, a second trial seam will be made; if both test specimens do not pass, then the seaming device and its operator will not perform any seaming operations until the deficiencies are corrected and two successive passing trial seam test specimens are produced. Completed trial seam samples cannot be used as portions of a second sample and will be discarded.

g. Where fishmouths occur, the material will be cut, overlapped, and an overlap weld applied. Where necessary, patching using the same liner material will be welded to the FML sheet.

h. Acceptable seaming methods for FML are:

   1) Extrusion welding using extrudate with identical physical, chemical, and environmental properties.

   2) Hot-wedge welding using a proven fusion welder and master seamer.

i. Seaming device will not have any sharp edges which might damage the FML. Where self-propelled seaming devices are used, it will be necessary to prevent "bulldozing" of the device into the underlying soil.

D. Seam Testing

1. Non-destructive seam testing will be performed on 100% of field seams. The following test method and procedures may be used.

a. Air pressure testing may be used if double track hot-wedge welding has been utilized to seam the HDPE FML. Using approved pressure testing equipment, the following procedures will be followed:

1) Seal both ends of the air channel separating the double hot-wedge welds.
2) Insert pressure needle into air channel and pressurize the air channel to 25 psi.
3) Monitor pressure gauge for 3 minutes and determine whether pressure is maintained without a loss of more than 2 psi.
4) If the pressure test fails, localize the leak and mark the area for repair.

Air pressure testing will be conducted under the direct observation of GE/GE's Representative.

b. Vacuum testing will be used on all seams not tested using air pressure testing. Using an approved vacuum box, the following procedures will be followed:

1) Apply a soapy water mixture over the seam.
2) Place vacuum box over soapy seam and form a tight seal.
3) Create a vacuum by reducing the vacuum box pressure to 5 psi (35 KPa) for 30 seconds.
4) Observe through the vacuum box window any bubbles.
5) Where bubbles are observed, mark seam for repair.
6) Move vacuum box further down seam overlapping tested seam by 3 inches.
7) Where hot-wedge seaming has been performed, the overlap will be cut back to the weld.

All vacuum testing will be conducted under the direct observation of GE/GE=s Representative.

2. In addition to non-destructive seam testing, the following destructive testing procedures will be performed:

a. Test samples will be prepared by the Installer every 500 feet of seam length performed by each welder, a minimum of one test for each seaming machine per day, or more frequently as necessary. Sample location and size will be selected by GE/GE=s Representative. The sample size (12 x 56 inches) will be large enough to produce three sets of test specimens for the following tests:

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1) Seam Shear Strength, ASTM D816 as modified in ANSI/NSF Std. 54.

2) Peel Adhesion, ASTM D413 and D4437 as modified in ANSI/NSF Std. 54.

3) Adjacent Geomembrane Elongation, ASTM D4437.

b. Ten specimens will compose a set. Five of these will be tested for peel and the other five for shear strength. Each specimen will be 1-inch wide and 12 inches long with the field seam at the center of the specimen. The 56-inch sample length will first be cut at the ends to produce two field peel test specimens. If both samples pass the field peel test, the remaining 54 inches will be divided into thirds and one third submitted to the Remedial Contractor, one third to an independent testing laboratory, and one-third to GE/GE's Representative for storage and future reference.

c. Test specimens will be considered passing if the minimum values below are met or exceeded for four of the five test specimens tested by the independent laboratory. All acceptable seams will lie between two locations where samples have passed.

d. Seams will meet the following minimum criteria:

Field Seam Properties	Test Method	Minimum Test Value
Shear Strength at Yield (lb/in width)	ASTM D816 as modified in ANSI/NSF Standard 54	90% of specification limit of sheet value for adjacent material
Peel Adhesion	ASTM D413 as modified in ANSI/NSF Standard 54	Film tear bond
Adjacent Geomembrane Elongation	ASTM D4437	100%

3. If a sample fails destructive testing, it will be insured that: the seam is reconstructed in each direction between the location of the sample which failed and the location of the next acceptable sample; or the welding path is retraced to an intermediate location at least 10 feet in each direction from the location of the sample which failed the test, and a second sample is taken for an additional field test. If this second test sample passes, the seam will then be reconstructed between the location of the second test and the original sampled location. If the second sample fails, the process must be repeated.

4. If double track hot-wedge welding is used, the track weld that will be used in the destructive testing will be agreed to by the parties involved. The weld chosen inside or outside will be consistently tested and pass according to the criteria above.

5. All holes created by cutting out destructive samples will be patched immediately with an oval patch of the same material welded to the membrane using extrusion welding. The patch seams will be tested using a vacuum box and using the procedures described above. Work will not proceed with materials covering the FML until passing results of destructive testing have been achieved.

6. At the ends of each field seam, two field test specimens will be taken and field tested with a field tensiometer. Both specimens must pass prior to placing the membrane in the anchor trench or continuing with additional seams. Failure of these specimens will require correcting the seaming device and repair of the preceding seam according to the failure testing and procedures described above.

E. Liner Repair

1. All imperfections, flaws, construction damage, and destructive and non-destructive seam failures will be repaired using the following methodology:

a. Patching, used to repair holes, tears, undispersed raw materials, and contamination by a foreign matter.

b. Grinding and rewelding, used to repair small sections of extruded seams.

c. Spot welding or seaming, used to repair pinholes or other minor, localized flaws.

d. Capping, used to repair large lengths of failed seams.

e. Topping, used to repair areas of inadequate seams which have an exposed edge.

f. Removing bad seam and replacing with a strip of new material welded into place used with large lengths of fusion seams.

F. Construction Material Placement and Penetrations

1. Wrinkles that develop from normal placement procedures will be controlled such that the underlying FML does not fold over. Small wrinkles, defined as having their height less than or equal to one-half their base width, may be trapped and pushed down by the overlying soil. Any wrinkle which becomes too large and uncontrollable or which folds the FML over will be brought to the attention of the appropriate individuals. If necessary, the FML will be uncovered, cut, laid flat, seamed by extrusion welding, and non-destructively tested.

3.02 POST-CONSTRUCTION

A. Record drawings will be prepared which illustrate the following:

1. Dimensions of all FML field panels.

2. Panel locations referenced to the technical drawings.

3. All field seams and panels with the appropriate number or code.

4. Location of all patches, repairs, and destructive testing samples.

3.03 WARRANTY

A. A standard Manufacturer warranty will be obtained and reviewed for completeness prior to accepting its provisions.

- END OF SECTION-

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes all labor, materials, tools, and equipment necessary to furnish and install geosynthetic drainage composite (GDC).

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-02234 - Geomembrane
B. Exhibit E-2 (QA/QC Procedures for Survey Activities)

1.03 REFERENCES

A. American Society of Testing and Materials (ASTM):

1. ASTM D413-98, Standard Test Method for Rubber Property - Adhesion to Flexible Substrate.

2. ASTM D1505-98, Standard Test Method for Density of Plastics by the Density-Gradient Technique.

3. ASTM D1238-99, Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

4. ASTM D1603-94, Standard Test Method for Carbon Black in Olefin Plastics.

5. ASTM D4716-00, Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geotextile Using a Constant Head.

6. ASTM D3776-96, Standard Test Method for Mass per Unit Area (Weight) of Fabric.

7. ASTM D1777-96, Standard Test Method for Thickness of Textile Materials.

8. ASTM D4632-91 (Rev. 1997), Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

9. ASTM D4833-00, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

10. ASTM D4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

11. ASTM D4533-91, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

1.04 TECHNICAL SUBMITTALS

A. Operational Submittals

1. Manufacturer's data for the GDC including physical properties and roll size.

2. GDC material sample.

3. Manufacturer's quality assurance/quality control program.

4. Certified results of all quality control testing.

5. Proposed transportation, handling, and storage techniques.

6. Shop drawings indicating panel layouts and proposed installation sequence and techniques.

1.05 QUALIFICATIONS

A. GDC Manufacturer

1. The following information regarding the GDC Manufacturer will be used to determine Manufacturer qualifications:

a. Corporate background and information.

b. Manufacturing capabilities including:

1) Quality control procedures for manufacturing.

2) List of material properties including certified test results, to which GDC samples are attached.

c. A list of at least 10 completed facilities, totaling a minimum of 1,000,000 ft^2, for which the Manufacturer has manufactured GDCs. For each facility, the following information shall be provided:

1) Name and purpose of facility, its location, and date of installation.

2) Name of owner, Project Manager, Designer, Fabricator (if any), and Installer.

3) Thickness of GDC and surface area of GDC manufactured.

d. Origin (resin supplier's name, resin production plan) and identification (brand name and number) of the resin.

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

PART 2 - PRODUCTS

2.01 MATERIALS

A. The GDC will comprise a high density polyethylene (HDPE) drainage net composited with two non-woven geotextiles. The geotextiles will be heat-bonded to both sides of the drainage net.

1. The drainage net to be utilized in the composite will be a profiled mesh made by extruding two sets of high density strands together to form a diamond shaped, three-dimensional net to *provide* planar fluid flow. The drainage net will be made of HDPE containing carbon black, anti-oxidants, and heat stabilizers which will be manufactured from resin provided from one resin supplier.

2. The geotextile will be a non-woven, needle-punched polymeric material.

B. The GDC will meet the following specifications:

1. Drainage Net

Property	**Test Method**	**Minimum Test Value[1]**
Specific Gravity (g/cm^3)	ASTM D1505	-
Melt Flow Index (g/10 min)	ASTM D1238 - Condition E	-
Percent Carbon Black (%)	ASTM D1603	-
Transmissivity (m^2/sec)	ASTM D4716	-
Thickness (mil)	ASTM D374 at Strand Intersection	-
1. Minimum test values will be provided in the technical RD/RA documentation.		

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

2. Geotextile

Property	Test Method	Minimum Test Value[1]
Fabric Weight (oz/yd^2)	ASTM D-3776	-
Thickness (mils)	ASTM D-1777	-
Grab Strength (lbs.)	ASTM D-4632	-
Grab Elongation (%)	ASTM D-4632	-
Puncture (lbs.)	ASTM D-4833	-
A.O.S. (U.S. Sieve)	ASTM D-4751	-
Trapezoidal Tear (lbs.)	ASTM D-4533	-
Permittivity (gal/min/ft^2/sec^{-1})	ASTM D-4491	-
Permeability (cm/sec)	ASTM D-4491	-
1. Minimum test values will be provided in the technical RD/RA documentation.		

2.02 DELIVERY, STORAGE, AND HANDLING

A. The GDC will be packaged and shipped by appropriate means so as to minimize damage. Materials will be delivered only after the required technical submittals have been received and reviewed.

B. The GDC will be furnished in rolls, marked, or tagged with the following information:

1. Manufacturer's Name
2. Product Identification
3. Lot/Batch Number
4. Roll Number
5. Roll Dimensions

C. The GDC will be stored in an approved area which minimizes the potential for damage to the product or packaging.

D. The GDC will be kept clean and free from dirt, dust, mud, and any other debris.

E. Any GDC found to be damaged will be replaced with new material.

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

2.03 QUALITY ASSURANCE

A. Field delivered material will meet the specification values according to the Manufacturer's specification sheet. Written certification will be provided stating that the delivered material meets the Manufacturer's specifications. Quality control test results conducted by the Manufacturer during the manufacturing of the GDC delivered to the project site will be prepared. The results will identify the sections of field delivered GDC they represent.

B. The Manufacturer will have developed and will adhere to its own quality assurance program in the manufacture of the GDC.

C. Prior to installation, it will be verified that the GDC has not been damaged due to improper transportation, handling, or storage.

D. Each individual involved with GDC installation will have recorded 500,000 sq. ft. of successful material installation.

PART 3 - EXECUTION

3.01 PREPARATION

A. The areas designated for placement of GDC will be free from any deleterious material.

B. If the GDC is not clean before installation, it will be washed to remove any soil and/or debris.

3.02 INSTALLATION

A. GDC will be installed at locations shown on the technical drawings.

B. Adjacent rolls will overlap approximately 2 to 4 inches (i.e., geonet component). Sewing shall be used to form the seam of the geotextiles. Heat leistering shall be performed to seam the geotextiles when sewing is not feasible.

C. In the corners of side slopes where overlaps between rolls of GDC are staggered, an extra layer of GDC will be installed from the top to the bottom of the slope.

D. The GDC will be unrolled downslope keeping the net in slight tension to minimize wrinkles and folds.

E. Adequate loading will be placed to prevent uplift by wind.

F. Holes or tears in the GDC will be repaired in accordance with the Manufacturer's recommendations and/or the technical RD/RA documentation.

3.03 POST-CONSTRUCTION

A. Record drawings identifying constructed panel layout, locations of imperfections and repairs, and any other appropriate observations will be prepared.

MATERIALS AND PERFORMANCE - SECTION 02236

GEOSYNTHETIC DRAINAGE COMPOSITE

3.04 WARRANTY

A. A standard Manufacturer warranty will be obtained and reviewed for completeness prior to accepting its provisions.

- END OF SECTION -

Exhibit E-2 – Quality Assurance/Quality Control Guidelines

Table of Contents

I. Introduction

A. General

This Exhibit E-2 provides general QA/QC guidelines for the performance of survey activities during the implementation of the construction-related response actions. As described below, certain survey activities will be performed by a Licensed Surveyor (which will be retained by the Remediation Contractor or GE/GE=s Representative), while the others will be performed by the Remediation Contractor or GE/GE=s Representative. The survey measurements will be performed to ensure the accuracy and completeness of response actions and to verify, as appropriate, attainment of the performance requirements set forth in the technical RD/RA documentation.

For the purposes of surveying, the construction-related response actions can generally be divided into two categories: 1) actions involving excavation of materials and subsequent backfilling, and 2) actions that entail placement of soil, asphalt, and/or geosynthetic materials (e.g., engineered barriers/caps and soil covers). Ancillary items (e.g., pipelines, manholes, ditches, etc.) included within the scope of a specific Removal Action will also require survey measurements during their construction, but such surveys will generally be performed by the Remediation Contractor. These measurements may, however, be verified by GE/GE=s Representative periodically throughout the construction.

B. Format

Following this introductory section, Section II describes the survey procedures to be implemented during response actions that require excavation of impacted materials. Section III discusses the survey procedures to be used during response actions that include placement of soil, asphalt, and/or geosynthetic materials.

II. Survey Procedures for Excavation Activities

A. General

The following is a general description of the field survey procedures to be used during the performance of response actions that require excavation of soils, sediments, or other materials.

B. Pre-Excavation Survey

Prior to the performance of excavation activities, a preliminary pre-excavation survey will be conducted by a Licensed Surveyor. The results of the survey will be used by the Design Engineer for the preparation of a Site Construction Plan. Once prepared, the plan will be included as part of the RD/RA documentation to be reviewed and approved by EPA. The plan will illustrate the anticipated activities to be undertaken within the excavation area in accordance with the technical RD/RA documentation and will contain:

- Existing topographic conditions at and in the vicinity of the proposed excavation area;
- Removal limits provided in the technical RD/RA documentation; and
- A delineation of the materials to be excavated by category of disposition (e.g., TSCA vs. non-TSCA), as provided in the technical RD/RA documentation.

C. Pre-Excavation Survey Data Chart

Following EPA approval of the appropriate construction plan(s) (as part of its approval of the technical RD/RA documentation related to a Removal Action), and prior to initiation of excavation activities, a pre-excavation survey data chart will be prepared. The pre-excavation survey data chart will contain a list of the survey points associated with existing topographic conditions and the targeted removal depths, both generally and for any unique features of the excavation (e.g., materials with different disposition requirements). For each such point, the chart will provide the pre-excavation elevation and the excavation depth or elevation as described in the technical RD/RA documentation. Depending on the particular response action, the chart may be submitted to EPA for review and approval. This chart will be completed by the Remediation Contractor during the response actions.

D. Temporary Control Points

The Remediation Contractor will develop any offsets and temporary control points as needed to monitor excavation depths during the removal activities.

E. Verification of Removal Depths

As removal depths reach the required elevation, a Licensed Surveyor will measure and record subgrade elevations for all data points. The pre-excavation survey data chart referenced in Section C above will be updated by the Remediation Contractor to reflect post-excavation conditions. Depending on the particular response action, the chart may be submitted to EPA for review and approval.

F. Backfilling

Once authorized by GE/GE=s Representative, backfilling activities may begin. Backfill will be placed in accordance with the requirements provided in the technical RD/RA documentation. The Remediation Contractor and/or GE/GE=s Representative will monitor backfill lift thicknesses using control points set from the pre-excavation survey.

G. As-Built Survey

Once restoration activities are complete, a Licensed Surveyor will perform a final survey to document the completed construction activities and will prepare an as-built survey drawing. This drawing will include an updated post-excavation survey data chart which will record the final restored elevations. The survey drawing will be submitted as a component of the Final Completion Report.

III. Survey Procedures During Backfilling/Capping Activities

A. Introduction

This section discusses the survey activities to be performed during response activities that entail installation of soil, asphalt, and/or geosynthetic materials.

B. Site Construction Plan

Prior to the installation of an engineered barrier/cap/soil cover at an RAA, the Design Engineer will prepare a Site Construction Plan based on a site survey conducted by a Licensed Surveyor. The plan will be prepared as part of the RD/RA documentation and provided to EPA for review and approval.

The plan will depict, at a minimum, the following items:

- Existing topographic conditions at and in the vicinity of the proposed area(s) to receive an engineered barrier/cap/soil cover; and

- Final grading contours of the engineered barrier/cap/soil cover.

Following approval of the plan by EPA, the plan will be provided to the Remediation Contractor for use during the response action.

C. Temporary Control Points

The Remediation Contractor will develop any offsets and temporary survey control points necessary for the layout of all lines, grades, and levels for the proper construction of the work. GE/GE=s Representative may also use these points to monitor the material lift thicknesses, slopes, and grades during construction.

D. Survey During Backfilling Operations

The soil and/or geosynthetic materials comprising the engineered barrier/cap/soil cover will be installed in accordance with the technical RD/RA documentation. The installation of the construction materials will be monitored by the Remediation Contractor and/or GE/GE=s Representative. Monitoring activities will consist of survey verification along an appropriately sized grid (typically 50 feet by 50 feet) depending on the areal extent of the engineered barrier/cap/soil cover, at points where the slope changes, and at critical intersection points (e.g., drainage discharge points, the intersection line of the cover and the adjacent existing grades, etc.). At each point, horizontal and vertical control data will be obtained and used to determine conformance with the technical RD/RA documentation. Specific items to be verified may include subgrade elevations, lift and layer thicknesses and elevations, slopes, and horizontal limits.

E. Embankments

The construction of soil embankments (e.g., berms, ditches, etc.) will be required at certain RAAs. Survey measurements during embankment construction will be conducted by the Remediation Contractor to determine conformance with the technical RD/RA documentation. Verification of these measurements may be performed by GE/GE=s Representative periodically during construction.

F. As-Built Survey

Once filling operations are complete, a Licensed Surveyor will perform a final survey to document the completed construction activities, and will prepare an as-built survey drawing. Final grades and elevations, as well as the locations and dimensions of any new structures (e.g., manholes, culverts, etc.), will be recorded on the as-built survey drawing. The survey drawing will be submitted as a component of the Final Completion Report.

Attachment F

Contingency and Emergency Procedures Plan

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

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ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

Exhibits

F-1 Integrated Emergency Response Plan
F-2 OSHA Training for GE Personnel

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

1.0 Introduction

1.1 General

This *Contingency and Emergency Procedures Plan* (CEPP) describes the activities that will be conducted by the General Electric Company (GE) during the performance of Removal Actions at the GE-Pittsfield/Housatonic River Site (Site) under a Consent Decree (CD) executed by GE, the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and other government agencies in October 1999 and entered by the U.S. District Court in Massachusetts on October 27, 2000. Specifically, this plan applies to the Removal Actions that GE is obligated to perform under the CD at several Removal Action Areas (RAAs) within the Site, excluding the response actions being taken and to be taken at the Housatonic River. Additional information regarding these Removal Actions and the applicable Performance Standards for them is contained in a document titled *Statement of Work for Removal Actions Outside the River* (SOW), which is Volume I of Appendix E to the CD.

During the performance of these Removal Actions, GE will take reasonable steps to minimize the release of hazardous constituents and the possibility of a fire or explosion. This CEPP establishes precautionary/ preventative measures that will be taken during the Removal Actions to minimize the likelihood of releases, fires, explosions, medical injuries, or other similar emergency situations. In addition, in the event that such emergency situations do occur or are anticipated to occur, this CEPP outlines the emergency measures and procedures that will be implemented.

This CEPP is one of several plans that are part of GE=s *Project Operations Plan* (POP) for the Removal Actions Outside the River. At several points herein, this CEPP cross-references to another plan within the POP -- namely, GE=s *Site Health and Safety Plan* (HASP).

This CEPP, as approved by EPA, will be referenced as appropriate in future submittals relating to specific Removal Actions. However, some of the activities described in this CEPP may not be applicable to each response action in view of the type, scope, and magnitude of the activities to be conducted and location-specific considerations. Therefore, the contents of this plan are subject to modification based on specific response action activities for a given Removal Action, any location- or activity-specific considerations, and

specific input provided by the contractors selected by GE to do the work. Any modifications will be presented in the various work plans or technical RD/RA submittals for the Removal Action, and will be subject to EPA review and approval.

The Site HASP requires that each contractor used by GE develop, submit, and implement a contractor-specific health and safety plan, as necessary. The Site HASP further requires that the contractor identify the activities to be undertaken in connection with response actions to be performed by the contractor and provide an assessment regarding health and safety requirements. Similarly, this CEPP requires the preparation of a contractor-specific contingency plan. At a minimum, the contractor-s contingency plan should incorporate the procedures presented in this CEPP, with any modifications and additional details as required by location- or activity-specific considerations. The contractor-s contingency plan may be incorporated into the contractor-s health and safety plan, or may be prepared as a separate document. Prior to the initiation of Removal Actions within an RAA, a copy of the contractor-specific Contingency Plan will be provided to EPA for review.

This plan was originally submitted to EPA in January 2001, modified by an Addendum submitted on October 19, 2001, and approved by EPA in a letter dated January 2, 2002. This revision to the plan incorporates the modifications set forth in the October 19, 2001 Addendum. In the future, this plan will be reviewed and updated as necessary on approximately an annual basis. Any changes will be subject to EPA review and approval.

1.2 Format of Document

Section 2.0 describes the various roles and responsibilities of key personnel and support entities as related to implementation of this CEPP for the Site. Emergency response equipment that will be available during implementation of response actions at the Site is identified in Section 3.0. Section 4.0 describes work practices and general procedures that should be implemented to limit the potential for emergency situations, while procedures to be followed in the event of an emergency (including emergency reporting) are presented in Section 5.0. Post-emergency actions and reporting requirements are discussed in Section 6.0.

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

Two exhibits are included as a supplement to this plan. Exhibit F-1 is GE=s existing Integrated Emergency Response Plan. That plan details the emergency procedures that will be implemented if a fire, explosion, natural disaster, spill, or other unplanned release of hazardous waste/material to air, soil, surface water, or groundwater occurs within the GE facility. That plan delineates responsibilities and describes evacuation, cleanup, control, and containment methods to be used in an emergency. That plan was written to comply with OSHA regulations at 29 CFR 1910.38; EPA RCRA regulations at 40 CFR Part 264, Subpart D, 40 CFR Part 265, Subpart D, and 40 CFR 279.52; EPA Clean Water Act regulations at 40 CFR Part 112; Department of Transportation Onshore Oil Pipeline regulations at 49 CFR Part 194; and EPA Clean Air Act regulations at 40 CFR Part 68. Exhibit F-2 includes a listing of key GE employees who have received training pursuant to 29 CFR 1910.120.

2.0 Contingency Plan Roles and Responsibilities

2.1 General Organization

Given the potential range of response actions and potential emergency situations which may occur, the contents of this plan are necessarily general and subject to further definition (as needed) within the work plans and/or other technical RD/RA submittals prepared for each Removal Action. Consistent with the general nature of this plan, all of the primary activities, roles, and responsibilities associated with this CEPP will be performed by GE and its Remediation Contractor(s). However, in the course of an emergency response action, GE may enlist the services of one or more other organizations to assist in implementing this CEPP.

Implementation of this CEPP during the performance of response actions is the overall responsibility of GE and/or its representatives. The GE Project Manager for a given RAA (or designated alternate) will be involved in all emergency measures that may be required for that RAA. Assisting the GE Project Managers are three additional entities: 1) Contractor Emergency Coordinators; 2) First Responders; and 3) GE Plant Protection (including the GE Emergency Response Team) (for the GE facility only). The specific functions performed by GE and other support entities are described below in Section 2.2. In addition to these key personnel and entities, any GE or contractor employee who observes or identifies an emergency situation has certain duties, including noting relevant information regarding the emergency and making an initial notification, as described further in Section 5.2.

2.2 Responsibilities of Key Personnel/Entities

2.2.1 GE Project Manager

For each Removal Action, GE will assign a Project Manager who will serve as the primary point of contact for all phases of the Removal Action and the various response actions performed as part of that Removal Action. In this role, the GE Project Manager will be involved in all emergency/contingency planning and in the response to any emergency measures that are taken.

GE Project Managers must be familiar with: 1) the layout of the RAAs within which response actions are being conducted; 2) the nature of the activities to be performed; 3) the location and characteristics of hazardous materials that are handled or encountered; 4) the location, type, and operation of fire control and spill control/cleanup equipment at each RAA; and 5) the location of pertinent documents and records.

In the event of a chemical release, fire, explosion, medical injury, or other emergency situation, the GE Project Manager will perform or assist others in performing the following activities:

- Gather available information regarding the nature and extent of the emergency;
- Arrange for notification to and deployment of the Response Contractor (GE Emergency Response Team or outside firm);
- Notify other local agencies (e.g., police, hospital, Board of Health, etc.), as well as federal and state agencies, as needed;
- Coordinate temporary storage and disposal of any cleanup material;
- Assure compatibility of stored cleanup material with other stored wastes;

- Generate written follow-up reports regarding the incident as required by various regulatory statutes applicable to the Removal Actions (a sample Emergency Response Report is provided as Appendix II of Exhibit F-1);

- Stop operations and prevent reoccurrence (e.g., require additional training, provide additional engineering controls or other corrective measures);

- Review and approve or modify proposed evacuation routes and assembly areas for on-site personnel at each RAA; and

- Perform periodic assessments of work area conditions and emergency readiness, including audits of available emergency equipment and documentation of changes in work area conditions which may warrant modification of the CEPP.

2.2.2 Contractor Emergency Coordinators

The performance of response actions at a given RAA may require one or more contractors. Unless otherwise directed by GE, each contractor will be responsible for developing and implementing a contractor-specific contingency plan and appointing a Contractor Emergency Coordinator.

The Contractor Emergency Coordinator is responsible for implementation of the contractor-specific contingency plan and for ensuring that the proper precautions are taken by the contractor employees to prevent emergencies from occurring. The Contractor Emergency Coordinator=s routine responsibilities include:

- Establishment of evacuation routes and assembly areas for contractor personnel, which are subject to approval or modification by the GE Project Manager;

- Performance of periodic assessments of work area conditions and emergency readiness, including audits of available emergency equipment and documentation of changes in work area conditions which may warrant modification of the contractor=s contingency plan; and

- Maintenance of communications with GE to ensure that the contractor activities will not inhibit the ability of other on-site personnel to react to emergency situations.

- In the event of a chemical release, fire, explosion, medical emergencies, or other emergency situation, the Contractor Emergency Coordinator will:

- Provide the appropriate initial notifications (or verify that they have been made by other observers), depending on the location of the specific incident, as described in Section 5.2;

- Gather available information regarding the nature and extent of the emergency; and

- Perform additional duties as specified in the contractor-s contingency plan, or as directed by the GE Project Manager.

2.2.3 First Responders

GE is obligated, under federal and state laws and the CD, to provide notice to various federal, state, and local government authorities of certain releases or threatened releases of oil or hazardous substances or materials. In the event that a spill, fire, or other incident leads to such a release or threatened release, the GE Project Manager, with assistance from the First Responder, will be responsible for providing the appropriate notice. Specifically, the First Responder will:

- Gather information regarding the release;

- Assess the information received to determine if a reportable release has occurred; and
- Based on the above assessment, assist the GE Project Manager in notifying the appropriate authorities or organizations and in preparing any necessary written reports regarding the release.

A listing of GE=s current First Responders for overall activities within the GE facility is provided in Table 2 of Exhibit F-1. For each response action, GE may utilize these First Responders or assign others to serve in this role.

2.2.4 GE Plant Protection

GE Plant Protection is responsible for the initial coordination/communication of emergency situations within the GE facility. In the event of an emergency at one of the RAAs located within the GE facility, GE Plant Protection, in consideration of the nature of the emergency, will:

- Upon receipt of an emergency communication, document the information from that communication, along with other information gathered from monitoring radio communications, alarms, inspections, or other personnel, on the Plant Protection Emergency Response Report;

- As necessary, activate facility alarms if not already triggered;

- As necessary, contact the appropriate GE Emergency Response Team (see below), First Responder, and GE Project Manager; and

- As necessary, notify appropriate local emergency authorities (e.g., fire department, police department, or ambulance).

The GE Emergency Response Team and GE Plastics Medical Center Personnel are equipped to address a variety of potential emergency situations within the GE Plant Area. These GE personnel will respond and take actions as appropriate until the local emergency authorities arrive and assume incident command responsibility.

In the event of an emergency at one of the RAAs located outside of the GE facility, Plant Protection, in consideration of the nature of the emergency, may provide assistance to the First Responder and GE Project Manager.

3.0 Emergency Equipment

Emergency equipment, as required by applicable sections of 29 CFR 1910 and/or 29 CFR 1926, will be available prior to the commencement of project activities. This section describes the emergency equipment that may, depending on the specific response action, need to be present within the RAA.

3.1 Communications Systems

The potential for an emergency situation exists during all phases of any Removal Action conducted at the Site. Therefore, personnel involved in the Removal Actions shall have access to a telephone, two-way radio, or other emergency communication device.

Two-way radios are carried by GE Plant Protection personnel and are also located in certain GE company vehicles. Telephones are located within several occupied buildings and at GE Plant Protection checkpoints within the GE facility. Portable telephones should be utilized for activities conducted at RAAs located outside of the GE Plant Area, unless access to an alternate communications device (e.g., two-way radio or field office telephone) is available.

3.2 Fire-Fighting Equipment

Portable fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926 should be present at all work locations. All extinguishers should be inspected on a monthly basis and undergo preventative maintenance on an annual basis.

For response actions conducted within the GE facility, additional fire-fighting equipment (i.e., wall-mounted, hand-held fire extinguishers, fire alarms, automatic sprinkler systems) may be available at certain areas. All personnel should be familiar with the location and utility of any such supplemental fire-fighting equipment near the areas where response action activities are being performed.

Fire hydrants are located throughout the GE facility and within or near several off-plant RAAs. The areas around fire hydrants shall be kept clear of equipment and debris to allow access to the hydrants to any responding authorities (e.g., GE Emergency Response Team or Pittsfield Fire Department) in the event of an emergency. Any use of a fire hydrant for non-emergency-related activities (e.g., water supply for drilling activities or dust control operations) will only be permitted following approval of Plant Protection (for activities within the GE facility) or the City of Pittsfield (for activities outside of the GE facility).

3.3 Spill Control Equipment

Spill control equipment and related materials must be available at work areas where the potential for a release of hazardous materials exists. Sorbent pads and other absorbent materials, plastic sheeting, brooms, and shovels should be immediately available in the event of a spill to contain and control released materials and to prevent their spread to off-site areas. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. Clean, empty containers should also be available for containment of spill debris and used cleanup materials.

3.4 Personal Protective Equipment

Personal protective equipment is required to safeguard personnel from various hazards. Personal protective gear, such as hard hats, gloves, boots, coveralls, and face shields, should be utilized as needed. Varying levels of protection may be required depending on the degree of physical or chemical hazards present at each of the RAAs and the type of activity being performed. The various levels of protection and the conditions of use for each level are discussed generally in the Site HASP and should be established in the contractor-s health and safety plans.

4.0 Preventive Procedures

All response actions at the RAAs should be performed in a manner designed to minimize the possibility of any threat to on-site workers, the public, or the environment. The following sections list procedures to be followed in order to minimize the potential for work-related injuries, accidents, or other emergency situations.

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

4.1 Safe Working Practices

To minimize the potential for accidents, injuries, and dangerous situations, as well as to minimize the potential for emergency situations, standard safe working practices should be identified and adopted by the contractor. Prior to engaging in on-site activities, all contractor personnel must attend a pre-site entry safety meeting and review the Site HASP and this CEPP, as well as any other appropriate contractor-specific health and safety and contingency plans. All work area personnel have the following responsibilities pertaining to work area activities:

- Take all reasonable precautions to prevent injury to themselves and co-workers;
- Implement the requirements of the Site HASP and other applicable contractor-specific health and safety plans;
- Perform only those tasks that can be performed safely; and
- Immediately report any accidents, unsafe conditions, near misses, and/or other incidents as set forth in the Site HASP.

4.2 Hazard Assessments and Work Site Audits

Periodic work area hazard assessments and audits may be conducted by the GE Project Manager, the Contractor Emergency Coordinator, or other individuals. Modifications to contractor-specific safety programs may be made based on the results of the hazard assessments or work site audits.

The purpose of work area hazard assessments is to provide continuing recognition and analysis of potential safety hazards. Because of the changing nature of field projects, supervisors must continually inspect the work area to identify hazards that may affect personnel, the community, or the environment. Items typically evaluated during a work area hazard assessment include, but are not limited to:

- Availability of required personal protective equipment and clothing;
- Adequacy of safety-related monitoring;
- Evaluation of potential hazards relating to the tasks being performed;
- Maintenance of first aid supplies and emergency response equipment; and
- Compliance with hot work permits and lockout/tag out procedures.

Work site audits are performed to ensure that personnel have received the appropriate training and are performing their duties in the safest manner possible, and in compliance with the applicable safety requirements. Issues which arise from work site audits will be conveyed to the appropriate personnel who will identify and implement corrective actions.

4.3 Unanticipated Working Conditions

During the performance of Removal Actions, conditions may be encountered which are not anticipated based on previously available information. These conditions include, but are not limited to, observations of:

- Non-aqueous phase liquid;
- Intact buried drums or capacitors;
- Unmarked underground utilities; or
- Vapor emissions.

If unanticipated conditions are encountered, work should stop, the location should be secured and isolated to the extent practical and appropriate for the situation, and the GE Project Manager should be contacted for instructions.

4.4 Evacuation Plan

Each contractor performing response action activities must establish an evacuation plan as part of its contractor-specific health and safety plan or contingency plan. This plan must specify the alarm system(s) that will be utilized to call for an evacuation of the contractor-s work area and provide evacuation routes and assembly areas for workers leaving the area. All personnel entering a RAA will be informed of the

evacuation route and the assembly area. Evacuation routes will be planned to extend through the Contamination Reduction Zone (as defined in the Site HASP) in order to decontaminate personnel evacuating from the Exclusion Zone (if time permits) and to obtain a preliminary accounting of personnel. Alternate evacuation routes will be established in the event that the primary route is blocked by fire or spill or is otherwise impassable.

Assembly areas should be located upwind of the work area, based on predominant wind directions. Ideally, all workers, regardless of affiliation, should assemble in the same general area if evacuation is necessary. However, this may not be feasible in certain RAAs based on the size of the area and the activities being conducted at a given time. If the contingency plans of multiple contractors working in a RAA or adjacent RAAs propose differing assembly areas, the GE Project Manager will attempt to identify a common assembly area for all workers in the applicable RAA(s), to the extent practical and appropriate.

GE has established suggested evacuation routes and assembly areas for its employees working within occupied buildings at the GE facility (see Appendix I of Exhibit F-1). These previously designated assembly areas should be considered in the planning of evacuation procedures during the Removal Actions at the RAAs located at the GE facility.

5.0 Emergency Procedures

5.1 General

All response actions will be performed in a manner that minimizes the potential for an emergency situation to arise, or if such a situation arises, to minimize its magnitude. However, during the performance of response actions, the potential exists for the unplanned sudden or non-sudden release of hazardous materials to air, soil, or surface water, as well as the possibility of fire and explosion. Should such an emergency situation arise, countermeasures should be implemented quickly and in a manner that will protect the safety of workers and emergency response personnel, and will mitigate potential adverse impacts to the public and the environment.

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

Every emergency is a unique event that must be dealt with by trained personnel working in a calm, controlled manner. In the event of an incident, the prime consideration is to provide the appropriate initial response without placing additional personnel at unnecessary risk.

Following the identification of an emergency, general instructions for making the necessary notifications and initiating response activities are provided in Section 5.2. In that connection, Appendix V of Exhibit F-1 contains a list of phone numbers that may be used to contact federal, state, and local authorities and/or response contractors to report or respond to an incident. Contingency measures for spills and discharges from materials handling or transportation, or otherwise occurring during the course of performing the response actions are discussed in Section 5.3.

For other types of emergencies, if they occur at the GE facility, response actions will be taken in accordance with the procedures described in GE=s Integrated Emergency Response Plan (Exhibit F-1). For such types of emergencies occurring at locations outside the GE facility, the appropriate response actions will be described in the contractor-specific contingency plans.

5.2 Initial Notifications

Upon identification of an emergency situation, several notification and response activities will be performed by the entities identified in Section 2 of this CEPP, including GE, GE=s representatives, the Contractor Emergency Coordinator(s), First Responders, and Plant Protection. This section of the CEPP describes the general notification procedures that should be followed in response to the identification of an emergency situation. These procedures are organized into two categories -- those emergencies that may occur within the GE facility (Section 5.2.1) and those emergencies that may occur in areas outside the GE facility (Section 5.2.2). In addition, for both categories of emergencies, Section 5.2.3 provides additional information on the reporting required under the CD.

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

For the most part, it is anticipated that any emergency situation will be first identified by a person who is involved in the performance of the Removal Actions (e.g., a GE and contractor employee). That observer should, to the extent that he/she can do so safely, identify the emergency by surveying the incident and noting the information below, if possible:

- Type of emergency (fire, spill, explosion, etc.);
- Location (building, roadway, open field, etc.) and migration potential;
- Source of emergency (breach of underground utility line, equipment malfunction, slope failure, etc.);
- Material identification (visual appearance, odors, etc.); and/or
- Impact of emergency (persons injured, extent of spill, etc.).

In the event of a spill, release, fire, explosion, medical emergency, or other emergency situation related to the Removal Actions within the Site, the observer will provide initial notifications as described below in Sections 5.2.1 and 5.2.2.

However, it may also be possible that an emergency situation is first identified by persons other than those directly involved in the Removal Action, such as a property owner or other public entity. The first observer of an emergency situation -- regardless of whether that person is involved with the specific Removal Action or is a member of the general public -- will be the first to gather information regarding the type and nature of the situation and will also likely be involved in the first communications regarding the emergency. In this case, upon learning of the emergency situation, the Contractor Emergency Coordinator or GE Project Manager will ensure that the initial notifications described below have been made. If possible, the Contractor Emergency Coordinator or GE Project Manager will also contact the observer of the incident in order to identify relevant information concerning the type of emergency and any initial response actions undertaken.

5.2.1 Within the GE Facility

Emergency situations that occur within the GE facility will be responded to in the following manner:

1. The first observer of the emergency will immediately contact GE Plant Protection. The emergency telephone numbers for GE Plant Protection are as follows:

   - 448-6666 for any emergency
   - 448-7550 for general or other non-emergency communications

2. GE Plant Protection will coordinate the subsequent emergency response actions, and will contact the GE Emergency Response Team and other outside emergency response contractors, as well as the First Responder and GE Project Manager, as necessary.

3. The First Responder and GE Project Manager will coordinate subsequent notification actions regarding the incident, as required by applicable laws and regulations, as well as the CD. Depending on the specific incident, such reporting may be required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Section 103), the Emergency Planning and Community Right-to-Know Act (EPCRA) (Section 304), the Clean Water Act (Section 311), the Toxic Substances Control Act (TSCA), the EPA regulations under those statutes, Massachusetts General Law Chapter 21E, the Massachusetts Contingency Plan (MCP), and/or the CD for the Site. Such reporting may include notification to some or all of the following entities (phone numbers provided in Appendix II and Appendix V of Exhibit F-1):

   - Pittsfield Local Emergency Planning Committee (LEPC) (note: this is the same contact as the fire department, but may have to be notified separately as a discrete notification).
   - Massachusetts Department of Environmental Protection (MDEP).

- State Emergency Response Commission (SERC) (note: this is the same contact as the MDEP, but may have to be notified separately as a discrete notification).
- National Response Center.
- EPA New England Region.
- EPA Project Coordinator under the CD.
- MDEP Project Coordinator under the CD.

4. The First Responder will also assist the GE Project Manager in preparing a written report regarding the incident. A Spill Report Form is included as Appendix III of Exhibit F-1.

5.2.2 Outside of the GE Facility

Emergency situations that occur outside of the GE facility will be responded to in the following manner:

1. The first observer of the emergency will call the Pittsfield emergency 911 number and then the GE Project Manager and Contractor Emergency Coordinator (if different from the observer) for the specific RAA within which the incident has occurred.

2. The GE Project Manager will coordinate with the First Responder and/or Contractor Emergency Coordinator regarding the reporting of the incident to the other authorities. Depending on the specific incident, such reporting may be required under some or all of the laws and regulations (and CD) identified in Section 5.2.1 above, and may require notification to some or all of the entities listed in that section.

3. The First Responder and/or Contractor Emergency Coordinator will assist the GE Project Manager in preparing a written report regarding the incident. A Spill Report Form is included in Appendix III of Exhibit F-1.

5.2.3 Notifications Under Consent Decree

As noted above, the notification/reporting that must be made in the event of an emergency or other release of hazardous substances or materials may include notifications under a variety of laws and regulations, including CERCLA, EPCRA, the Clean Water Act, TSCA, Chapter 21E, and/or the MCP. In addition, the CD for this Site establishes certain specific notification requirements for emergencies and certain other releases of hazardous substances. Those requirements are summarized below.

Under Paragraph 90 of the CD, if any event occurs which causes or threatens a release of waste material that Aconstitutes an emergency situation or may present an immediate threat to public health or welfare or the environment@ (as defined in Paragraph 90), GE must immediately notify the EPA Project Coordinator (or if not available, EPA=s Alternate Project Coordinator, or if neither is available, the Emergency Response Section in the New England Region) and the MDEP Project Coordinator. The requirements for further response actions to prevent, abate, or minimize such a release or threat of release constituting an emergency are set forth in Paragraphs 91-92 of the CD.

In addition, under Paragraph 69 of the CD, if any event occurs that involves a reportable release under Section 103 of CERCLA or Section 304 of EPCRA -- which require reporting of any release of a hazardous substance in excess of a reportable quantity -- GE must notify EPA and MDEP (same contacts as noted above for emergencies). Such an event must be reported within 24 hours of the onset of the event or immediately upon obtaining knowledge of the event, whichever is later.

These notifications will be made by the GE Project Manager, with assistance provided by the First Responder, as appropriate.

5.3 Spill Response Procedures

In the event that a spill or other discharge of hazardous materials occurs during performance of the Removal Actions, the notification procedures described in Section 5.2 above will be implemented. In addition, depending on the location of the spill/release (i.e., within or outside of the GE facility), initial measures taken in response to the spill will be implemented. This section describes the general activities that will be taken in

response to a spill event. The information presented herein is general and intended to be supplemented by the information contained in Appendix II of Exhibit F-1 (for spills that occur within the GE facility) and by information developed by the Remediation Contractor and contained in the contractor-specific contingency plan (for spills that occur within or external to the GE facility).

In general, the techniques used for hazardous waste spill containment and cleanup will vary with the location, type of spill, and the materials spilled. Vehicular traffic and personnel must be alerted and diverted from the area until responding authorities arrive on the scene. If possible, the source of the spill should be secured and actions should be taken to contain the spill. Only persons with appropriate training should perform these initial response actions, and only when it will not endanger others. Protective equipment must be worn, as required, when attempting such actions. The availability of emergency equipment for spill cleanup is discussed in Section 3.3.

The methods used for spill response will depend on the type of material spilled, the extent of the spill, and the type of area at which the spill occurred. In the event that a container becomes damaged, material should be transferred from the container as soon as practical. Ruptured hose or pipe sections should be isolated by closing valves between the rupture and the material source(s). In the event of a spill outdoors, nearby drains and catch basins should be covered with plastic sheeting and surrounded with absorbent material to prevent material from entering. If spilled material reaches an open waterway, booms should be placed downstream to prevent further migration of the released material. Following containment of a spill or release, the released material will be cleaned up with absorbents and placed into other containers for proper disposal.

6.0 Post-Emergency Action

Following an emergency, the GE Project Manager will perform all appropriate written and verbal follow-up activities. Depending on the applicable reporting and regulatory requirements, the GE Project Manager will gather and summarize in writing, if necessary, the information to be provided to the appropriate agencies. The following sections summarize post-emergency actions to be completed.

ATTACHMENT F

CONTINGENCY AND EMERGENCY PROCEDURES PLAN

6.1 Follow-up to Reportable Releases

As noted above, certain releases of hazardous substances or materials must be reported verbally to various federal, state, and local agencies under applicable laws and regulations. To the extent that these laws and regulations require written follow-up reports, such report will be made. In addition, as required by Paragraph 70 of the CD, following the initial notification under Paragraph 69 of a release of a hazardous substance in excess of its reportable quantity, GE will submit a written report to EPA and MDEP within 20 days after the onset of the event, setting forth the events that occurred and the measures taken or to be taken in response, and a further written report within 30 days of the conclusion of the event, setting forth all action taken in response to the event.

6.2 OSHA Notification

In the event that injuries or fatalities or any incident resulting in lost time occur during the emergency at the GE work area, the Occupational Safety and Health Administration (OSHA) must be notified. The threshold reporting requirements are one fatality or three employees taken to the hospital for examination, observation, or treatment. Pursuant to 29 CFR 1904.8, notification must be made within eight hours of obtaining the information regarding the employees involved in the emergency.

Verbal notification is made to:

U.S. Department of Labor - OSHA Region 1
133 Portland Street - 1st Floor
Boston, MA 02114
Tel. (617) 565-7164

OSHA, depending on the circumstances of the emergency, may also request a written follow-up report and other documentation. OSHA reserves the right to conduct an investigation of the causes of any reported injury or fatality.

Exhibit F-1 – Integrated Emergency Response Plan

# GENERAL ELECTRIC COMPANY # CORPORATE ENVIRONMENTAL PROGRAMS **PITTSFIELD, MA** # HEALTH AND SAFETY PROGRAM	PROGRAM NO **1997ERPDOC**
	REV.NO. **2**
	PAGE 1 of 28
INTEGRATED EMERGENCY RESPONSE PLAN	DATE: **5/6/97** **Rev. 2/10/2006** **3/30/2007**

Approved by: _____ _____
Site Manager Date

Approved by: _____ _____
Health and Safety Specialist Date

RECORD OF CHANGES

REVISION	DATE	DESCRIPTION
0	5/6/1997	Initial Issuance
1	2/10/2006	Updated Contact Information for key personnel
2	3/30/2007	Updated Contact Information, phone numbers

Table of Contents

1. **PURPOSE:** The General Electric (GE) Integrated Emergency Response Plan details the emergency procedures that will be implemented if fire; explosion; natural disaster; spill or other unplanned release of hazardous waste / material to air, soil, surface water or ground water occurs. This plan delineates responsibilities and describes evacuation, cleanup, control and containment methods to be used in an emergency. This plan is written to comply with the OSHA 29 CFR 1910.38; RCRA 40 CFR part 264, Subpart D; 40 CFR part 265, Subpart D; 40 CFR 279.52; EPA 40 CFR part 112; DOT/RSPA-FRP 49 CFR part 194; and CAA RMP 40 CFR part 68.

2. **SCOPE:** This program applies to GE CEP employees and contractors working at the Pittsfield GE site. The work being performed at the site is under RCRA Corrective Action and employees conduct operations at TSDF facilities. The site is not an uncontrolled hazardous waste site. Employees working at the site are not allowed to assist in handling emergencies described under OSHA 1910.120. Outside HAZMAT contractors respond to such emergencies. Employees make notification to plant protection in case of an emergency and then they evacuate if necessary.

3. **REFERENCES:**
   - 3.1. OSHA 29 CFR 1910.120, 1910.38
   - 3.2. RCRA 40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D 40 CFR 279.52
   - 3.3. EPA 40 CFR part 112
   - 3.4. DOT/RSPA-FRP 49 CFR part 194
   - 3.5. CAA RMP 40 CFR part 68.
   - 3.6. Regulations
     - 3.6.1. OSHA 29 CFR 1910.120, 1910.38
   - 3.7. Related GE Health And Safety Programs And Procedures
     - 3.7.1. Confined Space Entry
     - 3.7.2. Medical Surveillance
     - 3.7.3. Respiratory Protection
     - 3.7.4. PPE Program
     - 3.7.5. LOTO
     - 3.7.6. Excavation Protocol

4. **RESPONSIBILITIES:**

4.1. SITE MANAGER is responsible for:

4.1.1. Implementing this Program by assigning the various functions described in this Program to competent individuals within the facility.

4.1.2. Ensuring that employees are informed of their rights and responsibilities under this Program, and that the proper training is provided to all affected employees (29 CFR 1910.38 (a)(2)(vi)).

4.2. HEALTH AND SAFETY SPECIALIST is responsible for:

4.2.1. Managing and enforcing this Emergency Response Program

4.2.2. Analyzing the work site to identify existing and potential hazards of working with hazardous substances/waste.

4.2.3. Implementing Hazard prevention/control and Safety/Health training. All records pertaining to training, hazard prevention and hazard potential will be maintained by the Health and Safety Specialist and located in Bldg. 11 room 205.

4.2.4. Evaluating the effectiveness of this Program and updating the Program as needed. (29 CFR 1910.38 (a)(2)(vi)).

4.3. DEPARTMENT SUPERVISOR is responsible for:

4.3.1. Ensuring that all employees in his/her Department are informed of their rights and responsibilities under this Program, and providing the proper training in coordination with the Health And Safety Specialist to all affected employees (29 CFR 1910.38 (a)(2)(vi)).

4.4. DESIGNATED CONTRACTOR REPRESENTATIVE is responsible for:

4.4.1. Informing Contractors of this Program while they are working at the site.

4.4.2. Ensuring that all Contractors understand their role related to emergencies, fires, evacuation, spills and natural disasters (29 CFR 1910.38 (a)(2)(vi)).

4.4.3. Ensuring that all relevant environmental health and safety regulations are being followed by contractors while work is being performed.

4.5. FACILITIES PROJECT ENGINEER is responsible for:

4.5.1. Performing the duties of the Designated Contractor Representative (29 CFR 1910.38 (a)(2)(vi)).

4.6. CONTRACTOR is responsible for:

4.6.1. Providing health and safety related information to the GE Designated Contractor Representative.

4.6.2. Ensuring that all contractor employees have the training required to perform work at the Pittsfield site.

4.6.3. Investigating all Contractor employee injuries, illnesses and accidents; reporting results to the Designated Contractor Representative and the Health and Safety Specialist.

4.6.4. Ensuring that all relevant environmental, health and safety regulations are enforced and followed by the Contractors employees.

4.6.5. Having a written program that covers procedures for emergencies and evacuations for its employees while working at the Pittsfield site. This program will be reviewed with the Designated Contractor Representative to assure that it conforms to the procedures in this Integrated Emergency Response Program.

4.7. EMPLOYEES are responsible for following the procedures required by this Program

4.8. MEDICAL DIRECTOR GE PLASTICS MEDICAL CENTER is responsible for:

4.8.1. Implementing all necessary aspects of medical monitoring required under OSHA.

4.8.2. Providing trained, on site medical emergency response personnel to respond to medical emergencies.

4.9. EMERGENCY COORDINATOR: The duties of the Emergency Coordinator as defined by 40 CFR 264.55 and 264.56, are performed by three closely linked individuals. These are:

4.10. FIRST RESPONDER is responsible for:

4.10.1.1. Gathering information regarding a spill (ref: 40 CFR 264.56(b))

4.10.1.2. Relaying information to management if a possible hazard to human health or the environment exists. (40 CFR 264.56(c))

4.10.1.3. Contacting state and federal agencies regarding a release if warranted. (e.g., NRC, DEP, LEPC, SERC, DOT) (40 CFR 264.56(d))

4.10.1.4. Assisting management with the generation of written notifications and reports. (40 CFR 264.56(j))

4.11. PLANT PROTECTION is responsible for

4.11.1. Gathering information on the reported spill. (40 CFR 264.56 (b))

4.11.2. Activating facility alarms as necessary. (40 CFR 264.56(a)(1))

4.11.3. Verifying all individuals in a work area are safely evacuated to a designated assembly area, by performing a role call.

4.11.4. Activating the First Responder (reporter) beeper page system if necessary.

4.11.5. Notifying appropriate state or local emergency agencies (e.g., fire department, police department, ambulance, county HAZMAT team). (40 CFR 264.56(a)(2))

4.11.6. Generating written a report of an incident.

4.11.7. Notifying Response Contractors to cleanup spills if necessary.

4.12. RESPONSE CONTRACTOR is responsible for:

4.12.1. Taking appropriate safe response measures to contain, isolate and cleanup spilled materials. (40 CFR 264.56(e) & 40 CFR 264.56(g))

5. **EMPLOYEE RESPONSE PROCEDURES:**

5.1. Threat of fire:

5.1.1. Immediately contact **Plant Protection (448-6666)** The threat, potential hazard, and any actions taken up to that time are described as part of this notification.

5.2. Fire in progress:

5.2.1. Any employee discovering a fire shall immediately evacuate the area and will use the nearest safe telephone or two-way radio to contact **Plant Protection (448-6666)** and explain that there is a fire in progress. The employee should describe the type of fire involved (e.g., "chemical fire" and its location).

5.3. Spill Emergencies:

5.3.1. **Evacuate the area immediately.**

5.3.2. **Notify Plant Protection (448-6666)**

5.3.3. The observer should to the extent **he/she can do so safely away from the incident**, identify the emergency by surveying the incident and noting the information below if available:

5.3.3.1. Type of emergency (fire, spill, explosion, etc.)

5.3.3.2. Location (building, tank farm, confined area, migration potential, etc.)

5.3.3.3. Source of emergency (tank, drum, etc.)

5.3.3.4. Material Identification (visual appearance, scents, etc.)

5.3.3.5. Impact of emergency (personnel injured, extent of spill, etc.)

5.3.3.6. Approximate quantity spilled (gallons or pounds)

5.4. Medical Emergencies:

5.4.1 All medical emergencies should be directed to **Plant Protection 448-6666**

5.4.2 Employee making notification should give the location and type of medical emergency if known.

5.5. **Non emergency** (follow up information) calls to plant protection should be directed to 448-7550.

6. **EVACUATION:**

6.1. When alarm systems are triggered, personnel must immediately evacuate the area in an orderly fashion and proceed to the designated primary or secondary assembly areas. (See Appendix I). Suggested evacuation routes are posted throughout the occupied areas of the facility. Employees are required to make themselves aware of the evacuation exits from the building in which they work. Employees will remain at the assembly area until Plant Protection takes a role call. Employees are not allowed to re-enter the evacuated area \until Plant Protection has designated it safe. **Employees working in unoccupied buildings will evacuate the area where they are working by the nearest safe exit.** They will then notify Plant Protection by radio or other means of their location and wait there till Plant Protection arrives.

6.2. **Incident Commander Designation**

The fire department will assume the role of incident commander for all situations involving major fires, major chemical spills, or explosions. The fire department will control the situation and determine alternate evacuation procedures, assembly areas, and accountability for employees, if section 6.0 of this program is determined to be insufficient to assure employee health and safety.

6.3. Procedures for those employees who remain to operate critical plant equipment before they evacuate are as follows:

6.3.1. There are no defined critical plant equipment operations that require an employee to remain in a building during an emergency evacuation. Employees will immediately evacuate buildings during fire, major chemical release, or explosion. Specific procedures for an anticipated flood event for the 64W, 64S, 64V, 64Z, 64X oil water separators are contained in section 10.12 of this program under FLOOD. These procedures are only followed if the flood event occurs with sufficient warning to perform such procedures

safely. Common sense actions, such as shutting off an electrical switch, are allowed if they can be performed while evacuating and not endanger the safety of the employee.

7. **PLANT PROTECTION - GENERAL RESPONSE PROCEDURE:**

7.1. Upon receipt of an emergency call, Plant Protection personnel will perform the following:

7.1.1. Document the receipt of the call with information received and recorded on the Plant Protection Emergency Response Report. (See Appendix II).

7.1.2. Coordinate the response to an emergency by contacting (as needed) the fire department, ambulance, police department, cleanup contractor and First Responder.

7.1.3. If notified of a fire, explosion or major spill, immediately activate the area building alarm systems.

7.1.4. Send a Plant Protection patrol person to the site to verify that all personnel have been safely evacuated to the designated assembly areas.

8. **FIRST RESPONDER - REPORT/RESPONSE PROCEDURE:**

8.1. First Responders have the general responsibility of notifying federal, state and local government agencies concerning releases. Table 1 lists the First Responders (and their phone numbers) assigned to report spills to government agencies. The following agencies/organizations may need to be notified if there is a release at the facility:

8.1.1. **Pittsfield Local Emergency Planning Committee (LEPC)** (same as fire department but must be reported as a discrete notification)

8.1.2. **Massachusetts DEP**

8.1.3. **State Emergency Response Commission (SERC)** (same contact as DEP but must be reported as a discrete notification)

8.1.4. **National Response Center**

8.1.5. **DOT** (via National Response Center if the emergency event occurred on a public road and meets DOT incident criteria)

8.1.6. **EPA Region I -- PCB Coordinator** (if PCB laden material/liquids is involved)

8.1.7. **Consent Decree Reporting** Report to GE Management and or GE Corporate Attorneys

8.2. For reportable spills with the potential to pollute soils/water/ground water, contact a GE Licensed Site Professional (LSP)

8.3. For reportable releases outside the facility and for releases inside the facility which may present a threat to human health and the environment, contact management and public relations.

8.4. Assist management with written reports to agencies

8.5. All pertinent emergency response information and monitoring data is entered on the First Responder Spill Report form (See Appendix III) and filed with the site manager. This report is used as a reference document when reporting to government agencies.

9. **MANAGEMENT RESPONSE PROCEDURES (SITE MANAGER):**

9.1. Assists in assessing public hazards to human health and the environment

9.2. Authority to stop operations and prevent reoccurrence (e.g., training, engineering controls)

9.3. Arrange for clean up, storage and disposal of released material

9.4. Assure compatibility of waste.

9.5. Write follow-up reports regarding the incident for agency submittals

10. **SPECIFIC EMERGENCY RESPONSE PROCEDURES**

10.1. For purposes of this document, a major spill is considered to be a release of hazardous materials in quantities greater than 5 gallons or a release of any amount of those hazardous materials immediately dangerous to human health or the environment. Employees are not allowed to clean up major spills; spills less than 5 gallons which have the potential to involve larger quantities of materials; or spills less than 5 gallons involving acids, caustics, or materials immediately dangerous to human health and the environment.

10.2. **Spill and leak procedures:**

10.2.1. If there is a spill or leak of hazardous material immediately notify plant protection at 448-6666, no attempt to mitigate it is made unless it can be done safely. The techniques used for hazardous waste material spill containment and cleanup will vary with the

location, type of spill or leak, and the amount of material involved. On site Emergency response contractors will respond to all spills. They are notified through plant protection. Whenever possible the source of the spill or leak is secured and contained. These initial response actions are performed only when they will not endanger the employee and the potential for the initial spill to evolve into a large spill (> 5gallons) does not exist. In the event that a spilled material cannot be identified by visual observation, the material will be collected by a trained Emergency Response person, and containerized in either a drum or tanker truck depending on the quantity spilled. A sample of the material would be analyzed to determine its identity. Response procedures for specific types of spills and leaks are outlined below. **These procedures are only to be used by trained emergency response personnel**:

10.3. **Ruptured hose or pipe:**

10.3.1. The ruptured section of hose/pipe is isolated by closing valves between the rupture and the material source.

10.3.2. In the case of a small leak from a low pressure line, cloth or tape is wrapped around the hose/pipe to slow or stop the leak until the material source is isolated from the leak and/or the leak is repaired.

10.3.3. In the case of a small leak, a drip pan is used to collect the leaking material until the source is isolated from the leak and/or the leak is repaired.

10.4. **Large spill or leak from ruptured hose or pipe:**

10.4.1. The ruptured section is isolated and the spilled material contained with absorbent pads, booms or clay absorbent by building a containment dike around the spill.

10.5. **Spills near drains, catch basins or open waterways:**

10.5.1. Nearby drains and catch basins are surrounded with absorbent material to prevent material from entering the drainage system.

10.5.2. In the event that an oil release reaches a catch basin which leads to an oil/water separator, the oil is removed from the separator by a collection belt.

10.5.3. If the release reaches an open waterway, booms are placed down stream to prevent further migration of released material.

10.6. **Spills within diked areas:**

10.6.1. Spills within diked areas will be removed at the earliest practical time. When it is safe to do so, the liquid spilled material will be cleaned up using proper spill response procedures. Large quantities of material will be transferred to a tanker truck for proper disposal. Material residue is cleaned up and drummed using absorbent pads or clay absorbent.

10.7. **Leaking drums:**

10.7.1. In the event a drum is damaged, material is transferred out of the damaged drum when practical or the drum is placed in an overpack drum. Spilled material is cleaned up with absorbent and placed in another drum.

10.8. **Spills of PCB containing materials:**

10.8.1. All spills involving PCBs at concentrations greater than 50 ppm will be cleaned up according to EPA's PCB cleanup policy.

10.9. **Leaking tank spills:**

10.9.1. When a tank is discovered leaking, steps are immediately taken to control the source of the leak and contain the released material only if an employee can do so safely. These actions are limited to turning off a valve or other immediate control action.

10.9.2. If the leaking tank contains hazardous material, the Response Contractor will perform the transfer of liquid from the tank to another hazardous material storage container.

10.9.3. The tank will be repaired and integrity tested before reuse. If the damage is determined to be excessive, the tank will be replaced or taken out of service.

10.10. **Atmospheric Release Response:**

10.10.1. The potential airborne hazards associated with a spill or fire depends on several factors including such as wind speed, direction, air, temperature and cloud cover as well as the volume of material spilled, its toxicity, its volatility and its flammability. Each of these factors is considered when the fire department determines the type of response and the need for evacuation. (29 CFR 1910.38 (a)(4)) The Pittsfield Fire Department will establish an Incident Command in charge of the release or fire. GE personnel will assist the Fire

Department with information relative to the incident. Employees will normally evacuate the area.

10.11. **Hurricanes and Tornadoes:**

10.11.1. Pittsfield, Massachusetts is situated approximately 120 miles inland from the Atlantic coast. Hurricanes occasionally have an impact on this area with serious wind and rain conditions however due to Pittsfield's inland location and hilly terrain, hurricane and tornado warning systems usually provide adequate notice of impending storms through commercial radio and television transmissions. (29 CFR 1910.38 (a)(4)) Equipment shutdowns and other necessary precautions are implemented as necessary.

10.12. **Floods:**

10.12.1. Heavy rainfall can result in increased water level in the Housatonic River, flooding areas of the plant near the river. Potential flooding is typically known in advance and allows adequate time to implement procedures designed to minimize the effect of flooding at the facility. **Section 10.13 of this program contains specific flood response procedures for bldgs. 64W, 64X, 64V, and 64S.**

10.13. **Flood Response Plan for Bldgs. 64W, 64X, 64V, 64S**

10.13.1. The following procedures are to be followed at each location in the event of imminent flooding. The responsible party shall take the following actions prior to the Housatonic River's East Branch flooding into the facility. These procedures are to be followed only if they will not endanger the safety of employees.

10.13.1.1. STAGE I: Staff gage at 64X reads 5.0(EL977) and source (snow melt /rainfall forecast to continue.

10.13.1.1.1. Contact the Groundwater treatment plant operators to arrange for vehicles and operators to move the 1000 gallon trailers to Bldgs. 64W, 64X, 64V, and 64S in that order.

10.13.1.1.2. At each building disable the well pumps that feed the holding tanks.

10.13.1.1.3. Electrical Pumps: *Shut off the power that feeds the well pumps.*

*10.13.1.1.4.*Air Pumps: Shut off the power to the air *compressor that runs the well pumps and isolate the pump from the source of compressed air*..

10.13.1.1.5.Properly position the 1000 gallon trailers and pump all free liquid from the oil/water separator tanks and caissons into the trailers.

10.13.1.1.6.Do not put more than 500 gallons of pumped material in the 1000 gallon tanker.

10.13.1.1.7.Close all valves.

10.13.1.1.8.Unload the trailers at Bldg. 64 tank farm.

10.13.1.1.9.When pumping is completed, relocate the empty trailers to the cement pad east of Bldg. 64

10.13.1.2.STAGE II: Staff gage at 64X reads 7.0 (EL979)

*10.13.1.2.1.*Disable all power to the effected areas.

10.14. **Earthquakes:**

10.14.1.The probability of earth tremors causing damage in Pittsfield is slight. Emergency shutdowns and isolation of storage tanks can minimize the effects of any aftershocks. Plant personnel are trained to take action for these situations. The actions taken will vary with each situation.

10.15. **Utility Failure:**

10.15.1.The facility uses several utilities including steam, water and electricity. The loss of any of these utilities may result in an emergency. Plant design compensates for many of these failures through automatic shutdowns and/or alarms. Personnel are trained to take corrective action for utility related emergencies depending on the situation.

10.16. **Medical Emergencies:**

10.16.1.During a medical emergency, the nurse on duty or certified trained personnel are responsible for administering first aid at the scene of the emergency and evaluating the need for an ambulance. Any person discovering a medical emergency should immediately call 448-6666. No attempt should be made to move a person with potential neck or back injuries except to remove that person from a life-threatening situation.

10.17. **Rescue Procedures:**

10.17.1. All rescue duties will be performed by either the Pittsfield Fire Department or the GE Plastics HAZMAT Team.

10.17.2. All medical duties will be performed by the Berkshire or County Ambulance Service.

10.17.3. If trained GE Plastics Medical Center Personnel or GE Plastics HAZMAT personnel arrive at the incident before the Ambulance services arrive they would be able to perform limited medical duties (CPR and First aid) until the Ambulance Service arrives.(29 CFR1910 (a)(2)(iv))

11. **POST EMERGENCY ACTIONS:**

11.1. Once the emergency is over, management will direct the appropriate cleanup actions. Based on the assessment of the type(s) of material spilled, management will structure and supervise the response procedures to ensure the site is secure and all wastes are properly cleaned up, segregated, containerized and labeled.

11.2. Free liquid waste is cleaned up using portable pumps or other equipment. Residues are cleaned up using absorbent pads or clay absorbent and containerized to facilitate material disposal.

11.3. All visibly contaminated soil is cleaned up and containerized under the direction of management personnel. All disposable personal protective equipment and cleanup debris such as absorbent pads and booms, are removed and containerized. PCB contaminated surfaces must be cleaned according to EPA spill cleanup policy.

11.4. Once the cleanup operation has been completed, all containerized waste and cleanup debris is labeled and moved to an appropriate waste storage area at the facility

11.5. If a release to the environment occurred, a determination if waste or soil samples need to be taken and analyzed is made. If spilled hazardous waste reached a storm drain, monitoring is required at appropriate plant discharge points to assess the environmental impact.

11.6. If it is determined that further cleanup is necessary, the site will if possible remain off limits to facility personnel until all cleanup operations are complete.

11.7. All equipment used in an emergency response will either be decontaminated (shovels, face shields, hoses, protective clothing, etc.) or disposed of as hazardous waste materials. Although most equipment will be disposed of as hazardous waste material, decontamination equipment will be available for cleaning reusable items. In addition all fire extinguishers and absorbent containers or other appropriate equipment is refilled or replaced before facility operations resume.

12. **FIRE PREVENTION PLAN (29 CFR 1910.38 (b)(1)):**

12.1. The potential workplace fire hazards and their proper handling and storage, procedures, potential ignition sources and their control procedures and the type of fire protection equipment or systems which can control a fire at the Pittsfield site are listed in Appendix IV. 4 (29 CFR 1901.38 (b)(2)(i)). All in place and portable fire extinguishing systems are inspected by GE Plant Protection and are maintained by a qualified outside vendor. Sprinkler systems are maintained by GE maintenance personnel (29 CFR 1910.38(b)(2)(ii)) All records pertaining to inspections of fire extinguishers and sprinkler systems are kept by GE Plant Protection.

13. **HOUSEKEEPING (29 CFR 1910.38(b)(3)):**

13.1. All employees are required to follow good housekeeping procedures. The following general good housekeeping practices will be followed:

13.2. Papers, cardboard, rags, and other combustible materials should be placed in an appropriate trash receptacle when discarding.

13.3. Oil soaked rags and debris should be placed in an appropriate hazardous waste container.

13.4. Any small containers (5 gallon or less) of a flammable material, such as solvents or gasoline, should be stored in an approved flammable container and labeled according to the GE HAZCOM Program. These containers, when not in use, will be stored in an approved Flammable Storage Cabinet. Flammable solvents used in the laboratory will not be stored on lab work benches when not in use but in approved Flammable Storage Cabinets.

13.5. Employees are required to obey all No Smoking Signs. Smoking is only allowed on site in designated smoking areas.

13.6. Spilled flammable materials and oils will be immediately cleaned up if the employee can do so without endangering themselves. Spills larger than 5 gallons should be cleaned up by the appropriate trained cleanup personnel. All materials generated from a spill will be placed in appropriate containers and labeled. Report all spills to your supervisor.

13.7. Access to all fire extinguishers as well as eyewash and emergency showers will be kept clear of obstructions and maintained accessible.

13.8. No employees or contractors are allowed to work alone in any unoccupied building. If working alone is absolutely necessary arraignments must be made with GE Plant Protection and radio or phone communications must be available to the employee.

13.9. Accumulation of large quantities of combustible or flammable materials not in use is not allowed in any building. Debris and other materials will be disposed of in an appropriate container.(Dumpster, Hazardous Waste Drum. etc.)

13.10. Storage of flammable materials greater than the limit for a storage area or storage cabinet is not allowed. Check with your supervisor for the amounts allowed and where materials can be stored.

13.11. Storage of incompatible wastes or chemicals is not allowed. Check with your supervisor on compatibility of materials.

14. MAINTENANCE- EQUIPMENT AND SYSTEMS (29 CFR 1910.38(b)(5)):

14.1 All new equipment and systems will be designed and installed according to the manufacturers instructions and NFPA regulations. Fire potential will be taken into consideration prior to obtaining equipment or designing systems. The Manager of Facilities will be made aware of all equipment and systems installations. The Pittsfield Fire Department will be notified of all tank storage systems containing combustible or flammable materials. Permits from the Fire Dept. are required for all installations of above ground or below ground tank/piping systems of combustible or flammable materials. All in place fire systems will be maintained and tested based on Factory Mutual Insurance Co. policy. All Fire extinguishers will be inspected and tested per manufacturers specifications and OSHA requirements.

15. **TRAINING:**

15.1. All employees and contractors will be trained on the elements of this Program prior to working at the GE site. Refresher training for all employees will take place on an annual basis. If the plan has any significant changes, employees will be notified of the changes through their supervisor.

16. **COMPLIANCE:**

16.1. All GE personnel are required to comply with the rules and work practices in this Program. Non compliance with this Program can result in disciplinary action. Disciplinary action for hourly personnel will be conducted as specified in the IUE local contract. Disciplinary action for exempt and non exempt personnel will be conducted following GE policies.

17. **PROGRAM UPDATES:**

17.1. This Emergency Response Program will be reviewed annually and updated as necessary by the Health and Safety Specialist, Site Manager, and the Manager of Facilities.

Table 1

CEP MANAGEMENT

Name	Title	Work Tel. No.	Home / Alternate Tel. No.
Mike Carroll	Mgr. Pittsfield Remediation Programs	448-5902	518-374-9869 / 413-441-4674 (cell)
Richard Gates	Remediation Project Mgr.	448-5909	413-848-2846 (cell)
Warren Wood	Mgr. Facilities and Brownfields Programs	448-5919	413-499-2925 (cell)
Andrew Silfer	GE Project Coordinator	448-5904	413-684-3647 / 413-441-4854

Table 2

FIRST RESPONDERS

Name	Title	GE Tel. No.	Home / Alternate Tel. No.
J. Levesque	Manager Environmental Operations	448-5914	413-743-3245 413-441-4786 (cell)
R. Gates	Remediation Project Mgr.	448-5909	413-848-2846
Warren Wood	Manager Facilities & Brownfields Programs	448-5919	413-499-2925 (cell)
J. Nicholson	Technical Specialist	448-5915	413-443-7988 413-441-4761 (cell)
S. Deloye	Manager – EHS, Security & Logistics	448-7320	413-623-6019 413-292-7574 (pager)
W. Pike	Plastics Env. Specialist	448-4642	413-655-8828 413-292-7790 (pager)
P. Wojcik	Specialist EHS	448-5908	413-743-2867 413-441-3104 (cell)

TABLE 3

OTHER SUPPORTIVE RESPONSE PERSONNEL

Name	Title	GE Tel. No.	After Hours No.
Plant Protection		448-6666 (emergency) 448-7550	448-7550
Veolia	Cleanup Contractor	494-5358	518-248-6685 (cell)
ARCADIS BBL	Cleanup Contractor	448-5969	281-0704 (cell)

APPENDIX I

ASSEMBLY AREAS

Appendix I

DESIGNATED ASSEMBLY AREAS FOR OCCUPIED BUILDINGS

BUILDING #	EXIT DIRECTION	ASSEMBLY AREA
59	WEST	AREA C – NORTH SIDE OF ENTRY GATE AT PLASTICS AVE
	NORTH	AREA B+C – NORTHEAST OF 51
	EAST	AREA B – NORTHEAST OF 51
	SOUTH	AREA C – NORTHSIDE OF ENTRY GATE AT PLASTICS AVE
64T	SOUTH	WEST SIDE OF 64R
	NORTH	
	EAST	WEST SIDE OF 64R
	WEST	EAST SIDE OF 64S
64G	NORTH	WEST SIDE OF 64R
	SOUTH	
	EAST	WEST SIDE OF 64R
	WEST	EAST SIDE OF 64S
78/Trailers	SOUTH	GATE 25
	NORTH	
	EAST	WEST SIDE OF CYLINDER STORAGE DOCK
	WEST	GATE 25

ASSEMBLY AREAS OF UNOCCUPIED BUILDINGS

ASSEMBLY AREAS FOR BUILDINGS THAT ARE NOT OCCUPIED ON A DAILY BASIS WILL BE NEAR THE SAFEST EXIT FROM THE BUILDING. IT IS THE RESPONSIBILITY OF THE PERSONS WHO EVACUATE TO NOTIFY PLANT PROTECTION BY RADIO OR PHONE OF THEIR LOCATION.

APPENDIX II

EMERGENCY RESPONSE REPORT & INCIDENT REPORT

Appendix II

FACILITIES & SECURITY UNIT

EMERGENCY RESPONSE REPORT
&
INCIDENT REPORT

TYPE OF EMERGENCY OR INCIDENT:

FIRE:	**MEDICAL:**	**SPILL:**	**ACCIDENT:**	**OTHER:**

DATE: _____ TIME: _____ DAY: _____

LOCATION OF EMERGENCY OR INCIDENT:

BUILDING: _____ FLOOR: _____ AREA: _____

UNITS RESPONDED:

GEP FIRE BRIGADE:	PLANT PROTECTION:	GE MEDICAL:
PITTSFIELD FIRE:	PITTSFIELD POLICE:	AMBULANCE:
OTHERS:		

NUMBER OF TOTAL PERSONNEL RESPONDING: _____

REPORT OF EMERGENCY OR INCIDENT: (THOSE INDICATED ABOVE WOULD RESPOND IF ACTUAL CALL)**

APPENDIX III

FIRST RESPONDERS SPILL REPORT

Appendix III

FIRST RESPONDER SPILL REPORT

GE-PITTSFIELD 159 PLASTICS AVENUE

REPORT BY:	PHONE NO.:	DATE::

SPILL OCCURRENCE
DATE:_____ TIME:_____ (AM / PM) Estimated / Actual

RESPONDER NOTIFIED
DATE:_____ TIME:_____ (AM / PM)

BUILDING and/or AREA OF SPILL:

_____

MATERIAL SPILLED
CHEMICAL NAME:_____
TRADE NAME [1]:_____

QUANTITY OF MATERIAL SPILLED
TOTAL [2]:_____ (gal / lbs.)
INSIDE BLDG [2]:_____ OUTSIDE BLDG [2]::_____
IF OUTSIDE BLDG, HOW MUCH IS OFF-SITE [3]::_____

MEDIA AFFECTED: (Check all that apply)
SOIL: _____ ASPHALT: _____ CONCRETE: _____
AIR (evap.): _____ WATER (Drainage, Waterway, Etc.)_____

ANY INJURIES?: YES / NO (circle one)
If YES, contact Public Relations and Environmental Management Personnel with Details

ANY POTENTIAL HAZARDS TO PUBLIC / EMPLOYEE HEALTH OR TO THE ENVIRONMENT[2]
YES / NO (circle one)
If YES, contact Public Relations and Environmental Management Personnel with Details

NARRATIVE OF SPILL:

_____
_____
_____
_____
_____

NOTES:

1. Obtain a copy of MSDS sheet or other technical data. Use this data to calculate individual chemical components.

2. If a spill occurs that exceeds a MDEP RQ, notify MDEP FIRST - Then, IF THE SPILL IS ASSOCIATED WITH GE PLASTICS OPERATIONS, CONTACT S. DELOYE.

3. By default, MDEP is also the State Emergency Response Commission (SERC); however, you must tell MDEP why you are specifically reporting to them as the SERC.

(SEE NEXT PAGE)

Appendix III

FIRST RESPONDER SPILL REPORT

GE-PITTSFIELD 159 PLASTICS AVENUE

CHEMICAL[1]: _____

	RQ in lbs.		RQ in lbs.
PCB or Oil Calc's (CH5):		CERCLA Air Tox (CH8):	
MDEP (CH6):		SARA (CH9):	
CERCLA (CH7):			

ANY RQ's EXCEEDED: YES / NO (circle one)
If YES, NOTIFY PROPER AGENCIES AND AUTHORITIES AFTER COMPLETING THIS FORM.
If NO, FINISH FORM AND FILE.

RESPONSE ACTIONS:

Was spill contained? YES / NO (circle one) If NO, when will it be? _____
Who is cleaning up spill? GE / NON-GE (circle one) If NON-GE, who? _____
What equipment is being used for clean up? _____
What is to be done with cleaned up material? _____

AS APPLICABLE, THE FIRST RESPONDER IS TO CONTACT THE FOLLOWING AGENCIES / AUTHORITIES:

AGENCY & PHONE NO.	PERSON CONTACTED & LOG NO.	TIME & DATE
NATIONAL RESPONSE CENTER (800)-424-8802 Call for CERCLA & SARA RQ Exceedances Call ASAP, but within 24 hours		
EPA REGION I (617)-556-1133 or (888)-304-1133 Call for PCB RQ Exceedance or Off-Site Oil Call within 24 hours or next work day		
MDEP – Springfield (413)-784-1100 (work days) (888)-304-1133 (nights and weekends) Call for MDEP RQ Exceedances Call within 2 hours		

CONSENT DECREE REPORTING (IMMEDIATLEY)
ONLY APPLIES TO RELEASES ABOVE THE RQ FROM THE AREAS COVERED BY THE CD
Contact GE Management

Name	Work Telephone		Cell
Richard Gates	(413)-448-5909		(413)-441-4938
Warren Wood	(413)-448-5919	--	(413)-441-4950
Andy Silfer	(413)-448-5904		(413)-441-4854

(SEE NEXT PAGE)

Appendix III

FIRST RESPONDER SPILL REPORT

GE-PITTSFIELD 159 PLASTICS AVENUE

ADDITIONAL REPORTING

For off-site spills, For SARA RQ Exceedances, or any visible oil sheen on waterway

AGENCY & PHONE NO.	PERSON CONTACTED	TIME & DATE
SERC[3] (CALL MDEP)		
LEPC[3] (CALL 911 OR 448-9764) (Fire Dept call within 2 hours)		
GE Plant Protection (413)-448-7550		

ADDITIONAL CONTACTS

GE PUBLIC RELATIONS – GE ENVIRONMENTAL MANAGEMENT

DEPARTMENT & PHONE NO.	CONTACTED	TIME & DATE
GE CEP – Richard Gates Days – (413)-448-5909 Evenings (Home) – (413)-354-7806 Cell – (413)-441-4938		
GE Plastics – Steve Deloye Days – (413)-448-7320 Evenings – (413)-623-6019 GE Plastics – Andy Hogeland Days – (413)-448-7706 Evenings – (413)-458-5966		

AS APPROPRIATE, PLANT PROTECTION TO CONTACT THE FOLLOWING		
DEPARTMENT & PHONE NO.	**CONTACTED**	**TIME & DATE**
PITTSFIELD POLICE (911 or (413)-448-9702)		
PITTSFIELD FIRE (911 or (413)-448-9764)		

(SEE NEXT PAGE)

APPENDIX IV

FIRE PREVENTION PLAN

PLANT SOURCES OF IGNITION

Appendix IV

FIRE PREVENTION PLAN/PLANT SOURCES OF IGNITION

LOCATION	TYPE OF HAZARD	GREATEST QUANTITY POTENTIALLY STORED	CONTAINER TYPE	FIRE PROTECTION STORAGE	FIRE PROTECTION STATIC ELECTRICITY	FIRE PROTECTION AMOUNTS	FIRE PROTECTION OTHER	FIRE PROTECTION SYSTEMS
Building 16 - Maintenance	Solvents	55 gal	Drum	Flammable Cabinets	Grounding	Limited Quantities	NA	Sprinkler System, Fire Extinguishers
	Oil Storage	55 gal	Drum	NA	Grounding	Limited Quantities	NA	Sprinkler System, Fire Extinguishers
Building 12 - BBL	Solvents	25 gal	Glass Containers	Flammable Cabinets	Grounding	Limited Quantities	NA	Sprinkler System, Fire Extinguishers
Building 64 - Outdoors	Propane	15 - 20 cylinders	Cylinders	Steel Caged Cabinets	NA	Limited Quantities	No Smoking Signs	NA
Oil/Water Separtors	PCB Oil	500 gal	Steel Tanks	NA	NA	NA	NA	Fire Extinguishers
Buildings 64G & 64T	Solvents	1 gal	Glass Containers	Flammable Cabinets	Grounding	Limited Quantities	NA	Sprinkler System, Fire Extinguishers
Building 59 Maintenance	Solvents	5 gal	Can	Flammable Cabinets	Grounding	Limited Quantities	NA	Sprinkler System, Fire Extinguishers

APPENDIX V

EMERGENCY PHONE NUMBERS

Appendix V

EMERGENCY TELEPHONE NUMBERS

1. **City of Pittsfield**

• Fire Department	911 **See note below**
• Police Department	911 **See note below**
• Dept. of Public Health	499-9411
• Berkshire Medical Center	447-2000
• Civil Defense	443-1292

2. **Commonwealth of Massachusetts**

• Department of Environmental Protection	(413) 784-1100 (9-5 weekdays) 1-888-304-1133 (nights & weekends)
• State Police (Cheshire)	743-1501

3. **National**

• Chemtrec	1-800-424-9300
• National Response Center	1-800-424-8802

4. **General Electric**

- Plant Protection	(413) 448-6666 (413) 448-7550 (non-emergency)

5. **Town of Lanesboro (Re: Rose site)**

• Fire Department	(413) 443-2321
• Police Department	(413) 443-4107

Notes:

1. **In case of a fire, spill or medical emergency the following GE Plant Protection phone number should be used: Fire, Spill or Medical Emergency 448-6666.**

2. ***The 911 number should only be used in case the GE Plant Protection phone numbers are not available.***

Contractor	Telephone Number(s)	Capabilities
Maxymillian Technologies, Inc.	(413)-499-3050 (413)-499-9862	Sand, clay, and heavy equipment operators, and laborers.
Clean Harbors, Inc. (Albany)	(800)-633-0666	Oil and hazardous material cleanup, disposal, boats, and booms.

Exhibit F-2 –
OSHA Training for GE Personnel

Exhibit F-2

OSHA TRAINING FOR
GENERAL ELECTRIC COMPANY PERSONNEL

Name	Title	Amount
Andrew Silfer	Remedial Programs Manager	40 hrs
Richard Gates	Remediation Project Manager	40 hrs
Kevin Mooney	Project Engineer	24 hrs
John Levesque	Environmental Operations Manager	40 hrs
Warren Wood	Electrical Foreman	8 hrs
Jeff Nicholson	Technical Specialist	8 hrs
Peter Wojcik	Residential & EHS Specialist	40 hrs

Note:

1. OSHA training completed in accordance with 1920, et. seq.

Date