GE ENERGY

GE MAIN PLANT
SCHENECTADY, NEW YORK

REVISED FEASIBILITY STUDY REPORT

MAY 2004

Prepared For:
GE Energy
One River Road
Schenectady, New York

URS Corporation - New York
28 Corporate Drive, Suite 200
Clifton Park, New York 12065

URS

May 27, 2004

Mr. Damian Foti
General Electric Energy
One River Road
Building 43, Room 237
Schenectady, New York 12345

RE: *Revised Feasibility Study*
General Electric Energy – Main Plant
Schenectady, New York

Dear Damian:

We have attached the *Revised Feasibility Study* for the General Electric Energy Main Plant Facility in Schenectady, New York. URS Corporation has prepared this document in general accordance with the regulations for the New York State Inactive Hazardous Waste Disposal Site Remedial Program (6 NYCRR Part 375) and Order on Consent #A4 0336-95-09. This *Revised Feasibility Study* reflects revisions made in response to New York State Department of Environmental Conservation's (NYSDEC's) comments of October 18, 2002, on the January 31, 2002 *Feasibility Study* for Main Plant and revisions made in response to NYSDEC's comments of April 8, 2004, on the May 30, 2003 *Revised Feasibility Study*.

Please call us if you have any questions or comments on this report.

Very truly yours,
URS CORPORATION – NEW YORK

Don Porterfield, P.E.
Environmental Manager – Clifton Park

URS Corporation
28 Corporate Drive, Suite 200
Clifton Park, NY 12065
Tel: 518.688.0015
Fax: 518.688.0022

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EXECUTIVE SUMMARY

This document presents the results of a *Revised Feasibility Study (FS)* for the 628-acre General Electric Energy (GE) Main Plant in Schenectady, New York. This *FS* has been prepared in accordance with the September 6, 1995 Order on Consent #A4-0336-95-09 (Order) between GE and the New York State Department of Environmental Conservation (NYSDEC) and reflects revisions made in response to NYSDEC's comments of October 18, 2002 on the January 31, 2002 *Feasibility Study* and NYSDEC's comments of April 8, 2004, on the May 30, 2003 *Revised Feasibility Study* for Main Plant. The results of the Remedial Investigation are presented in URS' May 2004 *Revised Remedial Investigation Report* (*RI Report*), which incorporates comments received from the NYSDEC in April 2004.

INTRODUCTION

Over the last century, GE has used Main Plant to manufacture a variety of products including electric motors and generators, gas turbines, wire and cable, insulating materials and microwave tubes. Although Main Plant activities have been reduced, it remains the world's leading producer of large steam turbines and generators.

Based on the data collected during the RI, while there is some contamination over the 628-acre site that should be remediated, overall the conditions generally do not pose a significant threat to human health and the environment. The data collected at and near the site indicates that:

- The site does not pose a threat to the nearby Rotterdam and Schenectady wellfields;
- The site does not adversely affect water quality in the adjacent Mohawk River;
- The site does not significantly affect water quality in the two creeks that flow through the site;
- The site does not pose a significant risk of health effects to employees, trespassers, residents, construction workers, or people who may use the site for recreation; and
- The western portion of the site provides diverse habitats for a variety of flora and fauna.

There are two principal potential threats to the environment at Main Plant:

- The groundwater beneath the central portion of the site that has been impacted by volatile organic compounds (VOCs); and
- Perched groundwater in the former East Landfill Area in the western portion of the site that has been impacted by VOCs.

The VOC impacted groundwater beneath the central portion of the site has the potential to migrate to the Mohawk River. However, data has shown that the water quality of the Mohawk

River has not been adversely impacted by the VOCs that are present in the on-site groundwater. The perched groundwater in the former East Landfill Area has the potential to migrate to the nearby Poentic Kill that passes through the site. Although, the data shows that the surface water quality has not been significantly affected, there is potential for adverse effects to site fauna if conditions are left unabated.

The objective of this *FS* is to develop and evaluate potential remedial actions for the Main Plant and recommend a remedial action that addresses the two principal potential threats to the environment and other areas of the site where some contamination remains, while protecting the habitats in the western portion of the site. This *FS* has been prepared pursuant to the NYSDEC's Inactive Hazardous Waste Disposal Site Remedial Program, as defined in the New York Environmental Conservation Law (ECL) and the rules of 6NYCRR Part 375. Specifically, this *FS* recommends an alternative for the Main Plant that:

- Will eliminate or mitigate "all significant threats to the public health and the environment," (6NYCRR Part 375) including the Mohawk River, that are posed by contaminants at the site; and

- Has been developed "through the proper application of scientific and engineering principles" (6NYCRR Part 375).

REMEDIAL ACTION OBJECTIVES

The primary objective of remedial actions at the Main Plant is to protect human health and the environment and to eliminate significant threats to the environment. The specific remedial action objectives at GE's Main Plant are:

- Minimize direct contact by site workers and the public with soil that may contain contaminants.
- Manage, control, and abate the migration of contaminated groundwater to surface waters on or near the site.
- Minimize further groundwater impacts through source control or removal.
- Minimize transport of contaminated soil by erosion.
- Prevent human consumption or use of groundwater that does not meet NYSDEC groundwater standards.
- Further reduce ecological risk by interrupting significant exposure pathways.
- Protect, preserve, and continue to enhance the existing habitats at the site.

RECOMMENDED REMEDY

Based on the evaluation of six remedial alternatives, URS recommends implementation of Alternative 4. Alternative 4 includes measures to remediate VOCs in groundwater beneath the central portion of the site, prevent shallow impacted groundwater in the former East Landfill Area from reaching the Poentic Kill, remove targeted areas of impacted soil, address other areas of the site where residual contamination has been detected, and protect and enhance the site habitats. The recommended alternative achieves the remedial objectives for the Main Plant site. The elements of this alternative include:

- Previously completed Interim Remedial Measures (IRMs) and abatement measures.
- Continue on-going IRMs and remediations. This involves:
    - Continue free-product recovery and
    - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).
- Place soil or asphalt cover over surface soil in portions of the manufacturing area.
- Construct asphalt caps over soil in portions of the manufacturing area where soil may be impacting groundwater.
- Enhance and accelerate aerobic bioremediation at the DM-405F area near the former Sector R Holding Pond.
- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg or subsurface soil where PCBs have been detected at concentrations greater than 10- mg/kg in manufacturing area.
- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.
- Placement of clean fill over surface soil where PCBs have been detected at concentrations between one and 10 mg/kg and subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.
- Construct expanded seep collection and treatment systems for the seeps along the former East Landfill Area.
- Install shallow groundwater treatment system in select areas between the former East Landfill Area and Poentic Kill.

- Place agronomic cover over portions of the former East and West Landfill Areas.
- Enhancement of site habitats.
- Enhance and accelerate the ongoing in-situ anaerobic bioremediation of chlorinated solvents in groundwater near the source area at the former Wire Mill Area.
- Enhance and accelerate the ongoing in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Propeller Test Building in the WWTP Area.
- Impose restrictive covenant and institutional controls, including access controls, on the site.
- Develop a comprehensive *Health and Safety Plan* for site workers.
- Develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations.
- Implement a maintenance program for the campus rehabilitations.
- Implement a free-product recovery standard operating procedure (SOP).
- Monitor the performance of groundwater treatment measures.
- Monitor the natural attenuation occurring in site groundwater.
- Monitor groundwater in the channel fill deposits annually at locations approximately one year and three years travel time upgradient from the Mohawk River.
- Monitor groundwater in the fill and floodplain deposits annually at locations approximately one year and three years travel time upgradient from on-site surface water bodies.
- Monitor the surface water in the Poentic Kill and Poenties Kill annually.
- Survey the biota and wildlife habitats every five years.
- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

The monitoring data collected at Main Plant would be used to evaluate the effectiveness of the remedial program, as a whole, in regions of the plant, including the former East Landfill Area as well as of individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if, based on the results of the routine monitoring, the RAOs are not being achieved.

SITE DESCRIPTION AND BACKGROUND

The Main Plant is in the City of Schenectady and the Town of Rotterdam, Schenectady County, New York. The site is approximately 628 acres and presently has approximately 40 buildings. The Main Plant is bordered on the east and north by Interstate 890, on the south by the Poentic Kill and the Delaware and Hudson Railroad, and on the west by the Poenties Kill, an adjacent unnamed wetland, and Rotterdam Square Mall. The Mohawk River is north of the site beyond Interstate 890. The Rotterdam-Schenectady wellfields are approximately 3,000 feet northwest of the GE Main Plant site.

There are five stratigraphic units at the site. In general, the stratigraphic sequence from the surface is fill, floodplain deposits, channel fill deposits, glaciolacustrine deposits, and glacial till. The channel fill deposits are the primary water-bearing unit beneath GE's property.

Due to the lower permeability of the floodplain deposits and glaciolacustrine deposits, these two units act as semi-confining layers. Groundwater migrates slowly through those semi-confining layers toward the more permeable channel fill deposits and, to some extent, the fill material. There is a naturally occurring hydrologic divide west of the western boundary of GE's property that separates groundwater that migrates beneath the site from groundwater west of the site. The groundwater beneath the site and east of the divide generally migrates from the south to the north towards the Mohawk River. The hydrologic divide is between the site and the municipal wellfields to the west. Thus, this divide prevents water beneath the site from migrating to the municipal wellfields.

As part of the development of the Remedial Investigation Work Plans, GE, in conjunction with NYSDEC, identified seven media based Areas of Concern (AOCs) at the site. These seven AOCs were presented in the *Area of Concern Report (AOC Report)*, dated January 14, 1997 and the *Zone 2 Area of Concern Report (Zone 2 AOC Report)*, dated March 23, 2000. The identification and subsequent investigation of the AOCs focused on evaluating whether the presence of industrial contaminants in the various environmental media at the site, and any associated potential exposure pathways, pose a significant threat to human health and the environment. The seven potential AOCs include:

- Soils
- Groundwater
- Surface water in the Poentic Kill and Poenties Kill
- Sediments in the Poentic Kill and Poenties Kill'
- Former Eastern Landfill Area Seeps
- Ambient Air
- Site Habitats

RI RESULTS

The RI collected an extensive amount of technical data and historical information. The data generated during these studies provided a technically sound and reliable basis to identify and understand the nature and extent of contamination and potential exposure pathways at the site.

Over the past two decades, GE and others have studied the 628-acre Main Plant site and surrounding areas to document the existing environmental conditions. The results of these investigations at the site show that while there is contamination at the industrial site at concentrations greater than the NYSDEC's guidance values or standards, the conditions do not generally pose a significant threat to human health or the environment.

The results of the RI are summarized below for each of the media-based AOCs, plus a summary of the areas where light non-aqueous phase liquids (LNAPL) were encountered.

Soils

- PCBs were detected in surface soils at concentrations that exceed NYSDEC's Recommended Soil Cleanup Objective (RSCO) in the former East and West Landfill Areas, near former Building 259, near former Building 29, near former Building 60, near former Building 109, and in the waste water treatment plant area. PCBs were detected in subsurface soils at concentrations that exceed NYSDEC's RSCO in the former East Landfill Area, near former Building 85, and in the former Binnie Kill Channel.

- VOCs were detected in subsurface soils in the former Wire Mill Area, former IMPS Area, former East Landfill Area, City Water Main IRM Area, the WWTP Area, and the former Binnie Kill Channel at concentrations that exceed NYSDEC's recommended soil cleanup objective (RSCOs) for total VOCs.

- PAHs and metals were detected in surface and subsurface soils at concentrations that exceed RSCOs.

Groundwater

- PCBs were not detected in the most recent groundwater samples collected from the channel fill groundwater.

- PCBs were detected in shallow groundwater at concentrations that exceed the NYSDEC's groundwater standards near the former East Landfill Area, near Building 49/53, and in the former Binnie Kill Channel. PCBs were also detected in LNAPL found in these areas.

- VOCs (BTEX and other petroleum compounds) were detected in shallow groundwater at concentrations that exceed the NYSDEC groundwater standards near the City Water Main IRM Area, south of the WWTP Area, in the former East and West Landfill Areas, near the former IMPS Area, and near the former Stark Oil Facility and in channel fill groundwater beneath the former East Landfill Area.

- VOCs (chlorinated solvents) were detected in shallow groundwater near the WWTP and the former Wire Mill Area and in channel fill groundwater near the WWTP, the former Wire Mill Area, the former IMPS Area, west of the former West Landfill Area, and near the former Building 285 parking lot.

- PAHs were detected in shallow groundwater at concentrations that exceed groundwater standards in the former East Landfill Area, near Building 49/53, and in the former Binnie Kill Channel.

Seeps

- PCBs, VOCs, and metals were detected in seeps at concentrations that exceed NYSDEC's groundwater standards.

- Based on an evaluation of filtered and unfiltered samples, the PCBs found in the seeps are associated with PCBs sorbed to suspended particles.

Surface Water

- Site related contaminants were not detected in surface water samples from the Mohawk River.

- VOCs were not detected in the Poentic Kill, Poenties Kill, or on-site wetlands at concentrations greater than the NYSDEC's surface water standards.

- PAHs were not detected in surface water samples at concentrations that exceed the NYSDEC's surface water standards.

- Iron was detected in surface water bodies, including water bodies upstream of the site, at concentrations exceeding NYSDEC surface water standards.

Sediments

- PCBs were not found in the sediment collected from the Mohawk River near GE's factory water intake nor in the sediment collected in the main channel of the Mohawk River. PCBs were detected in sediment at storm sewer Outfall 002 in 1992. The storm sewers were subsequently cleaned.

- PCBs were detected in sediment samples from the Poentic Kill, Poenties Kill, the on-site wetlands, and the swale south of the former East Landfill Area at concentrations that exceed the NYSDEC's sediment screening criteria.

- VOCs were not detected in sediment samples from the Poenties Kill and the Mohawk River at concentrations that exceed the NYSDEC's sediment screening criteria. With the exception of benzo(a)anthracene, no PAHs were detected in sediments from the Poenties Kill, on-site wetlands, and the Mohawk River.

- VOCs (BTEX) and PAHs were detected in sediment samples from the Poentic Kill near the seeps at concentrations that exceed the NYSDEC's sediment screening criteria.

- Metals were below the NYSDEC's lowest effect level in sediment samples from the Mohawk River.

Ambient Air

- The results of a human health risk assessment, which included evaluation of an inhalation exposure pathway conducted in 1999, along with an indoor air evaluation, indicate that conditions at the site do not pose a potential risk for adverse affects to site workers or potential trespassers.

Site Habitats

- Large areas of the site, especially in and around the former landfill areas, support a wide array of vegetation and wildlife.

- PCBs were detected in biota samples collected near the seeps at concentrations that exceed NYSDEC's standards.

LNAPL

- LNAPL (petroleum products) were found, or were previously addressed, near the former East Landfill Area, the former IMPS Area, the former Stark Oil Facility, Building 49/53, west of Building 273, near the City Water Main IRM Area, and near the former Binnie Kill Channel.

In 1999, URS conducted a screening level human health and ecological risk assessment for the Main Plant site. The ecological risk assessment was updated in response to NYSDEC's comments on the 1999 submittal and was resubmitted to NYSDEC as part of the May 30, 2003 *RI Report*. The results of the screening-level human health risk assessment indicated that conditions at the site do not pose a potential for adverse effects to site workers or potential trespassers under either current site conditions or under hypothetical future use conditions. The results of the screening-level ecological risk assessment concluded that although soil quality criteria for plants were exceeded by some constituents, site flora should not be considered a receptor of concern because of the "vigorous and diverse plant communities" that were found on-site. However, due to the use of conservative soil, surface water, and sediment quality criteria the potential for localized adverse effects to some ecological receptors could not be ruled out at the screening stage. Rather than conduct a more comprehensive *Risk Assessment*, it was decided that remedial measures would be implemented to abate the potential risks to ecological receptors.

The results of the RI indicate that the four media-based AOCs listed below have been impacted by site activities. Although two (surface water and sediment) of the three remaining AOCs may have been impacted by site activities, these impacts are related to migration of contaminants from one or more of the other AOCs (migration of dissolved contaminants in seep water and shallow groundwater, migration of PCB-containing suspended particles in seep water, and erosion of PCB-impacted surface soil) and are either undetectable in the case of the suspected contribution of PCBs to surface water in the Poentic Kill, or are present at concentrations that are similar to achievable clean-up levels in the case of the Poentic Kill sediments. Thus, the remedial actions at the site focus on halting the migration of contaminants to the on-site surface water and sediments from the other media-based AOCs.

The portions of each of the four media-based AOCs at the site that are evaluated in the FS are:

- Soil at locations where: (i) compounds are present at concentrations that may impact surface water due to erosion; (ii) VOCs are present at concentrations which are believed to be impacting groundwater; (iii) PCBs were detected at concentrations that are above NYSDEC RSCOs; or (iv) other compounds are above NYSDEC RSCOs;

- Groundwater at locations where: (i) VOCs are present at concentrations that are believed to be the principal contributors to the VOCs detected in the channel fill groundwater at the site boundaries; (ii) compounds are present at concentrations that may impact surface water; (iii) compounds are present at concentrations that are above NYSDEC's groundwater standards and are near the site boundaries; (iv) free-product is present in the subsurface; or (v) compounds are present at concentrations that are above NYSDEC's groundwater standards;

- Seeps along the former East Landfill Area, which have the potential to impact sediment, surface water, and biota in the Poentic Kill; and

- Existing site habitat areas.

INTERIM REMEDIAL MEASURES

During the course of the site investigations and normal operations of the plant, GE has implemented a wide variety of Interim Remedial Measures (IRMs) and remedial actions. These actions have been performed in accordance with NYSDEC-approved work plans, consent orders, permits, and NYSDEC's concurrence. GE has completed 13 IRMs and response actions and there are currently five on-going IRMs and response actions.

The completed actions meet some of the remedial objectives. These completed remedial measures as well as some on-going remedial measures include actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and ongoing remedial measures are listed below.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC Closure Plan;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;
- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and
- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;
- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to reduce migration of dissolved and suspended contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediment from the former Sector R Holding Pond.

REMEDY EVALUATION SUMMARY

The following six alternatives were developed for the site based on review of applicable technologies and conditions of the site. The elements of each of the six alternatives are summarized below.

- Alternative 1: No further action, other than monitoring (incorporates remedial actions already implemented and currently underway).
- Alternative 2: Institutional controls with monitoring (incorporates remedial actions already implemented and currently underway).
- Alternative 3: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill

Areas, enhancement of ground cover at former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 4: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 5: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, capping of the former landfill areas with clay or synthetic cover systems, collection and treatment of shallow groundwater along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 6: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, removal of free-product, treatment of groundwater at the northern property boundary, and monitoring (incorporates remedial actions already implemented and currently underway).

The six alternatives were subjected to a detailed analysis by evaluating each alternative against these eight criteria:

- Comparison with applicable or relevant and appropriate Federal Regulations and New York State Standards, Criteria, and Guidelines (SCGs)
- Overall protection of human health and the environment
- Short-term impacts and effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Community acceptance
- Cost

The primary remedial objective is the overall protection of human health and the environment. The statutory criteria that was used to evaluate whether the alternatives meet the remedial objectives was the elimination of significant threats to the environment and public health, in accordance with Article 27, Title 13 of the ECL. In addition, as required by the Order on Consent, the effect of each alternative on the Mohawk River, the Poenties Kill, the Poentic Kill, on-site groundwater, off-site groundwater, and the City of Schenectady and Town of Rotterdam municipal well fields was considered.

Alternative 4 is recommended based on the comparison of the evaluation of the six alternatives because it is effective in achieving the remedial objectives, it is the least destructive alternative that meets the remedial objectives for the site, it is protective of human health and the environment, and it is the most cost effective alternative that meets the remedial objectives. Alternatives 1 and 2 were ruled out because they do not achieve all the remedial objectives. Alternative 4 was chosen over Alternative 3 because it provides additional levels of protection for surface waters at and near the site and will allow groundwater that migrates in the channel fill to achieve groundwater standards in a shorter time frame. Alternative 4 was chosen over Alternative 5 based on environmental impact and cost effectiveness. Alternative 5 would destroy the existing habitats on the entire western third of the site and displace the wildlife into the surrounding areas. In contrast, Alternative 4 would enhance the site habitats, thereby better achieving one of the remedial objectives for the site: protection, preservation, and enhancement of the existing habitats. Alternative 4 was chosen over Alternative 6 based on the active treatment of source areas. Although Alternative 6 would achieve groundwater standards north of the property boundary, where there are no current or anticipated future receptors near the Mohawk River, in a slightly shorter time frame, the source areas would not be treated. Another advantage of Alternative 4 over Alternative 6 is that Alternative 4 includes treatment of the principal VOC source areas at the site. This will allow the channel fill groundwater beneath the site to achieve groundwater standards in a more timely manner. In contrast, the channel fill groundwater beneath the site would not meet groundwater standards for the foreseeable future if Alternative 6 were implemented.

SUMMARY

This *Revised Feasibility Study* and its selection of a comprehensive remedial program for the Main Plant site are the culmination of more than two decades of environmental investigations and studies. The recommended alternative, in conjunction with the many Interim Remedial Measures and response actions already implemented across the site, will effectively eliminate significant threats to the environment that may have resulted from more than 100 years of manufacturing and industrial operations at the Plant.

In summary, Alternative 4 is recommended because:

- It is protective of human health and the environment;
- It meets the remedial objectives;

- It enhances and preserves existing wildlife habitats; and
- It provides similar protection, meets more of the remedial objectives, is less destructive, and is easier to implement than more costly alternatives.

1.0 INTRODUCTION

On behalf of General Electric Energy (GE), URS Corporation (URS) has prepared this *Revised Feasibility Study* for GE's Main Plant at One River Road, Schenectady, New York. This *Revised Feasibility Study* is being submitted in accordance with Order on Consent #A4-0336-95-09 (Order) and reflects revisions made in response to New York State Department of Environmental Conservation's (NYSDEC's) comments of October 18, 2002, on the January 31, 2002 *Feasibility Study* for Main Plant and NYSDEC's comments of April 8, 2004, on the May 30, 2003 *Revised Feasibility Study* for Main Plant.

This *Revised Feasibility Study* (*FS*) for GE's Main Plant in Schenectady, New York (the site) is prepared in accordance with the Order between GE and NYSDEC. The Order was entered pursuant to NYSDEC's Inactive Hazardous Waste Disposal Site Remedial Program, Environmental Conservation Law (ECL) Article 27, Title 13; 6NYCRR Part 375 (Remedial Program). The Registry code for the site is #447004.

This *FS* represents the culmination of more than two decades of investigation and remediation activities at GE's Main Plant. To organize and manage the historic data and to move forward with Remedial Investigation and Feasibility Study (RI and FS) activities, the site was separated into two zones: Zone 1 and Zone 2. Zone 1 is the central part of the site and Zone 2 is the east and west portions of the site. The geometry of the zones is based on the hydrogeology beneath the Main Plant. Zone 1 is above a hydrogeological trough, which is generally oriented south to north through the center of the site. The hydrogeological trough is the primary groundwater pathway beneath the Main Plant. Zone 2 comprises all the area outside this trough.

In accordance with the Order, the initial investigations of the site focused on the two zones. On April 25, 2000, GE submitted the *Zone 1 Remedial Investigation Report (Zone 1 RI Report)* to the NYSDEC. The *Zone 1 RI Report* presented the results of the implementation of the *Revised Remedial Investigation/Feasibility Study Work Plan,* dated January 21, 1999. On June 30, 2000, GE submitted the *Zone 1 Phase II Remedial Investigation Work Plan* (*Zone 1 Phase II RI Work Plan*) and the *Zone 2 Remedial Investigation Work Plan* (*Zone 2 RI Work Plan*). Since field work investigations in both zones was completed concurrently, and because much of the information is relevant to both zones, a comprehensive *Remedial Investigation Report*, dated October 19, 2001 that covers both zones at the site was prepared.

In response to NYSDEC's comments on the *Remedial Investigation Report*, which were provided in a letter dated April 16, 2002, additional investigation activities were conducted. A *Revised Remedial Investigation Report* was prepared to address NYSDEC's comments and incorporate the results of the additional investigation work. The *Revised Remedial Investigation Report* (*RI Report*), which is being submitted concurrently with this *FS*, has been further revised in response to NYSDEC's comments of April 2004.

Because there are no zone-specific contaminants or unique zone issues found during the Remedial Investigation (RI), this *FS* includes both Zone 1 and Zone 2 of Main Plant. This *FS* is a companion document to the comprehensive *Revised Remedial Investigation Report* (*RI Report*), dated May 2004, that summarizes the investigation data. A site-wide FS is appropriate since sufficient data has been collected during the RI to evaluate remedial alternatives for the entire site. The investigation process has been on going for many years at the site and has generated an enormous amount of site data. The data has undergone technical review and has been the basis of numerous and on-going discussions with the NYSDEC remedial staff.

The *FS* summarizes the process followed to develop and evaluate alternatives to manage and remediate environmental contaminant conditions at the 628-acre manufacturing site. Following the evaluation of the alternatives, an appropriate remedial alternative to protect human health and the environment is recommended. This document was prepared in accordance with these five items:

- The requirements of Order on Consent A4-0336-15-09, which GE entered into September 6, 1995.
- ECL - Article 27 Title 13
- The National Contingency Plan (NCP) (40 CFR Part 300)
- The USEPA document, entitled *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, dated October 1988
- NYSDEC's TAGM HWR-90-4030, entitled *Selection of Remedial Actions at Inactive Hazardous Waste Sites*, dated May 15, 1990

Section 2.0 of this document provides an overview of the remedial approach that has been taken at the Main Plant. Section 3.0 provides background information on the Main Plant, including site geology and hydrogeology, and a summary of the 19 interim remedial measures and abatement measures that GE has undertaken at the site. Section 4.0 describes the areas of concern (AOCs) and summarizes the results of the Remedial Investigation (RI). Section 5.0 presents the remedial objectives. Section 6.0 discusses and screens potential remedial technologies. Section 7.0 provides a summary of the criteria used to evaluate each alternative, and a description and evaluation of site-wide remedial alternatives. The recommended alternative is discussed in Section 8.0. Section 9.0 is a list of the references that were used to prepare this document and Section 10.0 is a list of acronyms used in this *FS*.

2.0 REMEDIAL APPROACH

The environmental work at GE's Main Plant has been guided by the remedial investigation and remedial action requirements outlined in the New York Environmental Conservation Law (ECL) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as directed by the Order. These standards are:

- Elimination of significant threats to human health and the environment posed by a site (ECL Section 27-1313)
- Protection of human health and the environment (CERCLA 42USC Section 9621)

Over the past two decades, GE and others have studied the 628-acre manufacturing site and surrounding areas to document the existing environmental conditions. The results of these studies are summarized in the *RI Report* that accompanies this *FS*. The scope of these studies has included the installation and sampling of hundreds of groundwater monitoring wells. GE has also collected and analyzed over 700 soil and sediment samples to assess whether there are areas of significant contamination at the site.

The results of all of the investigations at the site show that there is some contamination at the 100-year old industrial site that should be remediated. Conditions at much of the site generally do not pose a significant threat to human health and the environment. As described in the *RI Report*, the studies indicate that:

- The site does not pose a threat to the Rotterdam and Schenectady wellfields, which are approximately one mile west of the site.
- The site does not adversely affect water quality in the Mohawk River.
- The site does not significantly affect water quality in the two creeks (Poentic Kill and Poenties Kill) that flow through GE's property.
- The site does not pose a significant risk of non-carcinogenic or carcinogenic health effects to employees, trespassers, residents, construction workers, or people who may use the site for recreation.

Over the past decade, GE has also carefully examined the diverse wetland and terrestrial ecosystem that is found throughout most of the western third of their property. As part of this effort, GE has mapped and inventoried the abundant flora and fauna on that portion of the site. The results of these studies indicate that the Main Plant has abundant open spaces with vigorous and diverse plant communities that provide diverse habitats for a variety of animal species.

Throughout the years, as GE has identified discrete conditions of concern, they have implemented eight Interim Remedial Measures (IRMs) and 11 other remedial measures to abate these conditions. The IRMs and remedial actions, which are described in more detail in Section 3.4, have focused on achieving one or more of these four objectives:

- Abating potential sources of contaminants through actions such as removing underground and unused storage tanks, removing PCB-containing transformers, and cleaning storm sewers.

- Reducing potential exposures to site workers and the environment by actions such as removing PCB-containing soils from an isolated holding pond, collecting and treating seepage from a former on-site landfill before it enters surface water, and removing mercury-containing soil from the basement of the power house.

- Recovering free-product from areas where it has been found.

- Improving site habitats by removing debris from the surfaces of the former landfills, refurbishing the open spaces between the manufacturing buildings, and designing and installing agronomic cover systems for various parts of the former landfill areas.

GE conducted a human health risk assessment in 1999 and screening level ecological risk assessment in 2002 for the Main Plant. The results of the risk assessments, which were performed using applicable New York and EPA guidance, indicated that:

- Conditions at the site do not pose a potential for adverse effects to site workers or potential trespassers (under either current site conditions or under hypothetical future site conditions).

- The vigorous and diverse plant communities near the former landfills suggest that the constituents of potential concern (COPCs) have a minimal effect on site flora. Thus, the site flora are not considered a receptor of concern.

- There is potential for adverse effects to site fauna if left unabated.

As the RI/FS program at the Main Plant enters the remedy selection stage, the process will focus on the primary goal of NYSDEC's Inactive Hazardous Waste Disposal Site Remedial Program, which is to eliminate significant threats to human health and the environment. Thus, the overriding standard used to evaluate the remedial action alternatives is whether they are protective of human health and the environment for the current and reasonably anticipated future uses of this 100 year old manufacturing site.

One of the evaluation criteria used in the FS process is to compare potential remedial alternatives to Applicable or Relevant and Appropriate Regulations (ARARs) and Standards, Criteria, and Guidelines (SCGs). By keeping the context of potential ARARs and SCGs in mind during the preparation of this *FS*, the potential ARARs and SCGs can be grouped into these three categories:

- *Regulations that establish numerical standards for environmental media that can migrate from the site*. Examples of this type of regulation include Federal MCLs and New York State's water quality standards (6NYCRR 701 and 6NYCRR 703). URS considers this first category of ARARs and SCGs in the evaluation of the potential remedial alternatives.

- *Regulations that establish prescribed methods for certain actions*. Examples of these types of regulations include New York's hazardous waste rules (6NYCRR 370-373), New York's solid waste landfill rules (6NYCRR 360), and Federal regulations that govern PCB cleanups (40 CFR 760). URS considers this second category of potential ARARs and SCGS in the evaluation of components of remedial alternatives that incorporate specific actions, such as off-site disposal.

- *Guidance materials that provide objectives or procedures that are to be considered (TBC) when evaluating the potential threat posed by conditions at a site*. Two examples of these types of guidance documents are the NYSDEC's *Technical Guidance for Screening Contaminated Sediments,* and the Recommended Soil Cleanup Objectives (RSCOs) in NYSDEC's *Technical and Administrative Guidance Memorandum Number 4046 (TAGM-4046)*. The values listed in both these documents were developed by NYSDEC to provide protection of human health and the environment and conservatively assume unrestricted exposure to the constituents over a lifetime. URS has used these TBC materials to identify areas and media at the site that are evaluated in this *FS*. While the TBC values will be used in the *FS*, they should not be considered the final cleanup levels for the site. In accordance with TAGM-4046, final cleanup levels are established in the *FS* after detailed evaluation of the preferred remedial alternative.

3.0 SITE BACKGROUND

This Section provides background information about GE's Main Plant. The site background topics include:

- Site Description
- History of Main Plant
- Site Geology and Hydrogeology
- Remedial Actions Undertaken by GE at the Site
- Previous Environmental Investigations at the Site

3.1 SITE DESCRIPTION

The Main Plant is in an industrial zoned area that straddles the Town of Rotterdam and the City of Schenectady. Figure 3-1 is a topographic map of Main Plant and surrounding area. Main Plant is bordered on the east and north by Interstate 890. To the south, Main Plant is bordered by the Delaware and Hudson Railroad and by the Poentic Kill. Residential areas are south of the railroad. These residential properties are approximately 50 to 100 feet above the site and are separated from the site by the steep, wooded Bellevue Bluffs. The west side of Main Plant is flanked by the Poenties Kill, an adjacent unnamed wetland, and Rotterdam Square Mall.

From past to present, Main Plant and its surrounding area have supported numerous industries. These industries include:

- The Erie (Barge) Canal's Schenectady port;
- Railroad sidings that linked the Main Plant to the former American Locomotive plant;
- A fuel oil distribution center at the former Stark Oil Facility;
- Jewelry manufacturing;
- Two major recycling centers for scrap steel, paper, and plastic;
- A municipal trash transfer station;
- A major regional maintenance center for an electrical and natural gas utility;
- Numerous automotive service stations and related machine shops;
- A major chemical manufacturing plant;
- A municipal sewage treatment plant;
- A sand and gravel mine;
- A retail shopping mall;
- A terminal and maintenance facility for a nationwide trucking company;
- A commercial green house;
- A local community college;
- A national guard armory; and
- A former Manufactured Gas Plant Site.

Today, Main Plant encompasses more than 628 acres. As previously discussed, for the purposes of organizing and prioritizing investigations, and based on underlying hydrogeologic features, Main Plant has been divided into two zones and 19 sectors. The zones and sectors at the site are shown in Figure 3-2. GE's manufacturing activities are conducted in the central and eastern portions of the site (Zone 1 and Zone 2 East). The western portion of the site (Zone 2 West) is comprised of wetlands and three former landfill areas: the former Binnie Kill Landfill Area, the former East Landfill Area and the former West Landfill Area.

The remainder of this section briefly describes past and present water features, at and near Main Plant.

Mohawk River

The Mohawk River flows west to east along the north side of Interstate 890. The NYSDEC has identified the Mohawk River as a Class A surface water body. A Class A surface water body is defined by the NYSDEC as: *a source of water supply for drinking, culinary or food processing purposes, primary and secondary contact recreation and fishing* (6 NYCRR Part 701).

Poentic Kill

Two streams pass through the Main Plant site. The first stream, the Poentic Kill, was formerly known as Tellers Kill. This stream flows north and northeast, passing between the former East and West Landfill areas, and discharging into the Mohawk River (Figure 3-2).

In 1947, the north-south leg of the Poentic Kill, which was then known as the Tellers Kill, was moved west, so the former East Landfill Area could be created. The new stream channel rejoined the natural stream channel leading to the Mohawk River, in the northeast corner of the former East Landfill Area. The abandoned stream channel and surrounding swampy area were eventually filled.

The Poentic Kill flows year round and has been identified by the NYSDEC as a Class B surface water body. According to 6 NYCRR Part 701, the best usages of a Class B water body are primary and secondary contact recreation and fishing.

Poenties Kill

The second stream that passes through Main Plant is called the Poenties Kill. The Poenties Kill is an intermittent stream exhibiting only seasonal flow. The stream flows north and northwest along the former West Landfill Area boundary and joins the Poentic Kill approximately 600 feet downstream (Figure 3-2) of former East Landfill. The Poenties Kill has been identified by the NYSDEC as a Class C surface water body. According to 6 NYCRR Part 701, the best usage for a Class C water body is fishing and the water shall be suitable for fish propagation and survival.

Wetlands

There are two wetland areas on site. The unnamed wetlands lie west and south of the former West Landfill Area (Figure 3-2). The two wetlands are mapped as one wetland area (S-115) on the New York State Freshwater Wetlands Map for Schenectady County (NYSDEC, 1994a).

Former Binnie Kill Channel

The Binnie Kill was connected to the Mohawk River until the mid-1900s. The former channel passed through the north central and northeastern portion of the site (Figure 3-2). Over time, most of the former Binnie Kill Channel was filled with soil and demolition debris.

Former Sector R Holding Pond

The former Sector R Holding Pond is the only area of free-standing water that remains of the former Binnie Kill Channel. The former Sector R Holding Pond was part of GE's storm water management system until the early 1990s. The area still receives surface water run-off from neighboring areas, but is no longer part of GE's storm water management system. The former Sector R Holding Pond is now overgrown with vegetation.

Seeps

Several iron-stained seeps exist along the eastern banks of the Poentic Kill (Figure 3-2). The most active seeps are south of the access road to the former West Landfill Area. No seeps have been noted along the perimeter of the former West Landfill Area.

Former Erie Canal

A portion of the Erie Canal once flowed through the Main Plant site. This portion of the Erie Canal was elevated above surrounding grade. The former passage remains visible in the western portion of the site and north of former Building 36 on the eastern portion of the property.

Schenectady Rotterdam Municipal Well Fields

The Schenectady-Rotterdam municipal well fields lie approximately 3,000 feet northwest of Main Plant. The municipal well fields serve as a source of drinking water for the City of Schenectady and the Town of Rotterdam.

3.2 MAIN PLANT ACTIVITIES

GE's history at Main Plant began with the purchase of two vacant factory buildings by Thomas Edison in 1886. Since then, over 240 structures have been erected to meet GE's growing manufacturing needs. As shown in Figure 3-3, many of the buildings that were constructed have been removed. Extensive landfilling was needed to reclaim the land prior to construction of these buildings. The initial filling and expansion of Main Plant took place south of the historic Erie Canal. The final expansion of the site in 1946 and 1947 was for the construction of Building 273, the main turbine and generator production facility.

3.2.1 Manufacturing

Over the years, GE has used Main Plant to manufacture a variety of products including electric motors and generators, gas turbines, wire and cable, insulating materials and microwave tubes.

Although structures have been removed, reducing the site to approximately 40 buildings, Main Plant remains the world's leading producer of large steam turbines and generators.

3.2.2 The Former Landfills

From the mid-1940s to the early 1980s, GE disposed of waste and debris in three areas in the western portion of the site: the former East Landfill Area, the former West Landfill Area and the former Binnie Kill Landfill Area (Figure 3-2).

Former East Landfill Area

GE used the former East Landfill Area from the late 1940s to 1971 to manage a variety of wastes including lubricants, mixed solvents, demolition debris, foundry sand, and PCB-containing materials generated at Main Plant. Aerial photographs indicate that "drummed wastes" were stored prior to off-site transport at the East Landfill from the mid-1960s until the early 1970s. From 1971 to 1989, only scrap wood was placed in the former East Landfill Area.

Currently, most of the former East Landfill Area is covered by approximately six to eight inches of cover material, and overgrown with trees, shrubs and grass. The cover thickness is up to two feet south of the former tank farm. In some portions of the former East Landfill Area there are some visible concrete blocks and other construction and demolition waste.

Former West Landfill Area

GE operated the former West Landfill Area under permits issued by the NYSDEC from the early 1970s until 1989. The wastes managed at the former West Landfill Area in accordance with the permits included demolition debris, foundry sand, slag, wood, cardboard, plastic, waste paper, wastewater treatment plant sludge, and grit.

Currently, the former West Landfill Area is covered with trees and various grasses. The soil cover is estimated to be between two and five inches thick, although some areas have as much as a foot. Additional soil cover has been placed over portions of the former West Landfill Area and much of the visible construction and demolition waste has been removed. However, in a small area of the southwestern portion of the former West Landfill Area, some construction and demolition wastes remain visible.

Former Binnie Kill Landfill Area

Under permits issued by the NYSDEC, GE disposed foundry skulls, slag and demolition debris in the former Binnie Kill Landfill Area from the late 1970s to the late 1980s. In 1997, with the consent of the NYSDEC, GE covered the area. GE placed approximately 48,000 cubic yards of clean fill over a 7.6-acre area. This fill consisted of a three-foot layer of sand and fill covered by six inches of seeded topsoil. Currently, the soil cover at the former Binnie Kill Landfill Area is well vegetated with grasses, shrubs and trees.

3.3 SITE GEOLOGY AND HYDROGEOLOGY

This section presents the geology and hydrogeology for the site.

3.3.1 Geology

Main Plant's geology has been described in detail in several other published reports including the *Zone 1 RI Report,* both *AOC Reports,* and the *RI Report*. The site's general stratigraphic sequence from the surface is:

- Fill
- Floodplain Deposits
- Channel Fill Deposits
- Glaciolacustrine Deposits
- Glacial Till

These five units are briefly described in the following sections. Figure 3-4 shows the location of two cross-sections (Figures 3-5 and 3-6) that depict the stratigraphy.

Fill

The fill material consists of sediments, sands, gravel, cinders, bricks, coal, wood, ash, mica, porcelain, and construction and demolition debris. Other fill material includes reworked natural material that was used to reclaim the floodplain during the multiple phases of westward development of the 628-acre industrial property. The thickness of fill ranges from zero to 50 feet. Areas of thickest fill material are within the former Binnie Kill Channel (as much as 50 feet) or near the former landfills in the western part of the site (as much as 40 feet) and the wastewater treatment plant (as much as 30 feet).

Floodplain Deposits

The floodplain deposits consist of low permeability very fine-grained sands, silts and clays. The floodplain deposits range in thickness from zero to approximately 30 feet. The floodplain deposits are thickest (30 feet thick) near former Building 285 (Figure 3-3). In general, the floodplain deposits thin to the south near Bellevue Bluff.

Channel Fill Deposits

The channel fill deposits are composed of river-deposited sands and gravels that form a permeable water-bearing unit. At some locations, the sediments are predominantly comprised of gravels, while at other locations they are comprised of fine-to-coarse-grained sands. This stratigraphic unit is the primary water-bearing unit beneath GE's property.

Because the channel fill deposits are more permeable than the overlying floodplain and underlying glaciolacustrine deposits, these sandy deposits serve in essence, as a sub-drain to gather and transmit large volumes of groundwater beneath the site. The channel fill deposits beneath Zone 1 are a primary concern because of their ability to transport large volumes of groundwater off site.

The channel fill deposits beneath the site range from zero to 75 feet thick. The channel fill deposits are thickest near the Mohawk River (75 feet). The band of thick channel deposits that extends from southwest of Building 265 towards the Mohawk River is the most significant groundwater transport mechanism within the channel fill deposits.

As discussed in the *RI Report*, the principal source of groundwater in Schenectady County is the Schenectady aquifer. The Schenectady and Rotterdam well fields extract their groundwater supplies from this primary aquifer. Specifically, the municipal well fields are screened in the glaciofluvial coarse sand and gravel deposits within the glacial Iromohawk River channel and the Lake Albany delta. These deposits are not found beneath the site. Although the channel fill deposits are at a similar elevation as the sand and gravel deposits screened by the municipal well fields, the channel fill deposits are a different formation.

Glaciolacustrine Deposits

Following the retreat of the continental ice sheet in this area, much of the region became inundated by glacial Lake Albany. The lake was formed by glacial melt water and surface water runoff. This lake became the depositional area of lacustrine deposits consisting of varved clays, silts and deltaic sand deposits.

Based on recent field observations and historic boring logs, the glaciolacustrine deposits appear to consist primarily of fine-grained silts and clays near the former landfills. The glaciolacustrine deposits encountered beneath Main Plant consist primarily of silts and fine-grained sand, interbedded with discontinuous lake clays.

Glacial Till

The glacial till forms a relatively thin veneer beneath much of the site. The till ranges between approximately zero to 15 feet in thickness beneath much of the site. The till is thickest east of the former East Landfill at approximately 95 feet below grade. Because most borings at the site did not reach the till or bedrock, the map of the till, provided in the *RI Report,* is not as fully detailed as the maps of the upper sedimentary units. However, with the exception of the bedrock ridge just west of the site, the contour of these units does not significantly affect the overall groundwater conditions at the site.

3.3.2 Groundwater Flow

The hydrogeology at, and near, the site is well understood and has been described in detail in the *Zone 1 RI Report* and further described in the *RI Report*. As shown in Figure 3-4, the groundwater at Main Plant generally migrates from south to north towards the Mohawk River. There is a naturally occurring hydrologic divide west of the western boundary of GE's property. This natural groundwater divide separates groundwater that flows northward beneath the site from groundwater west of the site. The groundwater beneath the site and east of the natural groundwater divide flows toward the Mohawk River. Thus, groundwater at the site does not impact the municipal well fields.

The conceptual groundwater flow model for the site is based on established hydrogeologic principals for unconsolidated layered materials. Due to the lower permeability of the floodplain and glaciolacustrine deposits, these units act as semi-confining layers. Groundwater in the semi-confining floodplain layer migrates slowly toward the higher permeability channel fill deposits, and to some extent laterally in the floodplain. Groundwater flow is predominantly horizontal within the fill and channel fill deposits. As shown in Figure 3-6, the groundwater in the channel fill deposits generally flows horizontally north. While the direction of groundwater migration is to the north, groundwater in the channel fill deposits generally converges towards the trough beneath Zone 1.

Much of the active areas of the site are covered by low permeability surfaces, such as pavement, buildings and various foundations. Furthermore, the site is graded such that much of the precipitation is directed to storm sewers. Thus, direct rainfall recharge to the fill material is limited.

Based on published geologic and hydrogeologic investigations of the Schenectady Aquifer, the groundwater in the channel fill deposits along the southern portion of the site is mostly recharged from the glaciolacustrine deposits that are south of the site (Winslow, *et al*, 1965). A small amount of groundwater recharge occurs on-site through the floodplain deposits.

Throughout most of the site there is a downward hydraulic gradient from the fill through the floodplain deposits, where present, into the channel fill deposits. There is an upward hydraulic gradient in two general areas. One area is at the north side of the site along the Mohawk River. The second area is along the Poentic Kill. The groundwater in these two areas migrates from the channel fill deposits upward into the Poentic Kill and Mohawk River.

3.3.3 Hydraulic Conductivity

The *RI Report* summarized the results of hydraulic conductivities for each of the stratigraphic units. These values were based on several pumping tests and slug tests performed during various environmental investigations:

Stratigraphic Unit	Geometric Mean	90% Confidence Interval
Fill Material	$8x10^{-4}$ cm/s	$5x10^{-5}$ to $2x10^{-2}$ cm/s
Floodplain	$4x10^{-4}$ cm/s	$3x10^{-4}$ to $5x10^{-4}$ cm/s
Channel Fill	$2x10^{-2}$ cm/s	$1x10^{-2}$ to $5x10^{-2}$ cm/s
Glaciolacustrine	$7x10^{-4}$ cm/s	$5x10^{-6}$ to $9x10^{-3}$ cm/s

3.4 SUMMARY OF INTERIM REMEDIAL MEASURES AND ABATEMENT MEASURES

During the course of site investigations and normal operations of the plant, GE has implemented a wide variety of Interim Remedial Measures (IRMs) and other abatement and protective measures. These actions have been performed in accordance with NYSDEC-approved work plans, consent orders, and permits. A number of these measures were performed under the 1991 Best Management Practice (BMP) Order on Consent (#R4-1266-10) which required a broad-based review of GE's operations and spills response programs. Others were conducted under the 1995 RIFS Order on Consent (#A4-0336-95-09). The IRM conducted at former Stark Oil property was conducted under a separate 1990 Order on Consent (#A4-0251-91-11). The locations of these IRMs and abatement measures are shown in Figures 3-7 and 3-8. The objectives of these IRMs and abatement measures are to:

- Abate potential sources of contaminants;
- Reduce the potential exposures to site workers and the environment;
- Recover free-product; and
- Preserve and improve site habitats.

The 14 IRMs and abatement measures that GE has completed include:

- Transformer Removals (BMP Order);
- Closure of RCRA Part A Permitted Storage Area (BMP Order);
- Closure of RCRA 90 Day Storage Areas (BMP Order);
- Site-Wide Storm Sewer Cleaning Program (BMP Order);
- Former Building 269 Storm Sewer Cleaning IRM (RIFS Order);
- Mercury Project - Building 265 (RIFS Order);
- Hi-Yard Storm Sewer Cleaning IRM (RIFS Order);
- Streambank Armoring (RIFS Order);
- Building 262 Soil Piles (BMP Order);
- Free-product Recovery at Insulating Material Products Section (IMPS) (BMP Order);
- Free-product Recovery System at former Stark Oil Facility IRM (Stark Oil and RIFS Order);
- Soil and Free-Product Removal at City Water Main IRM Area (RIFS Order);
- Storage Tank Removals IRM (RIFS Order); and
- Sector R Holding Pond IRM (RIFS Order).

The five IRMs and abatement measures that are active and/or on-going include:

- Free-product Recovery at Building 49/53 (BMP and RIFS Order);
- Habitat Enhancement at the former Landfills (BMP and RIFS Order);
- Seep Management IRM along Poentic Kill (RIFS Order);
- Site-Wide Renovations (BMP Order); and
- Proposed IRM at the former East Landfill Area (RIFS Order).

In addition, GE has implemented a pro-active spill cleanup program at the site. GE's spill response program generally includes the application of absorbents to the spill area, followed by removal of contaminated media and the containerization of the spent media for off-site disposal. GE's other spill responses included, but are not limited to, the removal of tanks or transformers, removal of contaminated soil, and the installation of several free-product recovery systems.

Each of these IRMs and abatement measures are briefly described in the remainder of this section.

3.4.1 Completed Programs

This section describes each of the 14 IRMs and abatement measures that GE has completed.

3.4.1.1 Transformer Removals

To date, GE has removed over 440 transformers from Main Plant as part of routine maintenance work and GE's best management practice (BMP) program. Historic locations of the former PCB transformers are shown in Figure 3-7. In 1996, GE, assisted by NYSDEC-Region IV, voluntarily replaced all 40 of their PCB-containing transformers. Only one PCB-containing transformer currently remains in the Hi-Yard. It is routinely inspected and properly maintained. When this transformer is removed, it will be managed in accordance with the disposal provisions of TSCA (40 CFR 761).

3.4.1.2 Closure of RCRA Part A Permitted Storage Facility

In November 1980, GE submitted Part A of the RCRA permit application to the USEPA. At that time, GE was granted Interim Status to operate a treatment, storage and disposal facility (TSDF) for the storage of hazardous waste. Building 259, which is shown in Figure 3-2, became the central hazardous waste and non-hazardous waste accumulation and storage facility for Main Plant. After November 8, 1992, GE chose to operate only as a generator of hazardous wastes and Building 259 became a less-than-90-day hazardous waste accumulation area.

In 1993, GE submitted a C*losure Plan* for Building 259, which was approved on November 8, 1993 by the NYSDEC. During 1993 and 1994, GE closed Building 259. GE's closure activities included the removal of all materials stored in the building, as well as vacuuming, dusting, scarification of certain areas, pressure washing, and removal of the upper one-inch of concrete flooring and concrete dike in their former PCB storage area. Samples of oil, coolant, soil, concrete chips and wipe samples were collected for analysis to document the effectiveness and adequacy of the closure.

GE's closure efforts are documented in McLaren-Hart's report, entitled *Interim Status Closure Certification Report – Hazardous Waste Management Facility Building 259*, dated May 20, 1994. The NYSDEC approved this report and officially terminated GE's TSDF status in a letter, dated June 27, 1994. GE demolished Building 259 in 1997.

3.4.1.3 Closure of RCRA 90-Day Storage Areas

Between 1996 and 2000, GE completed the closure of 14 less-than-90-day hazardous waste storage areas and management units (Figure 3-8). These closed units stored both wastes and raw products. All closures were completed in accordance with NYSDEC-approved closure plans and NYSDEC-approved sampling and analysis plans. These closure activities were documented in five reports to the NYSDEC from April 1997 to October 1999.
As shown in Figure 3-8, GE has closed many other storage units across the site. These closed units stored both wastes and raw products.

3.4.1.4 Site-Wide Storm Sewer Cleaning Program

Since the mid-1990's, GE has implemented substantial measures to reduce the frequency and duration of bypass events at the Wastewater Treatment Plant (WWTP) and to identify and eliminate sources of PCBs which have, on occasion, been detected in the bypass effluent from the WWTP.

GE has undertaken numerous measures to eliminate the PCBs entering the WWTP. GE believes that scouring historic PCB-containing sediment from the storm sewers have contributed to their presence at the WWTP. In 1996, GE discovered and removed an oil trap from Building 85 (Figure 3-3), which was a primary source of PCBs in the stormwater system. In 2000, GE removed PCB-contaminated sediment from manhole MH-751, which received water from the Building 85 oil trap. Manhole MH-751 was the sediment trap and sump for the western portion of Main Plant. In 2001, GE was able to increase the through-put capacity of the WWTP as a result of WWTP upgrades.

GE's stormwater sewer cleaning activities, which are documented in the November 1996 report prepared by RUST, entitled *Storm Sewer Evaluation and Remediation* and Earth Tech's report, entitled *Main Plant Stormwater Bypass Assessment (Final)*, dated August 12, 2001, included these actions:

- Completed a site-wide assessment of sewer sediments;
- Inspected and updated the storm sewer network map as of December 2000;
- Sampled site-wide stormwater during base flow and storm flow events;
- Sampled stormwater at strategic points during storms using auto-samplers;
- Sampled sediment from the manholes;
- Conducted a video inspection of storm sewers;
- Assessed off-site sources of water and contaminants that could affect bypass flows;
- Collected flow meter measurements from selected storm sewers;
- Modeled hydraulic flow of stormwater;
- Reduced the quantity and rate of runoff by creating additional greenspace and removing, or demolishing, parking lots and impermeable structures;
- Decommissioned and plugged sewer laterals and catch basins in inactive portions of the site and as part of building demolitions;
- Re-routed some roof drains and steam condensate lines;

- Cleaned sediment from 109 Line, the Hi-Yard Line, 85 Line, North Avenue Line, the line west of Building 265, and from several manholes near former Building 13;
- Decommissioned and plugged the 113 Line and 109 Line;
- Cleaned and removed sediment from MH-751 sediment trap and vault;
- Conducted an extensive cleaning of storm sewer lines in the western portion of the site;
- Removed 200 tons of PCB-contaminated sediments from the sewers;
- Treated approximately 229,000 gallons of water to less than 0.065 μg/l of PCBs;
- Disposed 80 drums of detergents and solvents used during the cleaning;
- Isolated and removed the Building 85 oil trap tank, believed to be a primary contributor of PCBs in the sewer system;
- Cleaned some of the WWTP processes units; and
- Completed physical and operational upgrades to the WWTP increasing through-put capacity of the WWTP's storm system.

GE's on-going stormwater management strategy focuses on:

- Reducing the frequency and duration of bypass events by decreasing total and peak flows;
- Continued compliance with SPDES permit;
- Source identification and abatement to eliminate detectable concentrations of PCBs in the water entering the treatment plant; and
- Reducing runoff to the stormwater system by increasing greenspace and increasing natural infiltration.

3.4.1.5 Former Building 269 Storm Sewer Cleaning IRM

GE submitted the *IRM Work Plan for Cleaning Storm Sewers Associated with Former Building 269* to the NYSDEC in October 1998, which was approved on December 3, 1998. GE retained OHM Remediation Services Corp. (OHM) to complete the storm sewer cleaning during October and November 1998. The Building 269 IRM consisted of:

- Inspection of over 1,500-linear feet of storm sewer;
- Removal of 12 drums of PCB-contaminated and metal-contaminated (arsenic, barium, cadmium, chromium, mercury, and lead) sediment;
- Collection, treatment and discharge of approximately 3,400 gallons of wash water; and
- Inspection of the cleaned lines using a full color, full pan and tilt video camera.

The activities performed for this IRM were summarized in OHM's report, entitled *Final Report Interim Remedial Measure for Cleaning Storm Sewers Associated with Former Building 269*, dated January 5, 1999.

3.4.1.6 Mercury Project – Building 265

Building 265 was constructed in the early 1930s as a powerhouse (Figure 3-3). The building originally housed two boilers. One boiler used steam as the heat exchange media and the other used mercury. The mercury boiler drove an adjacent turbine and generator that produced electricity for the site. The mercury boiler operated from the early 1930s until the mid-1940s, when the boiler was retrofitted to steam. The turbine has since been removed and both boilers, although still present, are shut down, disconnected, and inoperable.

In 1998, during routine maintenance in Building 265, elemental mercury was discovered in inactive piping within the sub-floor. In addition to mercury, friable asbestos was discovered in the sub-floor area. GE retained OHM to remediate the basement and sub-floor of Building 265. OHM prepared a work plan, entitled *Work Plan for General Electric Company Schenectady, New York - Building 265 Mercury Remediation*, dated September 2, 1998. The remediation project included decontamination of the interior of the building and the removal of mercury-containing dirt, debris and sludge from the basement and the sub-floor.

OHM's remedial activities for the mercury remediation project began in August 1998 and were completed by mid-December 1998. Remediation actions included:

- Removal of 146 drums (approximately 50 tons) of mercury-contaminated dirt;
- Removal of 12 tons of mercury-contaminated debris;
- Removal of two gallons (220 pounds) of elemental mercury;
- Removal of approximately 80 linear feet of process piping from the inactive mercury boiler;
- Cleaning and encapsulation of two channel trenches and sumps;
- Cleaning of 400 linear feet of storm sewer surrounding Building 265;
- Removal of approximately 14 cubic yards of asbestos;
- Treatment of 14,400 square feet of floor area with a mercury amalgamate, vapor suppressant and decontamination powder; and
- Treatment of approximately 30,000 gallons of wastewater generated during the decontamination activities using a zeolite and carbon water treatment system.

The completed work was summarized in OHM's report, entitled *Final Report for General Electric Company Schenectady, New York - Building 265 Mercury Remediation*, dated March 31, 1999. On May 4, 1999, GE submitted OHM's report to the NYSDEC.

3.4.1.7 Hi-Yard Storm Sewer Cleaning IRM

In September 1999, GE submitted an Interim Remedial Measures (IRM) Work Plan, *Remediation of PCB Sediments in Hi-Yard Area Storm Sewer Line*, dated August 2, 1999 and *Technical Specifications and Plans, Remediation of PCB Sediments in Hi-Yard Area Storm Sewer Line*, dated June 1999 to the NYSDEC. The NYSDEC approved the work plan on September 24, 1999. The Hi-Yard IRM area is shown in Figure 3-7.

GE contracted Maxymillian Technologies, Inc to implement this IRM. GE also contracted Onyx Environmental Services, L.L.C., for the transport and disposal of the PCB-contaminated sediment, PCB remediation waste, and decontamination wastes. Remediation of the PCB sediment was conducted between September 13 and December 30, 1999. The IRM:

- Isolated approximately 800 linear feet of sewer line from active sewer lines;
- Removed an estimated 170 cubic yards of PCB-contaminated sediment;
- Flushed and cleaned the isolated line;

- Contained and treated over 432,000 gallons of wash and waste waters;
- Transported the accumulated sediment for off-site disposal at a permitted treatment, storage and disposal facility; and
- Conducted a video camera inspection of the cleaned lines and manholes.

During a meeting on November 18, 1999, GE and NYSDEC agreed to complete an additional task that was not part of the original IRM plan. This additional task involved installing flexible piping within the 48-inch storm sewer line to minimize storm water contact with potentially contaminated sediments.

On February 2, 2000, GE submitted a certification report to the NYSDEC. The report, which was entitled the *Interim Remedial Measures Construction Certification Report – Remediation of PCB Sediments in Hi-Yard Area Storm Sewer Line, General Electric Main Plant*, dated January 31, 2000, documented the activities completed during the IRM.

3.4.1.8 Streambank Armoring

On May 11, 2001, GE submitted a joint application for a permit to the NYSDEC and New York State-United States Army Corps of Engineers (ACOE) to stabilize a portion of the south and east banks of the Poentic Kill. The location of the streambank armoring area is shown in Figure 3-7. The primary objective of the streambank armoring was to minimize streambank erosion along the edge of the former East Landfill Area.

This project focused on approximately 40 linear feet of eroding streambank along the south and east banks (corner) of the Poentic Kill where the kill bends to the northeast near the southwest corner of the former East Landfill Area. The streambank was stabilized and enhanced using a bioengineered system. The undercut bank was filled with a vegetated rip-rap. Layers of brush with soil bundles and branches wrapped in organic fabric and over 1,000 willow tree plantings were placed above the vegetated rip-rap toe. A topsoil layer with native plants completed the bioengineered streambank system. The root systems will eventually be established and bind the entire system into a coherent mass.

All in-stream work was completed prior to September 1, 2001. GE completed the streambank armoring project on September 4, 2001. While not originally intended for this purpose, the willow tree plantings are anticipated to eliminate flow from Seep-1. Because observations to date have only included minimal rainfall periods, GE will continue to monitor this area for flow.

3.4.1.9 Building 262 Soil Piles

GE designed and constructed an addition to Building 262 in 1991 (Figure 3-3). When soil borings were drilled beneath the footprint of the proposed addition, fuel oil (LNAPL) was discovered. The discovery of LNAPL was reported to the NYSDEC and assigned Spill Number 90-12354. The impacted soil was removed during excavation and construction of the basement for the addition.

With NYSDEC approval, the excavated fuel-oil-impacted soil was placed on an asphalt parking lot for biodegradation. From 1991 to 1997, GE turned or disturbed the pile once every fall and once every spring to promote aeration. In the fall of 1997, GE separated the soil into two piles. The approximate volume of the piles was estimated to be 2,685 cubic yards.

In a letter dated October 17, 2000, GE received approval from the NYSDEC to use the soil piles as sub-grade fill material. In April 2001, GE moved the two soil piles to the "B" dike area (Figure 3-7) in the former tank farm where other permitted construction and demolition debris has been previously placed. In a letter, dated October 17, 2000, NYSDEC informed GE that the 262 Spill (soil pile) was closed.

3.4.1.10 Free-Product Recovery System at IMPS

Manufacturing and product storage of insulating material took place primarily near former Buildings 67 and 73 (Figure 3-3). During the early 1980s, GE installed 16 monitoring wells around the insulating material product section (IMPS). The installation of these wells is summarized in Dunn Geosciences Corporation's report, entitled *Hydrogeologic Investigation of Insulating Materials Product Section*, dated March 8-9, 1983. One of the 16 wells (GE-45) contained oil, indicating that there had been releases from either of the two former tank farms west of former Buildings 67 and 73. Tanks in the two former tank farms had been used to store various solvents and other raw materials for making enamels, resins, lacquers and varnishes.

In 1984, GE installed three additional monitoring wells and one 10-inch diameter recovery well (GE-64). The purpose of well GE-64 was to recover the product found in well GE-45. Although there was an oily odor noted in the subsurface materials during the installation of GE-64, no recoverable product entered the well. In 1985, four additional borings and a second potential recovery well were installed approximately five feet north of well GE-45. The approximate location of the former IMPS area is shown in Figure 3-7.

Based on this information, the extent of the contamination is limited. These activities were summarized in Woodward-Clyde Consultants' report, entitled *Review of Groundwater Conditions at the IMPS Site, Preliminary Draft Report,* dated January 1986.

Since the initial discovery of oil in well GE-45, there have been no observations of the traces of oil found in the former IMPS Area. However, in January 2001, free-product (LNAPL) containing gasoline and PCBs (79.0 mg/kg) was encountered at a piezometer P-IMPS-4 downgradient of IMPS. Piezometers P-IMPS-4 and P-IMPS-5 were subsequently abandoned in June 2001 during the construction of a new weigh station for rail cars north of the former IMPS Area. In 2002, GE installed 16 monitoring wells (IMPS-1 through IMPS-16) in the area of abandoned piezometer P-IMPS-4 to assess the lateral extent of LNAPL. A sample of LNAPL collected from the new wells was comprised of mineral oil with no detection of PCBs. Since installation, GE has been checking these wells for LNAPL and removing recoverable LNAPL, when present, on a monthly basis.

3.4.1.11 Free-Product Recovery System at Former Stark Oil Facility

GE has conducted a product recovery IRM at the former Stark Oil Facility under Order on Consent #A4-0251-90-11, dated March 25, 1992, which is separate from the Site-Wide Order. However, the former Stark Oil Facility is considered to be part of the Main Plant site.

Starting in November 1993, GE operated a dual-phase pump and treatment system at the former Stark Oil Facility (Figure 3-7). Throughout the operational history of the former Stark Oil Facility dual-phase pump and treatment system, GE continually implemented system optimization efforts such as injecting oxygen-releasing compound to promote natural attenuation and various pilot tests to maximize extraction volume of the pump and treatment system. A soil vapor extraction system was installed and operated from 1993 to 1994.

In December 2000, GE conducted a dual-phase extraction pilot test using a combination of eight drive points and the existing wells to evaluate the aquifer response to more aggressive extraction. Dual-phase extraction simultaneously recovered soil vapor and groundwater under high vacuum conditions. Wells GE-122 and R-8 were selected as the extraction wells for the study. The pilot test indicated additional testing would probably show an increase in the radius of influence thereby increasing groundwater recovery as well as removing VOCs from the subsurface. There were no signs of LNAPL in the groundwater recovered during the pilot test. Following the pilot study, no free-product was observed in the wells through September 2001. In July 2001, GE completed a semi-annual sampling event and benzene was the only VOC detected in the groundwater at concentrations between 5 and 12 µg/L in three of the eight wells sampled.

Based on the lack of product recovery during the pilot test and the sporadic presence of product since then, GE has discontinued scheduled product recovery efforts. Earth Tech reported to GE that no free-product had been observed during monthly measurements at the former Stark Oil Facility since December 2000. Therefore, in August 2001 GE indicated to NYSDEC their intent to discontinue the IRM activities at the former Stark Oil Facility. However, GE independently checked wells for LNAPL and found that product was present in two wells (R-2 and GE-122). In December 2001, GE used a vac-truck to remove the product from wells R-2 and GE-122. Monitoring has continued monthly and vacuum extraction has been conducted when recoverable free-product has been detected.

3.4.1.12 City Water Main IRM

In 1997, the City of Schenectady began to replace approximately 7,500 feet of the 24-inch diameter water main that passes beneath Main Plant along an easement on River Road. The project was delayed in December 1997 because of the discovery of LNAPL along an approximately 100-foot long portion of the trench northwest of Building 81.

C.T. Male Associates, P.C., prepared a work plan to remove the LNAPL, entitled *Interim Remedial Measure (IRM) Work Plan Recovery of LNAPL Along the City Water Main Installation*, dated June 26, 1998. The *IRM Work Plan* was submitted to, and approved by the NYSDEC and the NYSDOH. The work plan included:

- Removal and disposal of petroleum-contaminated media near the new water main;
- Installation of a 300-foot long recovery trench with five product recovery wells;
- Installation of one six-inch diameter monitoring well; and
- Providing enhanced pipe protection measures, including the installation of fluorocarbon gaskets and wrapping 900 linear feet of water main with a low permeability, man-made geosynthetic clay liner.

GE excavated and properly disposed of over 2,500 tons of contaminated soils, collected and treated approximately 100,000 gallons of water, and completed the installation of the recovery trench and five recovery wells. The location of this IRM is shown in Figure 3-7.

To date, no measurable product has been detected in the five recovery wells, or outside the liner. As such, no product has been removed by the recovery system. GE notified the NYSDEC of its intent to remove the LNAPL recovery system. From August to November 2001, GE dismantled the recovery system. GE continues to check all the wells quarterly for product and reports conditions to NYSDEC in their monthly progress reports.

3.4.1.13 Storage Tank Removal IRM

To date, GE has removed over 430 inactive aboveground and underground storage tanks (USTs) from Main Plant. Former UST locations are shown in Figure 3-8. Most notably, the three aboveground fuel storage tanks A, B, and C in the former East Landfill Area were removed (Figure 3-3). Each tank had a storage capacity of 4,000,000 gallons of No. 6 fuel oil and was surrounded by a containment dike, sized to provide complete containment.

In 1996, RUST developed a site-wide inventory of USTs on the 628-acre site. The objective of this inventory was to identify all of the inactive UST locations that may require removal or closure.

Prior to 1998, there was a separate Order (#R4-1266-91-10) that required GE to find, investigate, and close their historic USTs. After 1998, GE and the NYSDEC agreed that the UST investigations were to be conducted under the RI/FS order as long as the conditions of NYSDEC's Spill Program were met. Earth Tech (formerly RUST) performed much of the work associated with the UST investigations and prepared a series of work plans and reports that documented their progress and the next steps in the program.

According to RUST's work plan, entitled *Underground Storage Tank (UST) Interim Remedial Measure Work Plan*, dated October 1998, there was an estimated total of 272 historic USTs at Main Plant: 32 USTs were closed in place, 137 USTs had been removed prior to the October 1998 plan and 103 potential USTs required further investigation to determine their status. In their study, RUST focused on 64 accessible potential USTs. RUST began their investigation with a file and map review in order to generate a map of potential UST sites. RUST investigated the potential UST sites using geophysical methods, such as magnetometer, ground penetrating radar, metal detectors and radio frequency instruments.

According to Earth Tech's report, entitled *Phase I Interim Remedial Measure Underground Storage Tank Report*, June 1999: 32 USTs were closed in place, 139 USTs were previously removed and 101 were potential USTs. The results of the file review, which was proposed in the October 1998 work plan, indicated that 20 USTs were classified as not needing further evaluation and 44 USTs were classified as needing further evaluation. During Earth Tech's November and December 1998 site reconnaissance, six USTs were classified as inaccessible and four USTs needed no further evaluation. Using geophysical instruments, three locations indicated anomalies, eight locations had inconclusive results, 25 locations had no anomalies and four locations were inaccessible.

According to Earth Tech's work plan, entitled *Phase II Interim Remedial Measure Underground Storage Tank Work Plan*, October 1999: 189 USTs were removed, 35 USTs were closed in place, 22 USTs were inaccessible, 15 UST locations were unknown and 11 potential USTs were in accessible locations. The objective of this work plan was to intrusively investigate the locations of the 11 potential accessible USTs.

Between November 1999 and July 2002, GE investigated the 11 potential UST locations identified during the Phase I effort. Based on exploratory test pits, eight of the 11 potential USTs (Tanks 42, 47, 63, 144, 145, 176, 203, and 205 in Earth Tech's report) were not found. It is believed that these eight USTs had been previously removed. Two USTs (Tanks 54 and 175 in Earth Tech's report) were found to be closed in place. One UST (178) was identified and removed. In addition, to the 11 tanks identified in the Phase I effort, six other USTs were discovered and removed during site construction activities. They include two permitted USTs, which were not part of the IRM, that had been in operation at Building 84, which were removed and replaced with an above ground storage tank; an unknown 550-gallon tank north of Building 29; an 8,000-gallon tank on the west side of Building 40; a 10,000-gallon tank (Tank 111 in Earth Tech's report) southwest of Building 49/53; and a 10,000-gallon tank near UST site #178. With the submission of the *Phase II Summary Report*, dated November 25, 2002 to the NYSDEC, the historic UST investigation and closure activities at the Main Plant are complete.

3.4.1.14 Sector R Holding Pond IRM

The Binnie Kill was an arm of the Mohawk River that flowed through Main Plant until the mid-1900s (Figure 3-2). The holding pond is a free-standing body of water that remains of the former Binnie Kill. The former Sector R Holding Pond collected water from surface runoff and from several pipes that drained from neighboring buildings. The area has become vegetated and, based on Natresco & Associates' mapping in 2000, is now classified as a wetland covering approximately half an acre.

On the east side of the former Sector R Holding Pond is an out-of-service lift station, which was used to transfer water from the pond to GE's waste water treatment plant. Power has been disconnected from the lift and the inlet valves closed, preventing further water flow through the system.

Analytical results of 115 soil and sediment samples collected from the base of the former Sector R Holding Pond indicated that sediments in the former Sector R Holding Pond contained elevated concentrations of PCBs. GE elected to remove and properly dispose of the impacted materials as an IRM. URS prepared a work plan (*Interim Remedial Measure Work Plan, Sector R Holding Pond* (*Holding Pond Work Plan*), dated March 29, 2001), which GE submitted to NYSDEC. The NYSDEC approved the work plan in a letter, dated May 4, 2001.

The primary objective of this IRM was to remove and properly dispose the PCB-contaminated sediments that have been delineated in the former Sector R Holding Pond. The cleanup goals used for the remainder of the former Sector R Holding Pond are 500 mg/kg for lead, 10 mg/kg for mercury and 10 mg/kg for PCBs, with a clean fill cover.

GE dewatered the former Sector R Holding Pond and removed the impacted soil. The water that was removed was pre-treated prior to discharge to GE's on-site water treatment plant. After the target excavation depths were reached, GE collected 24 post-excavation samples, which were analyzed for PCBs (EPA Method 8082), lead (EPA Method 6010) and mercury (EPA Method 7471). The analytical results have been submitted to NYSDEC.

The sediment removal and water treatment activities of the IRM were conducted in two phases. Phase 1 was conducted from July through August 2001 with the removal of approximately 2,660 tons of sediments and the collection and treatment of approximately 450,000 gallons of construction water. The final project activities were conducted during Phase 2, which was conducted from August 2003 through IRM completion in November 2003 with the removal of an additional 4,100 tons of sediments and the collection and treatment of approximately 4,200,000 gallons of construction water. The second phase was expanded with concurrence from the NYSDEC to remove sediments from three additional cells from the pond that contained concentrations of lead and mercury above the IRM cleanup goals. A total of approximately 6,800 tons of sediments were removed during the IRM project and disposed off-site.

GE submitted the Sector R Holding Pond final completion certification report to NYSDEC in March 2004.

3.4.2 On-Going Programs

Currently, GE is implementing five IRMs and abatement measures that focus on eliminating potential sources of contaminants. GE's on-going IRMs and abatement measures are described in this section.

3.4.2.1 Free-Product Recovery System at Building 49/53 Area

Over the last decade, GE has implemented a series of investigations, remedial actions, and IRMs to address the free-product found in the Building 49/53 Area. Building 49/53 was a former manufacturing area with numerous underground storage tanks. This area is shown as the Free-Product at 49/53 Area in Figure 3-7.

In 1986, Blasland and Bouck, Engineers (BBE) found fuel oil on the water table between Buildings 49 and 53. Their findings are documented in BBE's report, entitled *Building 53/49*

Product Delineation Program, dated October 15, 1986. The product thickness ranged from a sheen to 3.56 feet.

In 1991, GE installed a groundwater and liquid-phase hydrocarbons recovery system. The treatment system for the recovered fluids included solids filtration and granular activated carbon. The engineering design called for the reinjection of the treated groundwater into an on-site infiltration gallery. However, the NYSDEC did not issue a permit and the injection gallery was not constructed. The groundwater recovery and treatment system operated for approximately one month until GE's temporary water storage capacity was reached.

In June 1996, RUST completed an integrity assessment of the wells near the Building 49/53 Area and gauged the existing 11 monitoring wells. The gauging results showed the presence of liquid-phase hydrocarbons in four of the 11 monitoring wells. The thickness of product ranged from 0.005 feet east of Building 63 to 2.31 feet beneath the canopy area between Building 49 and Building 53.

From 1991 to 1999, GE initiated a Passive Oil Recovery Program for the Building 49/53 Area. The Passive Oil Recovery Program consists of weekly monitoring and bailing the free-product found in product-containing wells. The free-product encountered at well GE-101 was described by EPS (1997) as a black, highly fluid product with a burnt odor and at GE-104 as a heavy, viscous oil (fuel oil).

In December 2000, GE conducted aggressive purging at wells GE-101 (GE-115A), GE-104, GE-112, and GE-114A. Following the aggressive purging, LNAPL has only been observed at wells GE-101 (GE-115A) and GE-104.

On August 9, 2001, URS collected water level measurements from the site, including the wells in the Building 49/53 Area. Approximately 0.10 feet of product was found in wells GE-104 and GE-115A and a sheen of product was found at well GE-114A. Earth Tech, who had been conducting monthly checks for product at the wells in the Building 49/53 Area, had not detected product in the 11 wells. URS and GE determined that Earth Tech had mis-identified several wells and were referring to well GE-115A as well GE-101. In addition, wells GE-104 and GE-101 had not been checked. GE checked and found that well GE-115A contained LNAPL.

In December 2001, GE performed vacuum extraction on these wells to remove product. Monthly monitoring and vac-removal has continued monthly where recoverable free-product has been detected. As presented in the *RI Report*, during the September 2002 monitoring event, where detected, LNAPL thickness ranged from 0.01 to 0.38 feet.

3.4.2.2 Site-Wide Renovations

GE has revitalized the overall conditions at Main Plant by transforming much of the eastern portion of the site back to green space and providing a more campus-like setting for its employees (Figure 3-9). From 1999 through 2002, GE's activities have included: landscaping; construction of new pavement, sidewalks, curbs, and parking lots; placement and seeding of hundreds of thousands of cubic yards of clean fill; planting over 2,000 trees; construction of outdoor pavilions and outdoor recreational facilities (such as softball fields, soccer fields, volleyball courts, and tennis courts); and creating numerous parks and walking tracks between buildings. The clean fill, which averages two to three feet thick, provides a natural and effective barrier between workers at the site and the original ground surface. GE's restoration and beautification efforts were recognized by the National Arbor Day Foundation in April 2001 with a 2001 Project Award.

3.4.2.3 Habitat Enhancement at the Former Landfill Areas

From the mid- to late-1990s, GE has enhanced the habitats in the former Binnie Kill Landfill and the former East and West Landfill Areas by removing exposed surface debris and seeding or vegetating. The debris was properly disposed in off-site facilities. According to ARM Group Inc.'s (ARM's) 1999 *Alternative Cover Feasibility Report*, the application of a plant and soil cover system, or phytocover, appears to be a technically feasible alternative cover as part of an integrated management approach for enhancing evapotranspiration in the former landfill areas of the site. Habitat enhancement implemented as part of the alternative cover feasibility evaluation includes pilot-scale test plots of various plantings in the former East and West Landfill Areas.

Former Binnie Kill Landfill Area

In 1997, GE, with the NYSDEC's approval, placed a soil cover over the former Binnie Kill Landfill Area (Figure 3-2). The project consisted of: grading the existing construction debris; placement and compaction of approximately 40,000 cubic yards of sand and till material (three-foot thick); and placement and grading of approximately 8,000 cubic yards of topsoil (six-inch thick). In June 1998, GE seeded the former Binnie Kill Landfill Area with indigenous plant species.

Former East Landfill Area

In May 1999, GE continued to enhance the habitats in the southwest portion of the former East Landfill Area. Surface debris was removed and disposed of off-site and vegetation was planted on approximately two acres. The ARM Group, in collaboration with State University of New York, Environmental Science and Forestry staff, performed these enhancements.

During August 1999, approximately 100,000 cubic yards of soil was placed at the former East Landfill Area and spray seeded. In October 1999, GE initiated pilot studies to evaluate evapotranspiration rates and habitat enhancement effects, as well as to examine components of the near-surface hydrologic cycle at the former East Landfill Area. In particular, GE measured:

- Incidental precipitation;
- Soil water content;
- Soil temperature;
- Flux of water through top four feet of fill; and
- Transpiration of water in vegetation.

The instruments used to collect such data included: a micro meteorological station, soil moisture and temperature probes, lysimeter and tipping buckets. GE also installed a sap flow monitoring system to quantify actual vegetative transpiration rates. In addition to these empirical data collection efforts, which have continued through 2002, GE has developed estimates of local potential evapotranspiration.

GE submitted a project summary to the NYSDEC in their February 2001 Monthly Progress Report, dated March 12, 2001. The report describes the habitat enhancement activities that were initiated in 1999. Between April and August 2001, GE covered, seeded and reforested additional plots at the former East Landfill Area.

In summary, GE's cover assessment, evaluation, and habitat enhancements at the former East Landfill Area have included:

- Planting over 14,000 trees (native and non-native species) and shrubs;
- Planting over ten acres of native grasses and wildflowers;
- Measurement of growth and survival rates of willow and poplar clones planted in 1999;
- Measurement of growth and survival rates of native species;
- Estimation of total aboveground biomass, which is a good predictor of plant transpiration;
- Analysis of statistical data;
- Addition of a pyranometer to the meteorological station to measure solar radiation;
- Planting additional vegetation in June 2000 and April through August 2001;
- Coppicing trees to create stock for spring plantings; and
- Processing cuttings and whips for storage for spring plantings.

Former West Landfill Area

In the mid-to late 1990's, exposed debris was removed from the surface of the former West Landfill. Approximately 30,000 cubic yards of additional soil cover was placed on portions of the former West Landfill and the areas were seeded.

The former West Landfill Area was included as part of the two acres in the 1999 East Landfill Area pilot studies referenced above. Two areas of the West Landfill Area were vegetated with various species and included in the pilot studies to evaluate evapotranspiration rates and habitat enhancement effects.

3.4.2.4 Seep Management IRM

Since 1998, GE has implemented, evaluated, and improved a series of IRMs to control, collect and treat seeps near the southwest corner of the former East Landfill Area (Figure 3-7).

With the NYSDEC's approval, GE implemented a temporary protective measure to address Seep-2, Seep-3, and Seep-4. GE re-graded the area to direct flow through a passive treatment system using limestone and activated carbon. In February 1999, at the request of NYSDEC, GE conducted additional regrading in the IRM area and installed a temporary weir to measure water flow from the seep area. In June 1999, GE replaced the limestone and activated carbon.

In September 1999, seven piezometers were installed into the floodplain deposits near Seeps 3 and 4. The floodplain deposits along the western boundary of the former East Landfill Area, near the Poentic Kill, were found to be four to 15 feet thick. In general, the floodplain deposits tend to thicken to the north. Field observations further indicate that groundwater perched on top of the floodplain deposits is contributing to the seeps south of the landfill access bridge.

On February 18, 2000, GE submitted an IRM work plan, entitled *Interim Remedial Measure Work Plan Eastern Landfill Seeps* to the NYSDEC. After discussions with NYSDEC, GE submitted a revised work plan, (*Revised Interim Remedial Measure Work Plan Eastern Landfill Seeps* on March 30, 2000), which the NYSDEC approved. This *Revised IRM Work Plan* described the treatment system proposed for reducing or eliminating the concentration of contaminants in Seep-2, Seep-3 and Seep-4 and the monitoring program for evaluating the performance of the system. The specific objectives of this IRM were to:

- Operate the passive treatment system to treat the flow of water from Seeps 2-4;
- Monitor the quality and flow rate of the water treated and removed from the system; and
- Evaluate performance of the system.

GE constructed a stone-filled trench along the toe of the southwest portion of the former East Landfill Area to collect the flow from the seeps in the IRM area. There is a clay barrier along the west side of the trench to minimize lateral migration. GE completed the construction of the treatment system in July 2000.

Since the construction of the treatment system was completed, GE's modifications to the treatment system have included:

- Regraded and filled collection trenches with rip rap to limit exposure of water to sunlight to limit algae growth; and
- Replaced the limestone GAC filter with a series of disposable and backwashable filters to capture PCBs that are associated with suspended colloidal material.

GE's monitoring program for the treatment system includes monthly collection and analysis of water samples; measurements of flow through the system; and inspections of the treatment system. Influent water samples are analyzed for pH and PCBs. The effluent water samples are analyzed for PCBs, aromatic VOCs and iron. Influent water samples are collected periodically and analyzed for BTEX and iron.

All results from the monitoring program are reported in GE's monthly progress reports to the NYSDEC.

3.4.2.5 Former East Landfill Area IRM

In the spring of 2001, GE prepared a workplan, entitled *Interim Remedial Measure Work Plan Former East Landfill Area*, dated May 1, 2001. The overall objective of this plan is to manage, control and reduce the migration of contamination from the former East Landfill Area. The specific goals stated in this IRM plan are to:

- Minimize human and ecological contact with contaminants in the soil by means of focused soil excavation and agronomic cover, which will stabilize the soil and provide a physical barrier between the surface and the waste mass;

- Prevent migration of contaminants into the Poentic Kill at concentrations greater than surface water standards by means of in-situ groundwater treatment assisted by an agronomic cover;

- Prevent the migration of contaminants from the shallow groundwater beyond the lateral boundaries of the former East Landfill Area in either the floodplain deposits or the channel fill deposits at concentrations greater than the groundwater standards; and to

- Monitor the effectiveness of the program by monitoring the groundwater quality and surface water quality at agreed-upon monitoring stations.

The main components of the proposed plan, which are shown in Figure 3-10, included these measures:

- Remove, for off-site disposal, specific areas of surface soil that contain elevated levels of PCBs (greater than 25 mg/kg);

- Develop and place an agronomic cover on approximately 25 percent of the former East Landfill to reduce the infiltration of precipitation, eliminate exposure pathways, and preserve and enhance ecological communities;

- Construct seep water collection sumps and treat the seep water;

- Construct two air sparge curtains along the Poentic Kill to remove VOCs from the groundwater prior to the groundwater migrating to the Poentic Kill; and

- Monitor the groundwater and surface water quality at the periphery of the former East Landfill to gauge the performance of the program.

Because of the timing of the completion of the RI and in anticipation of the Feasibility Study (FS), NYSDEC chose not to approve or reject the plan, but to address that area as part of the final remedy for the site. As shown in Figure 3-10, while awaiting NYSDEC's comments, GE voluntarily began implementing portions of the plan and provided NYSDEC with monthly reports of planned and implemented actions. The portions of this proposed IRM Work Plan that GE has implemented include placement of agronomic soil cover and selected evapotranspiration enhancements in the former East Landfill Area.

3.5 PREVIOUS ENVIRONMENTAL STUDIES

Over the past 20 years, GE and others have conducted numerous and extensive investigations to evaluate environmental conditions at the site. The RI process generated numerous work plans and investigative reports, which were submitted to the NYSDEC for their review in accordance with the Order. These documents include, but are not limited to:

- *Sector Reports* (Twenty One Individual Reports)
- *Area of Concern Report*, Dames & Moore, dated January 14, 1997
- *Sampling and Analysis Report – Groundwater Sampling Program December 1997*, Dames & Moore, dated March 4, 1998
- *Summary Report, City of Schenectady Water Main Investigation*, Dames & Moore, dated June 10, 1998
- *Sampling Report, Mohawk River Sampling*, Dames & Moore, dated August 10, 1998
- *Seep Evaluation Report –GE Main Plant – Schenectady*, New York, Dames & Moore, dated October 30, 1998
- *Sampling and Analysis Report – Groundwater Sampling Program October 1998*, Dames & Moore, dated December 8, 1998
- *Revised Remedial Investigation/Feasibility Study Work Plan, GE – Main Plant Facility, Schenectady, New York*, Dames & Moore, dated January 21, 1999
- *Zone 2 Area of Concern Report, GE – Main Plant*, Dames & Moore, dated March 23, 2000
- *Zone 1 Remedial Investigation Report*, Dames & Moore, dated April 25, 2000
- *Zone 1 Phase 2 Remedial Investigation Workplan*, URS Corporation, dated June 30, 2000
- *Zone 2 Remedial Investigation Workplan*, URS Corporation, dated June 30, 2000
- *Remedial Investigation Report,* URS Corporation, dated October 19, 2001
- *Feasibility Study Report,* URS Corporation, dated January 31, 2002
- *Revised Remedial Investigation Report,* URS Corporation, dated May 30, 2003
- *Revised Feasibility Study Report*, URS Corporation, dated May 30, 2003

The results of the previous investigations, conducted at the site prior to the Order have been summarized in Section 2.4 of the *RI Report*. The documents used to prepare this *Revised Feasibility Study* are listed in Section 9.0 of this document.

The body of investigative work that has been completed at the Main Plant has developed a comprehensive database from sampling and analysis activities across the site that adequately characterizes the nature and extent of hazardous waste contamination at the site in order to support the evaluation of potential remedial alternatives in the Feasibility Study. As part of the RI, risk assessments were performed to evaluate potential risks to human health and ecological receptors based on the site conditions. The remainder of this section discusses the results of the human health and ecological risk assessments that have been performed at the Main Plant.

3.5.1 Human Health Risk

In 1999, GE performed a Human Health Risk Assessment (HHRA) to evaluate potential risks to human health under current and reasonably foreseeable future conditions. The risk assessment was performed in accordance with USEPA guidance document, entitled *Risk Assessment*

Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) USEPA, dated 1989, and, where appropriate, other USEPA and state guidance documents. The results of the HHRA were presented in the April 25, 2000 *Zone I Remedial Investigation Report*. This section summarizes the results of the HHRA.

Exposure scenarios were described, exposure concentrations and doses were calculated, and risks were quantified for:

- Current and future residents that live in the residential area northwest of the Main Plant;
- Potential current or future users of the Mohawk River as a source of drinking water;
- Current and future employees working at the property;
- Potential older children trespassing on the undeveloped former landfill portions of the property;
- Potential future workers who may perform subsurface excavation work during future construction or utility maintenance on the developed portion of the property; and
- Potential future children and adults using the former landfill portions of the site for recreation.

The primary concern for area residents is the potential use of groundwater as a drinking water source. Based on the hydrogeological data, and several years of analytical data, the groundwater beneath GE's Main Plant does not flow toward the Town of Rotterdam well field. Thus, groundwater conditions beneath Main Plant do not impact residents using this well field as a source of potable water.

To date, no chemicals of concern have been detected in the water in the Mohawk River. As part of the HHRA, conservative assumptions were used to estimate potential future concentrations of VOCs (primarily vinyl chloride) in the Mohawk River. The concentrations were determined to be well below drinking water standards. The estimated concentrations of VOCs were less than one tenth of their maximum contaminant levels (MCLs). Thus, based on this analysis, conditions at the site do not affect the suitability of the Mohawk River as a drinking water supply. Additionally, because of the turbidity of the water in the Mohawk River and its current use as a barge canal, there is no basis to anticipate that the river near the site will become a direct source of potable water.

The primary potential exposure pathway for employees is the inhalation of VOCs that could migrate into the indoor air. This potential pathway was evaluated using a conservative groundwater to air transfer model. The results show that conditions at the site do not pose a significant risk of non-carcinogenic or carcinogenic health effects to GE's employees. The total hazard index is less than one for employees working in all parts of the plant. A total hazard index equal to or less than one was considered acceptable based on USEPA guidance. The total incremental lifetime carcinogenic risk ranges between 1.45×10^{-6} and 2.88×10^{-6}. The USEPA has established an acceptable risk range between 1×10^{-4} and 1×10^{-6}. The acceptable incremental lifetime carcinogenic risk limit used in this risk assessment was 1×10^{-5}. In summary, there are no significant risks to employees.

The primary potential exposure pathways for trespassers include ingestion of surface soil, skin contact with soil, inhalation of particulate matter, ingestion of sediment, skin contact with sediment, or skin contact with the surface water in the Poentic Kill and the seeps. The total chronic hazard index is 0.08. The total incremental lifetime carcinogenic risk is 9.17×10^{-7}. Thus, the conditions at the site do not pose a significant risk of carcinogenic or non-carcinogenic health effects to trespassers. In summary, there are no significant risks to trespassers.

Under reasonably foreseeable future conditions, construction workers may be exposed to soil during excavation projects via incidental ingestion and dermal contact with soil and the inhalation of particulates. The total chronic hazard index of 0.271 is within acceptable limits and the incremental lifetime carcinogenic risk of 9.42×10^{-7} is also within acceptable limits. Thus, the site does not pose an unacceptable risk to construction workers who may be involved in either grading or excavation on the developed portion of the site.

Under reasonably foreseeable future conditions, adults and children could use the site for recreation. If so, they could only be exposed to the chemicals of concern detected in surface soil in the former landfill areas, sediment in the Poentic Kill and the Poenties Kill, and the surface water in the Poentic Kill. The average daily exposure doses were calculated for ingestion of soil, skin contact with soil, inhalation of particulate matter, ingestion of sediment, skin contact with sediment, and skin contact with surface water in the Poentic Kill. The total hazard index for young children is 0.2 and for older children is 0.05. The total time-weighted incremental lifetime carcinogenic risk is 2.52×10^{-6}. Thus, the conditions at the site do not pose a significant risk of non-carcinogenic or carcinogenic health effects to people who choose to use the site for recreational purposes in the future.

In summary, based on the assumptions used to calculate human health risks in the screening level risk assessment, GE's Main Plant site does not pose a significant risk of non-carcinogenic health effects to employees, trespassers, residents, construction workers or people who may use the site for recreation. The incremental lifetime carcinogenic health risks are also less than the acceptable risk limit.

3.5.2 Ecological Risk

This section summarizes the results of a screening level ecological risk assessment (SLERA) for the former landfill areas at Main Plant. The SLERA, which was originally submitted to the NYSDEC as part of the April 25, 2000 *Zone 1 Remedial Investigation Report,* was revised in accordance with comments provided by the NYSDEC. The revised SLERA is included in Appendix H of the 2003 *RI Report*.

The SLERA used available site data that had been collected through early 2000 to evaluate exposure, to evaluate potential toxicity of chemicals in on-site media, and to estimate the risk of adverse impacts to ecological receptors. The overall objectives of the ecological risk assessment process were: 1) to determine if plants or animals have been adversely affected at or near the site by chemical contamination resulting from past activities; and 2) to characterize the type, magnitude, and extent of potential or existing risks to ecological resources. Even though the Main Plant is not a Superfund Site, the SLERA document follows USEPA guidance that was developed for Superfund Sites (ERAGS; U.S. EPA 1997a), including Steps 1 and 2 of the eight step risk assessment process.

Step 1: Screening-Level Problem Formulation and Ecological Effects Evaluation

The SLERA focused on the former landfill areas, which contains the Poentic Kill drainage (Poentic and Poenties Kills) and the upland habitats in adjacent areas. Ecological receptors are not expected to be adversely affected by chemical concentrations occurring in other portions of the site, since ecological habitat or surface contamination is absent.

In the SLERA, receptors of concern (ROCs) represent species in most of the major consumer trophic levels. They include:

- Terrestrial Vegetation – Considered as a group
- Soil Invertebrates – Considered as a group
- Song Birds – Robin
- Carnivorous Birds – Red-Tailed Hawk
- Small Mammals – Deer Mouse and Short-Tailed Shrew
- Mammals-Herbivores – Eastern Cottontail
- Wetland Plants – Considered as a group
- Benthic Invertebrates – Considered as a group
- Fish Community – Considered as a group
- Amphibians – Considered as a group
- Waterfowl – Mallard Duck
- Piscivorous Birds – Belted Kingfisher
- Semi-aquatic Mammals – Mink

The initial chemicals of potential concern (COPCs) selection process commenced with a review of all historical data collected through early 2000 during the RI, as well as other data collected at the site. The chemical data for surface soils, surface water, groundwater seeps and sediments were reviewed and compared to New York State screening criteria for surface water, sediment and soil to identify COPCs for each media. The COPC selection process was based on the following conservative comparison criteria:

- Constituents of which the maximum detected concentrations are above screening values are considered COPCs.
- Detected constituents with no New York State screening criteria are considered COPCs.
- Undetected constituents with detection limits above screening values are considered COPCs.
- Undetected constituents with no New York State screening criteria are not considered COPCs.

The following complete exposure pathways were identified for the site, based on the ROCs and preliminary COPC screening for surface water, groundwater seeps, surface soil, and sediment.

ECOLOGICAL RECEPTOR EXPOSURE PATHWAYS TO BE EVALUATED

Exposure pathway	Receptor
Dermal contact with soils	Terrestrial biota
(Incidental) ingestion of soils	Terrestrial biota
Dermal contact with surface water, pore water, or sediment	Aquatic biota
(Incidental) ingestion of sediment	Aquatic biota
Ingestion of water	Terrestrial biota
Ingestion of prey	Terrestrial and aquatic biota

The assessment endpoints and measures of effect provide the foundation for Step 2, Screening-Level Exposure Estimate and Risk Calculation.

The assessment endpoints include:

1) Levels of COPC in the soils, sediments and surface waters on or near Main Plant which pose the potential for harm to populations of plants and biota living in the soil, sediment or surface water.

2) Levels of COPC in plant and animal tissues living on or utilizing Main Plant which pose the potential for adverse effects to individual wildlife predators feeding on them.

The measures of effect include:

1) Comparison of soil, sediment or surface water COPC concentrations to chronic standards for biota in sediment or surface water. Exceedance of these standards indicates that there is some potential for adverse effects to some portion of the population living in the soil, sediment or surface water.

2) Comparison of measurements or estimates of COPC body burdens in plants or animals to population level (e.g., reproductive impairment) toxicological reference values for wildlife predators derived from the literature. The amount by which the calculated intake, on average, by wildlife predators exceeds toxicological reference values is a measure of potential impact to populations of wildlife predators feeding on Main Plant aquatic biota.

Step 2: Screening-Level Exposure Estimate and Risk Characterization

Based on the exposure estimate and risk characterization, the SLERA concluded that a thorough baseline risk assessment is warranted, and additional sampling should be proposed during the baseline problem formulation (Step 3 of the ERAGS process). This conclusion represents the first Scientific Management Decision Point (SMDP) for a SLERA. Results of the SLERA indicate the presence of vigorous and diverse plant communities suggesting that effects from COPCs are minimal and site flora should not be considered a ROC in further Site assessments. The initial results of the SLERA for fauna are viewed with high uncertainty, with hazard quotients (HQs) > 1, indicating a potential for adverse effects. However, the available data is insufficient to fully characterize the risks that select COPCs may pose to fauna ROCs. The data used in the SLERA did not account at all for the many site-specific factors that may limit bioavailability and toxicity.

The recommendations for further data collection, which were developed in the SLERA, are shown below. The more recent investigation (July 2000 through April 2001), included collection and analysis of samples to address the first three questions listed below. The data is included in the 2003 *RI Report*, but was not incorporated into the SLERA.

RECOMMENDATIONS FOR FURTHER DATA COLLECTION

Question to Address	Data Required
Eliminate uncertainties in spatial distribution of COPCs in former landfill area media.	Additional collection of soil, sediment and surface water samples.
Eliminate uncertainties surrounding COPCs bioavailability and distribution in former landfill area media.	Additional analysis of those characteristics (AVS/SEM, TOC and grain size) that affect bioavailability of COPCs in soil and sediment. Filtered samples for dissolved metals analysis for surface water.
Assess body burdens of COPCs in prey organisms to reduce uncertainties inherent in food web modeling.	Biota collection for analysis of tissue residue of some bioaccumulative COPCs.
Eliminate uncertainties associated with multiple effects of COPCs on invertebrates in landfill area soil and sediment.	Focused laboratory toxicity testing.

4.0 REMEDIAL INVESTIGATION RESULTS

This section summarizes the results of the Remedial Investigation at Main Plant. The first part of this section summarizes general site conditions as they relate to the media based Areas of Concern (AOCs). A more detailed discussion of the Remedial Investigation (RI) can be found in the *Revised Remedial Investigation Report*, dated May 2004. The second part of this section discusses the principal source areas at the site. The third part of this section discusses the areas and concerns that will be addressed in this *FS*.

4.1 AREAS OF CONCERN

This section discusses the AOCs at the Main Plant that were presented in the *Area of Concern Report (AOC Report),* dated January 14, 1997 and the *Zone 2 Area of Concern Report (Zone 2 AOC Report),* dated March 23, 2000. In keeping with the site-wide approach, the AOCs are media based, rather than isolated, specific locations within the site, where contaminant releases are known, or suspected. The identification of the AOCs focused on evaluating whether the presence of industrial contaminants in the various environmental media at the site, and any associated potential exposure pathways, pose a significant threat to human health and the environment. The original *AOC Reports* combined surface water and sediments in the Poentic Kill and Poenties Kill into one media based AOC. In the *RI Report*, sediment and surface water were considered as separate media based AOCs. Therefore, the seven potential AOCs include:

- Soils
- Groundwater
- Surface Water in the Poentic Kill and Poenties Kill
- Sediments in the Poentic Kill and Poenties Kill
- Eastern Landfill Seeps
- Ambient Air
- Site Habitats

The following sections focus on each of the AOCs. Each of the following sections summarizes the AOC and how the data collected during the RI have defined or altered the understanding of the AOC. The potential pathway by which contaminants identified in each AOC may reach receptors is also presented. Then, the rationale for either dismissing the concern or addressing the concern with remedial actions is presented.

4.1.1 Soils

The soils, including surficial soils and subsurface soils, are an AOC at the Main Plant. Soils, and specifically surface soils, are an AOC because of the potential for direct contact, inhalation, and incidental ingestion of COPCs by humans. The results of the screening human-health risk assessment (HHRA), submitted to NYSDEC as part of the *Zone 1 RI Report,* indicate that under current conditions, the soils at the site do not pose a significant health risk to employees, construction workers, trespassers, or excavation workers. The results of the screening level ecological risk assessment (SLERA) indicate that fauna may be impacted by soils at the site. Although there is no evidence at this time that indicates that the surface soils at the site pose a significant threat to human health or the environment, GE has identified the soils as a potential AOC.

The following sections summarize the soil analytical results for the site that were discussed in the *RI Report*. The soil samples at the site were divided into surface and subsurface soil samples and are discussed separately in the following sections. These sections highlight the areas of the site where constituents were detected at concentrations that were above their respective New York State Department of Environmental Conservation's Recommended Soil Cleanup Objectives (NYSDEC RSCOs). The areas that will be evaluated during this FS are shown in Figure 4-1 and are discussed below. As part of our evaluation of the data, we have correlated areas with soil concentrations that are above NYSDEC RSCOs to areas where the same compounds are detected in the groundwater at concentrations greater than the NYSDEC Groundwater standards (NYSDEC GW standards). These areas are noted below in order to focus the remedial efforts.

4.1.1.1 Surface Soil Quality

Surface soil samples are defined in the *RI Report* as any soil sample collected from an interval that begins at a depth less than or equal to one-half foot below ground surface (bgs) and ends at a depth less than or equal to two feet bgs. The following sections summarize the analytical results for surface soil samples discussed in the *RI Report*.

4.1.1.1.1 Polychlorinated Biphenyls

The analytical results for PCBs in surface soils were compared to the NYSDEC RSCO of 1.0 mg/kg for surficial soils. The majority of the surface soil samples in which PCBs were detected above the NYSDEC RSCO are within the former landfill areas. There are only eight locations where PCBs were detected in surface soil samples above the NYSDEC RSCO outside of the former landfill areas. The locations where PCB concentrations were detected above the NYSDEC RSCO in surface soil samples are:

- Former East Landfill Area.
- Area near former Building 259.
- Area near former Building 29.
- Former West Landfill Area.
- Three areas near the WWTP.
- Area south of Building 84.
- Area near former Building 109.
- Area south of former Building 60.

The area near former Building 29 was graded, covered with 12 inches of topsoil, and seeded as part of GE's site-wide landscaping effort in 2000. The surface soil sample can be considered a subsurface soil sample (1 to 1.5 feet bgs) and is above the NYSDEC RSCO for subsurface soil samples of 10 mg/kg. GE collected an additional surface soil sample in June of 2002 from the "current" surface near former Building 29. That sample is above the NYSDEC RSCO of 1.0 mg/kg for surficial soils.

The area south of former Building 60 was graded, covered with approximately four feet of fill and topsoil, and seeded as part of GE's site-wide post-demolition landscaping effort in 1999. These soil samples can be considered as subsurface soil samples and are not shown on Figure 4-1.

4.1.1.1.2 Volatile Organic Compounds

The analytical results for VOCs were compared to NYSDEC RSCO for total VOCs in soil (10 mg/kg) in addition to the compound specific NYSDEC RSCOs. None of the surface soil samples contained concentrations of total VOCs that were above the NYSDEC RSCO of 10 mg/kg for total VOCs.

Acetone was the only VOC detected above its compound specific NYSDEC RSCO in surface soil samples. Acetone was not detected in the groundwater samples collected near the locations where acetone was present in the surface soil.

4.1.1.1.3 Semi-Volatile Organic Compounds

The analytical results for SVOCs were compared to NYSDEC RSCO for total SVOCs of 500 mg/kg in addition to the compound specific NYSDEC RSCOs. None of the surface soil samples were above the NYSDEC RSCO for total SVOCs of 500 mg/kg.

With the exception of dimethylphthalate and phenol, all of the SVOCs that were detected above their compound specific NYSDEC RSCO were PAHs. PAHs were detected above their respective NYSDEC GW standard at six locations that correspond to areas with SVOC exceedances in the surface soil. Five of these locations are within the former East Landfill Area and the other location is along the eastern boundary of the former East Landfill Area. These locations are shown in Figure 4-1.

4.1.1.1.4 Metals

Metals (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, mercury, nickel, selenium, vanadium, and zinc) were detected in the surface soils at the site at concentrations that are above the NYSDEC RSCOs.

There are slightly elevated levels of metals in surface soil in some areas at the site. As discussed in the *RI Report*, there is no apparent trend towards any one area or correlation with disposal or material handling practices at the site.

4.1.1.2 Subsurface Soil Quality

Subsurface soil samples are defined in the *RI Report* as any soil sample collected from an interval that begins at a depth greater than two feet bgs. The following sections summarize the analytical results for subsurface soil samples discussed in the *RI Report*.

4.1.1.2.1 Polychlorinated Biphenyls

The analytical results for PCBs in subsurface soils were compared to the NYSDEC RSCO of 10.0 mg/kg for subsurface soils. PCB concentrations in the subsurface soil samples were greater than 10 mg/kg at five locations. The specific subsurface soil locations where PCB concentrations were detected above the NYSDEC RSCO are:

- Three areas in the former East Landfill (near the access road) where the maximum total PCB concentration was found in the fill material.
- Area near former Building 85.
- The former Binnie Kill Channel.

The soil sample that had the maximum total PCB concentration near former Building 29 can be considered as a subsurface soil sample (1 to 1.5 feet bgs). It contained PCBs above the NYSDEC RSCO for subsurface soil. GE collected an additional four subsurface soil samples in June 2002 from the former Building 29 Area. None of these four additional samples contained PCBs.

4.1.1.2.2 Volatile Organic Compounds

The analytical results for VOCs in subsurface soils were compared to NYSDEC RSCO for total VOCs in soil (10 mg/kg) in addition to the compound specific NYSDEC RSCOs. There are six general areas where the total VOCs in subsurface soils were above 10 mg/kg. These six areas are:

- Former Wire Mill Area where TCE and DCE were found. The groundwater near this soil sample had concentrations of TCE and DCE that are above the NYSDEC GW standards.
- Former IMPS Area where xylenes and ethylbenzene were found.
- Former East Landfill Area where xylenes were found. The groundwater near this soil sample had concentrations of xylenes that are above the NYSDEC GW standard.
- City Water Main IRM Area where 2-butanone, isopropylbenzene, n-butylbenzene, benzene, ethylbenzene, and m&p-xylene were found. The groundwater near this soil sample had concentrations of 2-butanone, isopropylbenzene, n-butylbenzene, benzene, ethylbenzene, and m&p-xylene that are above their respective NYSDEC GW standards.
- Two areas in the WWTP Area. The area near the former Propeller Test Building where cis-1,2-dichloroethene, xylenes, and toluene were found. The groundwater near this soil sample had concentrations of cis-1,2-dichloroethene, xylenes, and toluene that are above the NYSDEC GW standards. The second area was in the northern area of the WWTP where xylenes and ethylbenzene were found. Xylenes and ethylbenzene were not detected in the groundwater near this soil sample.

- Former Binnie Kill Channel where 1,1,2-trichloroethane, xylenes, and chlorobenzene were found. The groundwater near this soil sample had concentrations of xylenes and chlorobenzene that are above the NYSDEC GW standards.

4.1.1.2.3 Semi-Volatile Organic Compounds

The analytical results for SVOCs were compared to NYSDEC RSCO for total SVOCs of 500 mg/kg in addition to the compound specific NYSDEC RSCOs. Only one subsurface soil sample was above the NYSDEC RSCO for total SVOCs of 500 mg/kg. This subsurface soil sample was collected near Building 2 at a depth of 0 to 4 feet bgs.

Several SVOCs were detected above their compound specific NYSDEC RSCO in at least one subsurface soil sample. The majority of these SVOCs are PAHs. PAHs were detected above their respective NYSDEC GW Standard at five locations that correspond to areas with SVOC exceedances in the subsurface soil. As shown in Figure 4-1, three of these locations are within the former East Landfill Area, one is along the eastern boundary of the Former East Landfill Area, and the other is located adjacent to the former Binnie Kill Channel near monitoring well DM-401F.

4.1.1.2.4 Metals

Metals (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, mercury, nickel, selenium, and zinc) were detected at the site in subsurface soils at concentrations that are above the NYSDEC's RSCOs.

There are slightly elevated levels of metals in subsurface soil in some areas at the site. As discussed in the *RI Report*, there is no apparent trend towards any one area or correlation with disposal or material handling practices at the site.

4.1.2 Groundwater

The groundwater in the channel fill deposits is the primary component of the groundwater AOC at the site because it is the main groundwater migration pathway beneath the site. The site conceptual model, which is based on extensive data, indicates that most of the contamination found in shallow groundwater and soils, if not attenuated or biodegraded within the less permeable floodplain deposits, will slowly migrate downward into the channel fill deposits. The groundwater within the channel fill deposits generally flows northward.

4.1.2.1 Groundwater Flow

Figure 3-4 is a potentiometric surface map of the channel fill deposits on February 20, 2001. As shown, groundwater generally migrates from south to north. Overall, the groundwater in the fill and floodplain deposits has a similar flow pattern to the flow pattern in the channel fill deposits. A complete discussion of groundwater flow is in the *RI Report*.

Most of the groundwater that migrates from the site does so through the channel fill deposits. Approximately 98 percent of the groundwater that flows towards the Mohawk River from the site migrates through the channel fill deposits. The estimated discharge through the channel fill deposits is 280 gpm. The groundwater from the fill and floodplain deposits that migrates laterally towards the Mohawk River comprises approximately two percent of total flow along the northern perimeter of the site. The estimated discharge through the fill and floodplain deposits is seven gpm.

As shown in Figure 3-4, there is a natural hydrologic divide that separates groundwater that flows beneath the site from groundwater that does not flow beneath the site. Studies of the natural hydrogeologic divide confirm that the groundwater beneath the site does not flow towards the municipal well fields. Furthermore, numerous investigations over the last decade have shown that the natural hydrogeologic divide has stayed west of the site. Thus, the data confirms that there is no migration of site contaminants toward the well fields. As such, this issue does not need to be addressed.

4.1.2.2 Shallow Groundwater Quality

In general, the fill and floodplain groundwater samples represent the water quality at the water table, regardless of stratigraphic unit. To a large extent, the low permeability floodplain deposits tend to separate the water table from the underlying channel fill deposits or retard the movement of water downward. In areas where the floodplain deposits are thin or absent, compounds may be able to migrate directly downward into the channel fill deposits.

This section summarizes the current shallow groundwater quality conditions at the site. As such, only data collected since April 1999 is considered representative of current groundwater quality beneath the site. April 1999 was chosen because this is the most recent sampling data for most wells not sampled during the RI. Wells not sampled after April 1999 were not included in this evaluation of current site conditions.

4.1.2.2.1 Polychlorinated Biphenyls

As shown in Table 4-1, 38 of the fill and floodplain wells had total PCB concentrations that are above the NYSDEC GW standard of 0.09 μg/L.

In general, there are four areas where PCBs were found in groundwater samples from the fill and floodplain deposits at concentrations that are above the NYSDEC GW standard. These four areas and relevant information about conditions near these areas are listed below.

- The former Binnie Kill Channel (Aroclors 1254 and 1260). PCB concentrations detected in the soil samples from the former Binnie Kill Channel were below NYSDEC RSCOs. LNAPL contaminated with PCBs was present in and near the former Binnie Kill Channel.

- The Building 49/53 Area (Aroclors 1254 and 1260). LNAPL contaminated with PCBs was present in the Building 49/53 Area.

- The southern portion of the former East Landfill Area (Aroclor 1248). PCB concentrations detected in the surface soil samples from the former East Landfill Area were above NYSDEC RSCOs. LNAPL contaminated with PCBs was present in the former East Landfill Area.

- The former Chip Pad Area (Aroclors 1254 and 1260). PCB concentrations detected in the surface soil samples from the former Chip Pad Area were above NYSDEC RSCOs. LNAPL contaminated with PCBs was present in the former Chip Pad Area.

The PCBs that were detected above NYSDEC GW Standards generally consisted of the more chlorinated Aroclors. As shown above, the detection of PCBs in the fill and floodplain deposits groundwater correlated with the presence of PCB contaminated LNAPL.

4.1.2.2.2 Volatile Organic Compounds

Figure 4-2 shows the distribution of total VOCs in the fill and floodplain deposits at the site. Approximately 35 percent of the groundwater samples from the fill and floodplain deposits did not contain VOCs during the most recent sampling event. Approximately 30 percent of the groundwater samples from the fill and floodplain deposits contained VOCs that are comprised primarily of BTEX compounds. Approximately 20 percent of the groundwater samples from the fill and floodplain deposits contained VOCs that are comprised primarily of chlorinated VOCs. Of this 20 percent, approximately half are chlorinated ethenes and approximately one third are chlorinated benzenes. Table 4-1 lists the individual VOCs that were detected in each well or groundwater screening sample above their NYSDEC GW standard.

In general, there are eight areas of groundwater with elevated VOC concentrations in the fill and floodplain deposits:

- The Waste Water Treatment Plant (WWTP) Area (chlorinated ethenes and BTEX)
- The southwestern portion of the Former East Landfill Area (BTEX)
- The former Stark Oil Facility (BTEX)
- The former Chip Pad Area (BTEX and chlorinated VOCs)
- The City Water Main Interim Remedial Measure (IRM) Area (BTEX and petroleum hydrocarbons)
- The former IMPS Area (BTEX)
- The former West Landfill Area near DM-426F (BTEX)
- The former Wire Mill Area (chlorinated ethenes)

4.1.2.2.3 Semi-Volatile Organic Compounds

As shown in Table 4-1, 32 of the fill and floodplain wells and two of the groundwater screening samples had concentrations of individual SVOCs that are above their respective NYSDEC GW standard. With the exception of bis(2-ethylhexyl)phthalate, all of the SVOCs that were above NYSDEC GW standards were PAHs. There are four areas with elevated concentrations of PAHs in the shallow groundwater:

- The southern half of former East Landfill Area. PAHs were detected at concentrations that are above NYSDEC RSCOs in both the surface and subsurface soils in the former East Landfill Area.

- The Building 49/53 Area.

- The former Chip Pad Area.

- Adjacent to the former Binnie Kill Channel, near monitoring well DM-401F. PAHs were detected at concentrations that are above NYSDEC RSCOs in the subsurface soils in the former Binnie Kill Channel.

LNAPL was detected in the former East Landfill Area, the Building 49/53 Area, the former Chip Pad Area and the former Binnie Kill Channel. The detection of PAHs in the fill and floodplain groundwater can be correlated with the presence of LNAPL in these areas.

4.1.2.2.4 Metals

Metals (antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, thallium, and zinc) were found at concentrations greater than the NYSDEC's groundwater standards or guidance values in one or more groundwater samples collected from the fill or floodplain deposits. Only antimony, arsenic, barium, cadmium, iron, magnesium, manganese, mercury, selenium, and sodium were detected in both total (unfiltered) and dissolved (filtered) fill and floodplain groundwater samples at concentrations that are above the NYSDEC's groundwater standards or guidance values. Table 4-1 lists the metals that were detected in each well above their NYSDEC GW Standard.

The naturally occurring metals (Fe, Mn, Mg, and Na) were found above their respective NYSDEC GW standard across the entire site. Background concentrations of Fe, Mn, Mg, and Na reported for groundwater in Schenectady County also are above the NYSDEC's groundwater standards or guidance values. The remaining metals that were above NYSDEC GW Standards were also found across the entire site. As discussed in the *RI Report*, there is no correlation between elevated metals concentrations in groundwater and disposal or material handling practices at the site.

4.1.2.3 Channel Fill and Glaciolacustrine Deposits Groundwater Quality

This section summarizes the current groundwater quality conditions in the channel fill and glaciolacustrine deposits at the site. Only data collected since April 1999 is considered representative of current groundwater quality beneath the site. April 1999 was chosen because this is the most recent sampling data for most wells not sampled during the RI. Wells not sampled after April 1999 were not included in this evaluation of current site conditions.

4.1.2.3.1 Polychlorinated Biphenyls

PCBs were not detected in the most recent groundwater samples collected from the channel fill deposits.

4.1.2.3.2 Volatile Organic Compounds

Figure 4-3 shows the distribution of total VOCs in the channel fill and glaciolacustrine deposits at the site. Approximately 35 percent of the groundwater samples from the channel fill and glaciolacustrine deposits did not contain VOCs during the most recent sampling event. Approximately 50 percent of the groundwater samples from the channel fill and glaciolacustrine deposits contained VOCs that are comprised primarily of chlorinated VOCs. Of this 50 percent, 80 percent are chlorinated ethenes. Less than 10 percent of the groundwater samples from the channel fill and glaciolacustrine deposits contained VOCs that are comprised primarily of BTEX compounds. Table 4-2 lists the individual VOCs that were detected in each well or groundwater screening sample above their NYSDEC GW standard.

In general, there are five areas of elevated VOC concentrations in the channel fill and glaciolacustrine deposits:

- Former Wire Mill Area (chlorinated ethenes);
- Area north of the WWTP Area (chlorinated ethenes);
- Former IMPS Area (chlorinated ethenes);
- Area west of the WWTP Area (chlorinated benzenes and chlorinated ethenes); and
- Former East Landfill Area (BTEX);

In addition to these five general areas, there are three smaller areas of slightly elevated VOCs that are near the site boundary.

- The eastern property boundary near the GE-218 cluster (chlorinated ethenes and cis-1,3-dichloropropene);
- The western property boundary near well GE-15 (chlorinated ethenes); and
- The western property boundary near well GE-10 (chlorinated ethenes).

4.1.2.3.3 Semi-Volatile Organic Compounds

None of the channel fill and glaciolacustrine groundwater samples contained PAHs at concentrations greater than NYSDEC groundwater standards. The only SVOC that was detected above the NYSDEC groundwater standard was bis(2-ethylhexyl)phthalate (BEHP). The maximum BEHP concentration was detected north of the former Wire Mill Area.

4.1.2.3.4 Metals

Metals (antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, sodium, and thallium) were detected in one or more groundwater samples collected from the channel fill and glaciolacustrine deposits at concentrations above the NYSDEC's groundwater standards or guidance values. Only antimony, arsenic, cadmium, iron, magnesium, manganese, sodium, and thallium were found in dissolved (filtered) groundwater samples at concentrations above the NYSDEC's groundwater standards or guidance values. Table 4-2 lists the metals that were detected in each well above their NYSDEC GW Standard.

The naturally occurring metals (Fe, Mn, Mg, and Na) were found above their respective NYSDEC GW standard across the entire site. Background concentrations of Fe, Mn, Mg, and Na reported for groundwater in Schenectady County also are above the NYSDEC's groundwater standards or guidance values. The remaining metals that were above NYSDEC GW Standards were also found across the entire site. As discussed in the *RI Report*, there is no correlation between elevated metals concentrations in groundwater and disposal or material handling practices at the site.

4.1.3 Light Non-Aqueous Phase Product

There are seven areas at the Main Plant where light non-aqueous phase product (LNAPL) has been encountered. These seven areas are shown in Figure 4-4. These seven areas are:

- Former IMPS Area where up to 0.11 feet of LNAPL was found in the northern portion of the former IMPS Area. Two types of LNAPL have been found in this area. One LNAPL, which was comprised of gasoline with detectable concentrations of PCBs of 79 mg/kg, was found in an area that was removed in order to install a scale for the railroad tracks. The other LNAPL, which was comprised of mineral oil with no detection of PCBs, was also found in the northern portion of the former IMPS Area.

- Former Binnie Kill Channel west of Building 273 where up to 1.06 feet of LNAPL was found. The LNAPL was identified as #4 fuel oil and diesel fuel with detectable concentrations of PCBs up to 145 mg/kg.

- City Water Main IRM Area where LNAPL was found in 1997 in the trench being excavated for the new water main. The LNAPL, which was typed as weathered gasoline, was found in an approximately 200 feet long area. As discussed in Section 3.4.1.12, CT Male initiated an IRM in 1998 to prevent LNAPL from coming in contact with the new water main. The IRM included lining the utility trench with geofabric. During construction of the IRM, a total of 2,505 tons of impacted soil and 100,000 gallons of groundwater were removed and properly disposed of. Since initiating the IRM, GE has attempted to recover LNAPL. Monitoring of the area continues and no measurable product has been found to date.

- Building 49/53 Area where up to 0.38 feet of LNAPL has been found. In 1991, the LNAPL from this area was identified as fuel oil with detectable concentrations of PCBs of 16 mg/kg. In December 2000, GE purged monitoring wells in the area in which product has consistently been detected. Following the purging event, LNAPL was only seen in two wells. LNAPL has also been found in the two newly installed monitoring wells.

- Southwest portion of the former East Landfill where up to 0.07 feet of LNAPL was found north of the landfill access bridge. This LNAPL is comprised of lubricants, oil, fuel oil, and gasoline with detectable concentrations of PCBs of 4.7 mg/kg.

- Former Chip Pad Area where up to 0.5 feet of LNAPL was found. This LNAPL is comprised of lubricating oil with detectable concentrations of PCBs of 288 mg/kg.

- Former Stark Oil Facility where up to 0.04 feet of LNAPL has currently been found.

4.1.4 Surface Water

There are two on-site streams at Main Plant, the Poentic Kill and the Poenties Kill. Both are near the former landfills. Both streams generally flow north and northeast through the site and eventually empty into the Mohawk River. There are two wetlands: one west and one south of the former West Landfill. For purposes of this discussion, the surface water bodies are discussed together based on the findings of the RI.

The surface water of the Poentic Kill and Poenties Kill are considered a primary AOC at the site because of its potential to transport contaminants off site. The surface water in the kills is also an AOC because it receives water from other AOCs (groundwater and seeps).

4.1.4.1 Polychlorinated Biphenyls

PCBs were not detected in the surface water samples collected from the Poentic Kill or the Poenties Kill. PCBs were detected in only one on-site surface water sample at a concentration above the NYSDEC Class C Surface Water Standard. This sample was collected from an area of standing water in the swale south of the former East Landfill.

4.1.4.2 Volatile Organic Compounds

VOCs were not detected in the surface water samples from the Poentic Kill, Poenties Kill, or on-site wetlands at concentrations greater than their respective NYSDEC surface water standards. No site-related VOCs were found in the Mohawk River, which is north of the site.

4.1.4.3 Semi-Volatile Organic Compounds

Bis(2-ethylhexyl)phthalate was the only SVOC detected in surface water samples from the Poentic Kill and on-site wetlands above its respective NYSDEC surface water standard. Bis(2-ethylhexyl)phthalate was detected in the Poenties Kill below the NYSDEC surface water standard. PAHs were not detected in the on-site water bodies or the Mohawk River.

4.1.4.4 Metals

Metals (iron, aluminum, copper, lead, zinc, and thallium) were detected at concentrations above their respective NYSDEC surface water standards in one or more of the surface water samples collected from the Poentic Kill, Poenties Kill, and on-site wetlands. Some of the metals detected in the upstream surface water that enters the site also are above surface water standards.

4.1.4.5 Surface Water Summary

Data indicates that the surface water in the Poentic Kill, Poenties Kill, on-site wetlands, and the Mohawk River are not significantly impacted by PCBs, VOCs, SVOCs, or metals. The results of the HHRA indicate that under current conditions, the surface water at the site does not pose a significant health risk to employees, construction workers, trespassers, or excavation workers. The results of the SLERA indicate that fauna may be impacted by the surface water at the site, if upland sources are not abated.

Although the surface water at the site has not been significantly impacted, there is still potential for other AOCs to affect the surface water. Therefore, remedial options will address groundwater and the seeps that may contain contaminants, which could affect surface water quality. The focus of the remedial options near the Mohawk River will address DCE and vinyl chloride that is present in the channel fill groundwater. The focus of the remedial options near the Poentic Kill will address petroleum compounds in the floodplain groundwater and PCBs in the seep water.

4.1.5 Sediment Quality

The sediments in the Poentic Kill, Poenties Kill, on-site wetlands, and Mohawk River are an AOC at the Main Plant. The sediment analytical results were compared to site-specific NYSDEC sediment screening criteria. In order to calculate the site-specific NYSDEC sediment screening criteria, the average total organic content (TOC) for each water body was used. For purposes of this discussion, the sediment samples are discussed together based on the findings of the RI.

The analytical results for the sediment samples collected from the former Sector R Holding Pond are not addressed in this section. The former Sector R Holding Pond IRM was completed in November 2003 and is discussed in Section 3.4.1.14.

4.1.5.1 Polychlorinated Biphenyls

PCBs were detected in isolated sediment samples collected from the Poentic Kill, the Poenties Kill, the on-site wetlands, and at a storm sewer outfall to the Mohawk River. With the exception of one sediment sample collected from the Poenties Kill, all detectable concentrations of PCBs were above their site-specific NYSDEC sediment screening criteria. The maximum concentration of PCBs in the Poentic Kill was found immediately downgradient of the Seep 2 through 4 Area. The Seep 2 through 4 Area is being addressed by an on-going IRM, which is intended to reduce the concentration of PCBs in the water from the seeps. The maximum concentration of PCBs in the on-site wetlands was found in the swale south of the former East Landfill. The maximum concentration of PCBs at the Mohawk River was found near Outfall 002 of the storm sewer. The storm sewers have been cleaned since the collection of this sample. PCBs were not detected in the sediments in the main channel of the Mohawk River.

4.1.5.2 Volatile Organic Compounds

VOCs were detected in the sediment samples collected from the Poentic Kill, Poenties Kill, and the Mohawk River. Only BTEX compounds were detected above their site-specific NYSDEC sediment screening criteria in samples collected from the Poentic Kill. The sediment samples with the highest concentrations of BTEX were collected near Seep 3 and Seep 4. The Seep 2 through 4 Area is being addressed by an on-going IRM.

4.1.5.3 Semi-Volatile Organic Compounds

SVOCs were detected in the sediment samples collected from the Poentic Kill, the Poenties Kill, the on-site wetlands, and the Mohawk River. The SVOCs detected in sediments consisted primarily of PAHs. SVOCs were not detected at concentrations that were above their respective site-specific NYSDEC sediment screening criteria in sediment samples collected from the Poenties Kill. The following PAHs were detected above their site-specific NYSDEC sediment screening criteria in at least one sediment sample from the Poentic Kill or the Mohawk River: benzo(a)anthracene, fluorene, 2-methylnaphthalene, naphthalene, and phenanthrene. In general, the maximum concentrations of PAHs in the Poentic Kill were found near Seeps 3 and 4 and near Seep-8.

4.1.5.4 Metals

The metals concentrations in sediment samples were compared to NYSDEC sediment screening criteria. Metals were not detected in the sediment sample collected from the Mohawk River near the Building 271 Intake above the NYSDEC sediment screening lowest effect level (LEL). Arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc were found at concentrations above the LEL in at least one sediment sample collected from the Poentic Kill, Poenties Kill, and on-site water bodies.

4.1.5.5 Summary

Data indicates that sediment in the Poenties Kill, on-site wetlands, and the Mohawk River are not significantly impacted by PCBs, VOCs, SVOCs, or metals. Data indicates that sediment in the Poentic Kill has been minimally impacted by PCBs, BTEX and PAHs in seep water or shallow groundwater in the former East Landfill area. As discussed in Section 3.4.2.4, loading of PCBs and BTEX to the Poentic Kill from the Seep 2 through 4 area has been addressed through implementation of the Seep IRM.

Although sediment at the site has been minimally or not significantly impacted, there is still potential for other AOCs to affect the sediment. Therefore, remedial options will address groundwater and the seeps that may contain contaminants and which could affect sediment quality. The remedial options near the Poentic Kill will address petroleum compounds in the floodplain groundwater and PCBs in the seep water.

4.1.6 Seeps

Groundwater in the former East Landfill Area flows radially from the central groundwater mound towards the Poentic Kill and to the east. Because the floodplain deposits are less permeable than the overlying fill, a portion of the water in the fill migrates toward the Poentic Kill and emerges as seeps.

The eight seep areas that have been identified along the eastern bank of the Poentic Kill are considered an AOC. All eight seeps are along the ½-mile long segment of the Poentic Kill where it passes the former East Landfill Area. These eight seep areas are shown in Figure 3-10. This section of the Poentic Kill was excavated into the floodplain deposits when the Poentic Kill was moved in 1947. The seeps are a primary AOC because of the potential to impact other AOCs (surface water, sediments, and biota in the Poentic Kill).

4.1.6.1 Polychlorinated Biphenyls

Thirty-two seep samples had total PCB concentrations that were above the NYSDEC GW standard of 0.09 µg/L. As discussed in the *RI Report*, based on mass loading calculations, the PCBs found in the seeps on the southwestern corner of the former East Landfill Area are the most likely contributor to the PCBs found in the sediments and, therefore, fish in the Poentic Kill.

After implementation of the March 2000 Seep IRM, the relationship between PCB concentrations and suspended particles in the seep samples was evaluated by filtering seep samples using 0.45 micron, 1.0 micron, 5.0 micron, and 10.0 micron filters prior to laboratory analysis. The results indicate that the PCB detections in the seep samples can be attributed to PCBs that are sorbed to the suspended particles present in the sample.

4.1.6.2 Volatile Organic Compounds

Thirteen individual VOCs were detected above their NYSDEC GW standard in at least one seep sample. These 13 VOCs are: benzene, chlorobenzene, 1,2-dichlorobenzene, cis-1,2-dichloroethene, 1,2-dichloroethene, ethylbenzene, 1,2,4-trimethylbenzene, isopropylbenzene, methylene chloride, n-propylbenzene, toluene, m&p-xylene, and o-xylene.

4.1.6.3 Semi-Volatile Organic Compounds

None of the SVOCs detected in the seep samples were above their NYSDEC GW standard.

4.1.6.4 Metals

Iron and manganese were detected in the filtered water samples collected from all eight seeps at concentrations above the NYSDEC GW standard.

4.1.6.5 Interim Remedial Measure

GE has been developing and implementing engineered measures to address the seeps and prevent the migration of PCBs to the Poentic Kill. On February 18, 2000, GE submitted an IRM work plan, entitled *Interim Remedial Measure Work Plan Eastern Landfill Seeps* to the NYSDEC. After reviewing with the NYSDEC, GE submitted a revised work plan entitled, *Revised Interim Remedial Measures (IRM) Work Plan, East Landfill Seeps*, dated March 29, 2000. This *IRM Work Plan* described the passive treatment system proposed to remediate Seep-2, Seep-3, and Seep-4 and the monitoring program for assessing the performance of the system. Since construction of the *IRM Work Plan* was completed in July 2000, GE has continued to modify and improve the system. Based on the most recent data evaluated, the current system is effectively removing PCBs from the overland seep water. Additionally, a streambank armoring project for erosion control, which included the planting of hundreds of deep-rooted willows and poplars near the seep area, was initiated in July 2001. Since completion of this project in September 2001, the Seep-1 location has been dry.

4.1.7 Ambient Air

Although ambient air was not evaluated at the site during the RI, VOCs are not present in surface soils over large portions of the site. Thus, there is little likelihood of VOCs in ambient air. The 1999 screening-level Human Health Risk Assessment (HHRA), which was provided as Appendix H in the *Zone 1 RI*, concluded that the conditions at the site do not pose significant risks to employees, trespassers, construction workers, potential future recreational users, or residents. The HHRA did consider inhalation exposure pathways.

URS used the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil* (*Subsurface Vapor Intrusion Guidance)*, which is a screening tool recently issued by the USEPA, to evaluate whether indoor air at the site poses a significant risk to human health. The results of our evaluation are summarized in this section and are provided in Appendix A.

Although the *Subsurface Vapor Intrusion Guidance* was developed for residential scenarios, it states that OSHA PELs should be used to evaluate indoor air quality at sites, such as the Main Plant, where the only exposures are to workers. Thus, the target concentrations listed in the *Subsurface Vapor Intrusion Guidance*, which are based on residential exposure scenarios, were adjusted on a pro-rata basis using the OSHA PELs to develop site-specific target concentrations for indoor air, soil gas, and shallow groundwater.

The Target Indoor Air concentrations listed in the *Subsurface Vapor Intrusion Guidance* are based on a lifetime cancer risk of $1x10^{-5}$ and a hazard index of 1.0 for non-carcinogenic compounds. Because the anticipated exposures at the site are work place exposures, the OSHA PELs were used as the Target Indoor Air concentrations for the site and the ratio of the OSHA PEL to the Residential Target Indoor Air concentration was used to develop Site-Specific Target concentrations for soil gas and shallow groundwater. If the OSHA PEL was not available, the ratio was assumed to be 1.0, and therefore the residential target concentrations were equivalent to the site-specific target concentrations.

All of the VOCs detected in the soil gas samples were below the Site-Specific Target Shallow Soil Gas concentrations. All of the VOCs, except for three compounds for which there are no OSHA PELs, were detected in the shallow groundwater samples at concentrations less than the Site-Specific Target Groundwater concentrations. The three VOCs (n-propylbenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene), for which there are no OSHA PELs, were detected in the shallow groundwater samples above the Residential Target Groundwater concentrations listed in the *Subsurface Vapor Intrusion Guidance*.

However, as discussed above, the residential exposure scenario used in the *Subsurface Vapor Intrusion Guidance* is not appropriate for worker exposure at sites such as the Main Plant. Appendix A shows that the OSHA PELs are generally five orders of magnitude greater than the Residential Target Indoor Air concentrations. Thus, if the Residential Target Groundwater Concentrations were increased by five orders of magnitude, the concentrations of the three VOCs without OSHA PELs would be far less than these calculated Site-Specific Target Groundwater concentrations.

In summary, neither ambient air nor indoor air pose a significant risk at the site.

4.1.8 Site Habitats

Large areas of the site, especially in and around the former landfill areas, have been shown to support a wide array of wildlife. The site habitats are shown in Figure 4-5. The protection of the existing wetlands, streams, and terrestrial cover on, and adjacent to, the former landfills should be a primary consideration during the evaluation of potential remedial actions at the site. Care must be taken not to destroy or irreparably alter these areas.

An assessment of the existing ecological conditions, which included an inventory of the species and ecological communities at the site, is summarized in Dames & Moore's *Natural Resources Evaluation Report*, dated August 13, 1996, that was included in the January 1997 *AOC Report*. The results of the assessment indicated that the Main Plant supports a variety of both freshwater wetland and terrestrial habitats and ecological communities.

These habitats and associated ecological communities range from relatively diverse assemblages of plants and animals in wetland and terrestrial areas that are on or border the former landfills, to less diverse assembles of opportunistic species that inhabit some areas that are in a transitional stage of forest development. These habitats also include state-protected plant species or variants. In addition, 81 species of birds and nine species of mammals were also recorded at the site in 1995 and 1996. Because these diverse wildlife habitats exist at the site, further disruption of these areas should be minimized by effectively managing and protecting the existing ecosystems.

A total of 14 biota samples (nine fish samples, four macro invertebrate (cray fish) samples, and one frog sample) have been collected at the site for analysis. These samples were collected from the former landfill areas. PCBs were detected in 11 of the 14 biota samples. Where detected, the total PCB concentration in the crayfish samples ranged from 0.2 mg/kg to 0.209 mg/kg. The total PCB concentration in the frog sample was 0.26 mg/kg. Where detected, the total PCB concentration in the fish samples ranged from 0.0529 mg/kg to 4.92 mg/kg.

The PCBs detected in the biota samples collected during the RI are attributable to exposure to the PCBs found in the sediments of the Poentic Kill. As discussed in Section 4.1.5.1, the maximum concentration of PCBs in the Poentic Kill sediments was found downstream of the Seep 2 through 4 locations. As discussed in Section 4.1.6.1, the PCBs detected in seep water samples are attributed to PCBs that are sorbed to suspended particles present in the seep water. An IRM to mitigate migration of PCBs from the Seep 2 through 4 locations to the Poentic Kill was implemented in July 2000, and has subsequently been modified and improved. Based on the most recent data evaluated, the current system is effectively removing PCBs from the overland seep water. Therefore, as the PCBs found in biota are attributable to other AOCs (the seeps) and erosion of PCB-impacted surface soil, remedial options will focus on mitigating sources of PCBs to the Poentic Kill.

4.2 DISCUSSION OF PRINCIPAL SOURCE AREAS

The primary AOC at Main Plant is the groundwater in the channel fill deposits that migrates beneath the center of the site toward the Mohawk River. There appear to be two areas at the site that are the principal contributors to the chlorinated VOCs (primarily chlorinated ethenes) that are present in the channel fill groundwater that migrates beneath the center of the site. These two areas are:

- The former Wire Mill Area, and
- The WWTP Area, near the former Propeller Test Building.

The following sections provide a general discussion of the history of and conditions at these two areas. The *RI Report* provides a detailed discussion of both of these areas.

4.2.1 Former Wire Mill Area

GE operated the Wire Mill from 1916 to 1987 as part of the Schenectady Wire Plant. Operations at the former Schenectady Wire Plant included wire drawing and braiding, fabrication of magnet wire, wire enameling and coating, wire tinning, product testing and development, and storage of electrical equipment, plant supplies, and motors. The former Schenectady Wire Plant buildings included former Building 109, Building 111, and ancillary buildings including former Buildings 109A through 109E and Building 111A. There was a fabric room, draw and roll area, and enamel area, a die room, an oil house, and an oil room in Building 109. Chemicals used in the wire plant operations included copper dust, cresol, methyl ethyl ketone, mica dust, naptha, phenol, tetrachloroethene (PCE), sodium hydroxide, toluene, xylenes, glass fiber, and asbestos fiber. GE used both the oil house and oil room to store various wire enamels, cresylic acid, and thinners. GE used solvents to clean parts from the enamel-coating machines in the oil house.

Figure 3-4 shows the potentiometric surface near the former Wire Mill. As shown on Figure 3-4, groundwater flow in the former Wire Mill Area is generally to the northeast. There are no channel fill deposits near former Building 109. Instead, the floodplain deposit silts are found directly on the glaciolacustrine silts and clays. Figure 3-4 shows an area of relatively high hydraulic gradient in the area where channel fill deposits are missing. This is indicative of the lower hydraulic conductivity of the glaciolacustrine deposits.

As shown in Figure 4-3, the highest concentrations of VOCs in the deep groundwater are in an east to west trending area along the road north of the former wire mill. These high concentrations of VOCs are parallel to the storm sewer north of the former Building 109 Area. In addition, the area with the highest VOC concentrations corresponds to the area where there are no channel fill deposits. This suggests that the VOCs have remained at higher concentrations in the low hydraulic conductivity glaciolacustrine deposits and are slowly releasing to the more permeable channel fill deposits northeast of the former Building 109 Area.

Appendix G of the *RI Report* presents an evaluation of the natural attenuation data near the former Wire Mill Area. URS used the initial screening scorecard developed by the USEPA to evaluate whether geochemical conditions at the former Wire Mill Area are favorable for the degradation of chlorinated solvents. This scorecard includes evaluation of geochemical parameters such as dissolved oxygen concentrations, oxidation-reduction potential (ORP), relative concentration of redox pairs (ferric and ferrous iron, sulfate and sulfide, and nitrate and nitrite), methane, and hydrogen. The score for the former Wire Mill Area indicates that there is evidence of natural attenuation of TCE. The relatively low dissolved organic carbon concentrations suggest that a potential limiting factor for the biodegradation may be the availability of a carbon source (food) for microorganisms that may degrade the chlorinated ethenes. The data suggests that the chlorinated ethenes are being degraded under anaerobic conditions (iron-reducing and potentially methanogenic conditions).

4.2.2 WWTP Area

The area north of Building 262, east of Binnie Kill Road and west of West Avenue, is referred to as the waste water treatment plant (WWTP) Area. As described in the Sector Q Report, waste water treatment at the site has evolved in three general phases since 1927. Between 1927 and 1956, the WWTP consisted of Building 270 (sewage pumping plant) and an open-topped concrete settling tank. During the second phase from 1957 to 1976, there were unlined sludge drying beds. The current WWTP was constructed in 1976 and included the removal of the former sludge drying beds. In addition to the structures associated with the WWTP, other buildings and features near the WWTP include Building 262 (gas turbine development laboratory) southwest of the WWTP, the former Propeller Test Building south of the WWTP, and the 96-inch storm sewer outfall line west of the WWTP.

As shown in Figure 4-2, the highest concentrations of chlorinated VOCs (primarily chlorinated ethenes) in the fill and floodplain deposit groundwater in the WWTP Area are near the former Propeller Test Building. It is likely that the chlorinated solvents found near the former Propeller Test Building are migrating along the storm sewer outfall line towards the Mohawk River. Since the floodplain deposits are thin or missing in this area, shallow groundwater may also be migrating directly from the fill downward into the channel fill deposits.

Appendix G of the *RI Report* presents an evaluation of the natural attenuation data near the WWTP Area. As discussed above, URS used the initial screening scorecard developed by the USEPA to evaluate whether geochemical conditions near the WWTP Area are favorable for the degradation of chlorinated solvents. The score for the WWTP Area indicates that there is strong evidence of natural attenuation. The groundwater in the channel fill just north of GE's WWTP is within the optimal pH range and there is sufficient organic carbon present for biodegradation of chlorinated VOCs. Anaerobic (iron-reducing and potentially methanogenic conditions) to slightly transitional conditions are present in the channel fill groundwater at the WWTP Area based on DO content. The presence of ethane, ethene, and methane in groundwater samples collected from the channel fill deposits indicates that biodegradation is occurring. Elevated chloride concentrations also indicate degradation of chlorinated VOCs.

4.3 FEASIBILITY STUDY AREAS

This section discusses the formulation of feasibility study areas from the AOCs. Section 4.1 discussed each of the seven media-based AOCs and the potential contaminants of concern.

Based on the data collected during the RI, one of the seven media-based AOCs (ambient air) has not been adversely impacted by past site activities and operations. Therefore, ambient air will not be addressed in this FS.

Surface water quality in the Poentic Kill and Poenties Kill does not appear to be significantly impacted by site activities. The low concentrations of contaminants detected were primarily found at concentrations less than NYSDEC surface water standards. These impacts appear to be directly related to releases from other media based AOCs (seeps and shallow groundwater). Therefore, surface water will not be directly evaluated in this FS. Instead, the AOCs that have caused the impacts will be addressed.

Sediment in the Poentic Kill and Poenties Kill appears to have been slightly impacted by site activities. These impacts appear to be directly related to releases from other media based AOCs (seeps, shallow groundwater, and surface soil). Therefore, sediment will not be directly evaluated in this FS. Instead, the AOCs that have caused the impacts will be addressed. Specifically, migration by overland flow of PCBs sorbed to suspended particles in seep water, migration of shallow groundwater from the former east landfill to the creek, and migration of PCB containing surface soil to the creek through erosion.

The remaining four media-based AOCs, as well as the areas in which LNAPL has been found, will be evaluated in this FS. The four feasibility study AOCs and the areas in which LNAPL has been found are briefly summarized in the remainder of this section.

4.3.1 Soils

The impacted soils at the site have been segregated into four categories to focus the evaluation of remedial alternatives. Each of the four soil categories are summarized below.

4.3.1.1 Surface Soil that May Impact Surface Water Due to Erosion

There are limited areas of the site where surface soil that is above NYSDEC RSCOs has the potential to impact surface water or sediments in surface water bodies through erosion. The five potential receptors of runoff at the site are in the western portion of the site. These potential receptors are the Poentic Kill, the Poenties Kill, the seasonal stream south of the former East

Landfill, the unnamed wetland south of the former West Landfill, and the unnamed wetland west of the former West Landfill. Most of the former landfill areas are well vegetated, thus, preventing erosion of impacted soils. These surface water bodies are in the former East and West Landfill Areas.

4.3.1.2 Soil that is Above NYSDEC RSCOs and is Impacting Groundwater

There are six general areas at the site with soil above the NYSDEC RSCO of 10.0 mg/kg for total VOCs that correspond to areas with groundwater exceedances for the same compounds. These six areas and the contaminants in each area are:

- Former Wire Mill Area – chlorinated ethenes
- Former IMPS Area - BTEX
- Former East Landfill Area - xylenes
- City Water Main IRM Area – 2-butanone, n-butylbenzene, isopropylbenzene, benzene, ethylbenzene, and m&p-xylene
- WWTP Area – DCE, toluene, and xylenes
- Former Binnie Kill Channel, near monitoring well DM-405F – xylene and chlorobenzene

In addition, there are three general areas at Main Plant with soil above NYSDEC RSCOs for individual SVOCs, specifically PAHs, that correspond to areas with groundwater exceedances for the same compounds. These three areas are:

- Former East Landfill Area
- Along the eastern boundary of the former East Landfill Area
- Near monitoring well DM-401F, adjacent to the former Binnie Kill Channel

4.3.1.3 Soil with PCB Concentrations that are Above NYSDEC RSCOs

There are eight locations at the site where PCB concentrations have been detected in surface soil samples above the NYSDEC RSCO of 1.0 mg/kg. These locations are:

- Former East Landfill Area
- Area near former Building 259
- Area near former Building 29
- Former West Landfill Area
- Three areas near the WWTP
- Area south of Building 84
- Area near former Building 109
- South of former Building 60

The PCB impacted soil south of former Building 60 was covered during landscaping work at the site.

In addition, there are four locations at the site where PCB concentrations have been detected in subsurface soil samples above the NYSDEC RSCO of 10 mg/kg. These four locations are:

- Former East Landfill Area
- Area near former Building 85
- Former Binnie Kill Channel
- Area near former Building 29

4.3.1.4 Soil with Other Compounds that are Above NYSDEC RSCOs

In addition to the areas discussed above, areas with VOCs and SVOCs that are above NYSDEC RSCOs, but at relatively lower levels, will also be addressed in this FS.

4.3.2 Groundwater

The impacted groundwater at the site has been segregated into five categories to focus the evaluation of remedial alternatives. Each of the five groundwater categories are summarized below.

4.3.2.1 The Principal Contributors to Chlorinated Ethenes in Channel Fill Deposits

The primary AOC at Main Plant is the groundwater in the channel fill deposits that migrates beneath the center of the site toward the Mohawk River. There are two areas at the site that are the principal contributors to the chlorinated VOCs (primarily chlorinated ethenes) that are present in the channel fill groundwater that is migrating beneath the center of the site. These two areas, which were described in Section 4.2, are:

- The former Wire Mill Area, and
- The WWTP Area, near the former Propeller Test Building.

Elevated concentrations of VOCs have been found in the fill and floodplain groundwater in both of these areas and in the channel fill groundwater immediately downgradient of these areas.

4.3.2.2 Impacted Groundwater that may Impact Surface Water

There are two general areas at the site where impacted groundwater has the potential to impact surface water:

- The former East Landfill Area, and
- The area north of the WWTP.

Former East Landfill Area

Perched groundwater in the former East Landfill Area contains concentrations of PCBs, VOCs, and PAHs above NYSDEC GW standards. In two portions of the former East Landfill Area, the southwest portion and the area north of the former Chip Pad, perched groundwater may be impacting the surface water in the Poentic Kill.

The groundwater in the southwest portion of the former East Landfill Area has elevated concentrations of PCBs, BTEX, and PAHs. The groundwater in the area north of the former Chip Pad has concentrations of PCBs, BTEX, chlorinated VOCs, and PAHs greater than NYSDEC GW standards. LNAPL has been found in both of these areas.

Area north of the WWTP

The groundwater in the channel fill deposits in the area north of the WWTP has elevated concentrations of chlorinated ethenes. This portion of the site is directly south of the Mohawk River. Although chlorinated ethenes have not been detected in the Mohawk River, there is the potential for VOCs to impact the surface water quality of the Mohawk River if sources are left unabated.

4.3.2.3 VOC-Impacted Groundwater Near the Site Boundary

There are five areas at the site where groundwater with concentrations of VOCs, which are primarily chlorinated ethenes, greater than NYSDEC GW standards are near the site boundary. These five areas are:

- Groundwater in the channel fill deposits at the western property boundary of the site near monitoring well GE-15
- Groundwater in the glaciolacustrine deposits at the western property boundary of the site near monitoring well GE-10
- Groundwater in the channel fill deposits at the northeast property boundary of the site near monitoring well cluster GE-218
- Groundwater in the fill and floodplain deposits at the northeast property boundary of the site near monitoring well GE-217M
- Groundwater in the fill and floodplain deposits and the channel fill deposits along the northern property boundary of the site near the WWTP and Building 273

4.3.2.4 Light Non-Aqueous Phase Product

There are seven areas at the Main Plant where LNAPL has been encountered:

- Former IMPS Area
- Former Binnie Kill Channel west of Building 273
- City Water Main IRM Area
- Building 49/53 Area
- Southwest portion of the former East Landfill
- Former Chip Pad Area
- Former Stark Oil Facility

LNAPL will be discussed in conjunction with the groundwater remedial measures during evaluation of potential remedial measures.

4.3.2.5 Remaining Groundwater with Compounds that are Above NYSDEC GW Standards

The remaining areas include groundwater in the fill and floodplain deposits and/or the channel fill deposits that have detected concentrations of PCBs, VOCs, or SVOCs greater than NYSDEC groundwater standards.

Polychlorinated Biphenyls

There are four areas where PCBs were found in groundwater samples collected from the fill and floodplain deposits at concentrations greater than the NYSDEC GW standard:

- The former Binnie Kill Channel
- The Building 49/53 Area
- Southern portion of the former East Landfill Area
- The former Chip Pad Area

The detection of PCBs in the fill and floodplain deposits groundwater correlated with the presence of PCB contaminated LNAPL. PCBs were not detected in the most recent groundwater samples collected from the channel fill deposits.

Volatile Organic Compounds

As discussed above, there are two areas at the site that are the principal contributors to the chlorinated VOCs (primarily chlorinated ethenes) that are present in the channel fill groundwater (the former Wire Mill Area and the WWTP Area, near the former Propeller Test Building). In addition to these two areas and the other FS Areas, there are six areas of groundwater at the site with elevated VOC concentrations:

- The southwestern portion of the former East Landfill (BTEX in the fill and floodplain deposits and channel fill groundwater)
- The former Stark Oil Facility (BTEX in the fill and floodplain deposits groundwater)
- The former Chip Pad Area (BTEX and chlorinated VOCs in the fill and floodplain deposits groundwater)
- The City Water Main Interim Remedial Measure (IRM) Area (BTEX in the fill and floodplain deposits groundwater)
- The former IMPS Area (BTEX in the fill and floodplain deposits groundwater and chlorinated ethenes in the channel fill groundwater)
- The former West Landfill Area near DM-426F (BTEX in the fill and floodplain deposits groundwater)

Semi-Volatile Organic Compounds

There are five areas with elevated concentrations of PAHs in the fill and floodplain deposits groundwater:

- The southern half of former East Landfill Area
- The WWTP Area had total PAH concentrations up to 270 µg/L.
- The Building 49/53 Area had total PAH concentrations up to 218 µg/L.
- The former Chip Pad Area
- Adjacent to the former Binnie Kill Channel near monitoring well DM-401F

LNAPL was detected in the former East Landfill Area, the Building 49/53 Area, the former Chip Pad Area and the former Binnie Kill Channel.

4.3.3 Seeps

The seep samples at the site had concentrations of PCBs, VOCs, and metals that are above their respective NYSDEC GW standard. PCBs, VOCs, SVOCs, and metals were detected in some sediment samples at the site at concentrations greater than the NYSDEC sediment screening criteria. Only metals were detected in the surface water samples at the site at concentrations that are greater than the NYSDEC surface water standards.

The seeps along the former East Landfill Area will be evaluated in this FS. Addressing the seeps will abate further impacts to the surface water, sediments, and biota at the site.

4.3.4 Site Habitats

Only localized impacts to site habitats were identified. As discussed previously, the impacts to biota at the site are attributable to the migration of contaminants from other AOCs, primarily the seeps along the former East Landfill area. Impacts to biota will be addressed through mitigating the seeps.

The site supports a diversity of quality wildlife habitats. This FS will evaluate programs to minimize further impacts to the site habitats and measures to enhance and preserve the habitats. The site habitats are shown in Figure 4-5.

5.0 REMEDIAL OBJECTIVES

The threshold remedial objective for GE's Main Plant is to protect human health and the environment and to eliminate, reduce, and control significant threats to the environment. As discussed in Section 3.5.2, screening level risk assessments conducted for GE's Main Plant show that neither site workers nor the flora at Main Plant are being adversely impacted by the presence of industrial contaminants from past manufacturing activities. The remedial objective for the Main Plant is to implement measures that will prevent contaminated media from adversely affecting off-site resources, to mitigate and abate on-site contaminant conditions, and to promote the continued protection of human health and the environment both on and off the Main Plant property. Specifically, the objectives for remedial actions at GE's Main Plant are to:

- Minimize direct contact by site workers and the public with soil that may contain contaminants.
- Manage, control, and abate the migration of contaminated groundwater to surface waters on or near the site.
- Minimize further groundwater impact through source control or removal.
- Minimize transport of contaminated soil by erosion.
- Prevent human consumption or use of groundwater that does not meet NYSDEC groundwater standards.
- Further reduce ecological risk by interrupting significant exposure pathways.
- Protect, preserve, and continue to enhance the existing habitats at the site.

6.0 SELECTION OF REMEDIAL TECHNOLOGIES AND FORMULATION OF REMEDIAL ALTERNATIVES

This section identifies general response actions for the Main Plant, evaluates potentially applicable remedial technologies, screens preliminary remedial alternatives for each FS Area, and formulates the remedial alternatives. Section 6.1 describes the general response actions identified for the site. Potentially applicable technologies for the FS Areas are described and screened in Section 6.2. The technologies that pass the screening are formulated into preliminary remedial alternatives for each FS Area or group of similar FS Areas and screened in Section 6.3. Section 6.4 describes the formulation of site-wide alternatives from the preliminary alternatives that pass the screening.

6.1 GENERAL RESPONSE ACTIONS

General response actions are broad classes of responses that alleviate one or more concerns associated with a site in a manner that is consistent with the remedial objectives for the site. The general response actions can exceed, attain, or partially attain the remedial objectives.

The potential general response actions focus on limiting the potential impact on the receptors for each of the media listed below. As discussed in Section 4.3, these four media have been impacted by site activities:

- Soil at locations where: (i) compounds are present at concentrations that may impact surface water due to erosion; (ii) VOCs are present at concentrations which are believed to be impacting groundwater; (iii) PCBs are present at concentrations that are above NYSDEC RSCOs; or (iv) other compounds are above NYSDEC RSCOs;

- Groundwater at locations where: (i) VOCs are present at concentrations that are believed to be the principal contributors to the VOCs detected in the channel fill groundwater at the site boundaries; (ii) compounds are present at concentrations that may impact surface water; (iii) compounds are present at concentrations that are above NYSDEC's groundwater standards and are near the site boundaries; (iv) free-product is present in the subsurface; or (v) compounds are present at concentrations that are above NYSDEC's groundwater standards;

- Seeps along the former East Landfill; and

- Existing site habitat area.

The potential adverse impacts related to each of these four media can be addressed by reducing the mobility, quantity, or concentrations of contaminants within each media, or by isolating the contaminants from the potential receptors, thus breaking the exposure pathway. The eight potential general response scenarios identified for the Main Plant include:

- No-action, which is included to provide a baseline for comparison to other actions.

- Monitoring, which will assess effectiveness of remedial actions at the site.

- Institutional Controls, which will control access and potential exposure pathways. These controls would also prevent actions that would decrease the effectiveness of the remedial actions at the site.

- Control and Isolation of Contaminants, which will reduce the mobility of the contaminants and lessen the risk of impact on potential receptors.

- Removal and Off-Site Disposal of Contaminants, which will remove contaminated materials from the site for disposal at properly licensed off-site facilities.

- Destruction of Contaminants, which will irreversibly destroy or detoxify all, or most, of the contaminants to appropriate clean-up levels. Destruction will not leave residues that contain unacceptable levels of contaminants. This type of action will result in a permanent reduction in the toxicity of all, or most, of the contaminants.

- Separation or Treatment of Contaminants, which will separate or concentrate the contaminants from site media. This type of action may leave a treated material with reduced concentrations of contaminants and a concentrated waste stream with high levels of contaminants. The concentrated waste stream would either be further treated to destroy the contaminants or disposed off-site at a properly licensed facility. This type of action would permanently reduce the volume of contaminants that remain at the site.

- Solidification or Chemical Fixation of Contaminants, which will reduce the mobility of the contaminants. This type of action will reduce the availability of contaminants at the site to environmental transport and uptake.

6.2 DESCRIPTION AND PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES

This section presents the criteria by which the potential technologies will be screened and descriptions of remedial technologies, as well as the screening of the technologies.

6.2.1 Technology Screening Criteria

The potential remedial technologies that are identified for each media in the following section are screened for their implementability and their effectiveness for addressing the contaminants and environmental conditions at the site. Technologies that are unsuitable for the media and site conditions will not be considered. The effective and technically implementable technologies for each media, and each type of response action, will be considered in the development of the site-wide alternatives.

The screening of the potential technologies is a two stage process. First, if a technology, or group of technologies is not technically implementable, the use of that technology will be ruled out. The relative effectiveness of the remaining implementable technologies will then be examined.

6.2.2 Potential Technologies

This section presents and evaluates potential remedial technologies for each of these four media at the Main Plant:

- Soil at locations where: (i) compounds are present at concentrations that may impact surface water due to erosion; (ii) VOCs are present at concentrations which are believed to be impacting groundwater; (iii) PCBs have been detected at concentrations that are above NYSDEC RSCOs; or (iv) other compounds are above NYSDEC RSCOs;

- Groundwater at locations where: (i) VOCs are present at concentrations that are believed to be the principal contributors to the VOCs detected in the channel fill groundwater at the site boundaries; (ii) compounds are present at concentrations that may impact surface water; (iii) compounds are present at concentrations that are above NYSDEC's groundwater standards and are near site boundaries; (iv) free-product is present in the subsurface; or (v) compounds are present at concentrations that are above NYSDEC's groundwater standards;

- Seeps along the former East Landfill; and

- Existing site habitat areas.

6.2.2.1 Soil

As discussed in Section 4.1.1, there are limited areas at the site where PCBs have been detected at concentrations greater than 1 mg/kg and 10 mg/kg in surface soils and subsurface soils, respectively. BTEX and chlorinated VOCs have been detected in the subsurface soils at concentrations above NYSDEC RSCOs. Acetone was the only VOC detected above NYSDEC's RSCO in the surface soils. In addition, metals have been detected in both surface soils and subsurface soils at concentrations above NYSDEC RSCOs.

There are isolated locations in the three former landfill areas where PCBs, metals, and PAHs have been detected above NYSDEC's RSCOs in surface soil, and have the potential, if not addressed by remedial action, to migrate due to erosion.

The potential technologies for soil that are screened in this section include:

- No-action
- Land Use and Access Restrictions
- Removal and Off-Site Disposal
- Soil Cover
- Asphalt Cover
- Asphalt Caps
- Agronomic Cover
- Caps
- Soil Vapor Extraction

The remainder of this section provides a brief description and discussion of the applicability of each of the technologies. The screening of these technologies is summarized in Table 6-1.

No-Action

The no-action alternative involves allowing the site to remain in its current condition and takes no action to remove, treat, or contain the impacted surface soils in the manufacturing or former landfill areas.

The no-action alternative is easy to implement, however, this technology does not effectively reduce the contaminant mass or contain the contaminants. The no-action alternative is included for the purpose of comparison with the other alternatives.

Land Use and Access Restrictions

Land use and access restrictions, which can include physical barriers and institutional controls, are means of reducing the potential for human exposure to contamination, such as soil. Land use and access restrictions can be used alone or in combination with other remedial actions.

At Main Plant, restrictions in the form of policies, such as a Health and Safety Plan for site workers, or physical barriers, such as fences, could protect site workers from contact with contaminated soil. Policies could be instituted to prevent access to certain areas and to ensure appropriate measures would be taken in case of construction or maintenance activities in the affected areas. Additionally, restrictions could be designed to match the assumptions in the risk assessment allowing limited access to certain areas. Restrictive covenants to deed could also provide long-term protection by limiting future uses of the site or requiring certain actions, such as maintenance of remedial systems or notification of agencies, if conditions change.

Land use and access restrictions will be retained for consideration.

Removal and Off-Site Disposal

Excavation of contaminated soils is an effective technology for removing contaminated soils. Excavation is frequently used in conjunction with either off-site disposal at a properly licensed facility, or with an ex-situ treatment method. The excavation is then backfilled with clean fill.

Excavation and off-site disposal of impacted surface soils at the Main Plant would effectively remove contaminated media. While soils in the manufacturing area of Main Plant contain levels of various contaminants greater than NYSDEC RSCOs, the HHRA indicates that they do not pose a significant risk to human health. Thus, excavation and off-site disposal is not warranted for all soils that are greater than RSCOs. Therefore, this technology will not be retained for consideration for all soils with compounds above RSCOs in the manufacturing area. This technology may, however, be considered for discrete areas in the manufacturing area.

This action is used infrequently for entire landfilled areas and is usually considered for cases where landfilled materials pose a severe risk to human health and the environment, which is not the case at the Main Plant. The removal of entire landfilled areas would result in the complete destruction of the existing habitat areas. This technology will not be considered further for the former landfill areas as a whole, but will be considered for discrete locations within the former landfills.

Removal and off-site disposal of exposed wastes in the former landfills might include discrete locations where bulky materials are found on the surface of the former landfills or locations where surface soils have detected contaminant concentrations above NYSDEC RSCOs. Removal and off-site disposal of exposed wastes is generally easy to implement, but it would need to be carefully performed because it would result in some destruction of the site habitats. This technology is effective for reducing human contact and environmental interaction with contaminants. Properly disposing removed material at an off-site facility usually results in treatment or containment of the waste and sometimes results in the destruction of the waste.

At the former landfill areas, removal and proper off-site disposal of exposed wastes or surface soils would be fairly easy to implement, but it would need to be carefully performed because it would result in some destruction of the site habitats. However, it would be an effective way to minimize contact between exposed waste and human and environmental receptors. Removal and off-site disposal of exposed wastes will be considered for discrete areas within the former landfill areas at Main Plant.

Soil Cover

Placement of clean soil over areas with contamination is an established method of breaking the direct contact exposure pathway. Soil cover is generally planted with grass or other vegetation to protect against erosion. Soil cover by itself does not provide treatment, but does provide containment. If used in conjunction with restrictive covenants that prohibit disruption of the cover and require regular maintenance, a soil cover can be effective for breaking the direct contact exposure pathway. For most sites, implementation is straightforward.

At Main Plant, a soil cover could effectively prevent direct contact with contaminated surface soils. Because the site is an industrial facility, preventing disruption of the cover and ensuring proper maintenance would be straightforward. Soil cover in portions of the habitat areas can also prevent direct contact and enhance growth of mature flora. This technology will be considered further for both the manufacturing and former landfill areas.

Asphalt Cover

An asphalt cover is sometimes used to cover contaminated soils. This technology does not provide treatment, but does provide containment. If an asphalt cover is used in conjunction with restrictive covenants that prohibit disruption of the cover and require regular maintenance, this technology can be effective for breaking the direct contact exposure pathway. An asphalt cover also limits infiltration of precipitation through impacted soil, thereby providing some protection to groundwater. For most sites, implementation is straightforward.

Asphalt covers could be used to prevent direct contact with surface soils in the manufacturing area at Main Plant without disrupting the use of the site for industrial purposes. The asphalt would effectively prevent direct contact with underlying soils and prevent migration of impacted soils by erosion. However, construction of asphalt covers in the former landfill areas would result in the destruction of habitat areas. Therefore, this technology will not be considered for soils in the former landfill areas. Asphalt covers will be considered further for soils in the manufacturing area.

Asphalt Caps

An asphalt cap is sometimes used to cover contaminated soils thereby protecting groundwater quality by preventing infiltration of precipitation. Asphalt caps are very similar to asphalt covers. The difference is that asphalt caps are designed to be less permeable, thereby better preventing infiltration of precipitation, while asphalt covers primarily provide containment of impacted soil. Therefore, a more rigorous inspection and maintenance program, as well as groundwater monitoring are generally implemented in conjunction with asphalt caps. Groundwater monitoring is used to evaluate the effectiveness of the containment measure. This technology does not provide treatment, but does provide containment of soil and protection to groundwater. If an asphalt cap is used in conjunction with restrictive covenants that prohibit the disruption of the cover and require a rigorous maintenance program, this technology can be effective for breaking the direct contact exposure pathway and protecting groundwater quality. The maintenance program usually includes annual inspection of the cap and sealing of any cracks that develop. In addition, the cap would be periodically recoated with sealer. For most sites, implementation is straightforward.

Asphalt caps could be used to prevent direct contact with surface soils at Main Plant. Although soils in the manufacturing area at Main Plant do not contain elevated concentrations of readily leachable contaminants, there are some areas where constituents detected in the soil are also present in the groundwater. An asphalt cap would effectively prevent direct contact with underlying soils and reduce infiltration without disrupting the use of the site for industrial purposes. However, construction of asphalt caps in the former landfill area would result in the destruction of habitat areas. Therefore, this technology will not be considered for protecting groundwater quality in the former landfill areas. Asphalt caps will be considered further for protecting groundwater quality in the manufacturing area.

Agronomic Cover

An agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, enhance soil stabilization and prevent soil erosion, and is an alternative to the traditional landfill cover systems. The agronomic cover system consists of a soil layer (water storage component) with a thick root zone (water pumping component) and contains plants, such as willows and poplars, which have a low water-use efficiency. This means that they produce relatively small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone. Finally, the root system provides a means of physical stabilization against erosion and a physical barrier against burrowing animals.

An agronomic cover system can be as effective as prescriptive landfill covers in eliminating exposure to waste and minimizing migration of contaminants from the waste mass. An agronomic cover system is technically easy to implement.

At the Main Plant former landfill areas, an agronomic cover would isolate the waste mass and eliminate the direct contact exposure pathway by providing an improved physical and geochemical barrier. An agronomic cover would also reduce infiltration into, and percolation of precipitation through the waste, thereby minimizing impacts to the shallow groundwater quality.

Implementation of an agronomic cover system in the former landfill areas would be straightforward, although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques. In the longer term, an agronomic cover system would enhance habitat areas. This technology will be retained for consideration for use in the former landfill areas as it provides an appropriate level of protection.

The soils in the manufacturing area at Main Plant contain low levels of sparsely distributed contaminants. An agronomic cover system would be effective for preventing direct contact with impacted surface soil and reducing infiltration of precipitation in the manufacturing area. However, dense plantings of trees in the manufacturing area would limit the future use of that portion of the site for industrial purposes. Therefore, installation of an agronomic cover system will not be considered further for the soils in the manufacturing area.

An additional potential benefit of agronomic covers is the potential for treatment (phytoremediation) of contaminated media within the root zone (rhizosphere) of the cover system. Phytoremediation has received attention over the past five to ten years due to promising data from bench and field tests that produced results comparable to conventional treatment methods. A number of Federal Superfund sites have implemented, or are considering, phytoremediation systems. These include landfills, industrial sites, and military installations where soil or groundwater contaminated with organic or inorganic constituents is being treated.

Contaminants in both soil and water could potentially be treated by an agronomic cover via three mechanisms:

- Phytoaccumulation - VOCs in the groundwater may be taken up by the roots, potentially transferred to stems and subsequently leaves, and transpired along with other emitted gases (water, oxygen, and carbon dioxide). Likewise, metals may be hyperaccumulated by plants, and thus removed from the groundwater.

- Rhizodegradation – Root zones (rhizospheres) generally have a two to three order of magnitude increase in soil microbes relative to soils outside the root zones. The increased microbial populations, which live off organic compounds and sloughed root cells, have the potential to degrade carbon based organic molecules (including organic contaminants) as they scavenge for hydrocarbon food. Organic compounds will be broken down into simpler compounds and eventually sugars, which are consumed by the organisms.

- Phytostabilization – Roots will secrete and exude large amounts of organic matter in the form of enzymes, organic acids, and dead and decaying cells. The increase in soil organic matter (SOM) that results from this will have the potential to form more stable organic complexes that may precipitate out of solution. This can reduce the bioavailability and toxicity of the compounds.

If selected for use in the former landfill areas at Main Plant, an agronomic cover would be designed to limit infiltration of precipitation and encourage transpiration. While not a requirement of the phytocover system, an additional benefit would be the potential to provide phytoremediation of wastes in the surface soil and shallow groundwater of the former landfills. In areas with slightly elevated concentrations of organic compounds, the addition of supplemental soil cover, with high soil organic matter content, has the potential to promote both degradation and stabilization. Degradation would occur due to the higher concentration of soil microbes in the rhizospere, while in-situ stabilization of available organic compounds (such as BTEX or solvents) might result due to complexation with organic compounds exuded by the roots. While decreases in the total concentration of the more recalcitrant compounds (such as PCBs) is not expected, a reduction in the bioavailability of PCBs could be anticipated.

Caps

Caps are an established method of isolating wastes from direct contact and protecting groundwater quality by limiting the infiltration of precipitation and run-off. Caps are generally constructed of a low permeability liner (either clay or clay with a synthetic membrane liner) in conjunction with a drainage layer and a soil cover capable of supporting vegetation.

Landfill caps constructed to comply with specific NYSDEC regulations would reduce infiltration into the former landfill areas, thus containing waste in place and reducing the volume of leachate. The specific design of a landfill cap depends upon the regulation that governs the type of waste the landfill contains (e.g., solid waste, construction and demolition waste, or hazardous waste). Capping of landfills in accordance with specific technical requirements in specific regulations is an established technology that has been used for landfill closures nationwide. Implementation is generally straightforward.

Capping soil in the manufacturing area at Main Plant with a traditional landfill cap is not appropriate. This technology is usually applied at sites where wastes or waste disposal activities are concentrated in one area. In the manufacturing portion of Main Plant, the impacts to soil are widely dispersed, and for the most part, are limited to relatively small exceedances of standards, with the exception of naturally occurring metals and a few discrete areas with compound exceedances. Construction of a traditional landfill cap over these areas would hinder the current site use and would limit the future use of the property. In addition, approximately 60 percent of the soil in the manufacturing area is already covered by impervious surfaces such as pavement and buildings.

Capping of the former landfills at Main Plant in accordance with specific regulatory requirements would contain the wastes and reduce the production of leachate. In order to construct such covers at Main Plant, the existing site habitats would be completely removed and portions of the adjacent wetlands would be destroyed by intrusion of the caps into such areas. In addition, large quantities of fill material would be needed to achieve caps that meet the landfill sloping requirements. If this technology is chosen, GE may consider consolidating the wastes, thereby, reducing the amount of fill required to achieve caps that meet the landfill sloping requirements. Fill would be obtained from off-site sources, resulting in additional land consumption and large scale hauling of fill. Such off-site impacts would need to be disclosed to the off-site community and a mitigation plan developed. The use of caps will be considered for the former landfill areas because capping is the presumptive remedy for landfills and provides an appropriate level of protection.

Soil Vapor Extraction

Soil vapor extraction (SVE) is a technology that is frequently used to remove and collect volatile organic vapors from soil. A vacuum system is applied to extract gaseous phase contaminants from the subsurface. This technology can be effective for removing VOCs and SVOCs from the vadose zone. The collected vapors are usually run through a treatment system, such as granular-activated carbon (GAC) or catalytic oxidation, before being released to the atmosphere. The effectiveness of SVE depends on the type of soil. The more permeable the soil, the more effective SVE can be at drawing air through the subsurface.

At Main Plant, there are discrete areas of soil with concentrations of VOCs that are above NYSDEC's individual RSCOs. Because the floodplain deposits at Main Plant are fairly impermeable, SVE would not be as effective for soil in the floodplain deposits as it would in more permeable materials. SVE will be considered for treatment of soils with VOC concentrations above NYSDEC's individual RSCOs in the fill deposits.

6.2.2.2 Groundwater

As described in Section 4.1.2, the groundwater in the channel fill deposits, which migrates toward the Mohawk River, has elevated levels of VOCs at the north site boundary. There are several potential contributors of the chlorinated VOCs at the site. The principal contributors of chlorinated VOCs are the former Wire Mill Area and the WWTP Area near the former Propeller Test Building.

Shallow groundwater in the former East Landfill has elevated detections of PCBs, VOCs, and PAHs. The shallow groundwater is perched within the fill material and manifests as seeps into the Poentic Kill along the western and northern boundaries of the former East Landfill Area. In addition, there are isolated areas of the Main Plant where elevated detections of PCBs, PAHs, and free-product are present in the shallow groundwater.

The potential technologies for the groundwater at Main Plant are:

- No-action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Asphalt Cover
- Asphalt Caps
- Agronomic Cover
- Caps
- Groundwater Collection
- Groundwater Treatment
- Source Removal of LNAPL
- Monitored Natural Attenuation of Groundwater
- Air Sparging
- Soil Vapor Extraction
- Enhanced In-Situ Aerobic and Anaerobic Biodegradation
- Hot Water or Steam Flushing/Stripping
- Stripping Wells
- Permeable Reactive Barriers
- Dual-Phase Soil Vapor Extraction
- Chemical Oxidation

The remainder of this section provides a brief description and discussion of the applicability of each of these technologies. Table 6-2 summarizes technology screening for groundwater and free-product.

No-Action

The no-action alternative allows the site to remain in its current condition, taking no action to remove, treat, or contain the impacted groundwater in the channel fill deposits at the site boundaries, groundwater which may impact surface water, areas of free-product, groundwater with concentrations of VOCs elevated enough to serve as source areas, or other groundwater at the site with compounds that are above groundwater standards.

The no-action alternative is easy to implement, however this technology does not effectively reduce the contaminant mass or contain the contaminants. The no-action alternative is included for the purpose of comparison with the other alternatives.

Land Use and Access Restrictions

Land use and access restrictions, which can include physical barriers and institutional controls, are means of reducing the potential for human exposure to contaminated soil and groundwater. Access to the area may be limited by a fence or other physical barrier. A restrictive covenant may be added to prohibit use of impacted groundwater for potable purposes or restrict the future uses of an area in order to protect remedial systems. Land use and access restrictions reduce human contact with contaminants, including VOCs, BTEX, PAHs, and free-product. However, they do not contain or treat contamination and require involvement of government agencies. Land use restrictions prohibiting the use of the groundwater would be appropriate at and near the Main Plant. Therefore, land use restrictions will be further considered to prohibit the use of groundwater as a potable water source at and near the site.

Groundwater Monitoring

Groundwater monitoring refers to the periodic sampling of groundwater from monitoring wells within and surrounding the contaminated area. Groundwater monitoring is useful for evaluating the effectiveness of contaminant and treatment measures, but is not itself a containment or treatment technology. Using groundwater monitoring in conjunction with containment, treatment, or removal technologies may be more effective than monitoring alone.

Groundwater monitoring would be appropriate for measuring the attenuation and degradation of VOCs detected in the groundwater in the channel fill deposits and the VOCs and SVOCs detected in the shallow groundwater at Main Plant. Groundwater monitoring would also be appropriate for gauging the effectiveness of other technologies. Therefore, groundwater monitoring will be further considered for evaluating groundwater in the channel fill deposits and shallow groundwater.

Asphalt Cover

An asphalt cover is sometimes used to cover contaminated soils, thereby protecting groundwater quality by preventing infiltration of precipitation. This technology does not provide treatment, but does provide containment. If an asphalt cover is used in conjunction with restrictive covenants that prohibit disruption of the cover and require regular maintenance, this technology can be effective for breaking the direct contact exposure pathway and providing some protection to groundwater quality by limiting infiltration of precipitation. For most sites, implementation is straightforward.

Asphalt covers could be used to prevent direct contact with surface soils at Main Plant. Although soils in the manufacturing area at Main Plant do not contain elevated concentrations of readily leachable contaminants, there are some areas where constituents detected in the soil are also present in the groundwater. The asphalt cover would effectively prevent direct contact with underlying soils and reduce infiltration without disrupting the use of the site for industrial purposes. However, the asphalt cover would not provide treatment. Although the asphalt cover would minimize contaminant migration within and through the fill deposits, it would not immobilize contaminants in the channel fill deposits. Therefore, asphalt covers will be considered further for protecting shallow groundwater quality in the manufacturing area, but will not be considered for protecting groundwater quality in the channel fill deposits. Construction of asphalt covers in the former landfill area would result in the destruction of habitat areas. Therefore, this technology will not be considered for protecting groundwater quality in the former landfill areas.

Asphalt Caps

Asphalt caps are very similar to asphalt covers. The difference is that asphalt caps are designed to be less permeable, thereby better preventing infiltration of precipitation, while asphalt covers primarily provide containment of impacted soil. Therefore, a more rigorous inspection and maintenance program, as well as groundwater monitoring, are generally implemented in conjunction with asphalt caps. Groundwater monitoring is used to evaluate the effectiveness of the containment measure. This technology does not provide treatment, but does provide containment of soil and protection to groundwater. If an asphalt cap is used in conjunction with restrictive covenants that prohibit the disruption of the cover and require a rigorous maintenance program, this technology can be effective for breaking the direct contact exposure pathway and protecting groundwater quality. The maintenance program usually includes annual inspection of the cap and sealing of any cracks that develop. In addition, the cap is periodically recoated with sealer. For most sites, implementation is straightforward.

Asphalt caps could be used to prevent direct contact with surface soils at Main Plant. Although soils in the manufacturing area at Main Plant do not contain elevated concentrations of readily leachable contaminants, there are some areas where constituents detected in the soil are also present in the groundwater. The asphalt cap would effectively prevent direct contact with underlying soils and reduce infiltration without disrupting the use of the site for industrial purposes. However, asphalt caps would not provide treatment. Although the asphalt cap would minimize contaminant migration within and through the fill deposits, it would not immobilize contaminants in the channel fill deposits. Therefore, asphalt caps will be considered further for protecting shallow groundwater quality in the manufacturing area, but will not be considered for protecting groundwater quality in the channel fill deposits. Construction of asphalt caps in the former landfill area would result in the destruction of habitat areas. Therefore, this technology will not be considered for protecting groundwater quality in the former landfill areas.

Agronomic Cover

As discussed in Section 6.2.2.1, an agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, and is an alternative to the traditional landfill cover systems. The cover system consists of a soil layer (water storage component) with a thick root zone (water pumping component) and contains plants, such as willows and poplars, which have a low water-use efficiency. This means that they produce relatively small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone.

An agronomic cover system can be as effective as prescriptive landfill covers in eliminating exposure to waste and minimizing migration of contaminants from the waste mass. An agronomic cover system is technically easy to implement.

At the Main Plant former landfill areas, an agronomic cover would isolate the waste mass and reduce infiltration into, and percolation of precipitation through the waste, thereby reducing impacts to the shallow groundwater quality. For the former East Landfill Area, the reduction in infiltration would result in less perched groundwater, and therefore, less seepage along the west and north edges of the former landfill area.

Implementation of an agronomic cover system in the former landfill area would be straightforward, although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques. In the longer term, an agronomic cover system would enhance habitat areas. This technology will be retained for consideration for the former landfill areas.

The soils in the manufacturing area at Main Plant contain low levels of sparsely distributed contaminants. An agronomic cover system would be effective for preventing direct contact with impacted surface soils and reducing infiltration of precipitation in the manufacturing area. However, dense plantings of trees in the manufacturing area would limit the future use of that portion of the site for industrial purposes. Therefore, installation of an agronomic cover system will not be considered further for the manufacturing area.

While not a requirement of the cover system, an additional benefit of agronomic covers is the potential for treatment (phytoremediation) of contaminated media within the root zone (rhizosphere) of the cover system. Contaminants in both soil and water can potentially be treated by an agronomic cover via phytoaccumulation, rhizodegradation, and phytostabilization.

Caps

As discussed in Section 6.2.2.1, landfill caps constructed to comply with specific technical requirements described in specific regulations would reduce infiltration in the former landfill areas, thus containing waste in place and reducing the volume of leachate. The specific design of a landfill cap depends upon the regulation that governs the type of waste the landfill contains (e.g. solid waste, construction and demolition waste, or hazardous waste). Capping of landfills in accordance with specific regulatory requirements is an established technology that has been used for landfill closures nationwide and their implementation is generally straightforward.

Capping of landfills in accordance with specific NYSDEC regulations would contain the wastes and reduce the production of leachate. In order to construct such traditional “caps” at Main Plant, the existing site habitats would be completely destroyed and portions of the adjacent wetlands would be destroyed by intrusion of the caps into such areas. In addition, large quantities of fill material would be needed to achieve caps that meet the landfill sloping requirements. Fill would be obtained from off-site sources, resulting in significant land consumption and large scale hauling of fill. Such off-site impacts would need to be disclosed to the off-site community and a mitigation plan developed. The use of caps will be considered for addressing groundwater in former landfill areas because capping is the presumptive remedy for landfills and provides an appropriate level of protection.

Capping soil in the manufacturing area at Main Plant with a traditional landfill cap is not appropriate. This technology is usually applied at sites where wastes or waste disposal is concentrated in one area. In the manufacturing portion of Main Plant, the impacts to soil are widely dispersed, and for the most part, are limited to relatively small exceedances of standards, with the exception of naturally occurring metals and a few discrete areas with compound exceedances. Construction of a traditional landfill cap over these areas would hinder the current site use and would limit the future use of the property. In addition, approximately 60 percent of the soil in the manufacturing area is already covered by impervious surfaces such as pavement and buildings.

Groundwater Collection

Groundwater collection wells and groundwater collection trenches are similar types of technologies and will be evaluated together as groundwater collection. Groundwater collection is generally applied in conjunction with groundwater treatment. In choosing between collection wells and collection trenches, the primary factor in applying one or the other is dependent on the depth of the impacted water, site conditions, groundwater chemistry, and installation cost. These two technologies are discussed separately below.

<u>Groundwater Collection Trenches</u>

Groundwater collection trenches are constructed to intercept the flow of contaminated groundwater. Perforated pipes installed in the trenches allow the water to flow to collection sumps. The water may be pumped or passively collected from the sumps before being treated and discharged. Groundwater collection trenches are an effective method of collecting shallow groundwater. Ease of implementability is dependent on site-specific conditions such as the existing hydraulic gradient and depth to groundwater.

Groundwater collection trenches would be very difficult to implement for collecting the groundwater in the channel fill deposits. In order to effectively control impacted groundwater, the trenches would need to extend approximately 70 feet below ground. Therefore, groundwater collection trenches will not be considered for groundwater in the channel fill deposits.

Groundwater collection trenches could be used to collect the shallow groundwater moving laterally from the former East Landfill Area before it reaches the Poentic Kill. Groundwater collection trenches would be relatively easy to install between the former East Landfill Area and the Poentic Kill because the groundwater is perched within the fill. However, construction of structures below the natural groundwater level presents challenges. The low permeability of the native floodplain deposits would improve the effectiveness of this technology by forming a natural barrier to downward groundwater flow. This technology will be retained for further consideration for shallow groundwater at the boundary of the former East Landfill Area and other shallow groundwater areas.

Groundwater Collection Wells

Groundwater collection wells are installed and pumped in order to promote drawdown in the vicinity of the well. The hydraulic gradient allows nearby groundwater to flow into the well. The water pumped from the wells is collected, treated, and discharged. Collection wells are usually used when the contaminated groundwater is more than a few feet below ground surface. Collection wells are effective and used at many sites. This technology is easy to implement, but may take a long time to achieve remedial goals.

It would be difficult to use groundwater collection wells at Main Plant to maintain hydraulic control of the channel fill groundwater. The channel fill deposits are highly permeable sands and gravels. URS estimates the flow through the channel fill deposits is approximately 280 gpm. With such permeable stratigraphy and rapid recharge rates, a groundwater collection system to hydraulically control groundwater migration would result in closely spaced wells and the daily treatment of hundreds of thousands of gallons of water. Because groundwater collection and treatment is a commonly used remedy for impacted groundwater, this technology will be retained for consideration for application in localized areas at Main Plant.

Groundwater Treatment

Groundwater treatment is used in conjunction with groundwater collection. Different groundwater treatment methods are suited to different types of contaminants. Adsorption by GAC is effective for treating most organic contaminants. Air stripping will remove volatile chemicals from groundwater. Chemical pretreatment is effective at removing many metals from solution. Ultraviolet (UV) and chemical processes may be used to oxidize some organic metals.

For the Main Plant, a groundwater treatment system would probably consist of pretreatment to remove or reduce the concentration of metals, followed by filtration to remove suspended particles, and then GAC. Groundwater treatment has been effectively used at many sites and will be considered for use at Main Plant as a companion technology.

Source Removal of LNAPL

Source areas frequently contain free-product either in the form of LNAPL or DNAPL or as residual NAPL in the interstitial pores of the soil. There are no known sources of DNAPL at Main Plant. As discussed in Section 4.0, there are several areas at Main Plant where LNAPL has been detected.

Source removal, through free-product recovery, is an effective way to reduce the dissolution of contaminants into groundwater. Free-product is commonly recovered through the use of automated pumps, manually operated pumps, or hand bailing from wells. These methods are effective, but may need to be operated for extended periods of time. Other methods, which may be faster, include the use of vacuum recovery systems or bioslurping to capture the free-product and hasten the collection of residual NAPL in the interstitial pores of the soil. Vacuum trucks are sometimes mobilized to sites with free-product to remove product quickly. This approach is often employed in conjunction with soil excavation.

Source removal is generally effective and easy to implement when source areas are clearly identified at the site. GE has previously removed free-product effectively by mobilizing a vacuum truck to extract product rapidly. Continued removal of the free-product will be considered.

Monitored Natural Attenuation of Groundwater

During monitored natural attenuation (MNA), processes such as volatilization, biodegradation, dilution, and dispersion that are occurring in the subsurface are allowed to attenuate contaminants, such as VOCs. Groundwater is monitored to confirm that contaminants are naturally attenuating.

Studies conducted over the past ten years have documented that organic compounds (VOCs and SVOCs) and certain metals are often reduced by natural processes that occur in groundwater systems (Carey et. al., 1996; and Christensen, et. al., 1994). Collectively, these processes alone can reduce the concentrations of constituents of concern to levels that are not adversely impacting water quality.

MNA is easy to implement and is effective at reducing contaminant mass provided site conditions are conducive to natural attenuation. According to the USEPA, the three lines of evidence used to evaluate whether natural attenuation processes are occurring are:

1. Historical trends indicating declining or stable contaminant trends
2. Hydrogeologic and geochemical evidence that indicate natural attenuation processes and rates
3. Microbiological laboratory studies supporting degradation and decay rates

The first two lines of evidence are typically sufficient to demonstrate that contaminants are being degraded in the subsurface (USEPA, 1999).

During the biodegradation of organic compounds, aromatic hydrocarbons (BTEX), or less oxidized chlorinated compounds (i.e., 1,1-dichloroethane, chlorobenzene, or vinyl chloride) can be used by microorganisms as growth substrates (electron donors) for metabolism in conjunction with naturally occurring organic carbon. This process is known as co-metabolism.

The process of co-metabolism requires electron donors as well as electron acceptors. If appropriate concentrations of dissolved oxygen and nutrients are present in the groundwater, oxygen is typically the electron acceptor. If, however, dissolved oxygen concentrations are low (anaerobic conditions), microorganisms will use other electron acceptors including, in order of preference, nitrate, iron, sulfate, and carbon dioxide (methanogenesis). Each sequential reaction results in a lowering of the overall oxidation reduction potential (ORP) of the groundwater.

If negative ORP readings are measured in groundwater, then the groundwater is predominantly reduced and thus favors the biodegradation of the VOCs. Chlorinated VOCs detected in the groundwater can biologically degrade under anaerobic conditions (USEPA, 1998). Most chlorinated ethenes and ethanes are degraded under anaerobic conditions. However, the less-chlorinated daughter products (such as vinyl chloride, ethene, and ethane) are degraded more rapidly under aerobic conditions.

Several geochemical conditions often develop during, and as a result of, the biodegradation of organic compounds. These changes can be used as an indicator of the rate of on-going biodegradation of VOCs in groundwater. These changes include:

- A decrease in the concentration of highly-chlorinated aliphatic hydrocarbons such as PCE, TCE, and TCA, and the increase of lightly-chlorinated daughter products such as dichloroethenes, dichloroethanes, and vinyl chloride;
- Low or depleted concentrations of dissolved oxygen, nitrate, and sulfate in the groundwater as a result of chemical oxidation; and
- An increase in, or elevated concentrations of, dissolved iron (Fe^{+2}), methane, alkalinity, and chloride (during the degradation of the chlorinated organic compounds).

In addition to these trends, ethene and ethane gases are produced. These gases are often detected in the groundwater when chlorinated hydrocarbons biodegrade.

The USEPA has developed an initial screening scorecard to evaluate whether geochemical conditions are favorable for the degradation of chlorinated solvents (USEPA, 1998). This scorecard includes evaluation of geochemical parameters such as dissolved oxygen concentrations, oxidation-reduction potential (ORP), relative concentration of redox pairs (ferric and ferrous iron, sulfate and sulfide, and nitrate and nitrite), methane, and hydrogen.

As discussed in Appendix G of the *RI Report*, evaluation of the periodic groundwater monitoring data, including the use of score cards for some areas, from the Main Plant indicate there is evidence that natural attenuation of VOCs and/or SVOCs in groundwater is occurring at five areas within GE's Main Plant. A summary for each of these five areas is provided below.

<u>Chlorinated VOCs in the Channel Fill Groundwater at the WWTP Area</u>

The scorecard for the WWTP Area indicates that there is strong evidence of natural attenuation. The groundwater in the channel fill deposits just north GE's WWTP is within the optimal pH range and there is sufficient organic carbon present for biodegradation of chlorinated VOCs. Anaerobic (iron-reducing and potentially methanogenic conditions) to slightly transitional conditions are present in the channel fill groundwater at the WWTP Area based on DO content. The data indicates a 60 percent decrease in total VOCs in only six years between 1993 and 1999. Furthermore, during the same period, the percentage of vinyl chloride, which is a breakdown product, increased from not detected (0 percent) to 46 percent, which suggests the reduction of DCE through reductive dehalogenation. The presence of ethane, ethene, and methane in groundwater samples collected from the channel fill deposits indicates that biodegradation is occurring. Elevated chloride concentrations also indicate degradation of chlorinated VOCs.

Chlorinated VOCs in the Channel Fill Groundwater at the Former IMPS Area

Long-term historic groundwater data is not available for DCE and vinyl chloride that may originate from the former IMPS Area (monitoring wells GE-17 and GE-50). However, if available, this data is expected to show a similar trend as the trend of the WWTP Area. The data for the former IMPS Area does suggest that the TCE is being degraded under anaerobic conditions (iron-reducing and sulfate-reducing, nitrate-reducing, and potentially methanogenic conditions).

Chlorinated VOCs in the Channel Fill Groundwater Along the Western Boundary of the Former West Landfill Area

Based on the evaluation of the groundwater data for channel fill monitoring well GE-15 and glaciolacustrine monitoring well GE-10 at the former West Landfill Area, the relatively low levels of VOCs along GE's western property boundary will continue to biodegrade under natural conditions. The data from GE-15 indicates a 90 percent decrease in total VOCs between 1988 and 1999. In addition, the data for the western property boundary suggest that the TCE and other chlorinated ethenes are being degraded under anaerobic conditions (iron-reducing and sulfate-reducing, nitrate-reducing, and potentially methanogenic conditions).

Chlorinated VOCs in the Groundwater at the Former Wire Mill Area

The scorecard for the former Wire Mill Area indicates that there is adequate evidence of natural attenuation of TCE. The presence of the two daughter products (DCE and vinyl chloride) indicate that natural attenuation is on-going. The relatively low dissolved organic carbon concentrations suggest that a potential limiting factor for the biodegradation may be the availability of a carbon source (food) for microorganisms that may degrade the chlorinated ethenes. The data suggests that the chlorinated ethenes are being degraded under anaerobic conditions (iron-reducing and potentially methanogenic conditions).

BTEX, Chlorinated VOCs and PAHs in the Groundwater at the Former East Landfill Area

The groundwater in the fill and floodplain deposits at the former East Landfill Area has pH values within the optimal range for biodegradation and there are sufficient amounts of organic carbon in the groundwater to sustain biodegradation. Elevated groundwater temperatures (greater than 20^{o}C) at the south end of the former East Landfill Area suggest that biological activity is likely to be greatest in the southern portion of the former East Landfill Area. The presence of ethane and ethene in the groundwater in the former East Landfill Area suggests that there is on-going biodegradation of VOCs in the groundwater. The analytical results for nitrite/nitrate, iron, and methane, and the field measurements for ORP suggest that the groundwater in the southern portion of the former East Landfill Area is under anaerobic conditions. Elevated concentrations of iron in the groundwater suggest that iron reduction is, in all likelihood, a significant reaction path in the biodegradation of organic carbon in groundwater. Anaerobic degradation may also be occurring in the northern portion of the former East Landfill Area where field measurements of DO are low.

Bench-Scale Laboratory Studies

At the Main Plant the relatively low dissolved organic carbon concentrations suggest that a potential limiting factor for the biodegradation may be the availability of a carbon source (food) for microorganisms that may degrade the chlorinated ethenes. A bench-scale laboratory study was conducted by General Electric Global Research (GEGR) of Schenectady, New York using soil and groundwater from the former Wire Mill Area to evaluate the feasibility and potential effectiveness of enhanced bioremediation. Four carbon sources were used in the study to evaluate which would serve as suitable electron donors at the site. The bench-scale laboratory study indicated that degradation of TCE was occurring, but not past TCE and cis-DCE at the former Wire Mill Area for the unamended control set. Complete dechlorination was achieved in several of the amended sets. The results of GEGR's study are discussed further in the enhanced anaerobic biodegradation section.

A similar bench-scale laboratory study is currently being conducted by GEGR using soil and groundwater collected near the former Propeller Test Building in the WWTP Area. While the study is not yet complete, the results through 172 days for the unamended control set show complete degradation of TCE and cis-DCE as well as declining concentrations of vinyl chloride and ethene. Therefore, while insufficient carbon may limit unamended biodegradation at the former Wire Mill Area, conditions at the WWTP Area are favorable for complete unamended degradation of chlorinated ethenes.

In summary, the RI Report documented that MNA is occurring at all five areas of the site where there is sufficient groundwater data to evaluate natural attenuation of chlorinated solvents. The evaluation indicated that a lack of carbon might limit degradation in the former Wire Mill Area, the WWTP Area, the former IMPS Area, and along the western property boundary. However, data from the bench-scale laboratory study currently being conducted on soil and groundwater from the WWTP Area indicate that sufficient carbon is present for complete degradation of the chlorinated ethenes. Because the microcosm study conducted by GEGR using soil and groundwater from the former Wire Mill Area confirmed that carbon is the limiting factor, MNA will not be considered for groundwater in the former Wire Mill Area. However, MNA will be considered for impacted groundwater everywhere at the site except the former Wire Mill Area.

Air Sparging

Air sparging is the injection of pressurized air into the groundwater through the use of horizontal or vertical sparge points. As the injected air rises to the surface, it causes increased volatilization of VOCs in the groundwater and promotes their desorption.

A vacuum extraction system is frequently used in conjunction with air sparging to collect the volatilized organic compounds. The air that is collected, along with any extracted water, passes through an air-water separator. Both the air and water streams are treated and discharged.

Because air sparging relies on the introduction of large volumes of air into the subsurface, air sparging wells are susceptible to iron fouling in areas where dissolved iron is abundant in the groundwater. Typically, groundwater quality is periodically monitored downgradient of the sparged area.

The low permeability floodplain deposits overlaying the channel fill deposits at Main Plant act as a confining layer. If air sparging were applied to groundwater in the channel fill deposits, the floodplain deposits would trap the injected vapor and prevent the volatilized gases from escaping through the unsaturated zone. In addition, because the channel fill is up to 70 feet thick along the northern site boundary, implementing a system with adequate control of both the influent and effluent vapor streams would be technically difficult. Therefore, while air sparging is not appropriate for treatment of the VOCs throughout the channel fill deposits, it may be appropriate for localized areas where the floodplain deposits are missing. This technology will be retained for consideration.

The elevated concentrations of iron in the shallow groundwater of the former East Landfill Area may require additional evaluation prior to full-scale application of this technology due to the potential increase in maintenance requirements. However, air sparging is an established technology that has proven reliable for removing VOCs from groundwater. Therefore, air sparging will be considered for treating the shallow groundwater at Main Plant.

Soil Vapor Extraction

Soil vapor extraction (SVE) is a technology that is frequently used to remove and collect volatile organic vapors from soil. A vacuum system is applied to extract gaseous phase contaminants from the subsurface. This technology can be effective for removing VOCs and SVOCs from the vadose zone. While this technology is often applied by itself, SVE is frequently used in conjunction with other technologies. For example, air sparging may be used to volatilize contaminants in groundwater and the vapors would then be collected and treated with an SVE system or vapor extraction can be used to collect vapors from groundwater stripping wells. The collected vapors are usually run through a treatment system, such as granular-activated carbon (GAC), before being released to the atmosphere.

The effectiveness of SVE depends on the type of soil. The more permeable the soil, the more effective SVE can be at drawing air through the subsurface. The low permeability floodplain deposits overlaying the channel fill deposits at Main Plant would hinder the passage of vapor and prevent volatilized gases from escaping through the unsaturated zone. Therefore, SVE is not an appropriate companion technology for treatment of the VOCs in the channel fill deposits, however, it may be appropriate for localized areas where the floodplain deposits are missing.

SVE is not effective for removing contaminants from groundwater. However, SVE is effective for removing gaseous phase contaminants. Therefore, SVE will be considered for use as a companion technology in localized areas with impacts limited to the fill deposits or where the floodplain deposits are missing.

Enhanced In-Situ Aerobic and Anaerobic Biodegradation

Where natural attenuation of contaminants is possible, it may be enhanced by making subsurface conditions more favorable for the natural processes to proceed. This often means the addition of oxygen as an electron acceptor or of a hydrogen source as an electron donor. Other methods of enhancing natural attenuation include the addition of microorganisms and nutrients to the subsurface. The first two subsections of this section describe enhanced aerobic and anaerobic biodegradation. The last three subsections describe methods for distributing amendments.

Enhanced In-Situ Aerobic Biodegradation

The addition of oxygen to an anoxic environment to encourage aerobic biodegradation of compounds is one of the most efficient natural attenuation processes. Oxygen may be added by injecting or drawing oxygen into the subsurface, or it may be added in the form of an oxygen-releasing chemical compound such as magnesium peroxide, which is sold commercially as Oxygen Releasing Compound (ORC) or similar products. In situations where the addition of oxygen is undesirable due to the presence of dissolved iron, which would react with oxygen to form insoluble precipitates that might clog soil pore spaces, alternate electron acceptors such as sulfate may be added to the subsurface to encourage anaerobic microbial respiration.

Enhanced in-situ aerobic biodegradation of the groundwater in some portions of Main Plant may be appropriate. However, if aerobic methods were applied, the high concentration of dissolved iron in the groundwater would react with oxygen resulting in the consumption of the dissolved oxygen needed for microbial activities. In order to promote aerobic degradation, excess oxygen releasing compound would need to be injected to overcome the demand of the iron. This volume of oxygen would likely act as an air sparging technique resulting in the removal of contaminants in lieu of degrading the contaminants in-situ. Therefore, enhanced aerobic biodegradation is unsuitable for use with the groundwater in the channel fill deposits and most of the shallow groundwater at Main Plant.

However, for discrete areas of Main Plant, such as the shallow groundwater near DM-405F in the former Binnie Kill Channel, enhanced in-situ aerobic biodegradation may be appropriate depending upon the concentration of dissolved iron. The injection of oxygen in the subsurface in discrete areas may encourage aerobic biodegradation of contaminants. Therefore, enhanced in-situ aerobic biodegradation will be considered.

Enhanced In-Situ Anaerobic Biodegradation

The natural attenuation of chlorinated hydrocarbons, such as TCE and DCE, which are recalcitrant under aerobic conditions but are anaerobically biodegradable, may be accelerated by the addition of hydrogen to the groundwater. Hydrogen Release Compound (HRC) is a commercially available substance that gradually releases lactic acid after it is injected into groundwater. The lactic acid is quickly metabolized by anaerobic microorganisms, releasing hydrogen into the groundwater. The hydrogen acts as an electron donor, facilitating the biodegradation of chlorinated hydrocarbons by reductive dehalogenation.

There are other amendments that may be injected into the subsurface to promote degradation. Carbon sources that are soluble (such as sodium lactate or molasses), slowly soluble (such as vegetable oil), or insoluble (such as chitin or bark mulch) can be used, depending upon the system design, to support reductive dechlorination of TCE to ethene by native bacteria.

In order to evaluate the feasibility and potential effectiveness of enhanced in-situ anaerobic bioremediation as a remedial alternative for one of the principal source areas of VOCs at the site, a bench-scale laboratory study was conducted on soil collected from the former Wire Mill Area by GE Global Research (GEGR) of Schenectady, New York.

This study was performed in accordance with standard practices developed through GE's partnership in the Remedial Technology Development Forum (RTDF) Bioremediation of Chlorinated Solvents Consortium. Secondary goals of the study were to evaluate which amendments would be most effective at reducing the chlorinated ethenes and to collect data which could be used at the design stage if enhanced in-situ bioremediation is a selected remedy. Four carbon sources (sodium lactate, molasses, chitin, and soybean oil) were used in the study to evaluate which would serve as suitable electron donors. Soil and groundwater collected from the former Wire Mill Area were divided into eleven study sets or microcosms. In addition to the electron donor analysis, the effectiveness of supplemental nutrients, in the form of reduced anaerobic mineral media (RAMM) and bioaugmentation with dechlorinating microorganisms (Pinellas consortium) were evaluated. The RAMM consisted of a phosphate buffer, potassium and ammonium salts, and trace metals (Shelton & Tiedje, 1984).

The four electron donors (sodium lactate, molasses, chitin, and soybean oil), yeast extract, RAMM, and Pinellas were added to the microcosms alone and in combination to assess the optimum conditions for carrying out the dechlorination. The design consisted of one set of unamended microcosms (treatment 1) as a reference control, and multiple sets of microcosms where the individual electron donors and yeast extract were added alone (treatments 2-5) and in combination with RAMM (treatments 6-9). In addition, one set of microcosms was amended with sodium lactate, yeast extract, supplemental nutrients and was bioaugmented with an active PCE-dechlorinating culture to act as a positive control (treatment 10). A second control (killed) was also included to monitor non-biological losses from the microcosms as a reference (treatment 11). The two sets of controls did not receive any electron donor or nutrient amendments.

At the beginning of the 210-day study, TCE was added to the microcosms resulting in concentrations of TCE from 14 to 179 mg/L in the microcosm soil. Concentrations of VOCs in each microcosm were sampled at the start and then at two to three-week intervals throughout the study. The concentrations of VOCs (TCE, DCE, VC, and ethene) plotted over time were used to evaluate the relative effectiveness of potential carbon sources (electron donor) and the effect of supplemental nutrients and microorganisms on degradation rates.

The overall conclusions, based upon statistical analysis of the data are as follows:

- Enhanced in-situ anaerobic biodegradation is capable of reducing the levels of TCE found in the Former Wire Mill Area soil to ethene and therefore is a feasible remedial option for this area of the site.

- An electron donor was necessary to promote complete dechlorination of TCE in this area. Sodium lactate and chitin were the most effective electron donors in degrading TCE completely to ethene. Both sets displayed essentially complete degradation of TCE to ethene during the 210-day study.

- RAMM and Pinellas each increased the rate at which the degradation occurred but did not have significant effects on the ultimate extent of degradation for the different electron donors during the 210-day study.

A similar bench-scale laboratory study is currently being conducted by GEGR using soil collected from the former Propeller Test Building Area. Results to date through 172 days show complete degradation of TCE to ethene in the chitin and sodium lactate sets. However, even the unamended control set is showing complete degradation of TCE and cis-DCE, as well as declining concentrations of vinyl chloride and ethene.

The use of enhanced in-situ anaerobic biodegradation would likely be effective for treating the chlorinated VOCs detected in the groundwater beneath Main Plant. Much of the groundwater beneath Main Plant is already anaerobically degrading, therefore, the addition of amendments would accelerate the process. Enhanced in-situ anaerobic biodegradation will be considered further.

<u>Injection of Amendments</u>

Direct injection of amendments into subsurface soils creates an in-situ treatment zone where conditions are optimized for the degradation of contaminants. Direct injection usually involves placement of aqueous amendments into the subsurface using a GeoProbe™.

The injection points can be focused on a source are or placed to form a permeable reactive barrier (discussed below). For source area treatment, injection points are spaced on a grid pattern to promote degradation throughout the source area. The spacing of the points is dependent on the quantity of amendments to be injected and the permeability of the soil.

The effectiveness and implementability of directly injecting amendments into subsurface soils to create treatment zones is dependent on site conditions, such as the mass of contaminants to be treated and the soil type. Multiple injections of amendments are needed at some sites to achieve complete degradation of contaminants. In general, it is easier to distribute amendments throughout more loosely grained soils, such as sands. However, injecting amendments into more tightly grained soils, such as silts and silty clays, is sometimes the preferred remedial approach because despite the challenges involved, there are a limited number of technologies to remediate contaminants that are bound up in tightly grained soils. For soils such as clay, variations of injection methods, such as hydrofracturing, have been developed. The use of hydrofracturing opens veins or fissures in the less permeable soil and distributes the election donor material closer to the source.

Within the Main Plant site, there are a limited number of locations where the concentration of total VOCs in groundwater are substantially elevated. An injection of amendments to enhance biodegradation could be used to promote degradation, thereby reducing the VOC concentrations. Therefore, injection of amendments will be retained for further consideration.

Permeable Reactive Barriers

One configuration for placing amendments is creating a permeable reactive barrier (PRB). A PRB is a passive in-situ treatment zone where conditions are optimized for the degradation of contaminants. Reactive barriers are installed perpendicular to the flow path of a contaminant plume and can be permanent, semi-permanent, or replaceable units.

Various amendments may be placed in the subsurface to enhance degradation of contaminants by native bacteria. Placing amendments as barrier configurations may be accomplished using two methods. Which construction method is employed is generally dependent upon the type of amendment and the geologic and hydrogeologic conditions. One method follows the procedure used to create traditional continuous PRBs. Excavation of a trench is followed by arrangement of the non-aqueous amendments within the trench. Another method of placing the amendments in the subsurface involves injecting aqueous amendments in a closely spaced pattern that serves to create a treatment zone perpendicular to groundwater flow.

An advantage of PRBs over other treatment processes is that once they are installed they require little or no maintenance. Periodic groundwater monitoring should be conducted to monitor the performance of the remedial system.

A well-designed PRB would be effective at intercepting contaminated groundwater flow and creating a zone of enhanced bioremediation. Critical design parameters include soil type, groundwater flow, depth to contamination, and the total depth of contamination. The implementability of PRBs is dependent on the site conditions and characteristics of the barrier to be placed.

Within the Main Plant site, there are a limited number of locations where the concentration of total VOCs in the channel fill deposits are substantially elevated. A PRB with amendments to enhance biodegradation could be used to reduce the VOC concentrations. Therefore, permeable reactive barriers will be retained for further consideration for treatment of areas with concentrated VOCs, such as the former Wire Mill Area and the WWTP Area.

Recirculating System

An alternate method of enhancing biodegradation is the use of recirculating wells or extraction and injection wells in conjunction with amendments to provide containment of and treatment of impacted groundwater. These engineered systems prevent migration of groundwater from the treatment zone, encourage the mixing of impacted groundwater and amendments, and depending on treatment design, may provide the continuous addition of amendments into the subsurface.

With the reinjection system, the combined containment and treatment method of enhancing biodegradation would be accomplished by placing extraction wells downgradient of a corresponding injection well or wells in a source area. Groundwater would be drawn into the extraction wells and pumped to an injection well or wells. Amendments would be delivered into the piping between the extraction and injection wells using a metering pump. As the groundwater travels to the injection well, the amendment is being mixed. Once the groundwater and amendment mixture is reinjected into the subsurface, treatment zones would be created through which the reinjected groundwater flows. Both the effectiveness and implementability of this method of enhancing biodegradation is dependent upon site characteristics, such as soil type, groundwater flow, groundwater velocity, and the depth of contamination. This method of enhancing biodegradation would only be cost effective for source areas.

With the recirculation well system, groundwater circulation wells with pumps would be placed in or near source areas to enhance biodegradation through the addition of amendments to the subsurface. The amendments could be placed into the subsurface using two methods. One method involves using a metering pump to directly supply the groundwater circulation well with the amendment prior to reinjection of the groundwater into the subsurface. An alternate method of placing amendments into the subsurface involves injecting amendments into the subsurface using GeoProbes™ spaced around a groundwater recirculating well. Independent of which method is used for placing the amendments in the subsurface, the result would be the creation of treatment zones through which the groundwater recirculating wells with pumps would cycle the water. Both the effectiveness and implementability of this method of enhancing biodegradation is dependent upon site characteristics, such as soil type, groundwater flow, groundwater velocity, and the depth of contamination.

Within the Main Plant site, there are a limited number of locations where the concentration of total VOCs is substantially elevated. For groundwater in the floodplain deposits, the small effective radius of the recirculating wells, due to the short distance between the well screens, would result in numerous tightly spaced wells. Although recirculating wells would be more effective in the channel fill deposits, Main Plant does not have source areas in channel fill deposits. Extraction and reinjection wells could also be used in the channel fill, however, extra consideration would be required during design to reduce the potential for impacted water to escape the boundary of this system. The effectiveness of extraction and reinjection could be used in the floodplain deposits, however it would be limited by the ability to re-inject the water. Therefore, extraction and reinjection wells will be retained for further consideration for the principal source areas of VOCs at the former Wire Mill Area and the WWTP Area.

Hot Water or Steam Flushing/Stripping

With this technology, steam is forced into an aquifer through injection wells to vaporize volatile and semi-volatile contaminants. Vaporized components rise to the unsaturated zone where they are removed by vacuum extraction and then treated.

At Main Plant, this technology could be applied to NAPL source areas or to dissolved phase contaminants. However, this technology is only marginally effective in treating dissolved phase contaminants, and because an extensive NAPL source area has not been found at Main Plant, this technology will not be considered.

Groundwater Stripping Wells

This technology uses air to vaporize volatile and semi-volatile contaminants by aerating the groundwater within specially configured groundwater wells. The well design depends on whether the aquifer is unconfined or confined. For a confined or semi-confined aquifer, like the groundwater in the channel fill deposits at Main Plant, aeration occurs by injecting air into an inner well casing and the vaporized gases are then collected with an SVE system attached to the outer well casing.

Stripping wells have proven effective at removing VOCs from groundwater at many sites. In-situ stripping is generally more cost effective and is easier to implement because no special permits are required. However, the dissolved iron concentrations at the Main Plant are expected to cause an increased amount of maintenance. For in-situ stripping wells to be effective, the site characteristics need to meet certain criteria to provide a treatment zone that is deep enough for effective treatment and off-gas collection. Much of the channel fill deposits at Main Plant are deep enough to provide an adequate treatment zone. In-situ groundwater stripping will be retained for consideration for the groundwater in the channel fill deposits. In-situ groundwater stripping will not be considered for the shallow groundwater at Main Plant because the treatment zone would not be deep enough for effective treatment.

Permeable Reactive Barriers

A permeable reactive barrier (PRB) is a passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material. Reactive barriers are installed perpendicular to the flow path of the plume and can be permanent, semi-permanent, or replaceable units.

The natural groundwater gradient transports contaminants across either a continuous PRB or through a funnel-and-gate style PRB. The treatment media degrade, sorb, precipitate, or remove chlorinated solvents, metals, radionuclides, and other contaminants. Depending on site conditions, different media and chemical processes are used for treatment. For a site with relatively low concentrations of VOCs, such as most of the groundwater beneath Main Plant, the treatment media in the barriers may contain reactants, such as iron (most common) or zinc, for degrading volatile organics. Zero valent iron is commonly used in PRBs to reductively dehalogenate hydrocarbons. Other reactants may include amendments such as nutrients and oxygen for microorganisms to enhance biodegradation. At some sites, HRC has been injected into the subsurface in a pattern that serves as a PRB to promote anaerobic degradation of contaminants.

An advantage of PRBs over other treatment processes is that once they are installed they require little or no maintenance. Periodic groundwater monitoring is generally conducted to monitor the performance of the remedial system. PRBs have been effectively used in full-scale remediation projects. However, a thorough understanding of contaminant boundaries, contaminant composition and mass, and site hydrogeology is important to design an effective PRB. The implementability of PRBs is dependent on site conditions and characteristics of the barrier to be placed. In general, the deeper the contaminants, the more difficult it is to construct the barrier.

At Main Plant, the channel fill deposits extend approximately 70 feet below ground surface near the Mohawk River. Installation of a PRB to this depth would be challenging. Therefore, this technology will not be considered for use along the northern site boundary.

Within the Main Plant site, there are a limited number of locations where the concentrations of total VOCs in the groundwater are substantially elevated. A PRB could be used to reduce the VOC concentrations in those areas that are shallow enough to easily allow construction of the PRB. PRBs have been used to remediate VOC-impacted groundwater at other industrial sites. Therefore, permeable reactive barriers will be retained for further consideration for treatment of areas with concentrated VOCs, such as the former Wire Mill Area and the WWTP Area.

Dual-Phase Soil Vapor Extraction

Dual-phase soil vapor extraction (DP SVE) is a variation of SVE. In DP SVE, a high vacuum system is applied to simultaneously remove contaminated groundwater, immiscible phase contaminants, and gaseous phase contaminants from the subsurface. The removal of the free-product and the groundwater depresses the water table, increasing the volume of the unsaturated zone. DP SVE encourages the volatilization of VOCs and some SVOCs.

The extracted water and free-product pass through an oil/water separator. The water and vapor streams pass through an air-water separator, and both the water and air streams are treated and discharged. Because DP SVE relies on the introduction of large volumes of air into the subsurface, DP SVE equipment is susceptible to iron fouling in areas where dissolved iron is abundant in the groundwater. The shallow groundwater in the former East Landfill contains concentrations of iron that may hinder the effectiveness of DP SVE. Typically, groundwater quality is monitored periodically at sites that employ DP SVE.

Dual-phase SVE is a technology that has proven reliable for removing floating product and VOCs from groundwater. When the source area is clearly defined, implementing a DP SVE system is fairly easy.

For the source areas at Main Plant, which are in the fill and are above the floodplain deposits, DP SVE may be appropriate and will be considered. However, for source areas below the low permeability floodplain deposits, DP SVE would not be as effective. An important component of DP SVE is establishing a flow of air through the subsurface. The floodplain deposits would hinder migration of air through the subsurface and may reduce the effectiveness of the technology. Therefore, DP SVE will not be considered for source areas in the channel fill deposits.

The areas at Main Plant where elevated concentrations of VOCs are found in the fill and upper floodplain deposits are the City Water Main IRM Area, the former Chip Pad Area, the former IMPS Area, and the former Stark Oil Facility. For these areas, DP SVE will be considered.

Chemical Oxidation

In-situ chemical oxidation (ISChem-Ox) involves the injection of chemicals (oxidants) into the subsurface to promote the destruction of contaminants. A variety of oxidants (including hydrogen peroxide and potassium permanganate) and injection techniques can be employed. ISChem-Ox is a program that injects the reagents at low pressure, thereby reducing the risk of producing a significant exothermic reaction in the subsurface, as is the case with high-pressure injection programs. The reagents would be injected into the subsurface through the use of GeoProbes™. The radial influence of each injection point would depend on the seasonal fluctuation of the groundwater table. The initial treatment program would probably include two rounds of injections. After both rounds, additional soil and groundwater samples would be collected and analyzed to evaluate the results. For some sites, additional injections are needed to achieve the remedial goals.

Use of ISChem-Ox requires a thorough understanding of site conditions that may influence the migration of the injected oxidants near the target area. Additional field work may also be required to collect the information that is needed to further characterize the targeted zone. Soil and groundwater samples would also be collected for a bench-scale test to gather site-specific data about the interaction of the anticipated reagents with site contaminants and soils. The final design of a site-specific treatment system would be based on the results of the bench-scale study.

ISChem-Ox is an effective way to destroy concentrated organic contaminants. ISChem-Ox provides a significant reduction in the toxicity, mobility, and volume of contaminants through destruction of organic contaminants in the treatment zone. However, obtaining permits for underground injection of reagents can be difficult. In addition, there are limited vendors available for ISChem-Ox, which can hinder its implementation.

ISChem-Ox will not be considered for Main Plant because it would be cost prohibitive to address large areas, DNAPL has not been encountered at the site, there are less complicated ways to address LNAPL, and the varied subsurface conditions at Main Plant could drastically limit the effectiveness.

6.2.2.3 Seeps

Shallow groundwater perched within the fill material of the former East Landfill Area manifests as seeps along the west and northern boundaries. Both PCBs and VOCs have been detected in the seeps along the former East Landfill Area.

The potential technologies screened in this section include:

- No-action
- Land Use and Access Restrictions

- Monitoring
- Agronomic Cover
- Caps
- Collection and Treatment of Seep Water
- Groundwater Collection
- Groundwater Treatment

The remainder of this section provides a brief description and discussion of each of the technologies. The screening of these technologies is summarized in Table 6-3.

No-Action

As discussed previously, the no-action alternative allows the site to remain in its current condition and takes no action to remove, treat, or contain the existing waste, contaminated soil, or impacted groundwater. The no-action alternative is included for the purpose of comparison with other alternatives.

Land Use and Access Restrictions

As discussed previously, the use of institutional controls, such as land use and access restrictions, are means of reducing the potential for human exposure to contaminated media, such as seep water.

The use of institutional controls for the seeps in the former East Landfill Area would ensure that the current access restrictions provided by fencing would be continued in perpetuity. Land use restrictions would limit the future use of the area so that any future owner of the property would be required to maintain the access restrictions and maintain remedial systems. Restrictive covenants could also be used to prohibit disruption of the area and the systems which exist and which could be constructed for the seep areas.

Land use and access restrictions will be retained for consideration.

Monitoring

Monitoring is useful for evaluating the effectiveness of contaminant and treatment measures, but is not itself a contaminant or treatment technology. Monitoring of the seeps at Main Plant would be appropriate for periodically evaluating changes in the contaminant concentrations of the seep water. Seep monitoring would also be appropriate for gauging the effectiveness of other technologies. Monitoring will be retained for consideration.

Agronomic Cover

As discussed in Sections 6.2.2.1 and 6.2.2.2, an agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, and is an alternative to traditional landfill cover systems. The cover system consists of a soil layer (water storage component) with a thick root zone (water pumping component) and contains plants, such as willows and poplars, which have a low water-use efficiency. This means that they produce relatively small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be effective in preventing percolation beyond the root zone.

At the Main Plant former East Landfill Area, an agronomic cover would reduce infiltration into and percolation of precipitation through the waste, thereby minimizing impacts to the shallow groundwater quality. For the former East Landfill, the reduction in infiltration would result in less perched groundwater, and therefore, less seepage along the west and north edges of the former landfill. An agronomic cover can also limit lateral migration of shallow groundwater and may further decrease flow at the seep areas. Dense plantings of willows and poplar trees near Seep 1, which were part of the streambank armoring project, have dried up the flow at this intermittent seep. While not a requirement of the cover system, an additional benefit of an agronomic cover is the potential phytoremediation of wastes in the surface soil and shallow groundwater of the former East Landfill.

Implementation of an agronomic cover system would be straightforward, although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques. In the long term, an agronomic cover system would enhance habitat areas. This technology will be retained for consideration.

Caps

As discussed in Section 6.2.2.1 and 6.2.2.2, caps constructed to comply with specific technical requirements described in specific regulations would reduce infiltration, into the former East Landfill Area, thus containing waste in place and reducing the volume of leachate. Capping of soil in order to contain contaminants within landfills in accordance with specific regulatory requirements is an established technology that has been used to close numerous landfills.

Capping of the soil at the former East Landfill Area in accordance with specific NYSDEC regulations would contain the wastes and reduce infiltration, and consequently, seepage. However, in order to construct a cap over the former East Landfill Area, the existing site habitats would be completely destroyed. In addition, large quantities of fill material would be needed to achieve caps that meet the sloping requirements. Fill would be obtained from off-site sources, resulting in significant land consumption and large scale hauling of fill.

This technology will be considered for the soil at the former East Landfill Area because it is the presumptive remedy for landfills and has been traditionally used for landfill closures. Capping should also reduce the seepage draining from the former East Landfill Area. Therefore it will be retained for further consideration.

Collection and Treatment of Seep Water

Collection of seep water can be achieved by providing a preferential path from areas of seepage to sump locations. The seep water may be pumped or passively collected from the sumps before being treated and discharged. The ease of implementation for seep collection systems depends upon site conditions.

The collected water can be treated by either passive or active systems prior to discharge. Passive treatment technologies include filtration, aeration, or GAC. All of these systems rely on the available head in each seep area. Thus, their capacity may be limited. Active treatment technologies include filtration, GAC, or metals pretreatment. The capacity of the active treatment technologies can be designed to handle the range of anticipated flows.

Filtration would be effective for removing contaminants that are sorbed to particulates, but would not remove dissolved contaminants. GAC is an effective treatment for most dissolved organic contaminants, but can be inhibited by solids or metals if they are present in the influent.

As discussed in Section 3.4.2.4, a collection and treatment system has been constructed for Seeps 2 through 4. Collection systems for the water from the other former East Landfill seeps could also be constructed. The seep water could then be pumped through a suitable treatment system before being discharged. This technology has already been implemented and will be considered further.

Groundwater Collection

Groundwater collection wells and groundwater collection trenches are similar types of technologies and will be evaluated together as groundwater collection. Groundwater collection is generally applied in conjunction with groundwater treatment. In choosing between collection wells and collection trenches, the primary factor is dependent on the depth of the impacted groundwater, site conditions, groundwater chemistry, and comparative cost for installation. These two technologies are discussed separately below.

<u>Groundwater Collection Wells</u>

Groundwater collection wells, which were discussed in Section 6.2.2.2, are frequently used to control the hydraulic gradient and prevent contaminated groundwater from leaving the area. The water pumped from the wells would be treated prior to discharge. Groundwater collection wells could be used to control the shallow groundwater in the former East Landfill Area, which would result in elimination of the seeps. This technology will be retained for consideration.

<u>Groundwater Collection Trenches</u>

As discussed in Section 6.2.2.2, groundwater collection trenches are constructed to intercept the flow of contaminated groundwater. Perforated pipes installed in the trenches allow the water to flow to collection sumps. The water may be pumped or passively collected from the sumps before being treated and discharged. Groundwater collection trenches are an effective method of collecting groundwater. Ease of implementability is dependent on site-specific conditions, such as the existing hydraulic gradient and depth to groundwater.

Groundwater collection trenches could be used to collect the shallow groundwater near the former East Landfill Area before it reaches the Poentic Kill. Collection trenches would limit seepage along the Poentic Kill by intercepting the shallow groundwater before it emerges as seeps. Groundwater collection trenches would be relatively easy to install between the former East Landfill Area and the Poentic Kill because the groundwater is perched within the fill. However, construction of structures below the natural groundwater level presents challenges. The low permeability of the native floodplain deposits would improve the effectiveness of this technology by forming a natural barrier to downward groundwater flow. This technology will be retained for further consideration.

Groundwater Treatment

Groundwater treatment is used in conjunction with groundwater collection. Different groundwater treatment methods are suited to different types of contaminants. Adsorption by GAC is effective for treating most organic contaminants. Air stripping will remove volatile chemicals from groundwater. Chemical pretreatment is effective at removing many metals from solution and ultraviolet (UV) and chemical processes may be used to oxidize some organic metals.

For the Main Plant, a groundwater treatment system would probably consist of pretreatment to remove or reduce the concentration of metals, followed by filtration to remove suspended particles, and then GAC. Groundwater treatment has been effectively used at many sites and will be considered for use at Main Plant as a companion technology.

6.2.2.4 Protection of Existing Habitats

The western portion of the site, in particular the former landfill areas, supports a wide array of wildlife. The protection of the existing wetlands, streams, and terrestrial habitats on and adjacent to these areas, which serve as a home for diverse species, is consistent with the site-wide remedial approach and remedial objectives.

The potential technologies screened in this section include:

- No-action
- Land Use and Access Restrictions
- Monitoring
- Agronomic Cover
- Constructed Wetland

The remainder of this section provides a brief description and discussion of the applicability of these technologies. Table 6-4 presents a summary of the screening.

No-Action

As discussed previously, the no-action alternative allows the site to remain in its current condition. The no-action alternative is easy to implement, however this technology does nothing to contain or treat contamination or enhance the existing habitats. The no-action alternative is included for the purpose of comparison with other alternatives.

Land Use and Access Restrictions

As discussed previously, the use of institutional controls, such as land use and access restrictions, provide mechanisms that will limit current and future use of certain areas. The habitats could be protected by limiting current and future use of the area with physical barriers such as fences and with restrictive covenants. In addition, restrictive covenants could mandate habitat maintenance activities that will promote the continued biodiversity of the ecological systems. Institutional controls are easy to implement, however, they do not contain or treat contamination or actively enhance the wildlife habitats. This technology will be considered.

Monitoring

Habitat monitoring may include surveying biota and wildlife environments to evaluate whether these resources are being adversely impacted. This may be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates.

As part of the habitat monitoring program, areas of potential erosion would be examined in both upland and riparian environments, to identify areas requiring replanting. The habitat monitoring program may also include a combination of aerial photography and ground surveys to document populations of various plant species, as well as to identify stressed or unhealthy plants.

If an agronomic cover were part of the selected site remedy, an ecological monitoring program would be instituted. The ecological monitoring program would focus on the assessment of soil cover integrity, vegetation cover density, and overall system development. Monitoring would include periodic inspections. The ecological monitoring program would be coupled with an active maintenance program that would review the health of the agronomic cover and provide for rehabilitation, if needed.

Agronomic Cover

An agronomic cover is an engineered biosystem composed of soil, plants, their attendant root systems, and soil microbes. Covers are designed to minimize contact of human and ecological receptors with underlying waste to reduce infiltration and encourage evaporation and transpiration. The use of an agronomic cover as a landfill cover system is discussed in Section 6.2.2.1. An agronomic cover could enhance the richness, biodiversity, and biomass production on areas of the site. The fast-growing hybrid vegetation would also add value as a food source for fauna at the site.

Ecosystem rehabilitation can be achieved by leaving the unimpacted marsh, swamp, and floodplain communities in place (Dames and Moore, 1997) along the surface waterways at the site, and augmenting or replacing other communities to meet the short-term requirements of the agronomic cover. Implementation of an agronomic cover would include treatments to ensure successful restoration or rehabilitation of habitat areas. Potential treatments include: soil replacement or augmentation, physical treatments (including ripping, or loosening), mulch and compost additions, species addition, and if necessary, overcoming soil phytotoxicities (Bradshaw, 1993).

An agronomic cover can be easy to implement and can be an effective way to enhance habitat for many species of flora and fauna. At GE's Main Plant, a number of diverse communities are already in existence. Therefore, the addition of the agronomic cover would further improve the quality of the habitats. Use of an agronomic cover will be retained for further consideration.

Constructed Wetland

Constructed wetlands are engineered systems that replicate naturally occurring wetland conditions. Constructed wetlands are often used to replace natural wetlands that have been filled. They can also be used to treat waste waters contaminated with VOCs or metals. Constructed wetlands have been used effectively at many sites for treatment of waste water streams or to provide new or replacement habitats. Ease of implementability is site-specific.

Constructed wetlands could be used at Main Plant to either replace wetlands that are damaged or filled by other remedial activities, or to enhance the biodiversity of the existing wetlands. At Main Plant there is little room to construct additional wetlands adjacent to the Poentic Kill and Poenties Kill. However, compensatory wetlands could be constructed off-site to replace wetlands that may be damaged by remedial measures. Constructed wetlands will be considered further.

6.3 FORMULATION AND SCREENING OF PRELIMINARY ALTERNATIVES BY FS AREA

In this section, preliminary alternatives are formulated and evaluated for each FS Area or group of FS Areas that have similar physical and chemical characteristics. This preliminary evaluation will aid in the development and formulation of the site-wide alternatives. The results of this preliminary screening are summarized in Tables 6-5 through 6-8.

Evaluation Criteria

In general accordance with USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, the preliminary alternatives will be evaluated based on implementability, effectiveness, and relative cost. Implementability will be evaluated by assessing the requirements to construct and operate the system. The evaluation of the effectiveness of each preliminary alternative technology will be considered for the effectiveness in regard to both the immediate area and site-wide conditions. For this preliminary evaluation, costs for construction, operation, and maintenance will be considered in a relative sense between the preliminary alternatives.

6.3.1 Surface Soil That May Impact Surface Water Due to Erosion

There are limited areas of the site where surface soil that is above NYSDEC's RSCOs has the potential to impact surface water or sediments in surface water bodies through erosion.

The five potential receptors of runoff at the site are in the western portion of the site. These potential receptors are the Poentic Kill, the Poenties Kill, the seasonal stream south of the former East Landfill, the unnamed wetland south of the former West Landfill, and the unnamed wetland west of the former West Landfill. Most of the former landfill areas are well vegetated, thus preventing erosion of impacted soils. The exception to this is the southwest portion of the former East Landfill.

The east-west road crossing the former East Landfill has drainage ditches that direct surface water runoff toward the Poentic Kill. In addition, there are exposed soils along the landfill access road that runs north-south adjacent to the Poentic Kill. PCBs have been detected in surface soil samples collected from these areas at concentrations greater than the NYSDEC RSCOs for surface soils of 1 mg/kg PCBs. Locations where soil with concentrations of PCBs greater than NYSDEC RSCOs have been detected will be discussed in Section 6.3.3. Evaluation of preliminary alternatives for soils that may impact surface water through erosion is deferred until Section 6.3.3 because the soils identified in this section are a subset of the soils evaluated in Section 6.3.3.

6.3.2 Soil Which is Above NYSDEC's RSCOs and May be Impacting Groundwater

As discussed in Section 4.1.1, there are six general areas at the site with soil that is above NYSDEC's RSCOs for individual VOCs that correspond to areas with groundwater exceedances for the same compounds. These six areas and the contaminants in each area are:

- Former Wire Mill Area – chlorinated ethenes
- Former IMPS Area - BTEX
- Former East Landfill Area - Xylene
- City Water Main IRM Area – 2-butanone, n-butylbenzene, isopropylbenzene, benzene, ethylbenzene, and m&p-xylene
- WWTP Area – DCE, toluene, xylene
- Former Binnie Kill Channel, near monitoring well DM-405F – xylene, chlorobenzene

In addition, there are three general areas at Main Plant with soil that is above NYSDEC's RSCOs for individual SVOCs, specifically PAHs, which correspond to areas with groundwater exceedances for the same compounds. These three areas are:

- Former East Landfill Area
- Along the East Boundary of the former East Landfill Area
- Near monitoring well DM-401F, adjacent to the former Binnie Kill Channel

Preliminary alternatives for the shallow groundwater in the former East Landfill Area are discussed in Section 6.3.8 and the former Landfill Areas are discussed in Section 6.3.4. Therefore, soil in the former East Landfill Area and soil along the east boundary of the former East Landfill Area will not be discussed in this section.

The former Wire Mill Area and the WWTP Area, near the former Propeller Test Building, were identified in the *RI Report* as the two principal source areas of the chlorinated ethenes in the channel fill deposits. The RI did not identify a large mass of contaminated soil in these areas. It is likely the release or releases in these areas happened so long ago that compounds that may have been released would have, for the most part, moved through the vadose zone and into groundwater. Preliminary alternatives to address groundwater in the principal source areas are discussed in Section 6.3.6. Therefore, soil in the former Wire Mill Area and near the former Propeller Test Building will not be discussed in this section.

The IMPS Area has been the focus of remedial measures (Section 3.4.1.10) to remove product and impacted soil. In 2001, GE constructed a rail scale near the north end of the IMPS Area. During this work, approximately 180 cubic yards of soil was removed. The *RI Report* documented that the impacts to groundwater in the IMPS Area are limited to the groundwater in the fill and floodplain deposits. The BTEX compounds found in soil in the IMPS Area appear to be related to the residual free-product in the area. Preliminary alternatives to address groundwater and residual product in this area are discussed in Section 6.3.10. Therefore, the soil in the IMPS Area will not be discussed in this section.

The three areas that will be evaluated in this section are:

- City Water Main IRM Area
- Area Near DM-405F – Former Binnie Kill Channel
- Area Near DM-401F – Adjacent to Former Binnie Kill Channel

Each of these areas are described briefly in the following paragraphs.

The City Water Main IRM Area has been the focus of remedial measures to remove product and impacted soil. As discussed in Section 3.4.1.12, 2,500 tons of impacted soil was removed from the City Water Main IRM Area. The *RI Report* documented that the impact to groundwater is limited to the groundwater in the fill and floodplain deposits. The VOCs found in soil in the City Water Main IRM Area appear to be related to the free-product that was previously found in the area. Preliminary alternatives to address groundwater and possible residual product in this area are discussed in Section 6.3.10. The extent of impacted shallow groundwater in this area appears to be fairly stable. The most likely receptor for this area would be construction workers if a construction project were to occur in this area.

In the former Binnie Kill Channel, near monitoring well DM-405F, concentrations of xylene and chlorobenzene are above their respective RSCOs and groundwater standards for both saturated soil and shallow groundwater. The *RI Report* documented no exceedances in vadose zone soil in this area. Shallow groundwater in this area is migrating northeast toward the WWTP Area. The floodplain deposits are missing in the former Binnie Kill Channel in this area and are thin or missing in the WWTP Area.

Adjacent to the former Binnie Kill Channel, near monitoring well DM-401F, concentrations of some PAHs are above their respective RSCO and groundwater standard in soil and shallow groundwater, respectively. Shallow groundwater in this area is mounded and flows radially away from DM-401F. The shallow groundwater near monitoring well DM-401F does not appear to have significantly impacted the channel fill groundwater.

6.3.2.1 Technology Screening

The technologies that passed the initial technology screening in Section 6.2.2.1 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Removal and Off-Site Disposal
- Soil Cover
- Asphalt Cover
- Asphalt Caps
- Agronomic Cover
- Caps
- Soil Vapor Extraction

As discussed in Section 6.2.2.1, construction of an agronomic cover or traditional cap in the manufacturing areas is inappropriate for Main Plant because these types of covers could impact future use of the property. Additionally, while soil cover may be suitable for breaking the direct contact exposure pathway, this technology would not prevent infiltration of precipitation, and thus would not be as effective in preventing further impacts to groundwater in these areas.

Asphalt covers and asphalt caps are similar technologies. While both provide protection against the direct contact exposure pathway, asphalt caps are designed to be less permeable. Therefore, asphalt caps would be more appropriate for protection of groundwater and will be evaluated.

Additional technologies, which were evaluated in Section 6.2.2.2, that may be suitable for use in the City Water Main IRM Area, the area near DM-405F, and the area near DM-401F are:

- Soil Vapor Extraction
- Dual-Phase Soil Vapor Extraction

These technologies may be suitable for these areas because impacts are limited to the fill and upper floodplain deposits. Soil vapor extraction and dual-phase soil vapor extraction are similar types of technologies in which a vacuum is applied to the subsurface. Therefore, these technologies will be evaluated together in this preliminary alternative evaluation. If this type of technology is selected for use at Main Plant as part of the site-wide alternative, the form that would be used at these areas would be selected during the design phase based on an evaluation of the mass of contaminants removed and relative cost of each system.

In addition, enhanced bioremediation, which was evaluated in Section 6.2.2.2, may be suitable for use near monitoring well DM-405F because impacts to soil appear to be limited to the saturated zone.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.1, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

6.3.2.2 Preliminary Alternative Screening

The following five technologies or classes of technologies passed the technology screening for use in these areas and will be incorporated into preliminary area alternatives for evaluation:

- Removal and Off-Site Disposal – Removal and off-site disposal of exposed wastes is generally easy to implement. This technology is effective for reducing human contact and environmental interaction with contaminants. Properly disposing of removed materials at an off-site facility generally results in treatment and containment of the waste.

- Asphalt Caps – An asphalt cap is sometimes used to cover contaminated soils and reduce infiltration of precipitation. This technology does not provide treatment, but does provide containment. If an asphalt cap is used in conjunction with institutional controls that prohibit disruption of the cover and require regular maintenance, this technology can be effective for breaking the direct contact exposure pathway and preventing further impacts to groundwater by blocking infiltration of precipitation through contaminated soils. For most sites, implementation is straightforward.

- Soil Vapor Extraction – Soil vapor extraction (SVE) is a technology that is frequently used to remove and collect volatile organic vapors from soil. A vacuum system is applied to extract gaseous phase contaminants from the subsurface. The collected vapors are usually run through a treatment system before being released to the atmosphere. This technology can be effective for removing VOCs and some SVOCs from the vadose zone. While this technology is often applied by itself, SVE is frequently used in conjunction with other technologies.

- Dual-Phase Soil Vapor Extraction – Dual-phase soil vapor extraction (DP SVE) is a variation of SVE. In DP SVE, a high vacuum system is applied to simultaneously remove contaminated groundwater, immiscible phase contaminants, and gaseous phase contaminants from the subsurface. The removal of the free-product and the groundwater depresses the water table, increasing the volume of the unsaturated zone. DP SVE encourages the volatilization of VOCs and some SVOCs.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations. Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it re-circulates. This approach results in a treatment zone within which contact between the impacted groundwater and amendments is maximized. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

Each of these technologies would be paired with institutional controls. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

As discussed above, DP SVE and SVE are similar technologies. Therefore, they will be evaluated together.

6.3.2.2.1 Implementability

Removal and off-site disposal of impacted soil would be challenging to implement in all three area classes because excavation would need to be extended below the water table. This type of excavation frequently requires dewatering of the pit and may require sheet pile to minimize water generation and/or stabilize the sides of the excavation. Construction of asphalt caps over the areas would be easy to implement. Installation of a soil or dual-phase vapor extraction system would be straightforward to implement in these areas because impacts are limited to the fill and upper floodplain deposits. Implementation of enhanced bioremediation would be straightforward for impacted soil in the saturated zone near the DM-405F Area.

6.3.2.2.2 Effectiveness

Removal and off-site disposal of impacted soil would be effective in preventing further impacts to groundwater. However, railroad tracks immediately adjacent to the impacted soils at the City Water Main IRM Area and DM-401F may limit the extent of excavation, and thus the effectiveness of this alternative. Removal and off-site disposal would reduce the quantity of contaminants present at Main Plant, but would not result in destruction of contaminants. Removal and off-site disposal of impacted soil would reduce the potential for VOCs to migrate into the channel fill groundwater from the DM-405F Area, but would disrupt the existing habitats and ecosystems associated with the nearby wetland during construction. For the City Water Main IRM Area, where impacts to groundwater are fairly stable, there would be minimal benefit to downgradient receptors or potential future construction workers.

Construction of asphalt caps over impacted soil would be effective in reducing further impacts to groundwater and would reduce the potential for migration of contaminants. However, asphalt caps would not reduce the quantity of VOCs or SVOCs present at the site. Asphalt caps would not reduce the potential for VOCs in saturated soil in the DM-405F Area from migrating to groundwater and would be destructive to existing habitats and ecosystems associated with the nearby wetland. For the City Water Main IRM Area, the use of an asphalt cap would reduce the potential for impacted soil in the vadose zone to continue to impact shallow groundwater quality.

Applying vapor extraction to the areas where VOC impacts are limited to the fill and upper floodplain deposits would be an effective method of removing VOCs from the soil. This technology is applied regularly at sites with VOC-impacted soil and groundwater. If dual-phase soil vapor extraction were applied to the City Water Main IRM Area, the quantity of residual product, if any, would also be reduced. Because the soil near DM-401F is impacted by SVOCs, the effectiveness of vapor extraction would be limited.

Vapor extraction would reduce the potential for VOCs in shallow groundwater in the DM-405F Area to migrate to the channel fill deposits. For the City Water Main IRM Area, where the groundwater quality is fairly stable, the use of vapor extraction would provide minimal benefit to potential downgradient receptors.

Enhanced aerobic or anaerobic bioremediation would be effective at reducing contaminant levels in soils in the saturated zone. However, enhanced bioremediation would do nothing to reduce contaminant levels in vadose zone soil. Enhanced aerobic bioremediation would be effective at reducing the concentration of chlorinated benzene and xylene near monitoring well DM-405F in the saturated zone.

6.3.2.2.3 Cost

Removal and off-site disposal of soil would be very costly to implement if soil below the groundwater table were excavated. Such excavations frequently require dewatering of the pit and may require sheet piling to reduce water generation and/or stabilize the excavation side walls. In addition, removed soil would need to be dewatered prior to disposal. There would be significant transportation costs, however, there would be no operation and maintenance costs associated with this technology, unless ex-situ soil treatment is implemented.

Construction of asphalt caps would be the most cost effective of the alternatives to implement. Operation and maintenance costs would include inspection and repair of the caps, and eventually replacement of the asphalt.

The capital cost to implement soil vapor extraction or dual-phase soil vapor extraction would be high. Operation and maintenance costs for vapor extraction would include electricity to run the systems, labor for routine maintenance, and the cost to replace worn parts. The operation and maintenance costs would depend in part on whether a soil vapor extraction or dual-phase vapor extraction was to be applied, and if systems to treat the collected vapor were required. The capital, operation, and maintenance costs for dual-phase soil vapor extraction would be higher than for soil vapor extraction because the system is more complex. The operation and maintenance cost associated with this alternative would be greater than the operation and maintenance cost associated with asphalt caps.

The capital cost to implement enhanced anaerobic or aerobic bioremediation would be comparable to the cost of constructing asphalt caps. However, the operation and maintenance costs would consist only of groundwater monitoring. Therefore, the total costs associated with enhanced bioremediation would be less than the other alternatives.

6.3.2.3 Summary and Conclusion

The results of the screening of the preliminary alternatives are summarized in Table 6-5.

Asphalt caps are a containment technology and will therefore be considered for inclusion in the site-wide treatment and containment alternatives.

Excavation and off-site disposal and vapor extraction would reduce the quantity of soil that is above NYSDEC's RSCOs and will be considered for inclusion in the site-wide treatment alternatives. Enhanced aerobic or anaerobic biodegradation would reduce the quantity of contaminants in the groundwater and saturated soil and will be considered for inclusion in the site-wide treatment alternatives for areas with impacted saturated soil.

City Water Main IRM Area

As discussed above, measures have already been taken to reduce the mass of contaminants in this area. Consequently, impacts to soil and groundwater in the City Water Main IRM Area have been restricted to the immediate vicinity.

There would be limited additional benefits for potential human and environmental receptors if vapor extraction or excavation and off-site disposal were selected for this area over asphalt caps. Therefore, for the City Water Main IRM Area, an asphalt cap will be included in site-wide treatment and containment alternatives.

Area Near DM-405F – Former Binnie Kill Channel

As discussed above, vapor extraction or soil removal would be more effective and less disruptive to the nearby wetland than an asphalt cap at protecting downgradient groundwater quality if contaminants were present in the vadose zone. Because the *RI Report* documented impacts only in the saturated zone, enhanced aerobic biodegradation would be most effective and will be included in site-wide treatment alternatives.

Area Near DM-401F – Adjacent to Former Binnie Kill Channel

As discussed above, vapor extraction would provide minimal treatment of the SVOCs present in soil near monitoring well DM-401F. There would be limited additional benefits for potential human and environmental receptors if excavation and off-site disposal were selected for this area over asphalt caps. Therefore, for the area near DM-401F, asphalt caps will be included in site-wide treatment and containment alternatives.

6.3.3 Soil Locations with PCB Concentrations Detected Above NYSDEC RSCOs

As discussed in Section 4.1.1.1, there are eight locations at the site with surface soil that have detected concentrations of PCBs greater than the NYSDEC RSCO of 1 mg/kg. These eight locations are at or near:

- Former East Landfill Area
- Former West Landfill Area
- Former Building 259
- WWTP Area
- Former Building 29
- South of Building 84
- Former Building 109
- South of Former Building 60

Of these eight locations, the former East Landfill Area, the former West Landfill Area, and the area near former Building 259 have locations where surface soil PCB concentrations have been detected at greater than 10 mg/kg.

As discussed in Section 4.1.1.2, there are four locations at the site with subsurface soil samples that have detected concentrations of PCBs greater than the NYSDEC RSCO of 10 mg/kg. These four locations are at or near:

- Former East Landfill Area
- Former Building 85
- Former Binnie Kill Channel
- Former Building 29

The subsurface soil locations near former Building 81 and former Building 29 are relatively shallow and are above the groundwater table. The soil where PCBs (12 mg/kg at SB-HP-6) have been detected in the former Binnie Kill Channel, south of the former Sector R Holding Pond, is 15 to 20 feet below grade and is approximately 8 to 13 feet below the water table.

6.3.3.1 Technology Screening

The technologies that passed the initial technology screening in section 6.2.2.1 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Removal and Off-Site Disposal
- Soil Cover
- Asphalt Cover
- Asphalt Cap
- Agronomic Cover
- Caps

As discussed in Section 6.2.2.1, installation of an asphalt cover or cap in the landfill areas is not appropriate for Main Plant because it is inconsistent with the remedial objective of protecting the habitat areas. In addition, construction of an agronomic cover or traditional cap in the manufacturing areas is inappropriate for Main Plant because these types of covers are not consistent with the expected future uses of the property. As discussed in Section 6.2.2.1, excavation of landfills is only considered in rare instances of imminent threat to human health and the environment. As this is not the case at Main Plant, excavation of locations where PCB concentrations greater than 10 mg/kg have been detected in subsurface soil within the landfill areas will not be considered.

Asphalt covers and asphalt caps are similar technologies. While both provide protection against the direct contact exposure pathway, asphalt caps are designed to be less permeable, thereby better protecting groundwater quality. Because PCBs are not readily leachable, the extra protection provided by an asphalt cap is not warranted. Therefore, asphalt covers will be evaluated in this section.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.1, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated soil or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

6.3.3.2 Preliminary Alternative Screening

The following three technologies passed the technology screening for the manufacturing area soils and will be incorporated into preliminary area alternatives for evaluation:

- Removal and Off-Site Disposal - Removal and off-site disposal of soil at targeted locations is generally easy to implement. This technology is effective for reducing human contact and environmental interaction with contaminants. Properly disposing removed material at an off-site facility generally results in treatment or containment of the waste.

- Soil Cover – Placement of clean soil over contaminated areas is an established method of breaking the direct contact exposure pathway. A soil cover is generally planted with grass or other vegetation to protect against erosion. A soil cover by itself does not provide treatment, but does provide containment. If used in conjunction with institutional controls that prohibit disruption of the cover and require regular maintenance, a soil cover can be effective for breaking the direct contact exposure pathway. For most sites, implementation is straightforward.

- Asphalt Cover - An asphalt cover can be used to cover contaminated soils. This technology does not provide treatment, but does provide containment. If an asphalt cover is used in conjunction with institutional controls that prohibit disruption of the cover and require regular maintenance, this technology can be effective for breaking the direct contact exposure pathway and reducing infiltration. For most sites, implementation is straightforward.

The following three technologies passed the technology screening for the former landfill area soils and will be incorporated into preliminary area alternatives for evaluation:

- Removal and Off-Site Disposal of Surface Soils - Removal and off-site disposal of soil at targeted locations is generally easy to implement. This technology is effective for reducing human contact and environmental interaction with contaminants. Properly disposing removed material at an off-site facility generally results in treatment or containment of the waste.

- Agronomic Cover - An agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, and is an alternative to traditional landfill cover systems. The agronomic cover system consists of a soil layer and plants that have low water use efficiency. This means they produce small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone.

- Caps - Caps are usually used to protect groundwater quality by limiting the infiltration of precipitation and run-off and are used to cover waste. Caps are generally constructed of a low permeability liner in conjunction with a drainage layer and a soil cover capable of supporting vegetation.

Soil, asphalt, and agronomic covers and caps would be paired with institutional controls. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.3.2.1 Implementability

Targeted removal and off-site disposal of soil where PCBs have been detected at concentrations above NYSDEC RSCOs would be straightforward for surface soils. In the former landfill areas, care would need to be taken to minimize disruption to habitat areas during implementation. Excavation of subsurface soil that is beneath the water table in the former Binnie Kill Channel would be difficult.

Placement of either asphalt cover or soil cover would be straightforward to implement. Construction of an agronomic cover would be slightly more difficult to construct, but still readily implementable. Construction of a traditional landfill cap is also straightforward, but is more complex than the other cover systems.

6.3.3.2.2 Effectiveness

Targeted excavation of soil where PCB concentrations have been detected above NYSDEC RSCOs would result in the removal of the soil from the site, but is unlikely to result in the permanent destruction of contaminants. Because the soil would be removed, no institutional controls would be necessary to maintain the effectiveness of this technology.

All four cover systems would effectively break the direct contact exposure pathway to PCBs. While PCBs are not readily leachable, the more impermeable covers would provide extra protection to groundwater quality.

Each of these technologies would reduce the potential for direct contact by humans or site fauna. In addition, each of these technologies would effectively reduce the potential for PCB-containing surface soil detected near the Poentic Kill in the former East Landfill Area to erode and impact surface water or sediment quality. Targeted removal of the soil where PCBs have been detected at concentrations above NYSDEC RSCOs near the Poentic Kill would completely remove the threat of erosion, while the cover systems would require maintenance and institutional controls to maintain their effectiveness. Because the current and anticipated future use of Main Plant is industrial use, institutional controls would be fairly easy to implement and would be effective at protecting the effectiveness of cover systems.

6.3.3.2.3 Cost

The cost associated with removal and off-site disposal of soil where PCBs have been detected above NYSDEC RSCOs would be limited to capital costs. The challenges involved with excavating soil beneath the groundwater table would significantly increase the cost associated with this alternative in the former Binnie Kill Channel.

The capital costs to install a cover system increase with the complexity of the system. A soil cover would be the least expensive and a traditional cap system would be the most expensive. The costs to construct an agronomic cover and asphalt cover would be greater than, but closer to the capital cost for the soil cover. Operation and maintenance costs for each cover system would include routine inspections and repairs.

6.3.3.3 Summary and Conclusions

The screening of preliminary alternatives for soils where PCBs have been detected above NYSDEC RSCOs is summarized in Table 6-5. Each of these alternatives would meet the remedial goals for the site.

In the area south of Building 84, PCBs have been detected at a concentration of 1.1 mg/kg, which is slightly greater than the NYSDEC Recommended Soil Cleanup Objective of 1.0 mg/kg for PCBs in surface soil. Similarly, in the Binnie Kill Channel, south of the former Sector R Holding Pond, PCBs have been detected at one location in subsurface soil at a concentration of 12 mg/kg, which is slightly greater than the recommended cleanup objective of 10 mg/kg for PCBs in subsurface soil. Based on discussions between GE and NYSDEC, NYSDEC concurs that remedial measures for these two areas are not warranted as the cost of such measures far outweighs the limited benefits. While the PCB concentrations in those areas are greater than the NYSDEC’s published cleanup guidance values, the human health risk assessment, performed during the RI, documents that the PCBs present in these soils does not pose a risk to human health under current or anticipated future use scenarios for this site, soils in which PCBs have been detected are not impacting groundwater quality at the site and do not pose a threat to human health and there is no exposure pathway for subsurface soils in which PCBs have been detected to impact site fauna. Therefore, remedial measures for these locations have not been included in the site-wide remedial alternatives.

In general, PCB impacted surface soil in the manufacturing area contains concentrations of PCBs between 2 and 10 mg/kg. There is one location, near former Building 259, with higher (greater than 10 mg/kg) concentrations of PCBs detected in surface soil. Additionally, there are two locations in the manufacturing area where concentrations of PCBs greater than 1 mg/kg were detected in surface soil that has since been covered during landscaping work. Generally, excavation and off-site disposal may provide a greater level of protection. Therefore, excavation and off-site disposal of surface soil locations where PCBs have been detected at concentrations greater than 1 mg/kg in the manufacturing areas will be included in the site-wide treatment and containment alternatives.

For the former landfill areas, surface soil in which PCBs have been detected above NYSDEC RSCOs is not the only environmental issue of concern. Therefore, selection of technologies for these areas must consider the several AOCs and media in these areas. Because surface soil in which PCBs have been detected above NYSDEC RSCOs in the former East Landfill Area has the potential to erode and be transported to the nearby Poentic Kill, removal and off-site disposal of such surface soil will be considered for inclusion in the site-wide treatment and containment alternatives for surface soil locations where PCB concentrations have been detected at greater than 10 mg/kg. For surface soil locations with relatively low concentrations of PCBs (1 mg/kg to 10 mg/kg), an agronomic cover would provide appropriate protection against erosion and prevent direct contact by site fauna. Therefore, agronomic cover will be included in the site-wide treatment and containment alternatives.

As discussed previously, soils in which PCBs have been detected are not impacting groundwater quality at the site and do not pose a threat to human health. In addition, there is no exposure pathway for subsurface soils in which PCBs have been detected to impact site fauna. Therefore, removing subsurface soil will provide no benefits toward protecting human health and the environment. Therefore, soil or asphalt covers will be carried forward to the site-wide treatment and containment alternatives for subsurface soil locations where greater than 10 mg/kg of PCBs have been detected in the manufacturing area and agronomic cover will be carried forward to the site-wide treatment and containment alternatives for subsurface soil locations where greater than 10 mg/kg of PCBs have been detected in soil samples in the former landfill areas.

Construction of traditional landfill caps, in conjunction with institutional controls, would also be effective in preventing impacted surface soil from migrating through erosion. Therefore, if traditional landfill caps are selected for the former landfill areas in the site-wide treatment and containment alternatives due to other considerations, this technology would be applied for locations where PCBs have been detected in surface soils in the former landfill areas in lieu of excavation and removal.

6.3.4 Former Landfill and Habitat Areas

This section focuses on the former landfills and the habitat areas on the western portion of the site. As discussed in Section 3.2.2, the former Binnie Kill Landfill received construction and demolition debris, the former West Landfill received solid wastes, and the former East Landfill received a variety of solid wastes, including materials that are now considered hazardous.

Former Landfill Areas

As discussed in Section 3.4.2.3, GE covered the former Binnie Kill Landfill Area, with NYSDEC's concurrence, with three to four feet of clean fill and topsoil. The soil cover has been vegetated with a variety of indigenous plant species. The *RI Report* did not document any soil quality or groundwater issues associated with the former Binnie Kill Landfill.

GE's enhancements to the former East and West Landfill Areas were discussed in Section 3.4.2. GE removed and properly disposed of surface debris from both landfill areas. The soil cover over the former West Landfill Area is estimated to be five to twelve inches thick and vegetated with grasses, shrubs and trees. Approximately 100,000 cubic yards of soil was used to cover portions of the former East Landfill Area. The soil cover has also been graded, seeded and reforested. The former West Landfill has discrete areas of soil where PCB concentrations have been detected above NYSDEC's RSCOs. In addition, there are several areas at and near the former West Landfill where concentrations of VOCs in groundwater are above groundwater standards. Preliminary remedial alternatives for locations where PCBs in soil were detected above NYSDEC's RSCOs are discussed in Section 6.3.3. Preliminary remedial alternatives for VOC-impacted groundwater that is near site boundaries are discussed in Section 6.3.9, and preliminary remedial alternatives for other groundwater are discussed in Section 6.3.11. The potential exists for site fauna to come in direct contact with exposed wastes in certain locations on the former West Landfill Area, where the existing cover is thin. Other potential receptors include groundwater beneath or downgradient of the former West Landfill Area and surface water adjacent to the former West Landfill Area. To date, surface water adjacent to former West Landfill has not been impacted by site activities.

Soil with PCB, VOC, and SVOC concentrations above NYSDEC's RSCOs has been found in discrete locations within the former East Landfill Area. In addition, the perched groundwater within the former East Landfill Area emerges as seeps. Groundwater samples have detected concentrations of PCBs, VOCs, SVOCs, and metals (iron and manganese) detected above NYSDEC's groundwater standards. In two portions of the former East Landfill Area, the southwest portion and the area north of the former Chip Pad, perched groundwater has the potential to impact surface water in the Poentic Kill. In addition, free-product (LNAPL) has been found in both areas. Preliminary remedial alternatives for soil locations where PCBs have been detected above NYSDEC's RSCOs are discussed in Section 6.3.3. Preliminary remedial alternatives for perched groundwater in the former East Landfill Area that emerges as seeps are discussed in Section 6.3.8, and preliminary remedial alternatives for other groundwater are discussed in Section 6.3.11. Preliminary remedial alternatives for free-product are discussed in Section 6.1.10. The potential exists for site fauna to come in direct contact with exposed wastes in certain areas on the former East Landfill Area, where the existing cover is thin. Other potential receptors include groundwater beneath or downgradient of the former East Landfill Area and surface water adjacent to the former East Landfill Area.

Habitat Areas

Large areas of the site, especially in and around the former landfill areas, have been shown to support a wide array of wildlife in a variety of both freshwater wetland and terrestrial habitats and ecological communities. These habitats and associated ecological communities range from relatively diverse assemblages of plants and animals in wetland and terrestrial areas that border the former landfill areas, to less diverse assemblies of opportunistic species that inhabit some areas that are in a transitional stage of forest development. These habitats also include state-protected plant species or variants. In addition, 81 species of birds and nine species of mammals were recorded at the site in 1995 and 1996. Any remedial actions implemented should protect and preserve these habitat areas.

6.3.4.1 Technology Screening

The technologies that passed the initial technology screening in section 6.2.2.1 and may be suitable for former landfill areas include:

- No-action
- Land Use and Access Restrictions
- Removal and Off-Site Disposal
- Soil Cover
- Agronomic Cover

- Caps

The technologies that passed the initial technology screening in section 6.2.2.4 and may be suitable for the habitat areas include:

- No-action
- Land Use and Access Restrictions
- Habitat monitoring
- Agronomic Cover
- Constructed Wetland

As discussed in Section 6.2.2.1, removal and off-site disposal is a technology that is rarely used for landfills. The three former landfill areas at Main Plant do not pose an imminent threat to human health and the environment, and therefore, their removal and off-site disposal is not warranted. This technology was retained for possible application to discrete areas of exposed debris or for impacted soils that might pose a threat to the environment due to erosion. Surface soils that might erode are discussed in Sections 6.3.1 and 6.3.3. Removal and off-site disposal will be carried forward without evaluation for possible inclusion in site-wide treatment alternatives for exposed waste, such as construction and demolition debris.

Constructed wetlands can be constructed on-site to serve in a treatment capacity or either on- or off-site to replace destroyed wetlands. At Main Plant, there is little suitable space for constructing wetlands. Because the remedial goal is to protect and enhance the existing site habitats, construction of off-site wetlands will only be considered if on-site wetlands are destroyed. Therefore, this technology will not be screened in this section.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.4, habitat monitoring is used to monitor the health and stability of the habitats. Therefore, this technology will be included in every site-wide alternative except the no-action alternative or any alternative involving the application of caps. Habitat monitoring would be unnecessary if the selected site remedy involves the use of caps due to the destruction of habitats caused by cap placement. If an agronomic cover was part of the selected site remedy, additional habitat monitoring would be instituted.

As discussed in Section 6.2.2.1 and 6.2.2.4, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media, prevent disruption of remedial systems, or provide a protected habitat environment. Institutional controls can be used alone, or in conjunction with other remedial measures. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

In addition, monitoring of groundwater around the former landfill areas will be included in every site-wide alternative, except the no-action alternative, regardless of the technology selected.

6.3.4.2 Preliminary Alternative Screening

The following three technologies passed the technology screening for the former landfill areas and habitat areas and will be incorporated into preliminary area alternatives for evaluation:

- Soil Cover – Placement of clean soil over areas with contamination is an established method of breaking the direct contact exposure pathway. Soil cover is generally planted with grass or other vegetation to protect against erosion. Soil cover by itself does not provide treatment, but does provide containment.

- Agronomic Cover – An agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, and is an alternative to the traditional landfill cover systems. The agronomic cover system consists of a soil layer (water storage component) with a thick root zone (water pumping component), and contains plants, such as willows and poplars, which have a low water-use efficiency. This means that they produce relatively small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone. An additional potential benefit of agronomic covers is the potential for treatment (phytoremediation) of contaminated media within the root zone (rhizosphere) of the cover system.

- Caps – Traditional landfill caps are an established method of isolating wastes from direct contact and protecting groundwater quality. Caps are usually used to cover waste and to protect groundwater quality by limiting the infiltration of precipitation and run-off. Caps are generally constructed of a low permeability liner (either clay or clay with a synthetic membrane liner) in conjunction with a drainage layer and a soil cover capable of supporting vegetation.

Each of these technologies would be paired with institutional controls. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.4.2.1 Implementability

Both soil and agronomic covers would be straightforward to construct. Care would need to be taken during construction to minimize disruption to the site habitats. Traditional landfill caps would also be straightforward to construct. However, because traditional caps require specific layers and depths of sand and clay, a traditional cap would be more complex to install than either a soil or agronomic cover. In addition, a great deal of fill material would be required to meet minimum sloping requirements.

6.3.4.2.2 Effectiveness

Traditional landfill caps are a presumptive remedy for landfills because they have been proven to be effective at preventing direct contact with wastes and reducing leachate production, thereby protecting groundwater quality. Traditional landfill caps would provide no benefit to the habitat areas. Traditional landfill caps would provide for containment of the landfill wastes. However, construction of traditional landfill caps would result in destruction of the habitat areas.

An agronomic cover system can be as effective as prescriptive landfill covers in eliminating exposure to waste and minimizing migration of contaminants from the waste mass. In addition to protecting site fauna from the landfill waste, agronomic covers would enhance the habitat areas. Specific plantings can be done to provide production of food (nuts, berries) and for niche space development (shelter, protection). If carefully constructed, habitat areas would be preserved during the construction process.

Soil covers are effective at breaking the direct contact exposure pathway. However, they are not effective for preventing infiltration of precipitation, and thus do not protect groundwater quality. If carefully constructed, the habitat areas would be preserved during the construction process.

6.3.4.2.3 Cost

Construction of a soil cover would have the lowest capital costs of the cover alternatives. An agronomic cover would have slightly higher capital costs compared with soil cover, due mostly to the labor of planting the trees. The capital cost to construct a traditional landfill cap would be substantially higher due mostly to the large volume of less readily available materials. Operation and maintenance costs for the three systems would be comparable. Because traditional landfill caps are generally covered by grass that must be mowed regularly, the cost to maintain a traditional cap would be slightly higher. Soil covers are frequently planted with native species of grass and wildflowers, and therefore, generally require less upkeep. An agronomic cover would become self-sustaining once the plantings were established. Thus, the cost for maintaining an agronomic cover would be higher over the first few years, but would decrease and be less costly over the life of the remedy.

6.3.4.3 Summary and Conclusions

The screening of preliminary alternatives for the habitat and former landfill areas is summarized in Table 6-6.

An agronomic cover would eliminate exposure to wastes and reduce infiltration, which will protect groundwater. In addition, an agronomic cover would enhance the existing habitat areas after it is established. Thus, this technology will be included in the alternatives.

Traditional caps would also eliminate exposure to wastes and reduce infiltration. Although traditional caps are a common and accepted remedy for landfills, they would completely destroy the existing ecosystems and habitat areas. This technology will be included in a site-wide alternative because it is a prescribed remedy for landfills.

Construction of a soil cover would not be as protective of groundwater quality as the other technologies. However, a soil cover would break the direct contact exposure pathway and would protect against erosion. No groundwater or soil quality issues related to the former Binnie Kill Landfill Area were documented during the RI. Therefore, a soil cover over the former Binnie Kill Landfill Area would provide protection of human health and the environment, be congruous with the remedial goal of protecting and enhancing the existing habitats, and be cost-effective. Because this technology has already been implemented for the Binnie Kill Landfill Area, this technology will be included in the site-wide no-action, the institutional controls, and the treatment and containment alternatives.

6.3.5 Soil with Other Compounds Above NYSDEC's RSCOs

As discussed in Section 4.1.1, surface and subsurface soil at the site has been impacted by past site activities. In sections 6.3.1 through 6.3.4, appropriate technologies were discussed and preliminary alternatives formulated for specific classes of impacted site soil. The four soil classifications already addressed are:

- Surface soil that may impact surface water due to erosion;
- Soil which is above NYSDEC's RSCOs and may be impacting groundwater;
- Soil locations where concentrations of PCBs have been detected above NYSDEC RSCOs; and
- Former landfill and habitat areas.

In this section, the discussion of appropriate technologies and preliminary alternatives will focus on the remaining soil at the site that is above NYSDEC's RSCOs. These remaining locations are within the manufacturing area and the immediate downgradient receptor is groundwater. The human health risk assessment determined that there are no risks associated with the site for these compounds.

6.3.5.1 Technology Screening

The technologies that passed the initial technology screening in section 6.2.2.1 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Removal and Off-Site Disposal
- Soil Cover
- Asphalt Cover
- Asphalt Cap
- Soil Vapor Extraction

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

Asphalt covers and asphalt caps are similar technologies. While both provide protection against the direct contact exposure pathway, asphalt caps are designed to be less permeable, thereby protecting groundwater quality. Because the soil discussed in this section contains relatively low concentrations of contaminants and does not appear to be impacting groundwater, the extra protection provided by an asphalt cap is not warranted. Therefore, asphalt caps will not be evaluated in this section.

As discussed in Section 6.2.2.1, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated soil or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

6.3.5.2 Preliminary Alternative Screening

The following four technologies or classes of technologies passed the technology screening for use in these areas and will be incorporated into preliminary area alternatives for evaluation:

- Removal and Off-Site Disposal – Excavation and off-site disposal of impacted soil is generally easy to implement. This technology is effective for reducing human contact and environmental interaction with contaminants. Properly disposing removed material at an off-site facility generally results in treatment or containment of the waste.

- Soil Cover - Placement of clean soil over areas with contamination is an established method of breaking the direct contact exposure pathway. Soil cover is generally planted with grass or other vegetation to protect against erosion. Soil cover by itself does not provide treatment, but does provide containment. If used in conjunction with institutional controls that prohibit disruption of the cover and require regular maintenance, a soil cover is effective for breaking the direct contact exposure pathway. For most sites, implementation is straightforward.

- Asphalt Cover – An asphalt cover is sometimes used to cover contaminated soils. This technology does not provide treatment, but does provide containment. If an asphalt cover is used in conjunction with institutional controls that prohibit disruption of the cover and require regular maintenance, this technology is effective for breaking the direct contact exposure pathway. For most sites, implementation is straightforward.

- Soil Vapor Extraction – Soil vapor extraction (SVE) is a technology that is frequently used to remove and collect volatile organic vapors from soil. A vacuum system is applied to extract gaseous phase contaminants from the subsurface. The collected vapors are usually run through a treatment system before being released to the atmosphere. This technology can be effective for removing VOCs and some SVOCs from the vadose zone. While this technology is often applied by itself, SVE is frequently used in conjunction with other technologies.

Soil covers, asphalt covers, and soil vapor extraction would be accompanied by institutional controls. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.5.2.1 Implementability

Removal and off-site disposal of specific soil locations where compounds have been detected at concentrations above NYSDEC's RSCOs would be simple for surface soils. Subsurface soils may prove more difficult based on location and depth of the excavation. Placement of either an asphalt cover or soil cover would be straightforward to implement. Soil vapor extraction is also straightforward to implement, although it is more complex than construction of a soil or asphalt cover.

6.3.5.2.2 Effectiveness

Excavation of soil would result in the removal of the soil from the site, but would not necessarily result in permanent destruction of contaminants. However, because the soil would be removed, no institutional controls would be necessary to maintain the effectiveness of this technology.

Both cover systems would effectively break the direct contact exposure pathway, but would do nothing to reduce the mass of contaminants. Access restrictions would accompany both the soil and the asphalt cover systems.

For soils in the fill deposits, soil vapor extraction would reduce concentrations of VOCs and some SVOCs through volatilization. The levels of VOCs and SVOCs in the soils being evaluated in this section are relatively low; therefore, a system to treat the vapors would probably not be required because vapor emissions from an SVE system would pose no risk to human health or the environment.

6.3.5.2.3 Cost

The cost associated with excavation of soil, off-site removal, and transportation to an appropriate facility for disposal may incur large capital costs. However, there would not be any operation and maintenance costs associated with this alternative.

The capital costs of constructing a soil cover would be less expensive than the asphalt cover. Operation and maintenance costs for each cover system would include routine inspections and repairs.

The capital cost associated with implementation of soil vapor extraction systems would be higher than the cost associated with construction of a soil or asphalt cover. Targeted excavation and off-site disposal would be more expensive to implement, unless the excavation areas were readily accessible, dry, and fairly shallow. Operation and maintenance costs for SVE would include power to operate the systems in addition to routine maintenance, replacement of worn parts, testing and potential treatment of vapor emissions, and potentially maintenance and operations costs for a vapor treatment system.

6.3.5.3 Summary and Conclusions

Each of the preliminary alternatives would provide an increased level of protection to site workers under current conditions. However, based on the human health risk assessment, no threat to human health is posed by site soils. Thus, the net benefit of excavation or employing soil vapor extraction for this class of soil impacts is negligible when compared to application of institutional controls. Therefore, these technologies will not be included in the site-wide alternatives. However, employing soil or asphalt cover over this class of soils would compliment existing plans for the site and be congruent with anticipated future uses for the site. Therefore, soil and asphalt covers will be incorporated into site-wide containment alternatives. The results of this preliminary screening are summarized in Table 6-5.

6.3.6 Principal Contributors to Chlorinated Ethenes in Channel Fill Deposits

As discussed in the *RI Report*, there are two areas at the site that appear to be the principal contributors to the chlorinated VOCs (primarily chlorinated ethenes) that are present in the channel fill groundwater that is migrating beneath the center of the site. For the purpose of this FS, those areas with concentrations of total VOCs, which are primarily chlorinated ethenes, that are above 1,000 μg/L are considered principal source areas. This number has been chosen because it correlates the concentrations of total VOCs detected in groundwater to the areas that the RI identified as the principal contributors of chlorinated VOCs to the groundwater in the channel fill deposits. As discussed in Section 4.1.2.3, these two areas are:

- Former Wire Mill Area
- Waste Water Treatment Plant (WWTP) Area, near the former Propeller Test Building

In both of these areas, elevated concentrations of VOCs have been found in the fill and floodplain groundwater and in the channel fill groundwater immediately downgradient of the area. As discussed in Appendix G of the *RI Report*, natural attenuation is degrading the chlorinated VOCs in these areas. While elevated levels of VOCs have been found in some soil in these areas, no specific source of the chlorinated VOCs, such as free-product or a large mass of contaminated soil, has been found. The primary receptors for the contaminants in the source areas are the channel fill groundwater downgradient of the areas and ultimately the Mohawk River.

6.3.6.1 Technology Screening

The technologies that passed the initial technology screening for groundwater in section 6.2.2.2 and may be suitable for these areas include:

- No-Action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Asphalt Cover
- Asphalt Cap
- Groundwater Collection

- Monitored Natural Attenuation
- Air Sparging
- Soil Vapor Extraction
- Enhanced In-Situ Anaerobic Biodegradation
- Groundwater Stripping Wells
- Permeable Reactive Barriers
- Groundwater Treatment
- Dual-Phase Soil Vapor Extraction

As discussed in Section 6.2.2.2, air sparging, soil vapor extraction, and dual-phase soil vapor extraction are suitable for shallow groundwater, but not for the deeper groundwater. In addition, groundwater stripping wells are suitable for deep groundwater, but would not be suitable for treatment of shallow groundwater. Because the two source areas have elevated concentrations of chlorinated VOCs in both the shallow and deeper groundwater, the following technologies will not be considered: air sparging, soil vapor extraction, groundwater stripping wells, and dual-phase soil vapor extraction. These technologies might be suitable for addressing a portion of the groundwater in the source areas. However, it would be more cost-effective to implement a technology that will address both shallow and deep groundwater.

Asphalt covers and asphalt caps will not be considered for use in this area of the site because limiting infiltration through the use of a cap or cover would have a minimal effect on immobilizing contaminants already present in the channel fill groundwater.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.2, groundwater monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected to address the source areas.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media such as groundwater or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected to address the source areas.

6.3.6.2 Preliminary Alternative Screening

The following four technologies or classes of technologies passed the technology screening for use in the source areas and will be incorporated into preliminary area alternatives for evaluation:

- Groundwater Collection and Groundwater Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Groundwater collection wells or trenches were usually installed near the downgradient side of an area of impacted groundwater in order to hydraulically contain the impacted groundwater and prevent it from migrating further. The wells or trenches are outfitted with pumps and control systems to lower the water table, which creates the hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a groundwater treatment system designed to remove the contaminants of concern.

- Monitored Natural Attenuation – This technology can be employed at sites where natural attenuation is occurring. Microorganisms existing within the soil breakdown the contaminants to less complex and less hazardous compounds. Groundwater is usually sampled several times a year to monitor and document the degradation of contaminants.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations. Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain and treat impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it re-circulates. This approach results in a treatment zone that promotes contact between the impacted groundwater and amendments. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

- Permeable Reactive Barriers – This technology is a passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material that degrades, sorbs, precipitates, or removes chlorinated solvents, metals, radionuclides, and other contaminants. Reactive barriers are installed perpendicular to the flow path of the plume and can be permanent, semi-permanent, or replaceable units. Iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.6.2.1 Implementability

Monitored natural attenuation would be the easiest of the technologies to implement since there are no components to be installed unless additional monitoring wells are needed. Enhanced in-situ anaerobic biodegradation would be fairly easy to construct because it involves injecting amendments into the subsurface periodically over the life of the remedy or constructing a permeable reactive barrier designed to last the lifetime of the remedy. The configuration, injection points or permeable reactive barrier, is usually determined during the design phase and depends on desired depth of the treatment zone and which approach is more cost-effective to implement. If a recirculating system were selected, design and construction would be more complicated. Constructing a permeable reactive barrier would be fairly easy to most depths using a biopolymer slurry trench and has been implemented for other remediation projects successfully. While groundwater collection wells and groundwater treatment systems are straightforward to construct and are frequently used at sites with impacted groundwater, this remedial approach would be more complicated to implement than monitored natural attenuation, enhanced in-situ anaerobic biodegradation, and permeable reactive barriers.

6.3.6.2.2 Effectiveness

As discussed previously, the *RI Report* documented that natural attenuation (anaerobic biodegradation) is currently occurring at and downgradient of the source areas. Therefore, this technology could be expected to continue to reduce concentrations of chlorinated VOCs. However, concentrations of chlorinated VOCs in the source areas are not likely to be reduced to below NYSDEC's groundwater standards for many years. Concentrations of chlorinated VOCs downgradient of the source areas, toward the northern site boundary and the Mohawk River, would not likely be reduced to NYSDEC's groundwater standards until concentrations in the source areas were close to or below groundwater standards, which is unlikely to occur through natural attenuation during the foreseeable future.

Addition of amendments (enhanced in-situ biodegradation) would increase the rate of anaerobic biodegradation that is currently occurring. This would reduce the amount of time required to reduce chlorinated VOC concentrations to NYSDEC's groundwater standards. Based upon the results of laboratory bench tests conducted by GE Global Research on site soil and groundwater using various amendments, enhanced in-situ anaerobic biodegradation will result in complete degradation of the chlorinated VOCs in the source areas. Enhanced in-situ anaerobic biodegradation would result in permanent reduction of contaminants.

Groundwater collection and treatment has been considered a presumptive remedy for years because groundwater collection is effective at containing impacted groundwater and groundwater treatment is effective at reducing the mass of contaminants in groundwater by transferring the contaminants to other media. This would result in a reduction in concentrations of chlorinated

VOCs at or downgradient of the source areas, towards the site boundary and the Mohawk River, and would reduce continued migration through containment of contaminants. However, it would take several years for concentrations of chlorinated VOCs in the groundwater downgradient of the source areas to degrade to meet NYSDEC's groundwater standards. Depending on the treatment system, groundwater treatment may destroy contaminants or produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility.

Zero valent iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants. The effectiveness of PRBs is dependent upon having a thorough understanding of contaminant boundaries, contaminant composition and mass, and site hydrogeology. A properly designed permeable reactive barrier would be expected to reduce concentrations of contaminants in impacted groundwater to meet NYSDEC's groundwater standards.

6.3.6.2.3 Cost

Natural attenuation would have no capital costs because there are no components to construct, unless additional monitoring wells were needed. In addition, there would be no operation and maintenance costs associated with this alternative, beyond the cost to monitor groundwater.

The cost associated with implementing enhanced in-situ biodegradation would include the cost of the amendments and the materials and labor to place or install the amendments. If amendments were injected, multiple rounds of amendment injections would likely be necessary to completely reduce the chlorinated VOCs. If amendments were placed in a reactive barrier configuration using trenching, the barrier could be designed to last over the lifetime of the remedy. The cost to place amendments in a trench would be higher than the costs to inject the amendments. There would be no operation and maintenance costs associated with these approaches, beyond the costs to monitor groundwater. If a recirculating system were installed, the capital costs would increase and the operation and maintenance costs would include routine system maintenance and power to run the system.

Groundwater collection and treatment would have substantially higher capital and operational costs than a natural attenuation approach. Although the capital costs for groundwater collection and treatment could be similar to those for an enhanced in-situ biodegradation approach, the annual operating costs would be significantly higher. If a recirculation system with enhanced bioremediation were implemented, the annual operations and maintenance costs would be slightly less than if groundwater collection and treatment were employed. The capital costs associated with implementing this alternative would include installation of wells and pumps, plumbing, and the construction of a water treatment plant. Operation and maintenance expenses would include electricity, maintenance of the collection and treatment systems, and replacement and disposal of worn parts and spent treatment components, such as carbon. The annual cost for groundwater monitoring would be less than the other alternatives because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative.

The cost associated with constructing a permeable reactive barrier would include the cost of the reactive material (most commonly iron), the materials used to create the biopolymer slurry for the trench, and the disposal and dewatering of soils excavated to construct the barrier. There would be no operation and maintenance costs beyond the costs associated with monitoring groundwater. The cost capital costs to construct a PRB out of iron would be comparable to the capital costs to implement enhanced in-situ bioremediation.

6.3.6.3 Summary and Conclusion

The results of this preliminary screening are summarized in Table 6-7. All four alternatives for the source areas would eventually reduce concentrations of chlorinated VOCs to or below NYSDEC's groundwater standards. Because enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, and permeable reactive barriers are treatment technologies, they will be considered for inclusion in the site-wide containment and treatment alternatives.

As discussed above, enhanced in-situ anaerobic biodegradation would be more effective than groundwater collection and treatment because the chlorinated VOCs will be completely reduced with no concentrated waste streams generated. In addition, enhanced in-situ anaerobic biodegradation is considered to be a more cost-effective remedy. Therefore, enhanced in-situ anaerobic biodegradation will be incorporated into site-wide treatment alternatives.

6.3.7 Channel Fill Groundwater North of the WWTP

As discussed in Section 4.1.2.3, groundwater in the channel fill deposits north of the WWTP Area has significant concentrations of chlorinated ethenes. This area is physically unique because it is separated from Main Plant by Interstate 890. This area is approximately 110 to 160 feet wide in the north-south direction and is directly south of the Mohawk River. The Mohawk Hudson Bike/Hike Trail runs east-west along the river in this area.

The chlorinated ethenes in the groundwater in the channel fill deposits are believed to come from two principal sources. The increased concentrations of VOCs in this area are attributable to the preferential groundwater pathway along the storm sewer outfall line from the source area at the WWTP near the former Propeller Test Building. In addition, this area of elevated VOCs coincides with a region of channel fill deposits that have lower hydraulic conductivity than the surrounding channel fill deposits. Thus, the VOCs in the area are migrating slower than the nearby areas. The channel fill deposits in this area are approximately 70 feet thick. The primary receptor of concern for this area is the Mohawk River, which is immediately down gradient. The water quality of the Mohawk River is in compliance with Class A surface water quality standards for VOCs.

6.3.7.1 Technology Screening

The technologies that passed the initial technology screening in section 6.2.2.2 and may be suitable for this area include:

- No-action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Groundwater Collection
- Monitored Natural Attenuation of Groundwater
- Enhanced In-Situ Aerobic and Anaerobic Biodegradation
- Groundwater Stripping Wells
- Groundwater Treatment

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward to the no-action alternative without evaluation.

As discussed in Section 6.2.2.2, groundwater monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative, except the no-action alternative, regardless of the technology selected to address the channel fill groundwater north of the WWTP.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media such as groundwater or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative, except the no-action alternative, regardless of the technology selected to address the channel fill groundwater north of the WWTP.

6.3.7.2 Preliminary Alternative Screening

The following four technologies or classes of technologies passed the technology screening for use for the channel fill groundwater north of the WWTP and will be incorporated into preliminary alternatives for evaluation:

- Groundwater Collection and Groundwater Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Groundwater collection wells are usually installed near the downgradient side of an area of impacted groundwater in order to hydraulically contain or remove impacted groundwater within an area. The wells are outfitted with pumps and control systems to lower the water level, which creates the hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a groundwater treatment system designed to remove the contaminants of concern.

- Monitored Natural Attenuation – During monitored natural attenuation, processes such as volatilization, biodegradation, and dispersion that are occurring in the subsurface are allowed to attenuate contaminants, such as VOCs. Biodegradation occurs when microorganisms existing within the soil breakdown the contaminants to less complex and less hazardous compounds. Groundwater is usually sampled several times a year to monitor and document the degradation of contaminants.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations. Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it recirculates. This approach results in a treatment zone within which contact between the impacted groundwater and amendments is maximized. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

- Groundwater Stripping Wells – This technology uses air to vaporize volatile and semi-volatile contaminants by aerating the groundwater within specially configured groundwater wells. The exact configuration of the wells depends on whether the aquifer is unconfined or confined. A vapor extraction system is frequently used in conjunction with stripping wells to collect volatilized contaminants.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.7.2.1 Implementability

Monitored natural attenuation would be the easiest of the technologies to implement since there are no components to be installed unless additional monitoring wells are needed. Although enhanced in-situ aerobic/anaerobic biodegradation would be fairly easy to construct because it generally involves injecting amendments into the subsurface periodically over the life of the remedy, the coordination required to construct the remedy in this recreational area, which is open to the general public, would make implementation somewhat difficult.

While groundwater collection and treatment systems are straightforward to construct and are frequently used at sites with impacted groundwater, this remedial approach would be more complicated to implement than monitored natural attenuation and enhanced in-situ anaerobic biodegradation. Implementing either groundwater collection and treatment systems or stripping wells would be more difficult in this portion of the site because Interstate 890 separates this area from the main body of Main Plant. Additionally, because the current use of this area is for recreational purposes, the general public has free access to this area, which could lead to complications in operations and maintenance. Stripping wells would be approximately as difficult to implement as groundwater collection and treatment.

6.3.7.2.2 Effectiveness

As discussed previously, the *RI Report* documented that natural attenuation (anaerobic biodegradation) is currently occurring in groundwater at and downgradient of the WWTP. Therefore, this technology could be expected to continue to reduce concentrations of chlorinated VOCs. Although concentrations of chlorinated VOCs in this area are not likely to be reduced to below NYSDEC's groundwater standards for many years under current site conditions, implementing measures to reduce the continued migration of VOCs to this area from upgradient sources would enable groundwater standards to be achieved in substantially less time. Measures to address the principal source areas are discussed in Section 6.3.6. As documented in the *RI Report*, the Mohawk River, which is the potential downgradient receptor for this FS Area, has not been impacted by site activities. Therefore, natural attenuation would not provide any additional benefit to the downgradient receptor, the Mohawk River.

Addition of amendments (enhanced in-situ biodegradation) would allow the rate of anaerobic biodegradation currently occurring to increase. This would reduce the amount of time required to reduce chlorinated VOC concentrations to NYSDEC's groundwater standards. Based upon the results of laboratory bench tests conducted by GE Global Research on site soil and groundwater using various amendments, enhanced in-situ anaerobic biodegradation will result in complete degradation of the chlorinated VOCs. Applications of amendments at sites with similar concentrations of chlorinated ethenes have shown reductions in concentrations near and downgradient of the application area. Enhanced in-situ anaerobic biodegradation would result in permanent reduction of contaminants.

Groundwater collection and treatment has been considered a presumptive remedy for years because groundwater collection is effective at containing impacted groundwater and groundwater treatment is effective at reducing the mass of contaminants in groundwater by transferring the contaminants to treatment media. Depending on the treatment system, groundwater treatment may destroy contaminants or produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility.

Stripping wells have been effective at removing contaminants in groundwater at sites with similar conditions. Similar results are expected if this technology were applied at Main Plant.

As documented in the *RI Report*, the Mohawk River, which is the potential downgradient receptor for this FS Area, has not been impacted by site activities. Therefore, monitored natural attenuation, enhanced in-situ biodegradation, groundwater collection and treatment, or groundwater stripping wells would not provide any additional benefit to the downgradient receptor, the Mohawk River.

6.3.7.2.3 Cost

There would be no capital costs for natural attenuation because there are no components to construct unless additional monitoring wells were needed. In addition, there would be no operation and maintenance costs associated with this alternative, beyond the cost to monitor groundwater.

The cost associated with implementing enhanced in-situ biodegradation would include the cost of the amendments and the labor to inject or install the amendments. If amendments were injected, multiple rounds of amendment injections would likely be necessary to completely reduce the chlorinated VOCs. If amendments were placed in a reactive barrier configuration using trenching, the barrier could be designed to last over the lifetime of the remedy. The cost to place amendments in a trench would be higher than the costs to inject the amendments. Given the concentration of VOCs in the channel fill deposits in this area, it is likely that multiple rounds of amendment injection would be necessary to completely reduce the chlorinated VOCs. There would be no operation and maintenance costs associated with these approaches, beyond the cost to monitor groundwater. If a recirculating system were installed, the capital costs would increase and the operation and maintenance costs would include routine system maintenance and power to run the system. If a recirculating system with enhanced bioremediation were implemented, the annual operations and maintenance costs would be slightly less than if either groundwater collection and treatment or stripping wells were employed.

Groundwater collection and treatment would have substantially higher capital and operational costs. The capital costs associated with implementing this alternative would include installation of wells and pumps, plumbing, and the construction of a water treatment plant. Operation and maintenance expenses would include electricity, maintenance of the collection and treatment systems, and replacement and disposal of worn parts and spent treatment components, such as carbon and filters. The annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative.

Groundwater stripping wells would also have high capital and operational costs. The capital costs associated with implementing this alternative would include installation of the wells, air and vacuum systems, and plumbing. Operation and maintenance expenses would include electricity, maintenance of the air and vacuum systems, and replacement of worn parts. Like groundwater collection and treatment, the annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative. The capital and operational and maintenance costs for groundwater stripping wells would likely be slightly lower than costs related to groundwater collection and treatment.

6.3.7.3 Summary and Conclusion

The results of the preliminary screening are summarized in Table 6-7. All four alternatives for the VOC-impacted channel fill groundwater north of the WWTP would eventually reduce concentrations of chlorinated VOCs to or below NYSDEC's groundwater standards. Natural attenuation will be included in a site-wide containment alternative.

As discussed previously, the *RI Report* documented that the Mohawk River, which is immediately downgradient of the channel fill groundwater north of the WWTP, has not been impacted by site activities. Measures to address the upgradient source areas (Section 6.3.6) would reduce the risk of potential future impacts to the Mohawk River. Thus, the cost of active remedial measures in this area is not warranted since they will provide no additional benefits. Therefore, enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, and groundwater stripping wells will not be included in the site-wide treatment alternatives.

6.3.8 Shallow Groundwater in the Former East Landfill Area

As discussed in Section 4.1.2.2, shallow groundwater samples from the former East Landfill contain detectable concentrations of PCBs, VOCs, and PAHs above NYSDEC's groundwater standards. In two portions of the former East Landfill Area, the southwest portion and the area north of the former Chip Pad, perched groundwater emerges as seeps and may impact surface water in the Poentic Kill. Technologies to address the seeps are evaluated in Section 6.3.1.2. Groundwater samples collected from the southwest portion of the former East Landfill Area contain elevated concentrations of PCBs, BTEX, and PAHs. Groundwater samples collected from the area north of the former Chip Pad contained elevated concentrations of PCBs, BTEX, chlorinated VOCs, and PAHs. In addition, free-product (LNAPL) has been found in both areas. Potential receptors of the shallow groundwater include the Poentic Kill, site fauna, groundwater in the channel fill deposits, and ultimately the Mohawk River.

6.3.8.1 Technology Screening

The technologies that passed the initial technology screening for groundwater in section 6.2.2.2 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Agronomic Cover
- Caps
- Groundwater Collection Wells

- Groundwater Collection Trenches
- Source Removal of LNAPL
- Monitored Natural Attenuation of Groundwater
- Air Sparging
- Soil Vapor Extraction
- Enhanced In-Situ Aerobic and Anaerobic Biodegradation
- Groundwater Treatment
- Permeable Reactive Barrier

As discussed in Section 6.2.2.2, agronomic cover and caps are technologies used to reduce or prevent infiltration of precipitation into landfills, thus reducing the quantity of impacted groundwater and the likelihood that the groundwater will migrate. As discussed in Section 6.3.4, both agronomic covers and traditional cap systems will be included in site-wide alternatives. Therefore, this section will focus on technologies that are exclusive to groundwater and evaluating the groundwater technologies that could be implemented in conjunction with either a traditional landfill cap or an agronomic cover.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.2, groundwater monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media, such as groundwater, or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

Product recovery will be carried forward to the site-wide treatment and containment alternatives without evaluation because free-product has been detected at discrete locations in the southwest and northeast boundaries of the former East Landfill Area. Technologies to address free-product are discussed in Section 6.3.10.

6.3.8.2 Preliminary Alternative Screening

The following five technologies or pairs of technologies that passed the technology screening for perched groundwater in the former East Landfill Area and will be incorporated into preliminary alternatives for evaluation:

- Groundwater Collection and Groundwater Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Groundwater collection wells or trenches are usually installed near the downgradient side of an area of impacted groundwater in order to hydraulically contain the impacted groundwater within a certain boundary. The wells or trenches are outfitted with pumps and control systems to lower the water level, which creates the hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a groundwater treatment system designed to remove the contaminants of concern.

- Monitored Natural Attenuation of Groundwater – This technology is employed at sites where natural attenuation is occurring. Existing microorganisms within the soil breakdown the contaminants into less complex and less hazardous compounds. Groundwater is usually sampled several times a year to monitor and document the degradation of contaminants.

- Air Sparging and Soil Vapor Extraction – Air sparging is the injection of pressurized air into the groundwater through the use of horizontal or vertical sparge points. As the injected air rises to the surface, it causes increased volatilization of VOCs in the groundwater and promotes desorption. Soil vapor extraction (SVE) is the application of a vacuum system to extract gaseous phase contaminants from the subsurface. Combined air sparging and SVE may be utilized if air sparging is first used to volatilize contaminants in groundwater and then the vapors produced are collected and treated with an SVE system.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations. Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it recirculates. This approach results in a treatment zone within which contact between the impacted groundwater and amendments is maximized. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

- Permeable Reactive Barriers – This technology is a passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material that degrades, sorbs, precipitates, or removes chlorinated solvents, metals, radionuclides, and other contaminants. Reactive barriers are installed perpendicular to the flow path of the plume and can be permanent, semi-permanent, or replaceable units. Iron is the most commonly used reactive material in PRBs, and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.8.2.1 Implementability

Monitored natural attenuation would be the easiest of the technologies to implement since there are no components to be installed unless additional monitoring wells are needed. Enhanced in-situ aerobic or anaerobic biodegradation would be fairly easy to construct because it involves injecting amendments into the subsurface periodically over the life of the remedy or constructing a permeable reactive barrier designed to last the lifetime of the remedy. The configuration, injection points or permeable reactive barrier, is usually determined during the design phase and depends on the desired depth of the treatment zone and which approach is more cost-effective to implement. If a recirculation system were selected, design, construction, and implementation would be more complicated.

Constructing a permeable reactive barrier would be fairly easy to most depths using a biopolymer slurry trench and has been successfully implemented for other remediation projects. An iron PRB would be more complicated to implement than monitored natural attenuation or directly injected enhanced in-situ anaerobic biodegradation.

While groundwater collection and treatment systems are straightforward to construct and are frequently used at sites with impacted groundwater, this remedial approach would be more complicated to implement than monitored natural attenuation and enhanced in-situ aerobic or anaerobic biodegradation. Implementing either groundwater collection and treatment systems or air sparging and soil vapor extraction systems would be somewhat challenging to construct due to existing site conditions and groundwater chemistry. Along the southwest portion of the former East Landfill Area, groundwater in fill and floodplain deposits is fairly shallow. Therefore, groundwater collection trenches or a horizontal air sparge system would likely be used instead of more easily installed vertical systems. This would involve trenching and installation of components below the water table. Air sparging and soil vapor extraction would be approximately as difficult to implement as groundwater collection and treatment. However, an advantage of an air sparge and SVE system would be the reduced quantity of water to be treated.

6.3.8.2.2 Effectiveness

As discussed previously, natural attenuation (anaerobic biodegradation) is currently occurring in groundwater in the former East Landfill Area. This technology could be expected to continue to reduce concentrations of VOCs and SVOCs in groundwater. However, concentrations of VOCs and SVOCs in this area are not likely to be reduced to NYSDEC's groundwater standards for many years under current site conditions. Because of the concentrations of VOCs and SVOCs present along the western edge of the former East Landfill Area, and the proximity of the former landfill area to the kill, monitored natural attenuation is not likely to prevent impacted groundwater from reaching the Poentic Kill.

Addition of amendments (enhanced in-situ biodegradation) would allow the rate of biodegradation currently occurring to increase. This would reduce the amount of time required to meet NYSDEC's groundwater standards. Enhanced in-situ biodegradation would result in permanent reduction of contaminants. However, given the proximity of the impacted groundwater to the Poentic Kill, it is unlikely that amendment addition would sufficiently accelerate the on-going degradation to prevent impacted groundwater from reaching the Poentic Kill.

Groundwater collection and treatment is considered a presumptive remedy because groundwater collection is effective at containing impacted groundwater and groundwater treatment is effective at reducing the mass of contaminants in groundwater by transferring the contaminants to treatment media. Depending on the treatment system design, groundwater treatment may destroy contaminants or produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility. This technology would be effective at intercepting impacted groundwater before it reached the Poentic Kill.

Air sparging with soil vapor extraction is frequently employed at sites with similar concentrations of VOCs and SVOCs. This technology would likely be effective at treating groundwater to meet NYSDEC's groundwater standards. The high concentration of dissolved iron present in groundwater may decrease the effectiveness of the system and lead to more frequent maintenance. This technology would be effective at intercepting impacted groundwater before it reached the Poentic Kill.

Zero valent iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants. The effectiveness of PRBs is dependent upon having a thorough understanding of contaminant boundaries, contaminant composition and mass, and site hydrogeology. A properly designed permeable reactive barrier would be expected to reduce concentrations of contaminants in impacted groundwater to meet NYSDEC's groundwater standards.

6.3.8.2.3 Cost

There would be no capital costs to implement natural attenuation because there are no components to construct unless additional monitoring wells were needed. In addition, there would be no operation and maintenance costs associated with this alternative, beyond the costs to monitor groundwater.

The cost associated with implementing enhanced in-situ biodegradation would include the cost of the amendments and the labor to inject or install the amendments. If amendments were injected, multiple rounds of amendment injections would likely be necessary to completely reduce the chlorinated VOCs. If amendments were placed in a reactive barrier configuration using trenching, the barrier could be designed to last over the lifetime of the remedy. The cost to place amendments in a trench would be higher than the costs to inject the amendments. Given the concentration of VOCs and SVOCs in this area, it is likely that multiple rounds of amendment injection would be necessary to meet groundwater standards. There would be no operation and maintenance costs associated with these approaches, beyond the costs to monitor groundwater. If a recirculating system were installed, the capital costs would increase and the operation and maintenance costs would include routine system maintenance and power to run the system.

Groundwater collection and treatment would have substantially higher capital and operational costs. The capital costs associated with implementing this alternative would include installation of wells or trenches and pumps, plumbing, and the construction of a water treatment plant. Operation and maintenance expenses would include electricity, maintenance of the collection and treatment systems, and replacement and disposal of worn parts and spent treatment components, such as carbon. The annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative.

Air sparging in conjunction with soil vapor extraction would also have high capital and operational costs. The capital costs associated with implementing this alternative would include installation of the sparge systems, vapor collection systems, air and vacuum systems, and plumbing. However, the capital costs are expected to be slightly lower than with a groundwater collection and treatment system because the liquid treatment system would be smaller. Likewise, the operation costs would be less than a groundwater collection and treatment system because fewer materials would be handled. Operation and maintenance expenses would include electricity, maintenance of the air and vacuum systems, and replacement of worn parts. Like groundwater collection and treatment, the annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative. The capital and operational and maintenance costs for air sparging with soil vapor extraction would likely be slightly lower than costs related to groundwater collection and treatment.

The cost associated with constructing a permeable reactive barrier would include the cost of the reactive material (most commonly iron), the materials used to create the biopolymer slurry for the trench, and the disposal and dewatering of soils excavated to construct the barrier. There would be no operation and maintenance costs beyond the costs associated with monitoring groundwater. The capital costs to construct a PRB using iron would be comparable to the capital costs to implement enhanced in-situ bioremediation.

6.3.8.3 Summary and Conclusions

Monitored natural attenuation, enhanced in-situ biodegradation, or a permeable reactive barrier alone are not likely to reduce concentrations of VOCs and SVOCs to meet groundwater standards quickly enough to prevent impacted groundwater from reaching the Poentic Kill. Therefore, these technologies will only be included in the site-wide treatment alternatives if other measures to address the seeps and former East Landfill Area are incorporated.

Both groundwater collection and treatment and air sparging with soil vapor extraction would be expected to reduce contaminant levels in groundwater sufficiently to eliminate the threat of impacted groundwater migrating to the Poentic Kill. Air sparging with SVE will be included in site-wide treatment alternatives because it is expected to have a slightly lower cost.

6.3.9 VOC-Impacted Groundwater Near Site Boundaries

There are five areas at the site where groundwater with concentrations of VOCs, primarily chlorinated ethenes, have been found at concentrations greater than NYSDEC's groundwater standards near site boundaries. These five areas are:

- Groundwater in the channel fill deposits near the west boundary of the site near monitoring well GE-15;
- Groundwater in the glaciolacustrine deposits near the west boundary of the site near monitoring well GE-10;
- Groundwater in the channel fill deposits near the northeast boundary of the site near monitoring well cluster GE-218;
- Groundwater in the fill and floodplain deposits near the northeast boundary of the site near monitoring well GE-217M; and
- Groundwater in the fill and floodplain deposits and channel fill deposits along the north boundary of the site near the WWTP and Building 273.

As discussed in Appendix G of the *RI Report*, natural attenuation is degrading the chlorinated VOCs in these areas. While elevated levels of VOCs have been found in some soil in these areas, no specific source of the chlorinated VOCs, such as free-product or a large mass of contaminated soil, has been found. Currently, the groundwater downgradient of these areas is not used and based on the current land uses, no future use of the groundwater is anticipated. For each of these areas, the primary receptor of concern is the Mohawk River. As documented in the *RI Report*, the Mohawk River has not been impacted by site activities.

6.3.9.1 Technology Screening

The technologies that passed the initial technology screening for groundwater in section 6.2.2.2 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Asphalt Cover
- Asphalt Cap
- Agronomic Cover
- Caps
- Groundwater Collection
- Monitored Natural Attenuation of Groundwater
- Air Sparging
- Soil Vapor Extraction
- Enhanced In-Situ Anaerobic Biodegradation
- Groundwater Stripping Wells
- Permeable Reactive Barriers
- Groundwater Treatment

As discussed in Section 6.2.2.2, asphalt cover, asphalt caps, agronomic cover, and caps are suitable for areas where a source, such as a sizable mass of contaminated soil, has been identified and groundwater can be protected by reducing infiltration through the impacted soil or migration of contaminants can be limited by preventing groundwater recharge. The RI did not identify a source area at or immediately upgradient of GE-10, GE-15, GE-217M, or GE-218D. Measures to address the source areas upgradient of the northern site boundary were discussed in Section 6.3.1. Since the impacted groundwater near the site boundaries is within the channel fill or glaciolacustrine deposits, placement of a cover or cap system over the areas to prevent groundwater recharge would have no effect on reducing migration. Therefore, asphalt cover, asphalt caps, agronomic cover, and caps will not be considered for these areas.

As discussed in Section 6.2.2.2, air sparging and soil vapor extraction are suitable for shallow groundwater, but not for the deeper groundwater. In addition, groundwater stripping wells are suitable for deep groundwater, but would not be suitable for treatment of shallow groundwater. Air sparging in conjunction with soil vapor extraction and groundwater stripping wells are similar technologies in which oxygen is used to volatilize contaminants and a vacuum is applied to collect the vapors. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a comparison at the design stage would evaluate whether air sparging with soil vapor extraction or groundwater stripping wells were most cost-effective for specific areas at the site. Therefore, in this preliminary evaluation, groundwater stripping wells will be evaluated to represent this class of technologies.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.2, groundwater monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media such as groundwater or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

6.3.9.2 Preliminary Alternative Screening

The following five technologies or classes of technologies passed the technology screening for use for areas where groundwater with elevated concentrations of VOCs has been found near site boundaries and will be incorporated into preliminary area alternatives for evaluation:

- Groundwater Collection and Groundwater Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Groundwater collection wells or trenches are usually installed near the downgradient side of an area of impacted groundwater to hydraulically contain the impacted groundwater. The wells or trenches are outfitted with pumps and control systems to lower the water table and create a hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a groundwater treatment system designed to remove the contaminants of concern.

- Monitored Natural Attenuation – During monitored natural attenuation, processes such as volatilization, biodegradation, and dispersion that are occurring in the subsurface are allowed to attenuate contaminants, such as VOCs. Biodegradation occurs when existing microorganisms within the soil breakdown contaminants to less complex and less hazardous compounds. Groundwater is usually sampled several times a year to monitor and document the degradation of contaminants.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations.

Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it recirculates. This approach results in a treatment zone within which contact between the impacted groundwater and amendments is maximized. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

- Groundwater Stripping Wells – This technology uses air to vaporize volatile and semi-volatile contaminants by aerating the groundwater within specially configured groundwater wells. The exact configuration of the wells depends on whether the aquifer is unconfined or confined. A vapor extraction system is frequently used in conjunction with stripping wells to collect volatilized contaminants.

- Permeable Reactive Barriers – This technology is a passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material that degrades, sorbs, precipitates, or removes chlorinated solvents, metals, radionuclides, and other contaminants. Reactive barriers are installed perpendicular to the flow path of the plume and can be permanent, semi-permanent, or replaceable units. Iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.9.2.1 Implementability

Monitored natural attenuation would be the easiest of the technologies to implement since there are no components to be installed unless additional monitoring wells were needed. Enhanced in-situ anaerobic biodegradation would be fairly easy to construct because it involves injecting amendments into the subsurface periodically over the life of the remedy or constructing a permeable reactive barrier designed to last the lifetime of the remedy. The configuration, injection points or permeable reactive barrier, is usually determined during the design phase and depends on desired depth of the treatment zone and which approach is more cost-effective to implement. If a recirculation system were selected, design, construction, and implementation would be more complicated.

Constructing a permeable reactive barrier would be fairly easy to most depths using a biopolymer slurry trench and has been successfully implemented for other remediation projects. An iron PRB would be more complicated to implement than monitored natural attenuation or directly injected enhanced in-situ anaerobic biodegradation.

While groundwater collection wells and groundwater treatment systems are straightforward to construct and are frequently used at sites with impacted groundwater, this remedial approach would be more complicated to implement than monitored natural attenuation and enhanced in-situ anaerobic biodegradation. Groundwater stripping wells would be approximately as difficult to implement as groundwater collection and treatment.

6.3.9.2.2 Effectiveness

As discussed previously, the *RI Report* documented that natural attenuation (anaerobic biodegradation) is currently degrading chlorinated ethenes at the site. Therefore, this technology could be expected to continue to reduce concentrations of chlorinated VOCs. However, concentrations of chlorinated VOCs in groundwater near the site boundaries are not likely to be reduced to NYSDEC's groundwater standards for several years.

Addition of amendments (enhanced in-situ biodegradation) would increase the rate of anaerobic biodegradation that is currently occurring. This would reduce the amount of time required to reduce chlorinated VOC concentrations near the site boundaries to NYSDEC's groundwater standards. Based upon the results of laboratory bench tests conducted by GE Global Research on site soil and groundwater, enhanced in-situ anaerobic biodegradation will result in complete degradation of the chlorinated VOCs.

Groundwater collection and treatment is considered a presumptive remedy because groundwater collection is effective at containing impacted groundwater and groundwater treatment is effective at reducing the mass of contaminants in groundwater by transferring the contaminants to treatment media. Depending on the groundwater treatment system design, groundwater treatment may destroy contaminants or produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility.

Groundwater stripping wells have been used effectively at other sites with similar concentrations of VOCs to reduce the mass of contaminants in groundwater. Depending on whether the collected gases require treatment prior to discharge, this technology may destroy contaminants, produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility, or transfer the contaminants to the atmosphere. However, near monitoring well GE-10, impacted groundwater is located in the fairly impermeable glaciolacustrine deposits. Because groundwater stripping wells (or air sparging with soil vapor extraction) require fairly permeable soils, this technology would not be effective at treating groundwater near monitoring well GE-10.

Zero valent iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants. The effectiveness of PRBs is dependent upon having a thorough understanding of contaminant boundaries, contaminant composition and mass, and site hydrogeology. A properly designed permeable reactive barrier would be expected to reduce concentrations of contaminants in impacted groundwater to meet NYSDEC's groundwater standards.

As documented in the *RI Report*, the Mohawk River, which is the potential downgradient receptor for these FS Areas, has not been impacted by site activities. Therefore, neither enhanced in-situ biodegradation, groundwater collection and treatment, groundwater stripping wells, nor permeable reactive barriers would provide any additional benefit to the downgradient receptor, the Mohawk River.

6.3.9.2.3 Cost

Implementation of natural attenuation would not require any capital costs because there are no components to construct unless additional monitoring wells were needed. In addition, there would be no operation and maintenance costs associated with this alternative, beyond the costs to monitor groundwater.

The cost associated with implementing enhanced in-situ biodegradation would include the cost of the amendments and the labor to place or install the amendments. If amendments were injected, multiple rounds of amendment injections would likely be necessary to completely reduce the chlorinated VOCs. If amendments were placed in a trench to form a barrier, the barrier could be designed to last over the lifetime of the remedy. There would be no operation and maintenance costs associated with this alternative, beyond the cost to monitor groundwater. If a recirculating system were installed, the capital costs would increase and the operation and maintenance costs would include routine system maintenance and power to run the system.

Groundwater collection and treatment would have substantially higher capital and operational costs. The capital costs associated with implementing this alternative would include installation of wells and pumps, plumbing, and the construction of water treatment plant. Operation and maintenance expenses would include electricity, maintenance of the collection and treatment systems, and replacement and disposal of worn parts and spent treatment components, such as carbon. The annual cost for groundwater monitoring would be less than the other alternatives because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative.

Groundwater stripping wells would also have high capital and operational costs. The capital costs associated with implementing this alternative would include installation of the wells, air and vacuum systems, and plumbing. Operation and maintenance expenses would include electricity, maintenance of the air and vacuum systems, and replacement of worn parts. Like groundwater collection and treatment, the annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative. The capital and operational and maintenance costs for groundwater stripping wells would likely be slightly lower than costs related to groundwater collection and treatment.

The cost associated with constructing a permeable reactive barrier would include the cost of the reactive material (most commonly iron), the materials used to create the biopolymer slurry for the trench, and the disposal and dewatering of soils excavated to construct the barrier. There would be no operation and maintenance costs beyond the costs associated with monitoring groundwater. The cost capital costs to construct a PRB out of iron would be comparable to the capital costs to implement enhanced in-situ bioremediation.

6.3.9.3 Summary and Conclusion

The results of the screening of these preliminary alternatives are summarized in Table 6-7. All five alternatives for the VOC-impacted channel fill groundwater near the site boundaries would eventually reduce concentrations of chlorinated VOCs to NYSDEC's groundwater standards. Natural attenuation will be included in a site-wide containment alternative.

Because enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, groundwater stripping wells, and permeable reactive barriers are treatment technologies, they will only be considered for inclusion in the site-wide treatment alternatives. As discussed previously, the *RI Report* documented that the Mohawk River, which is immediately downgradient of the groundwater along the north site boundary, has not been impacted by site activities. There are no other current or reasonably anticipated future groundwater uses in this area. Thus, the costs to implement treatment type remedial measures in this area are not justified because they will provide no additional protection of human health or the environment.

However, a supplemental benefit of implementing one of the remedial measures would be avoiding the need for implementing institutional controls to restrict the use of groundwater at downgradient off-site properties. Therefore, enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, groundwater stripping wells, and permeable reactive barriers will be considered for inclusion in the site-wide treatment alternatives.

For the GE-10 area, monitored natural attenuation will be included in the site-wide treatment and containment alternatives for the reasons discussed below. The groundwater near monitoring well GE-10 has a total VOC concentration of 6.91 μg/L and is comprised of DCE (4.46 μg/L, NYSDEC groundwater standard of 5 μg/L) and vinyl chloride (2.45 μg/L, NYSDEC groundwater standard of 2 μg/L). As discussed in Appendix G of the *RI Report*, the presence of vinyl chloride in site groundwater indicates that natural attenuation is occurring. Because the groundwater in this area is within the less permeable glaciolacustrine deposits, remedial methods, which rely on introduction of air to the subsurface, would have minimal benefit. Therefore, because the contaminant levels at this area are very low, and natural attenuation is documented to be occurring, monitored natural attenuation will be included for the GE-10 area in the site-wide treatment and containment alternatives.

6.3.10 Product Areas

As discussed in Section 4.1.3, there are seven areas at Main Plant where light non-aqueous phase product (LNAPL) has been encountered that will be addressed in this FS. These areas and the type and thickness of product in each are:

- Former IMPS Area where up to 0.11 feet of LNAPL was found in the northern portion of the former IMPS Area. Two types of LNAPL have been found in this area. One LNAPL, which was comprised of gasoline with detectable concentrations of PCBs of 79 mg/kg, was found in an area that was excavated to install a scale for the railroad tracks. The other LNAPL, which was comprised of mineral oil with no detection of PCBs, was also found in the northern portion of the IMPS Area.

- Former Binnie Kill Channel west of Building 273 where up to 1.06 feet of LNAPL was found. The LNAPL was identified as #4 fuel oil and diesel fuel with detectable concentrations of PCBs up to 145 mg/kg.

- City Water Main IRM Area where LNAPL was found in 1997 in the trench being excavated for the new water main. The LNAPL, which was typed as weathered gasoline, was found in an approximately 200 feet long area. As discussed in Section 3.4.1.12, CT Male initiated an IRM in 1998 to prevent LNAPL from coming in contact with the new water main. The IRM included lining the utility trench with geofabric. During construction of the IRM, a total of 2,505 tons of impacted soil and 100,000 gallons of groundwater were removed and properly disposed. Since initiating the IRM, GE has attempted to recover LNAPL. Monitoring of the area continues and no measurable product has been found to date.

- Building 49/53 Area where up to 0.38 feet of LNAPL has been found. In 1991, the LNAPL from this area was identified as fuel oil with 16 mg/kg of PCBs. In December 2000, GE aggressively purged monitoring wells in the area in which product has consistently been detected. Following the purging event, LNAPL was only seen in two wells. LNAPL has also been found in the two newly installed monitoring wells.

- Southwest portion of the former East Landfill where up to 0.07 feet of LNAPL was found north of the landfill access bridge. This LNAPL is comprised of lubricants, oil, fuel oil, and gasoline with detectable concentrations of PCBs of 4.7 mg/kg.

- Former Chip Pad Area where up to 0.5 feet of LNAPL was found. This LNAPL is comprised of lubricating oil with detectable concentrations of PCBs of 288 mg/kg.

- Former Stark Oil Facility where up to 0.04 feet of LNAPL has currently been found.

For the two areas in the former East Landfill, the southwest portion and the area north of the former Chip Pad, the primary downgradient receptor is the Poentic Kill and the secondary downgradient receptor is the groundwater in the channel fill deposits, which is the main water bearing unit at the site. For the remaining areas, the primary downgradient receptor is the groundwater in the channel fill deposits.

The technologies that passed the initial technology screening for groundwater in section 6.2.2.2 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Source Removal of LNAPL
- Dual-Phase Soil Vapor Extraction

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

As discussed in Section 6.2.2.2, product recovery in the form of pumps, hand bailing from wells, vacuum recovery systems, bioslurping, and vacuum trucks have proven effective for removing free-product at the Main Plant and other sites. GE has effectively used vacuum trucks for fluid recovery at the site recently. Therefore, product recovery will be incorporated into site-wide treatment alternatives.

As discussed in Section 6.2.2.2, dual-phase soil vapor extraction (DP SVE), which could be considered a subset of product recovery, would be suitable only for areas where product and groundwater is in the fill deposits. However, in several of the product areas the impacted groundwater and product are found in the low permeability floodplain deposits, thus making recovery very difficult. Although DP SVE may be suitable for some areas, because DP SVE is similar to product recovery, its selection for a specific area is better deferred to the design stage.

6.3.11 Remaining Groundwater with Compounds that are Above NYSDEC Groundwater Standards

As discussed in Section 4.1.2, groundwater at the site in both the fill and floodplain deposits and the channel fill deposits has been impacted by past site activities. In Sections 6.3.6 through 6.3.10, appropriate technologies were discussed and preliminary alternatives formulated for specific areas of the site. In this section, the discussion of appropriate technologies and screening of preliminary alternatives will focus on the remaining groundwater at the site that has compounds detected at concentrations above NYSDEC's groundwater standards. The remaining areas, which were not discussed in preceding sections, are areas where groundwater samples collected from the fill, floodplain, channel fill, or glaciolacustrine deposits contain concentrations of VOCs, SVOCs, or PCBs greater than NYSDEC's groundwater standards.

For some of these locations the immediate downgradient receptor is the groundwater in the channel fill deposits, which are the primary water-bearing unit beneath the site. In all cases, the Mohawk River is the ultimate receptor.

6.3.11.1 Technology Screening

The technologies that passed the initial technology screening for groundwater in section 6.2.2.2 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Groundwater Monitoring
- Asphalt Cover
- Asphalt Caps
- Groundwater Collection
- Monitored Natural Attenuation of Groundwater
- Air Sparging
- Soil Vapor Extraction
- Enhanced In-Situ Aerobic and Anaerobic Biodegradation
- Groundwater Stripping Wells
- Permeable Reactive Barriers
- Groundwater Treatment
- Dual-Phase Soil Vapor Extraction

As discussed in Section 6.2.2.2, asphalt cover and asphalt caps are suitable for areas where a source, such as a sizable mass of contaminated soil, has been identified and groundwater can be protected by reducing infiltration through the impacted soil, or migration of contaminants can be limited by preventing groundwater recharge. The RI identified the principal source areas at Main Plant as the former Wire Mill Area and the former Propeller Test Building Area. Measures to address the source areas were discussed in Section 6.3.1. Since the impacted groundwater is not associated with a mass of contaminated soil, asphalt cover and asphalt caps will not be considered for the remaining areas where concentrations of compounds have been detected above NYSDEC's groundwater standards.

As discussed in Section 6.2.2.2, air sparging, soil vapor extraction, and dual-phase soil vapor extraction are suitable for shallow groundwater, but not for the deeper groundwater. In addition, groundwater stripping wells are suitable for deep groundwater, but would not be suitable for treatment of shallow groundwater.

Air sparging in conjunction with soil vapor extraction and groundwater stripping wells are similar technologies in which oxygen is used to volatilize contaminants and a vacuum is applied to collect the vapors. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and installation costs. If this technology were selected for use at Main Plant, a cost comparison at the design stage would evaluate whether air sparging with soil vapor extraction or groundwater stripping wells are most cost-effective for specific areas at the site. Therefore, in this preliminary evaluation, groundwater stripping wells will be evaluated.

In addition, dual-phase soil vapor extraction is similar to air sparging with soil vapor extraction. Because dual-phase soil vapor extraction would be appropriate for limited areas of Main Plant, this technology will not be evaluated separately in this preliminary evaluation. For areas of shallow impacts at which stripping wells pass this preliminary evaluation, the use of dual-phase soil vapor extraction will be considered in the design stage instead of air sparging with soil vapor extraction.

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.2, groundwater monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

As discussed in Section 6.2.2.2, institutional controls, such as land use and access restrictions, can effectively reduce the potential for human exposure to contaminated media or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected.

6.3.11.2 Preliminary Alternative Screening

The following five technologies or classes of technologies passed the technology screening for use on remaining groundwater that is above NYSDEC's groundwater standards and will be incorporated into preliminary area alternatives for evaluation:

- Groundwater Collection and Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for use at Main Plant, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Groundwater collection wells or groundwater collection trenches are usually installed near the downgradient side of an area of impacted groundwater to hydraulically contain the impacted groundwater. The wells or trenches are outfitted with pumps and control systems that lower the water table to create a hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a groundwater treatment system designed to remove the contaminants of concern.

- Monitored Natural Attenuation of Groundwater – During monitored natural attenuation, processes such as volatilization, biodegradation, and dispersion that are occurring in the subsurface are allowed to attenuate contaminants, such as VOCs. Biodegradation occurs when existing microorganisms within the soil breakdown the contaminants to less complex and less hazardous compounds. Groundwater is usually sampled several times a year to monitor and document the degradation of contaminants.

- Enhanced In-Situ Anaerobic Biodegradation – This technology is generally employed at sites where there is on-going anaerobic biodegradation. By adding amendments, such as a source of carbon, a more favorable environment is created for the microorganisms and degradation of contaminants occurs more rapidly. As discussed in Section 6.2.2.2, amendments can be added to the subsurface using different application methods and different configurations. Commonly, amendments are directly injected into the subsurface throughout the source area. This approach frequently requires a series of injections before high concentrations of contaminants are completely degraded. Another approach is placing amendments immediately downgradient of the source area to form a treatment zone or permeable reactive barrier through which the impacted groundwater passes. Placement can be accomplished by directly injecting amendments in a tightly spaced pattern of rows perpendicular to groundwater flow, or by excavating a trench perpendicular to groundwater flow and filling it with amendments. An alternate approach is to combine the addition of amendments with a groundwater recirculating system. A groundwater recirculating system, such as groundwater recirculating wells or extraction and injection wells, is installed within the source area to contain impacted groundwater. With this approach, amendments are added by direct injection into the subsurface or by metering them into the groundwater as it re-circulates. This approach results in a treatment zone within which contact between the impacted groundwater and amendments is maximized. The configuration, injection points, permeable reactive barrier, or recirculation system, in addition to the type of amendments, is determined during the design phase.

- Groundwater Stripping Wells – This technology uses air to vaporize volatile and semi-volatile contaminants by aerating the groundwater within specially configured groundwater wells. The exact configuration of the wells depends on whether the aquifer is unconfined or confined. A vapor extraction system is frequently used in conjunction with stripping wells to collect volatilized contaminants.

- Permeable Reactive Barriers – This technology is a passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material that degrades, sorbs, precipitates, or removes chlorinated solvents, metals, radionuclides, and other contaminants. Reactive barriers are installed perpendicular to the flow path of the plume and can be permanent, semi-permanent, or replaceable units. Iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.11.2.1 Implementability

Monitored natural attenuation would be the easiest of the technologies to implement since there are no components to be installed unless additional monitoring wells are needed. Enhanced in-situ anaerobic biodegradation would be fairly easy to construct because it involves injecting amendments into the subsurface periodically over the life of the remedy or constructing a permeable reactive barrier designed to last the lifetime of the remedy. The configuration, injection points or permeable reactive barrier, is usually determined during the design phase and depends on desired depth of the treatment zone and which approach is more cost-effective to implement. If a recirculation system were selected, design, construction, and implementation would be more complicated.

Constructing a permeable reactive barrier would be fairly easy to most depths using a biopolymer slurry trench and has been successfully implemented for other remediation projects. An iron PRB would be more complicated to implement than monitored natural attenuation or directly injected enhanced in-situ anaerobic biodegradation.

While groundwater collection wells and treatment systems are straightforward to construct and are frequently used at sites with impacted groundwater, this remedial approach would be more complicated to implement than monitored natural attenuation and enhanced in-situ anaerobic biodegradation. Groundwater stripping wells would be approximately as difficult to implement as groundwater collection and treatment.

6.3.11.2.2 Effectiveness

As discussed previously, the *RI Report* documented that natural attenuation (anaerobic biodegradation) is currently degrading chlorinated ethenes at the site. In addition, VOCs and SVOCs throughout the site are attenuating. Therefore, this technology could be expected to continue to reduce concentrations of VOCs and SVOCs. Concentrations of VOCs and SVOCs in groundwater are likely to be reduced to NYSDEC's groundwater standards, but this will take many years.

Addition of amendments (enhanced in-situ biodegradation) would increase the rate of biodegradation that is currently occurring. This would reduce the amount of time required to reduce VOC concentrations at the site boundaries to NYSDEC's groundwater standards. Enhanced in-situ anaerobic biodegradation would result in permanent reduction of contaminants.

Groundwater collection and treatment has been considered a presumptive remedy for years because groundwater collection is effective in preventing migration of contaminants and groundwater treatment is effective at reducing the mass of contaminants in groundwater by transferring the contaminants to treatment media. Depending on the treatment system, groundwater treatment may destroy contaminants or produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility.

Groundwater stripping wells have been used effectively at other sites with similar concentrations of VOCs to reduce the mass of contaminants in groundwater. Depending on whether the collected gases require treatment prior to discharge, this technology may destroy contaminants, produce a smaller volume of more concentrated contaminants that would be disposed at a properly licensed facility, or transfer the contaminants to the atmosphere.

Zero valent iron is the most commonly used reactive material in PRBs and has been effectively used in full-scale remediation projects to degrade, sorb, precipitate, and remove chlorinated solvents, metals, radionuclides, and other contaminants. The effectiveness of PRBs is dependent upon having a thorough understanding of contaminant boundaries, contaminant composition and mass, and site hydrogeology. A properly designed permeable reactive barrier would be expected to reduce concentrations of contaminants in impacted groundwater to meet NYSDEC's groundwater standards.

As documented in the *RI Report*, the Mohawk River, which is the potential downgradient receptor, has not been impacted by site activities. Therefore, neither enhanced in-situ biodegradation, groundwater collection and treatment, groundwater stripping wells, nor permeable reactive barriers would provide any additional benefit to the Mohawk River.

6.3.11.2.3 Cost

No capital costs would be incurred to implement natural attenuation because there are no components to construct unless additional monitoring wells were needed. In addition, there would be no operation and maintenance costs associated with this alternative, beyond the costs to monitor groundwater.

The cost associated with implementing enhanced in-situ biodegradation would include the cost of the amendments and the labor to place or install the amendments in many areas throughout the site. If amendments were injected, multiple rounds of amendment injections would be necessary to completely reduce the chlorinated VOCs. If amendments were placed in the form of a reactive barrier through trenching, the barrier could be designed to last the over the lifetime of the remedy. There would be no operation and maintenance costs associated with this alternative, beyond the cost to monitor groundwater. If a recirculating system were installed, the capital costs would increase and the operation and maintenance costs would include routine system maintenance and power to run the system.

Groundwater collection and treatment would have substantially higher capital and operational costs. The capital costs associated with implementing this alternative would include installation of wells and pumps at many locations throughout the site, extensive plumbing connections across much of the site, and the construction of a water treatment plant. Operation and maintenance expenses would include electricity, maintenance of the collection and treatment systems, and replacement and disposal of worn parts and spent treatment components, such as carbon. The annual cost for groundwater monitoring would be less than the other alternatives because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative.

Groundwater stripping wells would also have high capital and operational costs. The capital costs associated with implementing this alternative would include installation of the wells, air and vacuum systems, and plumbing at many locations throughout the site. Operation and maintenance expenses would include electricity, maintenance of the air and vacuum systems, and replacement of worn parts. Like groundwater collection and treatment, the annual cost for groundwater monitoring would be less than natural attenuation and enhanced in-situ biodegradation because the monitoring would include less parameters. However, this savings would not be substantial enough to outweigh the other operation and maintenance costs associated with this alternative. The capital and operational and maintenance costs for groundwater stripping wells would likely be slightly lower than costs related to groundwater collection and treatment.

The cost associated with constructing a permeable reactive barrier would include the cost of the reactive material (most commonly iron), the materials used to create the biopolymer slurry for the trench, and the disposal and dewatering of soils excavated to construct the barrier. There would be no operation and maintenance costs beyond the costs associated with monitoring groundwater. The cost capital costs to construct a PRB out of iron would be comparable to the capital costs to implement enhanced in-situ bioremediation.

6.3.11.3 Summary and Conclusions

The preliminary screening of these alternative is summarized in Table 6-7. All five alternatives for the remaining groundwater that is above NYSDEC's groundwater standards would eventually reduce concentrations of VOCs and SVOCs to or below NYSDEC's groundwater standards. Natural attenuation will be included in a site-wide containment alternative.

Because enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, groundwater stripping wells, and permeable reactive barriers are treatment technologies, under certain conditions they would be considered for inclusion in the site-wide treatment alternatives. However, as discussed previously, the *RI Report* documented that the Mohawk River, which is the primary receptor of concern, has not been impacted by site activities. Thus, the additional cost for implementation of these treatment remedial measures in these areas is not warranted because they would not provide additional benefits. Therefore, enhanced in-situ anaerobic biodegradation, groundwater collection and treatment, groundwater stripping wells, and permeable reactive barriers will not be included in the site-wide treatment alternatives.

6.3.12 Seeps

As discussed in Section 4.1.6, eight seep areas have been identified along the west and north boundaries of the former East Landfill Area. The seeps are a result of perched water in the former East Landfill Area migrating toward the Poentic Kill. Technologies for the former East Landfill Area are evaluated in Section 6.3.4 and technologies for the shallow groundwater in the former East Landfill Area are evaluated in Section 6.3.8.

Seeps 1, 5 and 7 are low flow and occur intermittently. The Seep 1 Area has been dry since completion of the streambank armoring project in September 2001. As discussed in Section 3.4.1.8, the streambank armoring project included the planting of hundreds of deep-rooted willows and poplars near the seep area. Seeps 2 through 4 are the subject of an on-going IRM (Section 3.4.2.4).

The primary receptor of concern for the seeps is the Poentic Kill. The seep water samples at the site have detectable concentrations of PCBs, VOCs, and metals that are above their respective NYSDEC groundwater standards.

6.3.12.1 Technology Screening

The technologies that passed the initial technology screening for groundwater in section 6.2.2.3 and may be suitable for these areas include:

- No-action
- Land Use and Access Restrictions
- Monitoring
- Agronomic Cover
- Caps
- Collection and Treatment of Seep Water
- Groundwater Collection

Because the site-wide alternatives will be formulated to correspond to the general response actions (GRAs), which were discussed in Section 6.1, the no-action technology will be carried forward without evaluation.

As discussed in Section 6.2.2.3, monitoring is frequently used to monitor the effectiveness of the selected groundwater remedial technology. Therefore, this technology will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected to address the seeps.

As discussed in Section 6.2.2.3, institutional controls, such as land use and access restrictions, can reduce the potential for human exposure to contaminated media or prevent disruption of remedial systems. Therefore, land use and access restrictions will be included in every site-wide alternative except the no-action alternative, regardless of the technology selected to address the seeps.

6.3.12.2 Preliminary Alternative Screening

The following four technologies or classes of technologies passed the technology screening for the seep areas along the Poentic Kill and will be incorporated into preliminary area alternatives for evaluation:

- Agronomic Cover – An agronomic cover is an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation, to encourage evaporation and transpiration, and is an alternative to traditional landfill cover systems. The agronomic cover system consists of a soil layer and plants that have low water use efficiency. This means they produce small amounts of biomass per unit of water transpired, and are therefore high water consumers. These features encourage water retention in the near-surface soil environment and uptake of this stored water by plants. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone.

- Caps – Caps are usually used to protect groundwater quality by limiting the infiltration of precipitation and run-off and are used to cover waste. Caps are generally constructed of a low permeability liner in conjunction with a drainage layer and a soil cover capable of supporting vegetation.

- Collection and Treatment of Seep Water – Collection of seep water can be achieved by providing a preferential path from areas of seepage to sump locations. The seep water may be pumped or passively collected from the sumps before being treated and discharged. The ease of implementation of seep collection systems depends upon site conditions.

- Groundwater Collection and Treatment – Groundwater collection wells and groundwater collection trenches are similar types of technologies, and they are generally applied in conjunction with groundwater treatment. In choosing between these two technologies, the primary factor in applying one or the other is dependent on the depth of the impacted water and comparative cost for installation. If this technology were selected for controlling the seeps, a cost evaluation at the design stage would determine whether collection wells or trenches are most cost-effective for specific areas at the site. Therefore, in this preliminary evaluation groundwater collection wells will be evaluated. Groundwater collection wells or groundwater collection trenches are usually installed near the downgradient side of an area of impacted groundwater in order to hydraulically contain the impacted groundwater within a certain boundary. The wells or trenches are outfitted with pumps and control systems that lower the water table to create a hydraulic barrier. The recovered groundwater is conveyed through a network of pipes to a treatment system designed to remove the contaminants of concern.

Each of these technologies would be paired with institutional controls and groundwater monitoring. At the conclusion of this preliminary evaluation, appropriate technologies will be selected for inclusion in site-wide containment and treatment alternatives.

6.3.12.2.1 Implementability

An agronomic cover would be fairly easy to construct, however care would need to be taken to minimize disruption to the habitat areas during construction. Placement of a cap over the former East Landfill Area would be straightforward, but would result in destruction of the habitat area. In order to meet minimum sloping requirements, a great deal of fill material would need to be imported to the site.

Groundwater collection wells and groundwater or seep water collection trenches are fairly straightforward to construct. Construction of trenches into the water table can be challenging, however the depth required to intercept groundwater or seep water is feasible. Care would need to be taken to minimize disruption to the habitat areas during construction.

6.3.12.2.2 Effectiveness

An agronomic cover would help to prevent infiltration of precipitation into the former landfill area, thus reducing the quantity of perched water and thereby reducing the volume of groundwater that manifests as seeps. Planting of willows and poplars, inefficient water using species typically used in agronomic covers, upgradient of the Seep 1 Area has been effective in stopping seepage in this area. Dense plantings of willow and poplar trees above Seeps 5 and 7 would be expected to prevent seepage in these areas. Additionally, an agronomic cover would enhance the surrounding habitats.

Capping is the presumptive remedy for landfills. Caps have proven to be effective at preventing infiltration, and thus reducing leachate production. However, construction of a traditional landfill cap would result in complete destruction of the habitat area.

Collection and treatment of seep water is currently being used at Main Plant for the Seep 2 through 4 Area and has proven effective. Overland flow from these seeps is being collected in a trench. The water is then treated prior to being discharged to the Poentic Kill.

Groundwater collection and treatment has proven to be an effective remedy at many sites. For the seep areas at Main Plant, intercepting groundwater flow with collection wells or trenches could be effective in preventing seepage. This technology would be minimally disruptive to the surrounding habitat area.

6.3.12.2.3 Cost

An agronomic cover would be considerably less expensive to construct than a traditional landfill cap. While planting of individual trees is labor intensive, it is substantially lower in capital cost than construction of a traditional landfill cap. In addition, operation and maintenance costs for agronomic cover would be less than those associated with a traditional cap, because an agronomic cover would be largely self-sustaining, while a traditional cap would require regular mowing.

Collection and treatment of seep water would have lower capital and operation and maintenance costs than groundwater collection and treatment because a collection system designed to collect seepage would be handling a much smaller volume of water than a system designed to intercept groundwater.

6.3.12.3 Summary and Conclusions

The results of the evaluation of preliminary alternatives for the seeps is summarized in Table 6-8. An agronomic cover would reduce infiltration and, if dense plantings were designed for areas immediately upgradient of the seeps, an agronomic cover could be expected to reduce or stop the seepage. If used in conjunction with seep collection and treatment for the higher flowing seeps, Seeps 2 through 4, 6, and 8, the operational cost associated with seep collection and treatment could be substantially reduced. Agronomic cover in conjunction with seep collection and treatment will be included in site-wide treatment and containment alternatives.

Traditional landfill caps, in conjunction with groundwater collection and treatment, are presumptive remedies for landfills because they are effective at minimizing or preventing the migration of contaminants through seepage. Therefore, a traditional landfill cap in conjunction with groundwater collection and treatment will be included in one of the site-wide alternatives.

6.4 REMEDIAL ALTERNATIVE FORMULATION

In accordance with NYSDEC TAGM 4030, URS has bundled technologies together to form alternatives that reflect the general response scenarios. Alternative 1 is the no-action alternative, which will provide a baseline for comparing the other alternatives. Alternative 2 is the institutional control alternative. Alternative 3 is primarily a containment alternative. Alternatives 4, 5, and 6 provide a mixture of containment and treatment technologies. Although complete removal of wastes from the former landfills is inappropriate and impractical, targeted removal of wastes for off-site disposal is included in Alternatives 3 through 6.

In selecting the technologies that form the alternatives, URS considered the overall goal of protecting human health and the environment. As previously discussed, the HHRA indicated that the site does not pose a significant risk to human health. The SLERA indicated that while conditions in the western portion of the site, if left unabated, may pose a risk to site fauna, conditions at the site do not pose a risk to the site flora. Thus, the focus of the remedy selection for the Main Plant site is to maintain the no risk conditions for human health and site flora and to select technologies that will preserve and protect site habitats and abate potential risks to site fauna. Remedies have been selected for inclusion in the containment and treatment alternatives to address conditions that, if left uncontrolled, could pose a significant threat to human health and the environment.

Tables 6-9 through 6-12 provide a summary of the technologies that were not discarded during the preliminary screening in Section 6.3. For each technology we provide the reasoning behind its inclusion or exclusion from the various alternatives.

7.0 DESCRIPTION AND EVALUATION OF ALTERNATIVES

The first part of this section describes the criteria used to evaluate the remedial alternatives. The second part of this section describes and evaluates each of the remedial alternatives. The third part of this section compares the six remedial alternatives for the Main Plant site.

7.1 EVALUATION CRITERIA

The goal of the remedial action program selected for the site will be to eliminate significant threats to human health and the environment in accordance with Article 27 Title 13 of the ECL. This is the threshold criteria used to evaluate the six remedial alternatives and will be considered as each alternative is evaluated with respect to eight of the nine criteria outlined in the CERCLA RI/FS guidance document. The ninth CERCLA criteria, Support (State) Agency Acceptance, is not included because there is no support agency. The NYSDEC will be responsible for developing the Record of Decision (ROD) for the selected remedial action. The eight evaluation criteria are:

- Comparison with applicable or relevant and appropriate Federal Regulations (ARARs) and New York State Standards, Criteria, and Guidelines (SCGs)
- Overall protection of human health and the environment
- Short-term impacts and effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Community acceptance
- Cost

In addition, as required by GE's Order on Consent, the effect of each alternative on the Mohawk River, the Poenties Kill, the Poentic Kill, on-site groundwater, off-site groundwater, and the City of Schenectady and Town of Rotterdam municipal well fields are considered in the evaluation. As discussed in the *RI Report* and confirmed by numerous other reports, a natural groundwater divide separates the City of Schenectady and Town of Rotterdam municipal well fields from the Main Plant. The well fields remain isolated from activities at Main Plant regardless of the selected remedial alternative. As discussed in Section 2.0, the existing conditions at Main Plant do not pose a human health risk and are not adversely affecting site flora.

7.1.1 ARARs and SCGs

The evaluation of each alternative with regard to ARARs and SCGs focuses on the degree to which each alternative complies with the identified ARARs and SCGs to be applied at a site. According to the NYSDEC and USEPA guidance documents on preparing feasibility studies, ARARs and SCGs can be divided into these three categories:

- Chemical specific – which may be acceptable exposure limits for particular compounds that can be used to establish remediation goals;

- Location specific – which may set restrictions on activities within specific areas such as wetlands; and
- Action specific – which may set restrictions or controls on particular treatment activities.

As discussed in Section 2.0, the potential ARARs and SCGs are further grouped into these three categories based on their context:

- Regulations that establish numeric standards for media that can migrate from the site.
- Regulations that establish prescribed methods for certain actions.
- Guidance materials that provide objectives or procedures that are to be considered when evaluating the potential threat posed by conditions at a site.

Finally, the potential ARARs and SCGs will be consistent with the Order on Consent. The remainder of this section discusses the three categories and the specific ARARs and SCGs that have been identified for use in this *FS* to evaluate the effectiveness of the remedial alternatives for the site.

7.1.1.1 Chemical Specific

There are a limited number of chemical specific ARARs and SCGs for environmental media that have the potential to migrate from the site. They address:

- Groundwater quality standards;
- Surface water standards;
- Sediment standards; and
- Soil standards.

The remainder of this section describes the chemical specific SCGs that will be considered for each media at Main Plant.

Groundwater Standards

The NYSDEC's groundwater standards are regulatory-based ARARs and SCGs for dissolved contaminants in groundwater. Classifications of groundwater are provided in 6 NYCRR Part 701. The groundwater standards are provided in 6 NYCRR Part 703.

Surface Water Standards

The NYSDEC's surface water standards are ARARs and SCGs for dissolved contaminants. Classifications of surface waters are provided in 6 NYCRR Part 701. The surface water standards are provided in 6 NYCRR Part 703.

Sediment Standards

There are no regulatory-mandated cleanup criteria for sediments. However, there are values listed in the NYSDEC's Technical Guidance for Screening Contaminated Sediments. These guidance values will be used to evaluate whether the site sediment poses a potential threat to human health and the environment. While these guidance values will be used in the FS assessment of alternatives, they may not represent the final cleanup levels for the site.

Soil Standards

The only regulatory-established soil standards that address constituents found at the site are the federal TSCA regulations that establish cleanup levels for PCB spill response actions. These TSCA cleanup standards do not apply to releases that occurred prior to 1978. The PCBs found at the site are believed to be related to pre-1978 releases or activities. Therefore, only the disposal provisions of TSCA apply.

The RSCOs in the NYSDEC's Technical and Administrative Guidance Memorandum Number 4046 (TAGM 4046) will be used to evaluate whether the site soil poses a potential threat to human health and the environment. As discussed in the previous sections of this *FS*, the RSCOs have been used to identify areas to be evaluated for potential remedial actions. Based on discussions with NYSDEC, the RSCOs for locations where PCBs were previously detected above 1 mg/kg for surface soil and 10 mg/kg for subsurface will be used as cleanup goals for the site.

7.1.1.2 Location Specific

Location specific ARARs are generally regulatory based and apply to specific locations such as wetlands and floodplains. Some location specific ARARs may be appropriate for setting remedial cleanup goals and others specify requirements for protection of an environment during implementation of certain types of projects (i.e. excavation). The ARARs and SCGs that will be used during the evaluation of alternatives include:

- USACE Wetlands Executive Order 11990 – Protection of Wetlands
- USACE Wetlands Executive Order 11988 – Floodplain Management
- 6NYCRR Part 608 – Use and Protection of Waters

For some of the alternatives, implementation may require special measures. For example, any work adjacent to or in a wetland will be subject to the Protection of Wetlands Executive Order. For evaluating the performance of the alternatives in this *FS*, URS will consider the USACE Wetlands Executive Order 11990. This Executive Order calls for the minimization of adverse impacts to wetlands.

7.1.1.3 Action Specific

Action Specific ARARs and SCGs include regulations and guidance documents that apply to some particular aspects of remedial response. For example, a remedial action that includes an SVE system would need to comply with both air and water discharge requirements. The action specific ARARs and SCGs that will be used during the evaluation of the remedial alternatives include:

- Article 27, Title 13 of the ECL
- 6 NYCRR Part 375 – Inactive Hazardous Waste Disposal Sites
- 6 NYCRR Part 257 – Air Quality Standards
- TOGS 1.3.2 – Toxicity Testing in the SPDES Permit Program
- TAGM HWR-89-4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites
- 6 NYCRR Part 360 – Solid Waste Management Facilities
- 6 NYCRR Part 370-373 – Hazardous Waste Generated Disposal

For some of the alternatives, implementation may require special measures. For example, the New York State Department of Health (NYSDOH) may require a Community Air Monitoring Plan (CAMP) be developed prior to construction activities.

In addition, NYCRR Part 360 will be considered during the alternative evaluation, even though this regulation is not directly applicable to Main Plant. The intent of Part 360 is to protect human health and the environment through containment of wastes. Specifically, the goal of Part 360 is to prevent direct contact with wastes, mobilization of wastes through erosion or other mechanisms, and to protect groundwater by reducing or containing leachate. Each alternative will be compared to the intent and goal of Part 360 in order to evaluate if the remedial actions in the alternative provide appropriate protection of human health and the environment.

The identification of particular ARARs and SCGs depends on the site and actions considered in each alternative. After an alternative is selected, meeting the identified ARARs will be an integral part of designing and implementing the selected alternative.

7.1.2 Overall Protection of Public Health and the Environment

The evaluation of each alternative for the overall protection of human health and the environment is based on a combination of factors assessed under the other evaluation criteria. Most important are long-term effectiveness and permanence, short-term effectiveness, and comparison with SCGs. The evaluation focuses on how an alternative achieves protection over time and how site risks are reduced by eliminating, reducing, or controlling contaminated media. In accordance with CERCLA, the NCP, and USEPA Guidance, URS also considered the risks and adverse impacts on human health and the environment caused by the implementation of the remedial alternative.

7.1.3 Short-Term Effectiveness

The specific factors evaluated to assess each alternative's short-term effects on human health and the environment include:

- Risks to affected communities and environmental resources (both on- and off-site) during implementation of the alternative and the protection afforded by available mitigative measures;
- Potential adverse environmental impacts and the effectiveness of mitigative measures in reducing them;

- Time required to achieve remedial response objectives; and
- Potential impact on and protection of workers during remedial activities.

7.1.4 Long-Term Effectiveness

The long-term effectiveness and permanence of each alternative is evaluated by examining these four criteria:

- The permanence of the remedial alternative;
- Potential risks from residuals or untreated contaminants that remain on-site in the long-term. The risk is a function of contaminant volume and concentration, as well as the degree to which contaminants remain toxic or mobile;
- The adequacy, suitability, and long-term reliability of controls used to manage residuals and remaining untreated contaminants; and
- The potential for remediated media to be recontaminated.

7.1.5 Reduction of Toxicity, Mobility, and Volume

Each remedial alternative is evaluated in terms of its use of technologies that permanently and significantly reduce contaminant toxicity, mobility, and volume. The specific factors that URS evaluated include:

- The amount of hazardous material that will be destroyed or treated;
- The degree of expected reduction in toxicity, mobility, or volume of hazardous material;
- The degree to which the treatment will be irreversible; and
- The type and amount of residual material that will remain following treatment.

7.1.6 Implementability

The evaluation of the implementability of alternatives addresses their technical and administrative feasibility and the availability of various services and materials required during implementation. This evaluation includes these criteria:

Technical Feasibility

- The technical difficulty of construction and operation;
- The ability of the technology to meet specified process efficiencies or performance goals;
- The likelihood of unscheduled delays due to technical problems;
- The need to undertake additional remedial action; and
- The ease of monitoring the effectiveness of the alternative.

Administrative Feasibility

- The extent of activities needed to coordinate with other agencies, including local governmental authorities.

Availability of Services and Materials

- The availability of adequate treatment, storage, and disposal services;
- The availability of services and materials and the potential to obtain competitive bids; and
- The availability of required equipment, specialists, and operators without significant delay.

7.1.7 Community Acceptance

The proposed alternatives are evaluated in terms of the degree of public acceptance they are likely to receive. Factors taken into account in this evaluation include:

- Level of public awareness of the need for remediation and remediation methods;
- The perceived impact of the remedial system on the environment and public health;
- Aesthetic considerations, such as appearance, noise, transportation, and other activities during construction and during the remediation process; and
- Extent of impact on communities not near the remedial action.

7.1.8 Cost

The evaluation of the cost of each alternative will include the costs incurred to date for implemented and on-going remedial actions, as well as the present worth of the estimated costs for the additional actions proposed in each alternative.

The present worth of the proposed actions for each alternative has been estimated using a discount rate of five percent and a project life of 30 years. The estimated present worth includes the following costs:

- Direct capital costs, which include labor, equipment, materials, land and site development, buildings, services, relocation expenses, transportation, disposal, and contractor overhead and profit necessary to install remedial systems;

- Indirect capital costs, which include engineering, project management, permitting, licenses, legal fees, pilot and bench testing, startup and shakedown costs, inspections, and contingencies required to complete the installation of remedial systems; and

- Operation and management costs, which include annual post-construction costs such as labor, materials, utilities, equipment replacement, disposal, monitoring, sampling, and administration.

These cost estimates are intended to provide a basis for comparison between alternatives and should not be used for budgets or for financial planning.

7.2 REMEDIAL ALTERNATIVES

The six alternatives discussed and evaluated in this section are:

- Alternative 1: No further action, other than monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 2: Institutional controls with monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 3: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 4: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 5: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, capping of the former landfill areas with clay or synthetic cover systems, collection and treatment of shallow groundwater along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway).

- Alternative 6: Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, removal of free-product, treatment of groundwater at the northern property boundary, and monitoring (incorporates remedial actions already implemented and currently underway).

Each of these six remedial alternatives are described and evaluated with respect to the eight evaluation criteria described in Section 7.1.

7.2.1 Alternative 1: No Further Action, Other Than Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway)

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Continue on-going IRMs. This involves:
  - Continue free-product recovery; and
  - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).
- Take no additional remedial actions at the site.
- Monitor groundwater in the channel fill deposits annually one year travel time upgradient from the Mohawk River.
- Monitor groundwater in the fill and floodplain deposits annually one year upgradient of on-site surface water bodies.
- Monitor the active seeps along the Poentic Kill and the surface water in the Poentic Kill and Poenties Kill annually.
- Survey the biota and wildlife habitats every five years.
- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

A plan view of this alternative is shown in Figure 7-1. Alternative 1 provides no active remediation at the site beyond completion of the on-going IRMs.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. A brief summary of each of the completed and on-going remedial measures is presented below. A more detailed description of the work undertaken for each remedial measure is provided in Section 3.4.

Several programs have been conducted to abate potential sources, such as the removal of PCB-containing transformers, closure of the permitted hazardous waste TSDF at former Building 259, closure of RCRA Storage Areas, bioremediation of the Building 262 soil pile, and the removal of hundreds of storage tanks. From 1996 through 1998, over 440 PCB-containing transformers have been removed from the site. The permitted hazardous waste transportation, storage and disposal facility in former Building 259 was closed during 1993 and 1994, in accordance with a NYSDEC approved *Closure Plan*. Between 1996 and 2000, GE completed the closure and submitted closure certification reports for 14 less-than-90-day hazardous waste storage areas and management units. Approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262 have been removed. The impacted soil has been bioremediated and reused with the approval of the NYSDEC. In addition, more than 430 inactive aboveground and underground storage tanks have been removed or closed in place.

GE has taken actions to remove free-product encountered during these abatement activities, or other site work. Several measures were implemented at the former Stark Oil Facility to recover free-product from 1993 through 2001. At the City Water Main IRM Area, over 2,000 cubic yards of contaminated soils were excavated, and approximately 100,000 gallons of water were collected and treated. No measurable product has been detected in the recovery wells in the City Water Main IRM Area since the wells were installed. At the former IMPS Area, 16 monitoring wells were installed near the rail scale where product had been encountered previously. The wells are monitored monthly and vacuum extraction is used to recover free-product, if encountered. Free-product recovery at Building 49/53 involves on-going monthly monitoring and vacuum extraction to recover free-product where it is detected.

Several sewer cleaning programs have been conducted when impacted sediments have been discovered. In 1998, 500 linear feet of storm sewer associated with Building 269 was cleaned. In 1999, 800 linear feet of storm sewer in the Hi-Yard Area was cleaned, and approximately 170 cubic yards of PCB-containing sediment was removed from the sewer. In addition, during the mid-1990's, GE completed a site-wide assessment of storm sewer flow and sewer sediments, which resulted in the removal of more than an additional 200 tons of PCB-contaminated sediments.

GE has reduced the risk of exposure for site workers and environmental receptors through the removal of mercury-impacted materials from Building 265, armoring of the stream bank adjacent to the former East Landfill, beginning placement of an agronomic cover in the former East Landfill, seep management, and site-wide renovations. During routine maintenance in Building 265, elemental mercury was discovered within the sub-floor area, and an extensive mercury removal program was initiated. As part of the program, over 60 tons of dirt and debris containing mercury was removed, 14,000 square feet of floor area was decontaminated, and 400 linear feet of storm sewer was cleaned. In 2001, approximately 40 linear feet of eroded Poentic Kill stream bank along the former East Landfill was stabilized with a bioengineered system. The on-going planting of native trees and implementation of the agronomic cover will manage, control, and reduce the migration of contamination from the former East Landfill Area. Collecting and treating the seeps in the southwest corner of the former East Landfill has helped to abate the potential risk to environmental receptors posed by migration of contaminants from the seeps to the Poentic Kill. Many measures to rehabilitate the manufacturing portion of the site have been undertaken and are on-going. These measures include placing an average of two to three feet of clean fill over approximately 102 acres, and finishing these areas as either open greenspace or exercise facilities. In addition, worn asphalt pavement has been replaced over approximately 37 acres. As well as providing a more attractive work environment, these measures break the potential direct contact exposure pathway for site workers.

In addition, habitat improvement activities have been conducted, such as the Sector R Holding Pond IRM and plantings at all three former landfill areas. A total of approximately 6,800 tons of impacted sediments were removed from the former Sector R Holding Pond for off-site disposal between July 2001 and November 2003. In 1997, a soil cover was placed over the former Binnie Kill Landfill with the concurrence of NYSDEC. The project included the placement of approximately 40,000 cubic yards of sand and fill material (three-feet thick), followed by approximately 8,000 cubic yards of topsoil (six-inches thick) and seeding with indigenous plant species. In the mid-to late 1990's, exposed debris was removed from the surface of the former East and West Landfills. Approximately 100,000 cubic yards of additional soil cover was placed on portions of the former East Landfill and the areas were seeded. In addition, approximately 30,000 cubic yards of additional soil cover has been placed on portions of the former West Landfill, and the areas were seeded.

GE would continue to implement on-going remedial actions and IRMs until they are completed. GE would also continue their efforts to reduce potential exposure of site workers to industrial contaminants through site-wide renovations and continuation of seep control measures (including the Seep IRM).

The Seep IRM, which collects and treats the seep water discharging from Seeps 2, 3, and 4, would proceed with monthly performance monitoring and inspections. As provided in the Seep IRM Work Plan, GE may modify the system, if warranted.

In Alternative 1, GE would continue their on-going free-product remedial actions and IRMs until they are completed. This includes the periodic recovery of free-product at the Building 49/53 Area and continued monitoring of potential residual product, if any, at the former Stark Oil Facility and the City Water Main IRM Area. GE may modify one or more of the free-product IRMs and address the remaining NAPL by mobilizing a vacuum truck to remove the NAPL. After the initial NAPL removal is completed, GE would monitor the area monthly for six months to evaluate the effectiveness of the NAPL removal. If monitoring shows the initial removal was not sufficient to maintain a NAPL thickness of less than 0.1 feet, GE would initiate a second removal action, followed by another period of monitoring and evaluation. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would monitor free-product in three locations, and that one of these would require four additional removal mobilizations each year for the next five years.

Data presented in the *Zone 1 Phase I RI,* the *Landfill Investigation Report* and the *RI Report* indicates that subsurface groundwater contamination is naturally attenuating in some areas of the site. This process would be allowed to continue, although groundwater would not be monitored for natural attenuation parameters.

Groundwater in the channel fill deposits would be monitored annually upgradient of the Mohawk River at locations spaced from 250 to 1,000 feet laterally and approximately one year travel time (approximately 50 feet) upgradient of the property line. For the purpose of estimating the cost associated with this alternative, we have assumed that monitoring would include sampling 40 existing monitoring wells. Groundwater samples would be collected annually and analyzed for VOCs.

Groundwater would also be monitored upgradient of on-site surface water bodies. For the fill and floodplain groundwater, monitoring wells would be sampled from locations approximately 200 feet apart. The monitoring wells would be located approximately one year travel time (approximately 5 to 20 feet) upgradient of surface water bodies. For the purpose of estimating the cost associated with this alternative, we have assumed that approximately 51 existing and 25 new monitoring wells would be monitored annually for VOCs.

Annual monitoring of seeps, which are not included in the Seep IRM, and surface water in the Poentic Kill and Poenties Kill would be conducted to evaluate whether there are adverse impacts from the seeps on surface water streams.

Seep water would be sampled and analyzed for PCBs and BTEX annually to evaluate the effectiveness of the Seep IRM in preventing further adverse impacts to surface water, sediment, and biota quality in the Poentic Kill. The existing seep IRM system is currently being monitored monthly. For the purpose of estimating the cost associated with this alternative, we have assumed seep water samples would be collected annually from five locations, and the IRM monitoring would continue with monthly sampling of the effluent and quarterly sampling of the influent.

Surface water monitoring would occur annually. For the purpose of estimating the cost associated with this alternative, we have assumed surface water samples would be collected from 10 locations (eight in the Poentic Kill and two in the Poenties Kill and western wetlands) and analyzed for PCBs, BTEX, and iron.

Biota and wildlife environments would be surveyed every five years to evaluate whether these resources are adversely impacted. This would be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates. Mammals would only be observed.

Because wastes would be left on-site, the effectiveness of the remedial action would be reviewed at a minimum of every five years in accordance with CERCLA, and the results of this review would be submitted to the NYSDEC. As part of the review, the annual groundwater monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from the same groundwater monitoring wells would be analyzed for VOCs, B/N SVOCs, PCBs, and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures. Surveying of biota and wildlife habitats would also be conducted as part of the review.

Comparison with SCGs

With Alternative 1, the potential for PCB-containing surface soils in the former East Landfill to erode and potentially impact surface water, sediment quality, and biota in the Poentic Kill would remain. Groundwater standards would not be met in portions of the site, although natural attenuation and degradation may be sufficient to reduce VOC concentrations in some areas. Currently, the water of the Poentic Kill complies with Class B surface water standards for VOCs. In addition, the water quality of the Mohawk River has not been adversely impacted by the

VOCs that are present in the on-site groundwater. Long-term monitoring would be used to evaluate if this condition is sustained and would be re-evaluated every five years.

Protectiveness of Human Health and the Environment

Although the HHRA shows no significant human health risk, this alternative does not include mechanisms to continue the no-risk condition. The *RI Report* showed that the municipal well fields are protected by the natural groundwater divide and that the Mohawk River is not affected by current conditions. The Poentic Kill is currently in compliance with NYSDEC's Class B surface water standards for the compounds found in the nearby groundwater, with the exception of iron, which already is above NYSDEC's standards before entering the site. However, the potential to exceed other standards would still exist with this alternative. This alternative includes no active measures for habitat enhancements, and the potential risk to the fauna in the former landfill area would remain. The existing ecosystems in the former landfill area would not be disrupted because this alternative involves no digging or altering of the landscape. Natural attenuation and degradation currently occurring in the groundwater would continue. This alternative, however, provides no protection from groundwater at the site being used in the future for irrigation or consumptive purposes.

The Schenectady-Rotterdam well field would continue to be protected by the natural groundwater divide. It is likely that the Mohawk River, which has not been affected by current site conditions, would remain unaffected.

Short-Term Effectiveness

This alternative carries little short-term risk to the community. There would be minor risk of worker exposure during free-product removal. It would cause no short-term harm to the existing ecosystems in and adjacent to the former landfill areas, since it requires no disturbance to the existing landscape. However, this alternative does not address the seepage from the former East Landfill and the groundwater migrating into the Poentic Kill. The HHRA shows that there is no risk to the health of humans on or off site.

Long-Term Effectiveness

In some areas, such as the groundwater in the channel fill deposits beneath much of the site, contaminants appear to be naturally attenuating, and this alternative would allow this process to continue. However, portions of the site show higher contamination concentrations in the groundwater. Natural processes are not likely to be sufficient to attenuate these contaminants over the long term. This alternative would not reduce contamination concentrations near the Mohawk River in the foreseeable future. The affected groundwater in the former East Landfill would be neither treated nor contained and would continue to migrate into the Poentic Kill, rendering this alternative generally ineffective in the long term.

Reduction of Toxicity, Mobility, and Volume

This alternative would result in very little reduction of toxicity, mobility, or volume of contamination.

Implementability

Alternative 1 could be implemented quickly and with little technical difficulty.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefit, address significant risks to the environment, and preserve and enhance the existing habitats. This alternative would require little physical disturbance of the existing ecosystem, which may appeal to the community. However, the inability of this alternative to prevent contaminants from migrating off-site poses a potential risk to public health, making this alternative unlikely to gain public acceptance. Additionally, because Alternative 1 takes no action to contain or treat existing contamination or promote reuse of the former manufacturing area, this alternative would likely be received poorly by the community.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has already completed. As shown in Table 7-1, GE has already invested an estimated $16.4 million towards cleaning up the Main Plant site. As shown in Table 7-2, the estimated present worth of the actions proposed in Alternative 1 is approximately $4,100,000. This includes direct and indirect capital costs of approximately $120,000 and annual operation and maintenance costs that range from approximately $170,000 to $540,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions and abatement measures, is approximately $20,500,000. The details of the cost estimate are presented in Table 7-2.

7.2.2 Alternative 2: Institutional Controls with Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway)

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Impose restrictive covenant and institutional controls, including access controls, on the site.
- Develop a comprehensive *Health and Safety Plan* for site workers.
- Develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations.

- Implement a maintenance program for the campus rehabilitations that have been implemented.

- Continue on-going IRMs. This involves:

  - Continue free-product recovery; and
  - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).

- Take no additional remedial actions at the site.

- Monitor groundwater in the channel fill deposits annually at locations one year travel time upgradient from the Mohawk River.

- Monitor groundwater in the fill and floodplain deposits annually at locations one year travel time upgradient from on-site surface water bodies.

- Monitor the active seeps along the Poentic Kill and the surface water in the Poentic Kill and Poenties Kill annually.

- Survey the biota and wildlife habitats every five years.

- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

For Alternative 2, institutional controls would be implemented at the site in addition to the completed IRMs and abatement measures. Figure 7-2 shows the plan view of Alternative 2.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and on-going remedial measures are listed below. A more detailed description of the work undertaken for each remedial measure is provided in Section 3.4 and Section 7.2.1.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC *Closure Plan*;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;
- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and
- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;
- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to prevent migration of contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediments from the former Sector R Holding Pond.

Like Alternative 1, GE would continue to implement on-going remedial actions and IRMs until they are completed. GE would also continue their efforts to reduce potential exposure of site workers and the environment through site-wide renovations and continuation of seep control measures (including the Seep IRM).

The Seep IRM, which collects and treats the seep water discharging from Seeps 2, 3, and 4 to reduce migration of contamination to the Poentic Kill, would continue with monthly performance monitoring and inspections. As provided in the Seep IRM Work Plan, GE may elect to modify the system, if warranted.

As with Alternative 1, GE would continue their on-going free-product remedial actions and IRMs until they are completed. This includes the periodic recovery of free-product at the Building 49/53 Area and continued monitoring of potential residual product, if any, at former Stark Oil Facility and the City Water Main IRM Area. GE may modify one or more of the free-product IRMs and address the remaining NAPL by mobilizing a vacuum truck to remove the NAPL. After the initial NAPL removal is completed, GE would monitor the area monthly for six months to evaluate the effectiveness of the NAPL removal. If monitoring shows the initial removal was not sufficient to maintain a NAPL thickness of less than 0.1, GE would initiate a second removal action, followed by another period of monitoring and evaluation. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would monitor free-product in three locations, and that one of these would require four additional removal mobilizations each year for the next five years.

Institutional controls would be implemented to impose worker restrictions that match the assumptions used in the risk assessment. A comprehensive *Health and Safety Plan* would be developed and implemented at the site as part of the institutional controls. The comprehensive *Health and Safety Plan* would include measures to provide for the protection of both site workers and construction workers that might work at the site. Workers would be required to use appropriate personal protective equipment and employ measures to properly handle potentially contaminated materials.

A notice to deed would be filed to restrict future use of the property, including prohibiting disruption of the former landfill areas and restricting groundwater use. The deed notice would also require access restrictions, such as fences, to be maintained. Portions of the former landfill areas that are not currently protected by a fence would be fenced and posted, keeping in mind the needs of existing fauna. In addition, GE would work with local governments to ensure that off-site groundwater between the site and the Mohawk River would not be used as a drinking water supply source. The off-site areas that would be subject to use restrictions are shown in Figure 7-2.

GE would develop and follow a *Contingency Plan* to evaluate and address suspected contamination that is found at the site during the course of normal operations. The focus of the *Contingency Plan* would be subsurface activities. The purpose of this *Contingency Plan*, which would incorporate the *Health and Safety Plan*, would be to provide procedures that would enable GE to evaluate and address suspected contamination that is found at the site in a manner that is consistent with this remedial alternative. While the details of the *Contingency Plan* would be developed during the remedial design, the elements of the plan would include:

- The use of an existing dig permit system to advise site workers of conditions that they may encounter during subsurface activities;

- Characterization of the subsurface conditions through observation;
- Triggers for additional characterization via analysis if suspected contamination is observed;
- Triggers for remedial action if constituents are detected at concentrations in excess of existing conditions in other portions of the site, or if constituents pose a significant threat to human health and the environment; and
- Periodic reporting to NYSDEC regarding instances in which additional characterization activities are conducted and their outcome.

For the purpose of estimating the operational cost associated with this alternative, we have assumed that the only suspected contamination that would be encountered would be free-product.

GE would implement a maintenance program for the rehabilitated campus areas at the site. Figure 3-11 shows the portions of the site that have already been rehabilitated. The program would ensure that soil and asphalt covers continue to block the direct contact exposure pathway.

As with Alternative 1, the natural attenuation of detectable levels of VOCs in groundwater in some areas of the site would be allowed to continue, although groundwater would not be monitored for natural attenuation parameters.

Like Alternative 1, Alternative 2 includes annually monitoring groundwater in the channel fill deposits upgradient of the Mohawk River. Groundwater in the channel fill deposits would be monitored at locations spaced 250 to 1,000 feet apart and approximately one year travel time (approximately 50 feet) upgradient of the property line. For the purpose of estimating the cost associated with this alternative, we have assumed that monitoring would include sampling 40 existing monitoring wells. Groundwater samples would be collected annually and analyzed for VOCs.

Groundwater in the fill and floodplain would also be monitored upgradient of on-site surface water bodies. For the fill and floodplain groundwater, monitoring wells would be sampled from locations approximately 200 feet apart. The monitoring wells would be located approximately one year travel time (approximately 5 to 20 feet) upgradient of surface water bodies. For the purpose of estimating the cost associated with this alternative, we have assumed that approximately 51 existing and 25 new monitoring wells would be monitored annually for VOCs.

Like Alternative 1, annual monitoring of seeps, which are not included in the Seep IRM, and surface water in the Poentic Kill and Poenties Kill would be conducted to evaluate whether there are adverse impacts from the seeps on surface water streams.

Seep water would be sampled and analyzed for PCBs and BTEX annually. The existing seep IRM system is already being monitored monthly to evaluate the effectiveness of the Seep IRM in preventing further adverse impacts to surface water, sediment quality, and biota in the Poentic Kill. For the purpose of estimating the cost associated with this alternative, we have assumed seep water samples would be collected annually from five locations, and the IRM monitoring would continue with monthly sampling of the effluent and quarterly sampling of the influent.

Surface water monitoring would occur annually. For the purpose of estimating the cost associated with this alternative, we have assumed surface water samples would be collected from 10 locations (eight in the Poentic Kill and two in the Poenties Kill and western wetlands) and analyzed for PCBs, BTEX, and iron.

Like Alternative 1, biota and wildlife environments would be surveyed every five years to evaluate whether these resources are adversely impacted. This would be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates. Mammals would only be observed.

As with Alternative 1, the effectiveness of the remedial action would be reviewed every five years in accordance with CERCLA, and the results of this review would be submitted to the NYSDEC. As part of the review, the annual groundwater monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from the same groundwater monitoring wells would be analyzed for VOCs, B/N SVOCs, PCBs and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures. Surveying of biota and wildlife habitats would also be conducted as part of the review.

Comparison with SCGs

With Alternative 2, the potential for PCB-containing surface soils in the former East Landfill to erode and potentially impact surface water, sediment quality, and biota in the Poentic Kill would remain. Groundwater standards would not be met in portions of the site, although natural attenuation and degradation may be sufficient to reduce VOC concentrations in some areas. Currently, the water of the Poentic Kill complies with Class B surface water standards for VOCs. In addition, the water quality in the Mohawk River has not been adversely impacted by the VOCs present in the on-site groundwater. Long-term monitoring would be used to evaluate if this condition is sustained and would be re-evaluated every five years.

Protectiveness of Human Health and the Environment

The institutional controls included in Alternative 2 would continue the no significant human health risk demonstrated by the HHRA. However, the potential risks to fauna in the former landfill areas would continue. This alternative would not harm the existing ecosystem that has developed in and around the former landfill areas because it involves no digging or alteration of the landscape.

This alternative would continue to pose a potential risk to the environment because affected groundwater in the former East Landfill would continue to migrate toward the Poentic Kill, and PCB-containing surface soils on the former East Landfill could be carried to the Poentic Kill through erosion. The Poentic Kill currently complies with Class B surface water standards for the compounds found in nearby groundwater with the exception of iron, which already is above standards before entering the site. However, the potential to exceed other standards would still exist with this alternative.

The Schenectady-Rotterdam well field would continue to be protected by the natural groundwater divide. It is likely that the Mohawk River, which has not been affected by current site conditions, would remain unaffected.

Short-Term Effectiveness

This alternative carries few short-term risks to the community. There would be minor risks of worker exposure during free-product removal. It would cause little short-term harm to the existing ecosystem in the former landfill areas, since it requires no disturbance of the existing landscape. However, this alternative includes no measures to actively reduce or contain contaminants.

Long-Term Effectiveness

In some areas, such as the groundwater in the channel fill deposits beneath much of the site, contaminants in the groundwater appear to be naturally attenuating, and this alternative would allow this process to continue. However, portions of the site show higher contamination concentrations in the groundwater. Natural processes are not likely to be sufficient to attenuate these contaminants over the long term. Alternative 2 would not reduce contaminant concentrations near the Mohawk River in the foreseeable future. However, the restrictive covenants would protect human health and the environment from this groundwater. The affected groundwater in the former East Landfill would be neither treated nor contained and would continue to migrate towards the Poentic Kill, rendering this alternative generally ineffective in the long term.

Reduction of Toxicity, Mobility, and Volume

This alternative would result in very little reduction of toxicity, mobility, or volume of the contaminants at the site.

Implementability

Alternative 2 could be implemented quickly and with little technical difficulty. Implementing this alternative would require interaction with government agencies and nearby landowners to prohibit the use of groundwater at the site and at some adjacent downgradient properties as an irrigation or potable water supply.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefit, address significant risks to the environment, and preserve and enhance the existing habitats. This alternative would require little physical disturbance of the existing ecosystem, which may appeal to the community. However, the inability of this alternative to prevent contaminants from migrating off-site, or promote reuse of the former manufacturing areas, makes this alternative unlikely to achieve public acceptance.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has completed to date. As shown in Table 7-1, GE has already invested an estimated $16.4 million toward cleaning up the Main Plant site. As shown in Table 7-3, the estimated present worth of the actions proposed in Alternative 2 is approximately $23,400,000. This includes direct and indirect capital costs of approximately $200,000 and annual operation and maintenance costs that range from approximately $1,420,000 to $1,720,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions and abatement measures, is approximately $39,800,000. The details of the cost estimate are presented in Table 7-3.

7.2.3 Alternative 3: Institutional Controls, Elimination of Exposure Pathways in the Manufacturing Area, Targeted Soil Removal from the Manufacturing Area, Focused Placement of Asphalt Caps in the Manufacturing Area, Targeted Surface Soil Removal from the Former East and West Landfill Areas, Enhancement of Ground Cover at Former Landfill Areas with Agronomic Cover Systems, Enhancement and Preservation of Habitat Areas, Treatment of Principal VOC Source Areas, Removal of Free-Product, Monitored Natural Attenuation of Groundwater, and Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway)

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Impose restrictive covenants and institutional controls, including access controls, on the site.
- Develop a comprehensive *Health and Safety Plan* for site workers.
- Develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations.
- Implement a maintenance program for the campus rehabilitations.
- Continue on-going IRMs. This involves:
    - Continue free-product recovery; and
    - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).
- Place soil or asphalt cover over surface soil in portions of the manufacturing area.
- Construct asphalt caps over soil in portions of the manufacturing area where soil may be impacting groundwater.

- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg or subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the manufacturing area.

- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.

- Place clean fill over surface soil where PCBs have been detected at concentrations between one and 10 mg/kg and subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.

- Place agronomic cover over selected portions of the former East and West Landfills.

- Enhance site habitats.

- Implement a free-product recovery standard operating procedure (SOP).

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Wire Mill Area.

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Propeller Test Building in the WWTP Area.

- Monitor the performance of treatment measures.

- Monitor the natural attenuation occurring in site groundwater.

- Monitor groundwater in the channel fill deposits annually at locations approximately one year and three years travel time upgradient from the Mohawk River.

- Monitor groundwater in the fill and floodplain deposits annually at locations approximately one year and three years travel time upgradient from on-site surface water bodies.

- Monitor the seeps that are not included in the Seep IRM annually.

- Monitor the surface water in the Poentic Kill and Poenties Kill annually.

- Survey the biota and wildlife habitats every five years.

- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

Figure 7-3 shows a plan view of Alternative 3. For Alternative 3, the same institutional controls described for Alternative 2 (Section 7.2.2) would be imposed at and near the site. The maintenance program for maintaining the soil and asphalt covers in the manufacturing area would be expanded to include the areas covered during implementation of this alternative.

However, the maintenance requirements for the agronomic covers on the former landfill areas would be different.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and on-going remedial measures are listed below. A more detailed description of the work undertaken for each remedial measure is provided in Sections 3.4 and 7.2.1.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC *Closure Plan*;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;
- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and
- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;

- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to prevent migration of contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediment from the former Sector R Holding Pond.

As with Alternative 2, GE would develop and follow a *Contingency Plan* to evaluate and address suspected contamination that is found at the site during the course of normal operations. The focus of the *Contingency Plan* would be subsurface activities. The purpose of this *Contingency Plan*, which would incorporate the *Health and Safety Plan*, would be to provide procedures that would enable GE to evaluate and address suspected contamination that is found at the site in a manner that is consistent with this remedial alternative. While the details of the *Contingency Plan* would be developed during the remedial design, the plan would include the free-product SOP, which is described below, in addition to these elements:

- The use of an existing dig permit system to advise site workers of conditions that they may encounter during subsurface activities;
- Characterization of the subsurface conditions through observation;
- Triggers for additional characterization via analysis if suspected contamination is observed;
- Triggers for remedial action if constituents are detected at concentrations in excess of existing conditions in other portions of the site or if constituents pose a significant threat to human health and the environment; and
- Periodic reporting to NYSDEC regarding instances in which additional characterization activities are conducted and their outcome.

For the purpose of estimating the operational costs associated with this alternative, we have assumed that the only suspected contamination that would be encountered would be free-product.

With Alternative 3, GE would continue to implement on-going remedial actions and IRMs until they are completed. GE would modify the free-product IRMs and address the remaining NAPL using the free-product SOP described below. GE would also continue their efforts to reduce potential exposure of site workers and the environment through site-wide renovations and continuation of seep control measures (including the Seep IRM).

As shown in Figure 7-3, Alternative 3 also includes continuing the manufacturing area cover program to eliminate the direct contact exposure pathway. GE would place soil cover or asphalt pavement over portions of the manufacturing area as the intended future use is established. These newly rehabilitated areas would be included in the maintenance program for the campus rehabilitations.

The Seep IRM, which collects and treats the seep water discharging from Seeps 2, 3, and 4, would continue with monthly performance monitoring and inspections. As provided in the Seep IRM Work Plan, GE may elect to modify the system, if warranted.

With Alternative 3, GE would install asphalt caps in two locations in the manufacturing area where soil with total VOC concentrations greater than 10 mg/kg or soil with total SVOC concentrations greater than 500 mg/kg appear to be impacting groundwater. These two areas are: the City Water Main IRM Area (VOCs) and near monitoring well DM-401F (SVOCs), which is adjacent to the former Binnie Kill Channel. Monitoring wells would be placed upgradient, within, and downgradient of each asphalt cap. A maintenance program would be initiated to ensure that the caps continued to prevent infiltration by remaining in a state of good repair. The maintenance program would include annual inspections and repairs to any fissures, depressions, or holes found in the asphalt surface. For the purpose of estimating the cost associated with maintaining the caps, we assumed that five percent of the caps would be replaced annually.

In Alternative 3, GE would excavate soil in the manufacturing area where PCBs have been detected at concentrations greater than 1 mg/kg in surface soil and where PCBs have been detected at concentrations greater than 10 mg/kg in subsurface soil. The excavated soil would be properly disposed in an off-site facility. An estimated 2,650 cubic yards of impacted soil would be removed from nine areas. These nine areas, which are shown on Figure 7-3, include: surface soil near former Building 29, former surface soil south of former Building 60, surface soil near former Building 109, surface soil from two areas near former Building 259, surface soil from three areas near the WWTP, and surface and subsurface soils near former Building 85. Composite confirmatory samples would be collected from the base of the excavation to verify that sufficient soil had been excavated. Each area would be restored to original grade with clean fill and surface covering (such as lawn).

In Alternative 3, GE would excavate one to two feet of surface soil where PCB concentrations greater than 10 mg/kg have been detected in the former landfill areas. As shown in Figure 7-3, the proposed excavation locations (approximately 12,700 square feet) are primarily in the former East Landfill. An estimated 1,500 tons of PCB-impacted soils would be removed from the former landfill areas for disposal at a properly licensed off-site facility. Alternative 3 also includes covering surface soils where PCBs have been detected at concentrations between one and 10 mg/kg in the former East and West Landfill Areas. One to two feet of clean fill would be placed and vegetated in 14 areas, which total approximately 605,000 square feet.

An agronomic cover would be constructed on portions of the former East Landfill over approximately a three-year period. This phased approach would limit the adverse impact of construction to the existing habitats. The upland areas near the seep and areas where PCB-containing soil are to be removed would be targeted during the first phase. One to two feet of soil would be placed in and around areas where PCB-containing surface soil will be excavated. The soil cover would serve as a physical barrier, thus eliminating direct contact with underlying soils, while the vegetation would serve to reduce water infiltration and percolation. Additional plantings would be placed where soil quality appears to be impacting groundwater quality. In addition to reducing water infiltration and percolation, the agronomic cover has the potential to serve as a phytoremediation system, thus reducing the mass and mobility of contaminants in the root zone. Additional soil cover would be added to other portions of the former East Landfill during the second year. When complete, over 50 percent of the former East Landfill Area would have received supplemental cover. Figure 7-4 shows a conceptual cross section of the agronomic cover system.

All of the areas receiving soil cover would be supplemented with a layer of organic mulch. Planting of select species of trees would occur after each plot is prepared. Species selection would include combinations of highly evapotranspirative trees (willows and poplars) and various native species (black locust, eastern cotton wood, red oak, scrub oak, pitch pine, and white pine). Habitat restoration would also include creation of open space grass lands that would be seeded with select indigenous wildflower seed mixtures. The anticipated mixture, which was successfully used previously in the former landfill areas, includes partridge pea, black-eyed susan, wild blue lupine, deertongue, nodding wild rye, tall golden rod, common milkweed, and heath aster.

Alternative 3 also includes placement of agronomic cover over portions of the former West Landfill. Areas of the former West Landfill that would receive an agronomic cover include areas where PCBs have been detected in soil and areas with little organic cover material. The placement would follow the same steps as described for the agronomic cover on the former East Landfill. As with the former East Landfill, plantings would include evapotranspirative trees, various native species, and select indigenous wildflower seed mixtures.

GE would conduct an ecological monitoring program during construction of the agronomic cover and periodically for thirty years after completion. The ecological monitoring program would focus on the assessment of soil cover integrity, vegetation cover density, and overall system development. Monitoring would include annual inspection. As part of the monitoring program, GE would examine areas of potential erosion, in both upland and riparian environments, to evaluate the performance of the cover as a barrier between the covered soils and ecological and human receptors. A combination of aerial photography and ground surveys would be used to document populations of various species, evaluate overall soil stabilizing function, and identify areas requiring maintenance or replanting.

The ecological monitoring program would be coupled with an active maintenance program that would review the health of the agronomic cover and provide for rehabilitation, if needed. These remedies would include the addition of supplemental soil cover and replanting of areas where vegetation growth is inadequate. Areas identified by the ground survey as containing excessive numbers of non-desirable species would be targeted for further enhancement. As a first step, the non-desirable species would be removed. This would be followed by the addition of soil and organic matter, if appropriate, and replanting with desirable species.

GE would implement a habitat enhancement program, in addition to the habitat enhancements provided by on-going and completed remedial actions and the agronomic cover system. The focus of this program would be to enhance the existing ecosystems through additional planting of select flora species. Desirable species would be selected based on their suitability to produce food (such as nut and berry producing trees and shrubs), develop niche space (such as shade, shelter, and protection), and to restore portions of the habitat areas not yet fully recovered to their ecological potential (for example, where appropriate, certain upland areas would be restored to represent Pine Bush-type communities). The habitat enhancement program would be developed during the remedial design phase. The focus of this program would be the selection of desirable plant species for the production of food (for example, nut and berry producing trees and shrubs) and for niche space development (for example, shade, shelter, and protection). Monitoring of vegetation success and overall program success would be conducted as part of the ecological monitoring program.

In Alternative 3, GE would remediate the chlorinated VOC source areas near the former Wire Mill and the former Propeller Test Building at the WWTP Area by enhancing and accelerating the on-going in-situ anaerobic bioremediation by placing amendments into the subsurface. Potential amendments include soluble carbon sources, such as sodium lactate, and insoluble carbon sources (such as chitin), both of which performed well in bench-scale laboratory studies conducted by GE Global Research in 2002 and 2003.

For the purpose of estimating the cost associated with this alternative, we have assumed placement of a permeable reactive barrier downgradient of the former Wire Mill Area. The PRB would be approximately 240 feet wide and comprised of a chitin-sand mixture that would enhance biodegradation. The barrier would form a treatment zone through which VOC-impacted groundwater would flow. The actual amendments, configuration, placement, and construction methods would be determined during the design phase. For the purpose of estimating the cost associated with this barrier, we have assumed that a degradable slurry would be used to stabilize trench walls and standard trenching methods would be used to construct the barrier.

For the purpose of estimating the cost associated with this alternative, we have assumed the installation of a reinjection system in the area where the highest concentrations of VOCs have been found near the former Propeller Test Building at the WWTP Area. The reinjection system would combine containment and treatment methods and would be accomplished by placing extraction wells downgradient of a corresponding injection well or wells in the source area. Groundwater would be drawn into the extraction wells and pumped to an injection well or wells. Amendments would be delivered into the piping between the extraction and injection wells using a metering pump. As the water is pumped to the injection well, the amendment would be mixed. Once the groundwater and amendment mixture is reinjected into the subsurface, treatment zones would be created through which groundwater would flow and be treated. The actual amendments, pumping rates, reinjection rates, and well placement locations would be determined during the design phase. For the purpose of estimating the cost, we have assumed that sodium lactate would be applied to the groundwater using a metering pump, and that a closely spaced line of injection wells would be employed to ensure containment of the VOC-impacted groundwater.

GE would develop and implement a free-product removal SOP. The SOP would be used in the known free-product areas and when free-product is encountered during the course of standard business operations at a thickness greater than approximately 0.1 feet or a thickness greater than approximately 0.02 feet within approximately 50 feet of a surface water body. The first action would be removal of the free-product. The removal would likely involve mobilizing a vacuum truck to remove the NAPL. Depending on specific circumstances, alternative removal approaches might be used. After the initial NAPL removal is completed, GE would monitor the area monthly to evaluate the effectiveness of the NAPL removal. This monitoring would be continued for six months. If monitoring shows the initial removal was not sufficient to achieve a NAPL thickness of less than approximately 0.1 feet, or approximately 0.02 feet if near surface water, GE would initiate a second removal action, followed by another period of monitoring and evaluation. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would encounter free-product in five locations each year for the next five years, and that two of these would require four additional removal mobilizations.

Alternative 3 includes performance monitoring to evaluate the effectiveness of the treatment systems. Performance monitoring would be conducted in each of these two groundwater treatment areas: the enhanced in-situ anaerobic bioremediation near the former Wire Mill and the enhanced in-situ anaerobic bioremediation near the waste water treatment plant. In addition, performance monitoring would also be conducted for these two areas of soil covered with asphalt caps: the City Water Main IRM Area and near monitoring well DM-401F which is adjacent to the former Binnie Kill Channel.

For each capped area, groundwater samples would be collected from monitoring wells at approximately 50 feet or half a year travel time (whichever is closest) downgradient of the capped area, within the capped area, and approximately 100 to 200 feet upgradient of the capped area. For the purpose of estimating the cost associated with this alternative, we have assumed that five existing monitoring wells and four new monitoring wells would be sampled annually for thirty years and analyzed for VOCs.

For each enhanced bioremediation area, groundwater would be monitored at approximately 50 feet or half a year travel time (whichever is closest) downgradient of the treatment area, within the impacted area, and approximately 100 to 200 feet upgradient of the impacted area to track the progress of biodegradation. In addition, groundwater near the former Wire Mill Area would be monitored at five wells along the northern boundary of the impacted groundwater to monitor groundwater flow paths. Field parameters including temperature, ORP, DO, specific conductance, turbidity, and pH would be measured during purging and prior to collecting groundwater samples. The groundwater samples would be analyzed for VOCs. For the purpose of estimating the cost associated with this alternative, we have assumed that eight existing monitoring wells and 15 new monitoring wells would be sampled quarterly for five years and then annually for twenty-five years and analyzed for VOCs.

The natural attenuation occurring in the channel fill groundwater and the perched groundwater within the former East Landfill Area would continue. Groundwater would be monitored annually in perimeter wells and interior wells to track the progress of natural attenuation and degradation.

Alternative 3 includes monitoring of the groundwater in the channel fill deposits upgradient of the Mohawk River. Groundwater would be monitored annually at locations spaced 1,000 feet apart, and approximately one and three years travel time (50 and 150 feet) upgradient of the Mohawk River. For the purpose of estimating the cost associated with this alternative, we have assumed that monitoring would include sampling eight existing monitoring wells. Groundwater samples would be collected twice annually for 30 years and analyzed for VOCs.

For Alternative 3, the quality of groundwater in the channel fill deposits would also be monitored in select areas of the site interior to evaluate natural attenuation. Specifically, the areas downgradient of elevated VOCs where natural attenuation is occurring would be monitored. For the first two years, groundwater samples would be collected quarterly. Following the two years of quarterly monitoring, groundwater samples would be collected annually. Field parameters including temperature, ORP, DO, specific conductance, turbidity, and pH would be measured during purging and prior to collecting groundwater samples. The groundwater samples would be analyzed for VOCs. For the purpose of estimating the cost associated with this alternative, we have assumed that 11 existing monitoring wells and 3 new monitoring wells would be sampled from the six areas with elevated concentrations of VOCs in the channel fill groundwater.

Alternative 3 includes annual monitoring of groundwater in fill and floodplain deposits upgradient of on-site surface water bodies. Groundwater from the fill and floodplain deposits would be monitored from monitoring wells spaced approximately 500 feet apart, at one and three years travel time (approximately 20 and 25 feet) upgradient of on-site surface water bodies. For the purpose of estimating the cost associated with implementing this alternative, we have assumed that sampling will include 29 existing and 14 new monitoring wells, which are screened in the fill and floodplain deposits. The monitoring wells would be sampled twice annually for 30 years and the groundwater samples would be analyzed for VOCs.

In this alternative, the quality of the shallow groundwater within the former East Landfill would be monitored to track the progress of natural attenuation. For the first two years, groundwater samples would be collected quarterly. Thereafter, groundwater samples would be collected annually from monitoring wells downgradient of the areas with elevated BTEX and chlorinated VOC concentrations. Field parameters, including temperature, ORP, DO, specific conductance, turbidity, and pH, would be measured as the groundwater samples were collected. The groundwater samples would be analyzed for VOCs. For the purpose of estimating the cost associated with this alternative, we have assumed that 28 existing monitoring wells and 11 new monitoring wells would be sampled from the areas with elevated concentrations of BTEX and chlorinated VOCs in the perched groundwater in the former East Landfill Area.

Similar to Alternatives 1 and 2, annual monitoring of the seeps, which are not included in the Seep IRM, and surface water in the Poentic Kill and Poenties Kill would be conducted to evaluate impacts the seeps have on surface water.

Like Alternatives 1 and 2, seep water would be sampled annually and analyzed for PCBs and BTEX. The existing seep IRM system is already being monitored monthly to evaluate the effectiveness of the Seep IRM in preventing further adverse impacts to surface water and sediment quality in the Poentic Kill. For the purpose of estimating the cost associated with this alternative, we have assumed seep water samples would be collected annually from five locations, and the IRM monitoring would continue with monthly sampling of the effluent and quarterly sampling of the influent.

Like Alternatives 1 and 2, Alternative 3 includes annual monitoring of the surface water at the site. For the purpose of estimating the cost associated with this alternative, we have assumed that surface water samples would be collected from 10 locations and analyzed for PCBs, BTEX, and iron.

Similar to Alternative 1 and 2, biota would be surveyed every five years to evaluate whether these resources are adversely impacted. For Alternative 3, surveys of wildlife environments would be conducted as part of the ecological monitoring program. This would be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates. Mammals would only be observed.

The data collected under the ecological monitoring program would be evaluated at periodic intervals, which would be determined during the design phase, to evaluate the health of the agronomic cover system. The monitoring data collected at Main Plant would be used to evaluate the remedial program as a whole, for regions, such as the former East Landfill Area, as well as for individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if they are not achieving the RAOs. The reporting frequency for the on-going assessment would be determined during the design phase, but would occur at least once every five years.

As with Alternatives 1 and 2, the effectiveness of the remedial action would be reviewed every five years in accordance with CERCLA, and the results would be reported to the NYSDEC. As part of the review, the annual monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from the same groundwater monitoring wells upgradient of the Mohawk River and on-site water bodies and at select interior locations would be analyzed for VOCs, B/N SVOCs, PCBs and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures. Surveying of biota and wildlife habitats would also be conducted as part of the review.

Comparison with SCGs

The installation of agronomic cover on the former landfills and the existing seep control and treatment would serve to isolate waste and prevent releases from the waste mass thus adequately managing the former landfills in accordance with the intent of 6 NYCRR Part 360 and Part 375. The PCB-containing surface soils excavated from portions of the site would be disposed at a properly licensed off-site facility in accordance with TSCA.

Initially, the groundwater in the channel fill deposits would not meet groundwater standards with this alternative. However, the continuing natural attenuation of groundwater and degradation occurring at the site, coupled with source treatment, would reduce contaminant concentrations to meet groundwater standards over time. Implementation of enhanced anaerobic bioremediation at the principal source areas of the chlorinated ethenes in channel fill groundwater would reduce concentrations of chlorinated VOCs in these areas to meet groundwater standards. By eliminating these source areas, VOC concentrations in the channel fill groundwater beneath the site would be reduced. In addition, installation of asphalt caps in portions of the manufacturing area and removal of free-product would help prevent further impacts to groundwater quality. These measures would reduce the time needed for site groundwater to naturally attenuate and achieve groundwater standards.

The water quality of the Mohawk River has not been adversely impacted by the VOCs that are present in the on-site groundwater and is in compliance with Class A surface water standards for VOCs. The water of the Poentic Kill is currently in compliance with Class B surface water standards for VOCs. Although there is potential for VOC-impacted groundwater to continue to migrate toward the Poentic Kill and the Mohawk River, the measures included in this alternative would reduce the potential for migration of contaminants to these surface water bodies.

During the design phase, the work plans for earthwork would be prepared so that they would comply with the applicable action specific SCGs. The action specific SCGs that would be considered include:

- 6 NYCRR Part 257 – Air Quality Standards
- TAGM HWR-89-4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites
- 6 NYCRR Part 360 – Solid Waste Management Facilities
- 6 NYCRR Part 370-373 – Hazardous Waste Disposal

Additionally, the New York State Department of Health (NYSDOH) may require a Community Air Monitoring Plan (CAMP) be developed prior to construction activities.

Protectiveness of Human Health and the Environment

The institutional controls included in Alternative 3 would continue the no significant human health risk demonstrated by the HHRA. The addition of agronomic cover over portions of the former landfills would break the potential exposure pathway between site fauna and thinly covered or exposed wastes. Because the agronomic cover would be constructed in phases, the disruption to the ecosystem would be minimized. Agronomic cover measures will also enhance existing habitat areas in the long-term.

The agronomic cover, once established, would reduce the quantity of leachate generated, which would result in the prevention of further degradation of groundwater quality in the former landfill area. This, coupled with continuation of the existing seep control and treatment measures, would provide additional protection to the surface water of the Poentic Kill. In addition, removing or covering locations where PCBs have been detected in surface soils would prevent these soils from potentially eroding and being carried into the Poentic Kill, as well as prevent direct contact with fauna. The seep control and treatment measures, in conjunction with removing or covering locations where PCBs have been detected in surface soils, would mitigate further potential impacts to the surface water and sediment quality in the Poentic Kill, thus protecting site fauna.

With this alternative, treatment of the principal source areas near the former Propeller Test Building at the WWTP Area and the former Wire Mill Area would reduce volume of contaminants in site groundwater. In addition, the natural attenuation and degradation occurring in site groundwater would continue. It is likely that the Mohawk River, which has not been affected by current site conditions, will remain unaffected. The Schenectady-Rotterdam well fields will continue to be protected by the natural groundwater divide.

Short-Term Effectiveness

There would be minor risks of worker exposure to contaminants during installation of the agronomic cover, removal of soils where PCBs have been detected, construction of the asphalt caps, implementation of enhanced anaerobic bioremediation, placement of soil or asphalt cover over unrehabilitated portions of the manufacturing area and free-product removal. These risks could be controlled by mitigative measures such as training, air monitoring, dust control, exclusionary zones, the use of personal protective equipment, and appropriate handling and containment procedures. Mitigative measures to reduce exposure would also reduce the risk to the community and the environment.

Because Alternative 3 requires that fill material, topsoil, and asphalt pavement be brought to the site and that PCB-containing soil be transported off-site, this alternative would pose a greater risk of transportation related injuries than Alternatives 1 and 2. In addition, the off-site locations from which the fill and topsoil are obtained would be altered.

Alternative 3 would also cause short-term impacts to the existing habitat in the former landfill areas to be covered with additional topsoil and replanted, although the ecosystem would rebound as the new plants mature. The short-term disruption to the habitat areas would be minimized by the phased installation of the agronomic cover.

Long-Term Effectiveness

A properly designed, functioning agronomic cover could be as effective as a traditional landfill cover in the long term, while avoiding the irreparable complete habitat destruction associated with the installation of a traditional cap. Moreover, with time, the forces of nature would work to break down a traditional cap. In contrast, the performance of an agronomic cover will improve with time as plants mature and the ecosystem develops into a self-sustaining, regenerative system. Unlike a traditional constructed cap, this “living cap” system will have the ability to propagate and regenerate, thereby sustaining itself. In addition, as the plants mature, their capacity to evapotranspirate water will increase. This will reduce the volume of leachate produced, which would protect groundwater quality.

Treatment of the principal VOC source areas would reduce contaminant levels and would prevent migration of contaminants to remaining site groundwater, and potentially the Mohawk River. As shown in Appendix B, this alternative would reduce contaminant concentrations near the Mohawk River within 10 years, and groundwater standards would be met near the Mohawk River within approximately 30 years. The removal of free-product should improve the groundwater quality near sources and provide an opportunity for these areas to naturally attenuate. Depending on the hydrogeology in the immediate area, free-product removal may lead to a reduction in contaminant concentrations in the groundwater in the channel fill deposits.

The potential for VOC-containing groundwater to impact surface water bodies would be limited by the increased protection of groundwater quality provided by the agronomic cover, treatment of principal VOC source areas, and the removal of free-product. The continuation of the Seep IRM would protect the surface water, sediment quality, and biota in the Poentic Kill.

With general maintenance, the manufacturing area cover should continue to function to break the direct contact exposure pathway, particularly when coupled with institutional controls.

Reduction of Toxicity, Mobility, and Volume

Alternative 3 would reduce the volume of PCBs in soils through targeted removal and proper off-site disposal. In addition, the agronomic cover has the potential to reduce the mass and mobility of contaminants in the root zone through phytoremediation. The continuation of the Seep IRM would reduce the mobility of VOCs and PCBs, which have been detected in the seeps from the former East Landfill Area. The agronomic cover would further reduce the mobility of constituents in the former landfill areas due to reduced infiltration of precipitation and increased stabilization of surface soils. Treatment of the principal VOC source areas would reduce the mass and mobility of contaminants in groundwater. Construction of asphalt caps over soil that may be impacting groundwater quality would reduce the mobility of contaminants in these areas.

Implementability

Alternative 3 would be technically feasible to implement. Most of the technologies applied in this alternative are readily available and there would be no concerns regarding contractor availability. However, construction of permeable reactive barriers containing bioremediation amendments would be challenging. In addition, implementing this alternative would require interaction with government agencies and nearby landowners to prohibit the use of groundwater at the site and at some adjacent properties as an irrigation or potable water supply.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefits, address significant risks to the environment, and preserve and enhance the existing habitat. Community acceptance of this alternative is likely to be mixed. Because this alternative is far less disruptive to the existing ecosystem than the construction of synthetic or man-made caps, the agronomic cover system is likely to appeal to the public because it would work in harmony with nature and avoid the displacement of wildlife in the habitat areas. Some public uneasiness may arise because the long-term effectiveness of agronomic cover technology has not been comprehensively studied in the northeastern U.S. However, the combination of the cover and engineering controls, together with the five year re-evaluation would address this issue, as would public education and information. Some members of the public may feel that the time required to achieve groundwater standards in on-site groundwater in the channel fill deposits is too long. However, this concern could be reduced by committing to update the community on the progress of the natural attenuation and degradation. Because this alternative does not directly address Seeps 1 and 5 through 8, this alternative is not likely to gain as much community support as an option that would address all of the seep areas.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has completed to date. As shown in Table 7-1, GE has already invested an estimated $16.4 million toward cleaning up the Main Plant site. As shown in Table 7-4, the estimated present worth of the actions proposed in Alternative 3 is approximately $39,300,000. This includes direct and indirect capital costs of $12,100,000 and annual operation and maintenance costs that range from approximately $1,520,000 to $2,260,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions and abatement measures, is approximately $55,700,000. The details of the cost estimate are presented in Table 7-4.

7.2.4 Alternative 4: Institutional Controls, Elimination of Exposure Pathways in the Manufacturing Area, Targeted Soil Removal from the Manufacturing Area, Focused Placement of Asphalt Caps in the Manufacturing Area, Targeted Surface Soil Removal from the Former East and West Landfill Areas, Enhancement of Ground Cover at the Former Landfill Areas with Agronomic Cover Systems, Enhancement and Preservation of Habitat Areas, Shallow Groundwater and Seep Water Treatment Along the Former East Landfill Area, Treatment of Principal VOC Source Areas, Removal of Free-Product, Monitored Natural Attenuation of Groundwater, and Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway).

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Impose restrictive covenant and institutional controls, including access controls, on the site.
- Develop a comprehensive *Health and Safety Plan* for site workers.
- Develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations.
- Implement a maintenance program for the campus rehabilitations.
- Continue on-going IRMs and remediations. This involves:
    - Continue free-product recovery and
    - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).
- Place soil or asphalt cover over surface soil in portions of the manufacturing area.

- Construct asphalt caps over soil in portions of the manufacturing area where soil may be impacting groundwater.

- Place amendments at the DM-405F Area near the former Sector R Holding Pond to enhance and accelerate aerobic bioremediation.

- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg or subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the manufacturing area.

- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.

- Place clean fill over surface soil where PCBs have been detected at concentrations between one and 10 mg/kg and subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.

- Place agronomic cover over portions of the former East and West Landfills.

- Enhance site habitats.

- Construct expanded seep collection and treatment systems for the seeps along the former East Landfill.

- Install shallow groundwater treatment system in select areas between the former East Landfill and Poentic Kill.

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Wire Mill Area.

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Propeller Test Building in the WWTP Area.

- Implement a free-product recovery standard operating procedure (SOP).

- Monitor the performance of groundwater treatment measures.

- Monitor the natural attenuation occurring in site groundwater.

- Monitor groundwater in the channel fill deposits annually at locations approximately one year and three years travel time upgradient from the Mohawk River.

- Monitor groundwater in the fill and floodplain deposits annually at locations approximately one year and three years travel time upgradient from on-site surface water bodies.

- Monitor the surface water in the Poentic Kill and Poenties Kill annually.

- Survey the biota and wildlife habitats every five years.

- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

A plan view of this alternative is shown in Figure 7-5. Alternative 4 includes implementation of the same institutional controls described for Alternative 2 (Section 7.2.2), with an expanded maintenance program for the rehabilitated portions of the manufacturing areas and the addition of maintenance for the agronomic cover systems on the former landfills.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and on-going remedial measures are listed below. A more detailed description of the work undertaken for each remedial measure is provided in Sections 3.4 and 7.2.1.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC *Closure Plan*;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;
- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and

- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;
- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to prevent migration of contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediment from the former Sector R Holding Pond.

As with Alternatives 2 and 3, GE would develop and follow a *Contingency Plan* to evaluate and address suspected contamination that is found at the site during the course of normal operations. The focus of the *Contingency Plan* would be subsurface activities. The purpose of this *Contingency Plan*, which would incorporate the *Health and Safety Plan*, would be to provide procedures that would enable GE to evaluate and address suspected contamination that is found at the site in a manner that is consistent with this remedial alternative. While the details of the *Contingency Plan* would be developed during the remedial design, the plan would include the free-product SOP, which is described below, in addition to these elements:

- The use of an existing dig permit system to advise site workers of conditions that they may encounter during subsurface activities;
- Characterization of the subsurface conditions through observation;
- Triggers for additional characterization via analysis if suspected contamination is observed;
- Triggers for remedial action if constituents are detected at concentrations in excess of existing conditions in other portions of the site or if constituents pose a significant threat to human health and the environment; and
- Periodic reporting to NYSDEC regarding instances in which additional characterization activities are conducted and their outcome.

For the purpose of estimating the operational cost associated with this alternative, we have assumed that the only suspected contamination that would be encountered would be free-product.

As with Alternative 3, GE would continue their on-going remedial actions and IRMs until they are completed. This includes the periodic recovery of free-product at the former IMPS Area and the Building 49/53 Area. GE would modify one or more of the free-product IRMs and address the remaining NAPL using the free-product SOP described in Alternative 3 and summarized below. GE would continue to abate potential sources, such as decommissioning abandoned buildings. GE would also continue their efforts to reduce potential exposure of site workers and the environment through the decommissioning of abandoned buildings and site-wide renovations and continuation of seep control measures (including the Seep IRM).

As shown in Figure 7-5, Alternative 4, like Alternative 3, includes continuing the manufacturing area cover program to eliminate the direct contact exposure pathway. GE would place soil cover or asphalt pavement over the western portions of the manufacturing area. These newly rehabilitated areas would be included in the maintenance program for the campus rehabilitations.

As with Alternative 3, the Seep IRM, which collects and treats the seep water discharging from Seeps 2, 3, and 4, would continue with monthly performance monitoring and inspections. As provided in the Seep IRM Work Plan, GE may elect to modify the system, if warranted.

Similar to Alternative 3, Alternative 4 includes construction of asphalt caps over two areas of the manufacturing area where soil with total VOC concentrations greater than 10 mg/kg or soil with total SVOC concentrations greater than 500 mg/kg appears to be impacting groundwater. These two areas are: the City Water Main IRM Area (VOCs) and near monitoring well DM-401F (SVOCs), which is adjacent to the former Binnie Kill Channel. Monitoring wells would be placed upgradient, within, and downgradient of each asphalt cap. A maintenance program would be initiated to ensure that the caps continued to prevent infiltration by remaining in a state of good repair. The maintenance program would include annual inspections and repairs to any fissures, depressions, or holes found in the asphalt surface. For the purpose of estimating the cost associated with maintaining the caps, we assumed that five percent of the caps would be replaced annually.

Alternative 4 includes enhanced in-situ aerobic biodegradation near monitoring well DM-405F where impacted saturated soil may be degrading groundwater quality. For the purpose of estimating the costs associated with this alternative, we have assumed that oxygen releasing compound (ORC) would be injected into groundwater. In addition, we have assumed a second round of amendment additions would be needed over a portion of the area. The type of aerobic bioremediation amendment and the size of the treatment area would be determined during the design phase.

Like Alternative 3, GE would excavate soil in the manufacturing area where PCBs have been detected at concentrations greater than 1 mg/kg in surface soil and where PCBs have been detected at concentrations greater than 10 mg/kg in subsurface soil. An estimated 2,650 cubic yards of impacted soil would be removed from nine areas for off-site disposal at a licensed facility. These nine areas, which are shown on Figure 7-3, include: surface soil near former Building 29, former surface soil south of former Building 60, surface soil near former Building 109, surface soil from two areas near former Building 259, surface soil from three areas near the WWTP, and surface and subsurface soils near former Building 85. Composite confirmatory samples would be collected from the base of the excavation to verify that sufficient soil had been excavated. Each area would be restored to original grade with clean fill and surface covering (such as lawn).

Like Alternative 3, GE would remove surface soils where PCB concentrations greater than 10 mg/kg have been detected in the former landfill areas. As shown in Figure 7-5, the proposed excavation areas (approximately 12,700 square feet) are primarily in the former East Landfill. An estimated 1,500 tons of PCB-impacted soils would be removed for disposal at a properly licensed off-site facility. One to two feet of soil would be removed for off-site disposal from locations where PCB concentrations greater than 10 mg/kg have been detected. One to two feet of clean fill would then be placed on such areas after the excavation and removal. GE would also cover surface soils where PCB concentrations have been detected between one and 10 mg/kg in the former East and West Landfill Areas. One to two feet of clean fill would be placed and vegetated in 14 areas, which total approximately 605,000 square feet.

Alternative 4 also includes the phased placement of agronomic cover over portions of the former East and West Landfill Areas that was described in Alternative 3. When complete, over 50 percent of the former East Landfill Area would receive supplemental cover.

Alternative 4 includes the ecological monitoring program described in Alternative 3. In addition, periodic observations would document the natural ecological evolution of the plant and animal communities on the former landfills, as well as the changes in diversity and richness brought about by the habitat enhancements.

Like Alternative 3, Alternative 4 includes a habitat enhancement program. The focus of this program would be to enhance the existing ecosystems through additional planting of select flora species. Desirable species would be selected based on their ability to provide food or shelter, or their ability to restore portions of habitat areas to their ecological potential. The habitat enhancement program would be developed during the design-phase. Monitoring of vegetation success and overall program success would be conducted as part of the ecological monitoring program.

In Alternative 4, collection and treatment systems would be constructed for the seeps that have been identified on the west and north sides of the former East Landfill Area. The flow that these collection and treatment systems would handle is expected to be reduced by the agronomic cover that will be placed over the seep areas. For Seeps 2 through 4, which flow year round, seep water would be pumped from a collection area through a series of filters. Figure 7-6 shows a typical treatment system.

The treated water would be discharged to the Poentic Kill, or may be used as irrigation water during extended dry periods. The volume of clean surface water reaching the treatment system would be minimized by diverting event and seasonal runoff away from the seep areas using constructed earthen berms. These changes would be an enhancement to the Seep IRM.

Seeps 1, 5, and 7 occur as very low flow and intermittent seeps on either side of the service road that parallels the east bank of the Poentic Kill. The high density vegetation cover that would be planted immediately above the seeps would reduce recharge and lessen the seepage. Water that might continue to seep would be pumped through similar filter chambers and discharged to the Poentic Kill. Because of their insignificant volume and because they only appear during very wet conditions, they are not worth using for irrigation.

Seep 6 appears to be related to the bedding material placed around a former stormwater drain pipe, and as such, does not filter through the floodplain deposits. For Seep 6, approximately 30 feet of sheet piling or low permeability slurry wall would be installed parallel to the Poentic Kill and a gravel-filled recovery trench would be constructed to serve as a pumping station. A pump would be installed to maintain the water in the trench at or below the water level of the kill. The pumped water would be treated with filters followed by liquid phase granular activated carbon (GAC) before being discharged to the kill or used for irrigation within the former East Landfill Area. Figure 7-7 shows the system proposed for Seep 6.

A maintenance schedule for the new seep collection and treatment systems would be developed during the design phase and refined, as warranted, during operation. Each new system would be monitored quarterly, and the Seep IRM (Seeps 2 through 4) system would continue to be monitored monthly to evaluate the effectiveness of the system in reducing further adverse impacts to surface water and sediment quality in the Poentic Kill. For the five new systems, seep water would be sampled quarterly and analyzed for PCBs and BTEX, if flowing, for each treatment system. Monitoring is anticipated to occur once or twice annually for the seeps that only flow intermittently (Seeps 5 and 7). For the purpose of estimating the cost associated with this alternative, we have assumed seep water samples would be collected from one location monthly, three locations quarterly, and two locations twice annually, and that monitoring would include sampling of both the influent and effluent.

A system would be installed at two locations along the western and northern boundaries of the former East Landfill Area to treat the areas of VOC-containing shallow groundwater in the fill and floodplain deposits. For the purpose of estimating the cost associated with this alternative, we have assumed an air sparge/SVE system would be constructed. If pilot tests during the design phase indicate concentrations of iron in groundwater will hamper effective performance of the system, an alternate system for treating shallow groundwater would be selected. Approximately 500 to 700 feet of trenched-in or horizontal well sparge systems would be installed near the southwest corner of the former East Landfill and along approximately 300 feet near the northeast corner. For the southwest corner of the former East Landfill, where VOC concentrations (mostly BTEX) are higher, an SVE system would be used in conjunction with the air sparge system to collect or control the VOCs that would be transferred to the soil vapor by the air sparge system. Figure 7-8 shows a conceptual detail of the horizontal sparge system. The SVE equipment would include a positive displacement blower, a moisture knockout tank, and vapor–phase GAC vessels for treatment of the SVE exhaust. If necessary, condensate from the moisture knockout tank would be treated with liquid-phase GAC prior to discharge.

Like Alternative 3, GE would remediate the chlorinated VOC source areas near the former Wire Mill and the former Propeller Test Building at the WWTP Area by enhancing and accelerating the on-going in-situ anaerobic bioremediation by placing amendments into the subsurface. Potential amendments include soluble carbon sources, such as sodium lactate, and insoluble carbon sources (such as chitin), which both performed well in bench-scale laboratory studies conducted by GE Global Research in 2002 and 2003.

For the purpose of estimating the cost associated with this alternative, we have assumed placement of a permeable reactive barrier downgradient of the former Wire Mill Area. The PRB would be approximately 240 feet wide and comprised of a chitin-sand mixture that would enhance biodegradation. The barrier would form a treatment zone through which VOC-impacted groundwater would flow. The actual amendments, configuration, placement, and construction methods would be determined during the design phase. For the purpose of estimating the cost associated with this barrier, we have assumed that a degradable slurry would be used to stabilize trench walls and standard trenching methods would be used to construct the barrier.

For the purpose of estimating the cost associated with this alternative, we have assumed the installation of a reinjection system in the area where the highest concentrations of VOCs have been found near the former Propeller Test Building at the WWTP Area. The reinjection system would combine containment and treatment methods and would be accomplished by placing extraction wells downgradient of a corresponding injection well or wells in the source area. Groundwater would be drawn into the extraction wells and pumped to an injection well or wells. Amendments would be delivered into the piping between the extraction and injection wells using a metering pump. As the water is pumped to the injection well, the amendment would be mixed. Once the groundwater and amendment mixture is reinjected into the subsurface, treatment zones would be created through which groundwater would flow and be treated. The actual amendments, pumping rates, reinjection rates, and well locations would be determined during the design phase. For the purpose of estimating the cost, we have assumed that sodium lactate would be applied to the groundwater using a metering pump, and that a closely spaced line of injection wells would be employed to ensure containment of the VOC-impacted groundwater.

Like Alternative 3, in Alternative 4, GE would develop and implement a free-product SOP program. Alternative 5 includes addressing free-product encountered at a thickness greater than approximately 0.1 feet or approximately 0.02 feet within approximately 50 feet of surface water. As described in Alternative 3, the free-product SOP includes removal of the NAPL followed by monthly monitoring for six months. Additional removal measures would be implemented if the monitoring indicates free-product remains at thickness greater than approximately 0.1 feet or approximately 0.02 feet near surface water. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would encounter free-product in five locations annually for the next five years and that two of these would each require four additional removal mobilizations.

Similar to Alternative 3, performance monitoring would be conducted to evaluate the effectiveness of the treatment systems. Performance monitoring would be conducted for each of these three groundwater treatment areas: the air sparge curtains along the west and north boundaries of the former East Landfill, the enhanced in-situ anaerobic bioremediation near the former Wire Mill, and the enhanced in-situ anaerobic bioremediation near the former Propeller Test Building at the WWTP Area. In addition, performance monitoring would also be conducted for these two areas of soil covered with asphalt caps: the City Water Main IRM Area and near monitoring well DM-401F which is adjacent to the former Binnie Kill Channel. In Alternative 4, groundwater monitoring would also be conducted to monitor enhanced in-situ aerobic biodegradation at the DM-405F Area, where saturated soil quality may be impacting groundwater quality.

In Alternative 4, groundwater samples would be collected from monitoring wells at approximately 50 feet or half a year travel time (whichever is closest) downgradient and approximately 100 to 200 feet upgradient of the air sparge curtains. For the purpose of estimating the cost associated with this alternative, we have assumed that 24 existing monitoring wells and 10 new monitoring wells would be sampled quarterly for two years and then annually for twenty-eight years and analyzed for VOCs. In addition to monitoring groundwater, vapor samples would be collected from the air sparge curtains and SVE systems to monitor the mass of VOCs that the systems are removing. To estimate costs associated with this alternative, we have assumed that four samples would be collected from each of the four systems each month.

Performance monitoring for the remaining areas would be as described in Alternative 3. For each of the two capped areas, groundwater samples would be collected from monitoring wells at approximately 50 feet or half a year travel time (whichever is closest) downgradient of the capped area, within the capped area, and approximately 100 to 200 feet upgradient of the capped area. For each of the two enhanced bioremediation areas, groundwater would be monitored at approximately 50 feet or half a year travel time (whichever is closest) downgradient of the treatment area, within the impacted area, and approximately 100 to 200 feet upgradient of the impacted area to track the progress of biodegradation.

Like Alternative 3, the natural attenuation occurring in the channel fill groundwater and the perched groundwater within the former East Landfill Area would continue. Groundwater would be monitored annually in perimeter wells and interior wells to track the progress of natural attenuation and degradation, or until groundwater standards are attained.

With Alternative 4, groundwater in the channel fill deposits would be monitored at locations spaced from approximately 1,000 feet apart, and approximately one and three years travel time (approximately 50 and 1,500 feet) upgradient of the Mohawk River. For the purpose of estimating the cost associated with this alternative, we have assumed that monitoring would include eight existing monitoring wells. Groundwater samples would be collected twice annually and analyzed for VOCs.

For Alternative 4, the natural attenuation occurring in groundwater in the channel fill deposits would also be monitored in select areas of the site, specifically, areas of slightly elevated chlorinated VOCs near the east and west site boundaries where natural attenuation is occurring. For the first two years, groundwater samples would be collected quarterly, thereafter, groundwater samples would be collected annually. Field parameters including temperature, ORP, DO, specific conductance, turbidity, and pH, would be measured as the groundwater samples were collected. The groundwater samples would be analyzed for VOCs. For the purpose of estimating the cost associated with this alternative, we have assumed that a total of 11 existing monitoring wells and three new monitoring wells would be sampled from the four areas with elevated concentrations of VOCs in the channel fill groundwater.

Groundwater would also be monitored in the fill and floodplain deposits upgradient of on-site surface water bodies. For the fill and floodplain groundwater, approximately 25 existing and 14 new monitoring wells would be sampled from locations approximately 500 feet apart. The monitoring wells would be placed approximately one and three years travel time (approximately 20 and 25 feet) upgradient of on-site surface water bodies. Along the Poentic Kill, near the sparge curtain, the monitoring wells would be at least five feet from the radius of influence of the sparge curtain.

Similar to Alternatives 1 through 3, annual monitoring of surface water in the Poentic and Poenties Kills would be conducted. For the purpose of estimating the cost associated with this alternative, we have assumed surface water samples would be collected from 10 locations and analyzed for PCBs, BTEX, and iron.

Like Alternative 3, biota would be surveyed every five years to evaluate whether these resources are adversely impacted. Survey of wildlife environments would be conducted as part of the ecological monitoring program. This would be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates. Mammals would only be observed.

The data collected under the ecological monitoring program would be evaluated at periodic intervals, which would be determined during the design phase, to evaluate the health of the agronomic cover system. The monitoring data collected at Main Plant would be used to evaluate the remedial program as a whole, for regions, such as the former East Landfill Area, as well as for individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if they are not achieving the RAOs. The reporting frequency for the on-going assessment would be determined during the design phase, but would occur at least once every five years.

As with Alternatives 1 through 3, the effectiveness of the remedial action would be reviewed every five years in accordance with CERCLA, and the results would be reported to the NYSDEC. As part of the review, the annual groundwater monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from groundwater monitoring wells upgradient of the Mohawk River and on-site water bodies and at select interior locations would be analyzed for VOCs, B/N SVOCs, PCBs and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures. Surveying of biota and wildlife habitats would also be conducted as part of the review.

Comparison with SCGs

The installation of the agronomic cover on the surface soils at the former landfills, coupled with seep collection and treatment, air sparging, and a monitoring program, would serve to isolate wastes and prevent migration of contaminants. The PCB-containing surface soils excavated from portions of the former East and West Landfill would be disposed at a properly licensed off-site facility in accordance with TSCA. In addition to protecting surface water in the kills and maintaining 6 NYCRR Part 703 surface water standards, this alternative achieves the intent of Part 360.

With Alternative 4, the groundwater treatment measures, combined with the continuing natural attenuation of groundwater and degradation occurring at the site, would reduce contaminant concentrations to meet groundwater standards over time. The impacted groundwater in the channel fill deposits would not immediately meet groundwater standards with this alternative. However, because this alternative includes treatment of the principal chlorinated VOC source areas near the former Wire Mill and area near the former Propeller Test Building at the WWTP Area, groundwater standards in the channel fill groundwater at the site would be met in a much shorter time frame than with alternatives which do not include treatment of the principal source areas. In addition, installation of asphalt caps in portions of the manufacturing area would help prevent further impacts to groundwater quality. The treatment of the chlorinated and aromatic VOCs near DM-405F and the removal of free-product would likely improve the groundwater quality in the fill and floodplain deposits, thus, minimizing the migration of contaminants to the groundwater in the channel fill and accelerating the reduction of contaminant levels to meet groundwater standards.

The water quality of the Mohawk River has not been adversely impacted by the VOCs that are present in the on-site groundwater and is in compliance with Class A surface water standards for VOCs. The remedial actions included in this alternative would reduce the VOC concentrations in the on-site groundwater, thus allowing the water quality of the Mohawk River to remain unaffected. The water of the Poentic Kill is currently in compliance with Class B surface water standards for VOCs. The seep control measures and air sparging curtains would reduce migration of contaminants to the Poentic Kill, thereby promoting continued compliance with Class B surface water standards for VOCs.

During the design phase, the work plans for earth work, including excavation and installation of groundwater treatment systems and operation of the air sparge curtain SVE systems, would be prepared so that they would comply with the applicable action specific SCGs. The action specific SCGs that would be considered include:

- 6 NYCRR Part 257 – Air Quality Standards
- TOGS 1.3.2 – Toxicity Testing in the SPDES Permit Program
- TAGM HWR-89-4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites
- 6 NYCRR Part 360 – Solid Waste Management Facilities
- 6 NYCRR Part 370-373 – Hazardous Waste Disposal

Additionally, the New York State Department of Health (NYSDOH) may require a Community Air Monitoring Plan (CAMP) be developed prior to construction activities.

In addition, the USACE Wetlands Executive Order 11990 and 6 NYCRR Part 608 Use and Protection of Waters would be evaluated for applicability during the design of the seep control measures because of the proximity of the seeps to the Poentic Kill and wetland areas.

Protectiveness of Human Health and the Environment

The combined effect of the remedial measures included in Alternative 4 would continue the no significant human health risk demonstrated by the HHRA. The addition of agronomic cover over portions of the former landfills would break potential exposure pathways between site fauna and thinly covered or exposed wastes, thereby providing an additional level of protection. Because the agronomic cover would be constructed in phases, the short-term disruption to the ecosystem would be minimal.

The agronomic cover, once established, would reduce the quantity of leachate generated, which would prevent further degradation of groundwater quality in the former landfill area. While not a requirement of the cover system, the agronomic cover has the potential to provide phytoremediation of contaminants in the root zone through phytoaccumulation, phytostabilization, and rhizodegradation. The agronomic cover system, coupled with the additional seep control and treatment measures and the air sparging curtains, would provide additional protection to the surface water of the Poentic Kill. In addition, removing and covering surface soil where PCBs have been detected would prevent these soils from potentially eroding and being carried into the Poentic Kill. The seep control and treatment measures, in conjunction with removing or covering locations where PCBs have been detected in surface soils, would mitigate further potential impacts to the surface water, sediment quality and biota in the Poentic Kill, thus protecting site fauna.

With this alternative, treatment of the principal source areas near the former Propeller Test Building at the WWTP Area and the former Wire Mill Area would reduce volume of contaminants in site groundwater. In addition, natural attenuation and degradation occurring in the groundwater would continue and be accelerated because of the treatment of the principal VOC source areas and the removal of free-product. The Mohawk River, which has not been affected by current site conditions, would remain unaffected with the additional levels of protection provided in this alternative. The Schenectady-Rotterdam well fields would continue to be protected by the natural groundwater divide.

Short-Term Effectiveness

There would be moderate risks of worker exposure to contaminants during installation of the remedial measures included in this alternative. These risks could be controlled by mitigative measures such as training, air monitoring, dust control, exclusionary zones, the use of personal protective equipment, and appropriate handling and containment procedures. Mitigative measures to reduce exposure would also reduce the risk to the community and the environment.

Because Alternative 4 requires that fill material, topsoil, and asphalt pavement be brought to the site and that PCB-containing soil be transported off-site, this alternative would pose a greater risk of transportation related injuries than Alternatives 1 and 2. In addition, the off-site locations from which the fill and topsoil are obtained would be altered.

Alternative 4 would also cause short-term damage to the existing habitat in the former landfill areas to be covered with additional topsoil and replanted, although the ecosystem would rebound as the new plants mature. The short-term disruption to the habitat areas would be minimized by the phased installation of the agronomic cover. Installation of the additional seep control measures and the air sparge curtains would cause additional disruption to the habitat areas.

Long-Term Effectiveness

A properly designed, functioning agronomic cover can be more effective than a clay or synthetic landfill cover in the long term, while avoiding irreparable damage to existing habitats associated with a constructed cap. With time, the forces of nature work to break down a man-made cap. In contrast, the performance of an agronomic cover should improve with time as plants mature and the ecosystem develops into a self-sustaining, regenerative system. Unlike a man-made cap, this living cap system would have the ability to propagate and regenerate, thereby sustaining itself. As the plants mature, their capacity to evapotranspirate water would increase, thereby reducing the volume of leachate produced, which would protect groundwater quality. The agronomic cover may also provide phytoremediation in the root zone, thus reducing the mass and mobility of the contaminants.

In addition, the ecological richness and diversity inherent at the site would be further enhanced by the elements integral to the agronomic cover. Niche environments would be encouraged and both floral and faunal diversity expanded.

Treatment of the principal VOC source areas would reduce contaminant levels and would prevent migration of contaminants to remaining site groundwater, and potentially the Mohawk River. As shown in Appendix B, this alternative would reduce contaminant concentrations near the Mohawk River within approximately 10 years, and groundwater standards would be met near the Mohawk River within approximately 30 years. The removal of free-product should improve the groundwater quality within source areas. Depending on the hydrogeology in the immediate area, free-product removal may lead to a reduction in concentrations of contaminants in the groundwater within the channel fill deposits.

The possible impacts of VOC-containing groundwater on the surface water bodies would be reduced by the increased protection of groundwater quality provided by the agronomic cover, air sparging curtains, principal VOC source treatment measures, and the removal of free-product. The seep control and treatment measures would serve to protect the surface water, sediment quality, and biota in the Poentic Kill.

With proper maintenance, the manufacturing area cover should continue to function to break the direct contact exposure pathway, particularly when coupled with institutional controls.

Reduction of Toxicity, Mobility, and Volume

Because Alternative 4 includes remedial measures that remove or treat contamination, Alternative 4 provides greater reduction of toxicity, mobility, and volume than Alternatives 1 through 3.

Alternative 4 would reduce the volume of PCBs in soils through targeted soil removal and proper off-site disposal. The source treatment measures undertaken near the former Wire Mill and the former Propeller Test Building at the WWTP Area would decrease the volume and toxicity of VOCs in the groundwater in the channel fill deposits. Construction of asphalt caps over soil, which may be impacting groundwater quality, would reduce the mobility of contaminants in these areas. The enhanced aerobic biodegradation at the DM-405F Area, where saturated soil quality may be impacting groundwater quality, would decrease the volume and toxicity of VOCs in saturated soil and groundwater in the fill deposits. The seep control and treatment measures and the air sparging curtains would reduce the toxicity and volume of VOCs and PCBs that are currently present in the fill and detected in seep water from the former East Landfill Area, thus reducing the migration of dissolved and suspended contaminants to the Poentic Kill. The agronomic cover would reduce contact with shallow or exposed waste by forming a barrier. The agronomic cover would also reduce the mobility of constituents in the former landfill areas due to reduced infiltration of precipitation and stabilization of surface soils. In addition, the agronomic cover has the potential to provide phytoremediation, thus reducing the mass and mobility of contaminants within the root zone. The removal of free-product would reduce the petroleum constituents present in the groundwater in the fill and floodplain deposits.

Implementability

Alternative 4 would be technically feasible to implement. Most of the technologies applied in this alternative are readily available and there would be no concerns regarding contractor availability. Installation of the horizontal air sparge curtains may require specialized contractors, but this technology has been accomplished at other sites and can be applied at this site. Implementing this alternative would require interaction with government agencies and adjacent landowners to prohibit the use of groundwater at the site and at some adjacent downgradient properties as an irrigation or potable water supply.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefit, address significant risks to the environment, and preserve and enhance the existing habitats. Community acceptance of this alternative would likely be favorable. The preservation of the existing ecosystems is expected to be well received by the community. Ecosystems could eventually serve as nature preserves or educational observation areas. Some public concern may arise because of the time required to achieve groundwater standards in groundwater in the channel fill deposits. However, this concern could be reduced by committing to update the community on the progress of the natural attenuation and degradation.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has completed to date. As shown in Table 7-1, GE has already invested an estimated $16.4 million toward cleaning up the Main Plant site. As shown in Table 7-5, the estimated present worth of the actions proposed in Alternative 4 is approximately $45,800,000. This includes direct and indirect capital costs of approximately $13,300,000 and annual operation and maintenance costs that range from approximately $1,900,000 to $2,600,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions and abate measures, is approximately $62,200,000. The details of the cost estimate are presented in Table 7-5.

7.2.5 Alternative 5: Institutional Controls, Elimination of Exposure Pathways in the Manufacturing Area, Targeted Soil Removal from the Manufacturing Area, Focused Placement of Asphalt Caps in the Manufacturing Area, Capping of the Former Landfill Areas with Clay or Synthetic Cover Systems, Collection and Treatment of Shallow Groundwater Along the Former East Landfill Area, Treatment of Principal VOC Source Areas, Removal of Free-Product, Monitored Natural Attenuation of Groundwater, and Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway).

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Impose restrictive covenant and institutional controls, including access controls, on the site.
- Develop a comprehensive *Health and Safety Plan* for site workers.
- Develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations.
- Implement a maintenance program for the campus rehabilitations.
- Continue on-going IRMs, including free-product recovery.
- Place soil or asphalt cover over surface soil in portions of the manufacturing area.
- Construct asphalt caps over soil in portions of the manufacturing area where soil may be impacting groundwater.
- Place amendments at the DM-405F Area near the former Sector R Holding Pond to enhance and accelerate aerobic bioremediation.
- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg or subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the manufacturing area.
- Remove wildlife from habitat areas.
- Clear existing vegetation from all three former landfills and the surrounding area. This would include destruction of upland habitats, wetlands, and riparian corridors.

- Grade and cap soil and groundwater at the former landfill areas with man-made caps as follows:

  - Former East Landfill using a RCRA hazardous waste landfill cap design.
  - Former West Landfill using a Part 360 solid waste landfill cap design.
  - Former Binnie Kill Landfill using a construction and demolition landfill cap design.

- Collect and treat shallow groundwater on the west and north sides of the former East Landfill.

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Wire Mill Area.

- Enhance and accelerate the on-going in-situ anaerobic bioremediation of chlorinated solvents near the source area at the former Propeller Test Building in the WWTP Area.

- Implement a free-product recovery standard operating procedure (SOP).

- Monitor the performance of groundwater treatment measures.

- Monitor the natural attenuation occurring in site groundwater.

- Monitor groundwater in the channel fill deposits at locations approximately one and three years travel time upgradient from the Mohawk River.

- Monitor groundwater in the fill and floodplain deposits annually at locations approximately one and three years travel time upgradient from on-site surface water bodies.

- Monitor the surface water in the Poentic Kill and Poenties Kill annually.

- Possibly construct compensatory wetlands elsewhere, as required, due to destruction of existing wetlands during construction of the man-made caps.

- Review the effectiveness of the remedial alternative every five years, in accordance with CERCLA and report the results to the NYSDEC.

A plan view of Alternative 5 is shown in Figure 7-9. Like Alternatives 3 and 4, Alternative 5 includes implementation of some of the institutional controls described for Alternative 2 (Section 7.2.2). However, the maintenance requirements for the man-made caps would be different.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and on-going remedial measures are listed below. A more detailed description of the work undertaken for each remedial measure is provided in Sections 3.4 and 7.2.1.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC Closure Plan;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;
- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and
- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;
- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to reduce migration of contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediment from the former Sector R Holding Pond.

As with Alternatives 2, 3 and 4, GE would develop and follow a *Contingency Plan* to evaluate and address suspected contamination that is found at the site during the course of normal operations. The focus of the *Contingency Plan* would be subsurface activities. The purpose of this *Contingency Plan*, which would incorporate the *Health and Safety Plan*, would be to provide procedures that would enable GE to evaluate and address suspected contamination that is found at the site in a manner that is consistent with this remedial alternative. While the details of the *Contingency Plan* would be developed during the remedial design, the plan would include the free-product SOP, which is described below, in addition to these elements:

- The use of an existing dig permit system to advise site workers of conditions that they may encounter during subsurface activities;
- Characterization of the subsurface conditions through observation;
- Triggers for additional characterization via analysis if suspected contamination is observed;
- Triggers for remedial action if constituents are detected at concentrations in excess of existing conditions in other portions of the site or if constituents pose a significant threat to human health and the environment; and
- Periodic reporting to NYSDEC regarding instances in which additional characterization activities are conducted and their outcome.

For the purpose of estimating the cost associated with this alternative, we have assumed that the only suspected contamination that would be encountered would be free-product.

As with Alternatives 3 and 4, GE would continue implementation of on-going remedial actions and IRMs until they are completed. This includes operation of free-product recovery systems, continuing to abate potential sources, and reducing the potential exposure of site workers and the environment. In the future, GE would modify the free-product IRMs to address the remaining NAPL using the free-product SOP described in Alternative 3 and summarized below.

As shown in Figure 7-9, Alternative 5, like Alternatives 3 and 4, includes implementation of a cover program for exposed surface soils in the manufacturing area. Depending on future use of the areas, GE would place soil cover or pavement over portions of the manufacturing area that have not already been rehabilitated. These newly rehabilitated areas would be maintained under the maintenance program for campus rehabilitations.

Similar to Alternatives 3 and 4, Alternative 5 includes construction of asphalt caps over two areas of the manufacturing area where soil with total VOC concentrations greater than 10 mg/kg or soil with total SVOC concentrations greater than 500 mg/kg appears to be impacting groundwater. These two areas are: the City Water Main IRM Area and near monitoring well DM-401F, which is adjacent to the former Binnie Kill Channel. Monitoring wells would be placed upgradient, within, and downgradient of each asphalt cap. A maintenance program would be initiated to ensure that the caps continued to prevent infiltration by remaining in a state of good repair. For the purpose of estimating the cost associated with maintaining the caps, we assumed that five percent would be replaced annually.

Similar to Alternative 4, Alternative 5 includes enhanced in-situ aerobic biodegradation near monitoring well DM-405F, where impacted saturated soil may be degrading groundwater quality. For the purpose of estimating the costs associated with this alternative, we have assumed that oxygen releasing compound (ORC) would be injected into groundwater. In addition, we have assumed a second round of amendment additions would be needed over a portion of the area. The type of aerobic bioremediation amendment and the size of the treatment area would be determined during the design phase.

Like Alternatives 3 and 4, GE would excavate soil in the manufacturing area where PCBs have been detected at concentrations greater than 1 mg/kg in surface soil and where PCBs have been detected at concentrations greater than 10 mg/kg in subsurface soil. An estimated 2,650 cubic yards of impacted soil would be removed from nine areas for off-site disposal at a licensed facility. These nine areas, which are shown on Figure 7-3, include: surface soil near former Building 29, former surface soil south of former Building 60, surface soil near former Building 109, surface soil from two areas near former Building 259, surface soil from three areas near the WWTP, and surface and subsurface soils near former Building 85. Composite confirmatory samples would be collected from the base of the excavation to verify that sufficient soil had been excavated. Each area would be restored to original grade with clean fill and surface covering (such as lawn).

In this alternative, all three former landfill areas and the existing habitats would be stripped of existing vegetation, wildlife would be displaced or destroyed, and wildlife habitat would be ruined as these areas are graded and covered with man-made constructed caps. The type of cap constructed over each former landfill would be based on specific NYSDEC guidance. The design for capping soil and groundwater at each area depends on the nature of the waste each area received. Records of the types of waste placed in the former landfills suggest that the former Binnie Kill Landfill would be capped as a construction and demolition landfill, the former West Landfill would be capped as a solid waste landfill, and the former East Landfill would be capped as a hazardous waste landfill. A plan view of this alternative is shown in Figure 7-9 and a cross-section of the caps for the soil and groundwater at the former landfill areas are shown in Figure 7-10. In this alternative, the low permeability layers of the caps are assumed to consist of low permeability clay. To minimize erosion, the caps would be planted with grass, which would be mowed and tended to prevent the growth of other plants with deeper roots that might threaten the integrity of the man-made caps.

Due to the relatively flat topography of much of the former landfill area and to be able to meet the design requirements for four percent minimum slopes, substantial fill material would be required for this alternative. For this evaluation, the former East and West Landfill Areas were divided into cells to reduce the amount of fill needed. It is estimated that these areas would each require 250,000 cubic yards of fill, and the former Binnie Kill Landfill would require 75,000 cubic yards of fill in order to meet the minimum slope requirements. An additional 500,000 cubic yards of material would be required to complete the caps at the former West and Binnie Kill Landfills, and another 675,000 cubic yards would be needed to cap the former East Landfill. Thus, the total amount of fill material that would need to be brought to the site for these caps is over 1.7 million cubic yards.

For this alternative, collection trenches would be constructed along the west and north sides of the former East Landfill to intercept contaminated groundwater before it reaches the Poentic Kill. A conceptual cross section of the recovery trench is shown in Figure 7-11. An HDPE liner or similar low permeability material would be placed on the side of the trench adjacent to the kill to limit the flow of surface water into the recovery trenches. The trench would be sloped toward lift stations. The number and locations of lift stations would be determined during the design process. For the purpose of estimating the cost associated with this alternative, we have estimated approximately four lift stations would be spaced along the trench. Each lift station would be equipped with an automatic level-controlled pump and emergency high water indicators. The pumping rates in the trenches and wells would be adjusted to maintain a gradient from the Poentic Kill to the trenches. The estimated flow from the recovery trenches to maintain a 0.5-foot drawdown is approximately 20 gpm.

Collected water would be pumped to a water treatment plant. For this evaluation, it is assumed that a water treatment plant with a 50 gpm design capacity would be installed in Building 113. The anticipated treatment system, which would include metals pretreatment, air stripping, and carbon treatment of both vapor and water discharges, is illustrated in Figure 7-12.

Like Alternatives 3 and 4, Alternative 5 includes treatment of the VOC source areas near the former Wire Mill and the former Propeller Test Building through accelerated in-situ anaerobic bioremediation. Amendments would be introduced to the subsurface in both areas to accelerate the naturally occurring anaerobic bioremediation. Potential amendments include soluble carbon sources (such as sodium lactate) and insoluble carbon sources (such as chitin), which both performed well in bench-scale laboratory studies conducted by GE Global Research in 2002 and 2003.

For the purpose of estimating the cost associated with this alternative, we have assumed placement of a permeable reactive barrier downgradient of the former Wire Mill Area. The PRB would be approximately 240 feet wide and comprised of a chitin-sand mixture that would enhance biodegradation. The barrier would form a treatment zone through which VOC-impacted groundwater would flow. The actual amendments, configuration, placement, and construction methods would be determined during the design phase. For the purpose of estimating the cost associated with this barrier, we have assumed that a degradable slurry would be used to stabilize trench walls and standard trenching methods would be used to construct the barrier.

For the purpose of estimating the cost associated with this alternative, we have assumed the installation of a reinjection system in the area where the highest concentrations of VOCs have been found near the former Propeller Test Building at the WWTP Area. The reinjection system would combine containment and treatment methods and would be accomplished by placing extraction wells downgradient of a corresponding injection well or wells in the source area. Groundwater would be drawn into the extraction wells and pumped to an injection well or wells. Amendments would be delivered into the piping between the extraction and injection wells using a metering pump. As the water is pumped to the injection well, the amendment would be mixed. Once the groundwater and amendment mixture is reinjected into the subsurface, treatment zones would be created through which groundwater would flow and be treated. The actual amendments, pumping rates, reinjection rates, and well locations would be determined during the design phase. For the purpose of estimating the cost, we have assumed that sodium lactate would be applied to the groundwater using a metering pump, and that a closely spaced line of injection wells would be employed to ensure containment of the VOC-impacted groundwater.

Like Alternatives 3 and 4, GE would develop and implement a free-product SOP program. Alternative 5 includes addressing free-product encountered at a thickness greater than approximately 0.1 feet or approximately 0.02 feet within approximately 50 feet of surface water. As described in Alternative 3, the free-product SOP includes removal of the NAPL followed by monthly monitoring for six months. Additional removal measures would be implemented if the monitoring indicates free-product remains at thickness greater than approximately 0.1 feet or approximately 0.02 feet near surface water. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would encounter free-product in five locations annually for the next five years, and that two of these would each require four additional removal mobilizations.

Like Alternative 4, performance monitoring would be conducted to evaluate the effectiveness of the treatment systems. Performance monitoring would be conducted for the two principal treatment areas: the enhanced in-situ anaerobic bioremediation near the former Wire Mill, and the enhanced in-situ anaerobic bioremediation near the former Propeller Test Building. In addition, groundwater would be monitored for the asphalt capped areas at the City Water Main IRM Area and near monitoring well DM-401F, which is adjacent to the former Binnie Kill Channel. Groundwater monitoring would also be conducted to monitor enhanced in-situ aerobic biodegradation near monitoring well DM-405F, where saturated soil quality may be impacting groundwater quality. Groundwater monitoring for the groundwater collection system between the Poentic Kill and the former East Landfill would be incorporated into the monitoring of groundwater upgradient of on-site surface water bodies.

Similar to Alternatives 1 through 4, groundwater would be monitored annually in select perimeter and interior monitoring wells to track the progress of natural attenuation and degradation. To estimate the costs associated with this alternative we have assumed that three existing wells would be monitored quarterly for two years.

Like Alternatives 3 and 4, groundwater in the channel fill deposits would be monitored at locations spaced approximately 250 to 1,000 fee and approximately one and three years travel time (approximately 50 and 1,500 feet) upgradient of the Mohawk River. For the purpose of estimating the cost associated with this alternative, we have assumed monitoring would include six existing monitoring wells. Groundwater samples would be collected twice annually and analyzed for VOCs.

Groundwater in the fill and floodplain deposits would also be monitored at locations upgradient of on-site surface water bodies. For the fill and floodplain groundwater, approximately 124 locations approximately 500 feet apart, would be monitored. The monitoring wells would be placed approximately one and three years travel time (approximately 20 and 25 feet) upgradient of surface water. However, between the Poentic Kill and the groundwater collection trench, which includes an impermeable barrier between the trench and the creek, monitoring would consist only of water level data. Approximately 28 existing and 14 new monitoring wells screened in the fill and floodplain deposits would be sampled twice annually for 30 years and the groundwater samples would be analyzed for VOCs.

Like Alternatives 1 through 4, annual monitoring of surface water in the Poentic Kill and Poenties Kill would be conducted to evaluate impacts the remaining on-site waste has on nearby resources. For the purpose of estimating the cost associated with this alternative, we have assumed surface water samples would be collected from 10 locations and analyzed for PCBs, BTEX, and iron.

With this Alternative, unlike Alternatives 3 and 4, portions of the wetlands adjacent to the former landfills would be destroyed as the former landfills were capped. To compensate for this loss, compensatory, man-made wetlands might need to be constructed off-site. As part of the design process, a suitable location would need to be identified. Approximately 25 acres of compensatory wetlands would be constructed.

There would be no ecological monitoring as part of Alternative 5 as the existing ecosystems would be destroyed by capping. Should the establishment of compensatory wetlands be required as a component of Alternative 5, revegetation success would be monitored. Areas not achieving at least 75 percent vegetation cover within six months of seeding would be re-planted.

The monitoring data collected at Main Plant would be used to evaluate the remedial program as a whole, for regions, such as the former East Landfill Area, as well as for individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if they are not achieving the RAOs. The reporting frequency for the on-going assessment would be determined during the design phase, but would occur at least once every five years.

As with Alternatives 1 through 4, the effectiveness of the remedial action would be reviewed every five years in accordance with CERCLA, and the results of this review would be submitted to the NYSDEC. As part of the review, the annual groundwater monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from the same groundwater monitoring wells upgradient of the Mohawk River and on-site water bodies and at select interior wells would be analyzed for VOCs, B/N SVOCs, PCBs, and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures.

Comparison with SCGs

With this alternative, the caps that would be constructed over the soil and groundwater at the former landfill areas and portions of the adjacent wetlands would comply with traditional RCRA solid and hazardous waste landfill closure requirements. The groundwater in the former landfill area would be protected because the caps would minimize infiltration. In addition, the groundwater collection trench and water treatment system would provide groundwater containment, control, and treatment of groundwater in the area of the former East Landfill. These measures would significantly reduce the amount of contaminated water migrating to the Poentic Kill and would extract water from the kill as well. Groundwater collected from the perimeter of the former East Landfill would be treated to comply with SPDES permit requirements before being discharged to the Poentic Kill.

Initially, the on-site groundwater in the channel fill deposits would not meet groundwater standards with this alternative. However, the continuing natural attenuation of groundwater and degradation occurring at the site would reduce contaminant concentrations to meet groundwater standards over time. Because this alternative includes treatment of the principal chlorinated VOC source areas near the former Wire Mill and near the former Propeller Test Building at the WWTP Area, groundwater standards in the on-site groundwater in the channel fill deposits would be met in a shorter time frame than with alternatives which do not include treatment of the principal source areas. The removal of free-product, the treatment of chlorinated and aromatic VOCs near DM-405F, and construction of asphalt caps over soil that may be impacting groundwater quality would likely improve the groundwater quality in the fill and floodplain deposits, thus minimizing the migration of contaminants to the groundwater in the channel fill and accelerating the reduction of contaminant levels to meet groundwater standards.

The water quality of the Mohawk River has not been adversely impacted by the VOCs that are present in the on-site groundwater and is in compliance with Class A surface water standards for VOCs. The remedial actions included in this alternative would reduce the VOC concentrations in the groundwater prior to the groundwater migrating off-site, thus allowing the water quality of the Mohawk River to remain unaffected. The water of the Poentic Kill is currently in compliance with Class B surface water standards for VOCs. The groundwater collection and treatment measures along the former East Landfill would reduce migration of contaminants to the Poentic Kill, thereby promoting continued compliance with Class B surface water standards for VOCs.

During the design phase, the work plans for earthwork and the design of the SVE systems, stripping wells, and other remedial actions would be prepared to comply with applicable action specific SCGs. The action specific SCGs that would be considered include:

- 6 NYCRR Part 257 – Air Quality Standards
- TOGS 1.3.2 – Toxicity Testing in the SPDES Permit Program
- TAGM HWR-89-4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites
- 6 NYCRR Part 360 – Solid Waste Management Facilities
- 6 NYCRR Part 370-373 – Hazardous Waste Disposal

Additionally, the New York State Department of Health (NYSDOH) may require a Community Air Monitoring Plan (CAMP) be developed prior to construction activities.

In addition, the USACE Wetlands Executive Order 11990 and 6 NYCRR Part 608 Use and Protection of Waters would be evaluated for applicability during the design of the groundwater collection trench and the work plan for capping the soil and groundwater at the former landfill areas because of the proximity of the Poentic Kill and wetland areas. It is possible that destruction of the wetland may require the construction of compensatory wetlands elsewhere.

Protectiveness of Human Health and the Environment

The combined effect of the remedial measures included in Alternative 5 would continue the no significant human health risk demonstrated by the HHRA. The addition of man-made caps over the former landfills would break the potential direct contact exposure pathway, as well as protect the groundwater quality. However, in order to construct the landfill caps, more than 130 acres of natural habitat area would be destroyed, including portions of federally regulated wetlands. In addition, much of the 90 acres of habitat that surrounds the former landfill areas would be adversely impacted. Approximately 292 species or variants of flora would be destroyed, 81 species of birds would lose habitat, and nine species of mammals would be killed or displaced by construction of the caps. The caps, in conjunction with the groundwater treatment measures that reduce seepage from the former East Landfill Area, would reduce the migration of contaminants to the Poentic Kill.

With this alternative, natural attenuation and degradation occurring in the site groundwater would continue and accelerate because of the treatment of the VOC source areas, capping of areas where soil may be impacting groundwater quality, treatment of saturated soil and groundwater near DM-405F, and the removal of free-product. The Mohawk River, which has not been affected by current site conditions, would remain unaffected with the additional levels of protection provided in this alternative. The Schenectady-Rotterdam well field would continue to be protected by the natural groundwater divide.

In addition, an enormous quantity of fill material would need to be brought to the site in order to construct caps at the former landfill areas. This would cause substantial alteration of the landscape at the borrow sources and would require large numbers of trucks and construction equipment, thus increasing risks to workers and the public.

Short-Term Effectiveness

There would be moderate risks of worker exposure to contaminants during installation of the remedial measures included in this alternative. These risks could be controlled by mitigative measures such as training, air monitoring, dust control, exclusionary zones, personal protective equipment, and appropriate handling and containment procedures. Mitigative measures to reduce exposure would also reduce the risk to the community and the environment.

A number of short-term negative impacts would be associated with Alternative 5. The implementation of this alternative would cause the complete destruction of the existing habitats in the former landfill areas and destruction of portions of adjacent wetlands. The locations chosen as the sources of the 1.7 million cubic yards of material required to complete the former landfill area caps would almost certainly experience severe short-term environmental impacts. Furthermore, the excavation, transportation, and placement of such a large amount of material would pose a significant risk of injury to workers and to the public. In a 1998 study, Blasland, Bouck & Lee (BBL) estimated that the removal and transport of 960,000 cubic yards of contaminated sediment from a site in Wisconsin would lead to approximately 103 transportation accidents resulting in nine collision-related injuries and a one in six risk of a collision-related fatality. The BBL study did not examine the risk of non-transportation-related injuries. The results of the BBL study suggest that a number of accidents and injuries could occur with the implementation of Alternative 5. Alternative 5 is likely to cause short-term impacts to the environment and human health, with some impacts irreparable, and would include impacts, such as wear and tear of roadways, on communities not directly associated with the site.

Long-Term Effectiveness

The long-term effectiveness of Alternative 5 would depend on proper maintenance of the man-made caps in the former landfill areas. Treatment of the principal VOC source areas would reduce contaminant levels and would prevent migration of contaminants to remaining on-site groundwater, and potentially the Mohawk River. As shown in Appendix B, this alternative would reduce contaminant concentrations near the Mohawk River within 10 years and groundwater standards would be met near the Mohawk River within approximately 30 years.

Reduction of Toxicity, Mobility, and Volume

This alternative would reduce the mobility of contaminants by reducing the amount of infiltration, which will limit the transfer of contaminants to shallow groundwater, and collecting and treating the contaminants from the remaining shallow groundwater before allowing it to reach the Poentic Kill. As with other alternatives, Alternative 5 does nothing to reduce the recharge of groundwater in the fill of the former East and West Landfills from the upgradient glaciolacustrine deposits. The caps, in conjunction with the groundwater treatment measures that reduce seepage from the former East Landfill Area, would reduce the migration of contaminants to the Poentic Kill.

The treatment measures undertaken near the former Wire Mill and the former Propeller Test Building would decrease the volume and toxicity of the VOCs in the groundwater in the channel fill deposits. The enhanced aerobic biodegradation at the DM-405 Area, where saturated soil may be impacting groundwater quality, would decrease the volume and toxicity of VOCs in saturated soil and groundwater in the fill deposits. The removal of free-product would reduce the petroleum constituents present in the groundwater in the fill and floodplain deposits. In addition, placement of asphalt caps over areas where soil maybe impacting groundwater quality would reduce potential migration of contaminants.

Implementability

The construction of landfill caps, groundwater recovery and treatment systems, and air sparging systems are common and would not be technically challenging. The injection of enhancements to accelerate aerobic biodegradation near DM-405F would be slightly more challenging. The biggest obstacle for Alternative 5 would be obtaining the fill required to create four percent minimum slopes over all of the former landfill areas. Additional threatened and endangered species surveys during design may provide information that would delay implementation of the man-made caps.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefits, address significant risks to the environment, and preserve and enhance the existing habitats. Community acceptance of this alternative would likely be mixed. The public would likely react favorably to abating the migration of groundwater that is above groundwater standards, but would be expected to object to the killing of more than 290 species or variants of flora, displacing or killing of nine species of mammals, and destroying acres of wetlands during construction of the man-made caps. The exodus of wildlife during construction of the man-made caps would be a nuisance to residents near the west side of the plant and to commuters on Interstate 890, immediately north of the former landfill areas.

An enormous quantity of fill would have to be imported from one or more possibly distant locations to acquire the volume of fill required to obtain minimum slopes. The subsequent increase in heavy traffic, diesel emissions, noise, road damage, and the increased risk of transportation-related injuries and deaths, combined with the environmental impact of obtaining 1.7 million cubic yards of fill and the habitat destruction that would occur, could raise public opposition to the implementation of Alternative 5. In addition, there may be some opposition from the public that lives near the source of the borrow materials that would be needed to construct the landfill caps and complete the campus rehabilitations. Truck routes would need to be established to minimize the impact on neighborhoods through which trucks would travel.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has completed to date. As shown in Table 7-1, GE has already invested an estimated $16.4 million toward cleaning up the Main Plant site. As shown in Table 7-6, the estimated present worth of the actions proposed in Alternative 5 is approximately $105,600,000. This includes direct and indirect capital costs of approximately $57,500,000 and annual operation and maintenance costs that range from approximately $2,900,000 to $3,600,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions and abatement measures, is $122,000,000. The details of the cost estimate are presented in Table 7-6.

7.2.6 Alternative 6: Institutional Controls, Elimination of Exposure Pathways in the Manufacturing Area, Targeted Soil Removal from the Manufacturing Area, Targeted Surface Soil Removal from the Former East and West Landfill Areas, Enhancement of Ground Cover at the Former Landfill Areas with Agronomic Cover Systems, Enhancement and Preservation of Habitat Areas, Shallow Groundwater and Seep Water Treatment Along the Former East Landfill Area, Removal of Free-Product, Treatment of Groundwater at the Northern Property Boundary, and Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway).

The elements of this alternative include:

- Previously completed IRMs and abatement measures.
- Impose restrictive covenant and institutional controls, including access controls, on the site.
- Develop a comprehensive Health and Safety Plan for site workers.
- Develop and implement a Contingency Plan to evaluate and address areas where suspected contamination is identified during normal site operations.
- Implement a maintenance program for the campus rehabilitations.
- Continue on-going IRMs and remediations. This involves:
    - Continue free-product recovery and
    - Continue the Seep IRM at Seeps 2 through 4 (including monitoring).
- Place soil or asphalt cover over surface soil in portions of the manufacturing area.
- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg or subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the manufacturing area.
- Targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.
- Place clean fill over surface soil where PCBs have been detected at concentrations between one and 10 mg/kg at the site and subsurface soil where PCBs have been detected at concentrations greater than 10 mg/kg in the former landfill areas.
- Place agronomic cover over portions of the former East and West Landfills.
- Enhance site habitats.

- Construct expanded seep collection and treatment systems for the seeps along the former East Landfill.

- Install shallow ground treatment system in select areas between the former East Landfill and Poentic Kill.

- Install and operate in-situ groundwater treatment systems to treat the groundwater in the channel fill deposits along the north site boundary.

- Implement a free-product recovery standard operating procedure (SOP).

- Monitor the surface water in the Poentic Kill and Poenties Kill annually.

- Survey the biota and wildlife habitats every five years.

- Review the effectiveness of the remedial alternative every five years in accordance with CERCLA and report the results to the NYSDEC.

A plan view of this alternative is shown in Figure 7-13. Alternative 6 includes implementation of the institutional controls described for Alternative 2 (Section 7.2.2) except the use of off-site groundwater would not be registered in this alternative. In addition, the maintenance program for the rehabilitated portions of the manufacturing areas would be expanded and maintenance for the agronomic cover systems on the former landfills would be included.

This alternative includes the many remedial measures that GE has already completed at the site, as well as on-going remedial measures. These completed and on-going actions meet some of the remedial objectives. These completed remedial measures, which are shown in Figure 3-7, have included actions to abate potential sources, remove free-product, reduce the risk of exposure to site workers and environmental receptors, and improve site habitats. The completed and on-going remedial measures are listed below. A more detailed description of the work undertaken for each remedial measure is provided in Sections 3.4 and 7.2.1.

Programs to Abate Potential Sources

- Removal of more than 440 PCB-containing transformers;
- Closure of the permitted hazardous waste TSDF at former Building 259 in accordance with a NYSDEC Closure Plan;
- Closure of RCRA Storage Areas;
- Removal and bioremediation of approximately 2,685 cubic yards of petroleum-impacted soil discovered during construction of an addition to Building 262; and
- Removal of hundreds of storage tanks.

Programs to Remove Free-Product

- Implementation of several measures, including on-going monthly monitoring and vacuum extraction of free-product, where detected, at the former Stark Oil Facility;

- Removal of over 200 cubic yards of contaminated soils and treatment of approximately 100,000 gallons of water at the City Water Main IRM Area, and on-going monitoring for free-product;
- Installation of 16 monitoring wells at the former IMPS Area, near the rail scale, where product had been previously encountered, and on-going monthly monitoring and vacuum extraction to recover free-product, where it is detected; and
- On-going monthly monitoring and vacuum extraction of free-product, where it is detected, at Building 49/53.

Sewer Cleaning Programs

- Cleaning of 500 feet of storm sewer associated with former Building 269;
- Cleaning of 800 linear feet of storm sewer in the Hi-Yard Area, and removal of approximately 170 cubic yards of PCB-containing sediment; and
- Completion of a site-wide assessment of storm sewer flow and sewer sediments, and removal of more than an additional 200 tons of PCB-contaminated sediments.

Programs to Reduce the Risk of Exposure for Site Workers and Environmental Receptors

- Removal of mercury-impacted materials from Building 265;
- Armoring of the stream bank adjacent to the former East Landfill Area;
- Management, control, and reduction of the migration of contamination from the former East Landfill Area by planting numerous native trees and implementing the agronomic cover;
- On-going control, collection, and treatment of seeps near the southwest corner of the former East Landfill Area to reduce migration of contaminants to the Poentic Kill; and
- On-going site-wide renovations to break the potential direct contact exposure pathway for site workers.

Programs to Improve Site Habitats

- Placement of soil cover and planting of indigenous plant species over the former Binnie Kill Landfill Area;
- Removal of surface debris and placement of soil cover over portions of the former East and West Landfill Areas; and
- Removal of approximately 6,800 tons of contaminated sediment from the former Sector R Holding Pond.

As with Alternatives 2 through 5, GE would develop and follow a *Contingency Plan* to evaluate and address suspected contamination that is found at the site during the course of normal operations. The focus of the *Contingency Plan* would be subsurface activities. The purpose of this *Contingency Plan*, which would incorporate the *Health and Safety Plan*, would be to provide procedures that would enable GE to evaluate and address suspected contamination that is found at the site in a manner that is consistent with this remedial alternative. While the details of the *Contingency Plan* would be developed during the remedial design, the plan would include the free-product SOP, which is described below, in addition to these elements:

- The use of an existing dig permit system to advise site workers of conditions that they may encounter;
- Characterization of the subsurface conditions through observation;
- Triggers for additional characterization via analysis if suspected contamination is observed;
- Triggers for remedial action if constituents are detected at concentrations in excess of existing conditions in other portions of the site or if constituents pose a significant threat to human health and the environment; and
- Periodic reporting to NYSDEC regarding instances in which additional characterization activities are conducted and their outcome.

For the purpose of estimating the operational cost associated with this alternative, we have assumed that the only suspected contamination that would be encountered would be free-product.

As with Alternatives 3 and 4, GE would continue their on-going remedial actions and IRMs until they are completed. This includes the periodic recovery of free-product at the former IMPS Area and the Building 49/53 Area. GE would modify one or more of the free-product IRMs and address the remaining NAPL using the free-product SOP described in Alternative 3 and summarized below. GE would continue to abate potential sources, such as decommissioning abandoned buildings. GE would also continue their efforts to reduce potential exposure of site workers and the environment through the decommissioning of abandoned buildings and site-wide renovations and continuation of seep control measures (including the Seep IRM).

As shown in Figure 7-13, Alternative 6, like Alternatives 3, 4, and 5 includes continuing the manufacturing area cover program to eliminate the direct contact exposure pathway. GE would place soil cover or asphalt pavement over portions of the manufacturing area as the intended future use is established. These newly rehabilitated areas would be included in the maintenance program for the campus rehabilitations.

As with Alternatives 3, and 4, the Seep IRM, which collects and treats the seep water discharging from Seeps 2, 3, and 4, would continue with monthly performance monitoring and inspections. As provided in the Seep IRM Work Plan, GE may elect to modify the system, if warranted.

Like Alternatives 3, 4 and 5, GE would excavate soil in the manufacturing area where PCBs have been detected at concentrations greater than 1 mg/kg in surface soil and where PCBs have been detected at concentrations greater than 10 mg/kg in subsurface soil. An estimated 2,650 cubic yards of impacted soil would be removed from nine areas for off-site disposal at a licensed facility. These nine areas, which are shown on Figure 7-3, include: surface soil near former Building 29, former surface soil south of former Building 60, surface soil near former Building 109, surface soil from two areas near former Building 259, surface soil from three areas near the WWTP, and surface and subsurface soils near former Building 85. Composite confirmatory samples would be collected from the base of the excavation to verify that sufficient soil had been excavated. Each area would be restored to original grade with clean fill and surface covering (such as lawn).

Like Alternatives 3 and 4, GE would excavate one to two feet of surface soil where PCB concentrations greater than 10 mg/kg have been detected in the former landfill areas. As shown in Figure 7-13, the proposed excavation areas (approximately 12,700 square feet) are primarily in the former East Landfill. An estimated 1,500 tons of PCB-impacted soils would be removed for disposal at a properly licensed off-site facility. GE would also cover surface soils where PCB concentrations have been detected between one and 10 mg/kg in the former East and West Landfill Areas. One to two feet of clean fill would be placed and vegetated in 14 areas, which total 605,000 square feet.

Alternative 6 also includes the phased placement of agronomic cover over portions of the former East and West Landfill Areas that was described in Alternatives 3 and 4. When complete, over 50 percent of the former East Landfill Area would receive supplemental cover.

Alternative 6 includes the ecological monitoring program described in Alternatives 3 and 4. In addition, periodic observations would document the natural ecological evolution of the plant and animal communities on the former landfills, as well as the changes in diversity and richness brought about by the habitat enhancements.

Like Alternatives 3 and 4, Alternative 6 includes a habitat enhancement program. The focus of this program would be to enhance the existing ecosystems through additional planting of select flora species. Desirable species would be selected based on their ability to provide food or shelter, or their ability to restore portions of habitat areas to their ecological potential. The habitat enhancement program would be developed during the design-phase. Monitoring of vegetation success and overall program success would be conducted as part of the ecological monitoring program.

Alternative 6 includes the seep collection and treatment systems described in Alternative 4 for the seeps that have been identified on the west and north sides of the former East Landfill Area. The flow that these collection and treatment systems would handle is expected to be reduced by the agronomic cover that will be placed over the seep areas. For Seeps 2 through 4, which flow year round, seep water would be pumped from a collection area through a series of filters, and the treated water would be discharged to the Poentic Kill, or may be used as irrigation water during extended dry periods. For Seeps 1, 5, and 7, which occur as very low flow and intermittent seeps high density vegetation cover would be planted immediately above the seeps to lessen the seepage. Water that might continue to seep would be pumped through similar filter chambers and discharged to the Poentic Kill.

For Seep 6, sheet piling or a low permeability slurry wall would be installed parallel to the Poentic Kill, and a gravel-filled recovery trench would be constructed to serve as a pumping station. A pump would maintain the water in the trench at or below the water level of the kill. The pumped water would be treated with filters followed by liquid phase granular activated carbon (GAC) before being discharged to the kill or used for irrigation within the former East Landfill Area.

A maintenance schedule for the new seep collection and treatment systems would be developed during the design phase and refined, as warranted, during operation. Each new system would be monitored quarterly and the Seep IRM (Seeps 2 through 4) system would continue to be monitored monthly to evaluate the effectiveness of the system in further reducing adverse impacts to surface water and sediment quality in the Poentic Kill. For the five new systems, seep water would be sampled quarterly and analyzed for PCBs and BTEX, if flowing, for each treatment system. Monitoring is anticipated to occur once or twice annually for the seeps that only flow intermittently (Seeps 5 and 7). For the purpose of estimating the cost associated with this alternative, we have assumed seep water samples would be collected from one location monthly, three locations quarterly, and two locations twice annually, and that monitoring would include sampling of both the influent and effluent.

Like Alternative 4, Alternative 6 includes installing systems at two locations along the western and northern boundaries of the former East Landfill Area to treat the areas of VOC-containing shallow groundwater in the fill and floodplain deposits. For the purpose of estimating the cost associated with this alternative, we have assumed an air sparge/SVE system would be constructed. If pilot tests during the design phase indicate concentrations of iron in groundwater will hamper effective performance of the system, an alternate system for treating shallow groundwater would be selected. Approximately 500 to 700 feet of trenched-in or horizontal well sparge systems would be installed near the southwest corner of the former East Landfill and along approximately 300 feet near the northeast corner. For the southwest corner of the former East Landfill, where VOC concentrations (mostly BTEX) are higher, an SVE system would be used in conjunction with the air sparge system to collect or control the VOCs that would be transferred to the soil vapor by the air sparge system. Figure 7-8 shows a conceptual detail of the horizontal sparge system. The SVE equipment would include a positive displacement blower, a moisture knockout tank, and vapor–phase GAC vessels for treatment of the SVE exhaust. If necessary, condensate from the moisture knockout tank would be treated with liquid-phase GAC prior to discharge.

Alternative 6 includes treating the groundwater in the channel fill that contains elevated VOC concentrations along the site boundaries. A line of groundwater stripping wells would be installed along approximately 2,780 feet of the north site boundary and along approximately 300 feet of the west site boundary where concentrations of chlorinated VOCs in the groundwater in the channel fill deposits is above groundwater standards. A line of air sparging wells would be installed along approximately 250 feet of the eastern site boundary. Based on the site characteristics and for the purpose of costing this *FS*, the groundwater stripping wells along the northern site boundary would have an estimated radius of influence (ROI) of approximately 50 feet. Therefore, approximately 56 wells would be needed. For the western boundary wells, where the groundwater is shallower and the contaminated zone is narrower, we have estimated that the ROI would be approximately 12 feet. Therefore, approximately 26 groundwater stripping wells would be needed. Each of the groundwater stripping wells would be attached to a blower to provide air and an SVE system to collect and treat the volatilized vapors. Figure 7-14 provides a conceptual detail of a groundwater stripping well. Because the VOC-impacted groundwater along the eastern site boundary is in a narrower zone and much closer to the ground surface, groundwater stripping wells would have a small ROI and would be inappropriate. For the purpose of estimating costs for this *FS,* we have assumed that air sparging wells would have an effective radius of 15 feet, thus requiring 17 air sparge wells. Because the levels of VOCs in this area are relatively low, our cost estimate does not include an SVE system. The details of the boundary treatment systems would be finalized during the design phase and pilot tests.

Like Alternatives 3 through 5, GE would develop and implement a free-product SOP program. Alternative 6 includes addressing free-product encountered at a thickness greater than approximately 0.1 feet or approximately 0.02 feet within approximately 50 feet of surface water. As described in Alternative 3, the free-product SOP includes removal of the NAPL followed by monthly monitoring for six months. Additional removal measures would be implemented if the monitoring indicates free-product remains at thickness greater than approximately 0.1 feet or approximately 0.02 feet near surface water. For the purpose of estimating the costs associated with this alternative, we have assumed that GE would encounter free-product in five locations annually for the next five years, and that two of these would each require four additional removal mobilizations.

Similar to Alternatives 3 through 5, performance monitoring would be conducted to evaluate the effectiveness of the treatment systems. For Alternative 6, performance monitoring would be conducted for these four treatment areas: the air sparge curtains along the west and north boundaries of the former East Landfill, the groundwater stripping wells near the west site boundary, the air sparging system near the east site boundary, and the groundwater stripping wells along the north site boundary.

Like Alternative 4, groundwater samples would be collected from monitoring wells at approximately 50 feet or half a year travel time (whichever is closest) downgradient and approximately 100 to 200 feet upgradient of the air sparge curtains. For the purpose of estimating the cost associated with this alternative, we have assumed that 24 existing monitoring wells and 10 new monitoring wells would be sampled quarterly for two years and then annually for twenty-eight years and analyzed for VOCs. In addition to monitoring groundwater, vapor samples would be collected from the air sparge curtains and SVE systems to monitor the mass of VOCs that the systems are removing. To estimate costs associated with this alternative, we have assumed that four samples would be collected from each of the four systems each month.

In addition to monitoring groundwater along the boundary treatment systems, vapor samples would be collected from the SVE systems to monitor the mass of VOCs that the systems are removing by the groundwater stripping wells. To estimate the costs associated with this alternative we have assumed that four samples would be collected from each of the two SVE systems each month. Vapor samples would also be collected from the air sparge system at the east site boundary to monitor the effectiveness of the system in removing VOCs.

Like Alternatives 3 and 4, groundwater in the channel fill deposits would be monitored at locations spaced approximately 250 to 1,000 feet and approximately one and three years travel time (approximately 50 and 1,500 feet) upgradient of the Mohawk River. For the purpose of estimating the cost associated with this alternative, we have assumed monitoring would include six existing monitoring wells. Groundwater samples would be collected twice annually and analyzed for VOCs.

Groundwater in the fill and floodplain deposits would also be monitored at locations upgradient of on-site surface water bodies. For the fill and floodplain groundwater, approximately 124 locations approximately 500 feet apart, would be monitored. The monitoring wells would be placed approximately one and three years travel time (approximately 20 and 25 feet) upgradient of surface water. However, between the Poentic Kill and the groundwater collection trench, which includes an impermeable barrier between the trench and the creek, monitoring would consist only of water level data. Approximately 28 existing and 14 new monitoring wells screened in the fill and floodplain deposits would be sampled twice annually for 30 years and the groundwater samples would be analyzed for VOCs.

Like Alternatives 1 through 5, annual monitoring of surface water in the Poentic Kill and Poenties Kill would be conducted to evaluate impacts the remaining on-site waste has on nearby resources. For the purpose of estimating the cost associated with this alternative, we have assumed surface water samples would be collected from 10 locations and analyzed for PCBs, BTEX, and iron.

Like Alternatives 3 and 4, biota would be surveyed every five years to evaluate whether these resources are adversely impacted. Survey of wildlife environments would be conducted as part of the ecological monitoring program. This would be accomplished through a visual inspection of habitat areas and a random sampling of fauna, such as fish and macroinvertebrates. Mammals would only be observed.

The data collected under the ecological monitoring program would be evaluated at periodic intervals, which would be determined during the design phase, to evaluate the health of the agronomic cover system. The monitoring data collected at Main Plant would be used to evaluate the remedial program as a whole, for regions, such as the former East Landfill Area, as well as for individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if they are not achieving the RAOs. The reporting frequency for the on-going assessment would be determined during the design phase, but would occur at least once every five years.

As with Alternatives 1 through 5, the effectiveness of the remedial action would be reviewed every five years in accordance with CERCLA, and the results would be reported to the NYSDEC. As part of the review, the annual groundwater monitoring data would be reviewed to confirm that the no-risk conditions are sustained. Samples collected from the same groundwater monitoring wells upgradient of the Mohawk River and on-site water bodies and at select interior locations would be analyzed for VOCs, B/N SVOCs, PCBs and metals. If the groundwater monitoring results are not consistent with the site model, GE will propose modifications or additional remedial measures. Surveying of biota and wildlife habitats would also be conducted as part of the review.

Comparison with SCGs

The installation of the agronomic cover on the surface soils at the former landfills, coupled with seep collection and treatment, air sparging, and a monitoring program, would serve to isolate wastes and prevent migration of contaminants. The PCB-containing surface soils excavated from portions of the former East and West Landfill would be disposed at a properly licensed off-site facility in accordance with TSCA. In addition to protecting surface water in the kills and maintaining 6 NYCRR Part 703 surface water standards, this alternative achieves the intent of Part 360.

Because Alternative 6 includes stripping or air sparge wells along portions of the site boundary where elevated concentrations of VOCs have been detected, groundwater would be treated as it passes through the system. While groundwater standards would be met at the site property line shortly after implementation, the groundwater in the channel fill deposits in the interior of the site would not meet groundwater standards in the foreseeable future. Although the principal source areas would not be treated, the continuing natural attenuation of groundwater and degradation occurring at the site would eventually reduce contaminant concentrations to meet groundwater standards. The removal of free-product would likely improve the groundwater quality in the fill and floodplain deposits, thus, minimizing the migration of contaminants to the groundwater in the channel fill.

The water quality of the Mohawk River has not been adversely impacted by the VOCs that are present in the on-site groundwater and is in compliance with Class A surface water standards for VOCs. The boundary stripping and air sparge wells would reduce contaminant levels and prevent migration of contaminants to off-site groundwater, and potentially the Mohawk River. The water of the Poentic Kill is currently in compliance with Class B surface water standards for VOCs. The seep control measures and air sparging curtains would reduce migration of contaminants to the Poentic Kill, thereby promoting continued compliance with Class B surface water standards for VOCs.

During the design phase, the work plans for earthwork, including excavation and installation of groundwater treatment systems, and operation of the air sparge curtain SVE systems, would be prepared so that they would comply with the applicable action specific SCGs. The action specific SCGs that would be considered include:

- 6 NYCRR Part 257 – Air Quality Standards
- TOGS 1.3.2 – Toxicity Testing in the SPDES Permit Program
- TAGM HWR-89-4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites
- 6 NYCRR Part 360 – Solid Waste Management Facilities
- 6 NYCRR Part 370-373 – Hazardous Waste Disposal

Additionally, the New York State Department of Health (NYSDOH) may require a Community Air Monitoring Plan (CAMP) be developed prior to construction activities.

In addition, the USACE Wetlands Executive Order 11990 and 6 NYCRR Part 608 Use and Protection of Waters would be evaluated for applicability during the design of the seep control measures because of the proximity of the seeps to the Poentic Kill and wetland areas.

Protection of Human Health and the Environment

The combined effect of the remedial measures included in Alternative 6 would continue the no significant human health risk demonstrated by the HHRA. The addition of agronomic cover over portions of the former landfills would break potential exposure pathways between site fauna and thinly covered or exposed wastes, thereby providing an additional level of protection. Because the agronomic cover would be constructed in phases, the short-term disruption to the ecosystem would be minimal.

The agronomic cover, once established, would reduce the quantity of leachate generated, which would prevent further degradation of groundwater quality in the former landfill area. While not a requirement of the cover system, the agronomic cover has the potential to provide phytoremediation of contaminants in the root zone through phytoaccumulation, phytostabilization, and rhizodegradation. The agronomic cover, coupled with the additional seep control and treatment measures and the air sparging curtains along the former East Landfill, would provide additional protection to the surface water of the Poentic Kill. In addition, removing and covering surface soil locations where PCBs have been detected would prevent these soils from potentially eroding and being carried into the Poentic Kill. The seep control and treatment measures, in conjunction with removing or covering locations where PCBs have been detected in surface soils, would mitigate further potential impacts to the sediment quality in the Poentic Kill, thus serving to protect site fauna.

In addition, natural attenuation and degradation occurring in the groundwater and the removal of free-product would continue. The Mohawk River, which has not been affected by current site conditions, would remain unaffected with the site boundary groundwater treatment measures in this alternative. The Schenectady-Rotterdam well fields would continue to be protected by the natural groundwater divide.

Short-Term Effectiveness

There would be moderate risks of worker exposure to contaminants during installation of the remedial measures included in this alternative. These risks could be controlled by mitigative measures such as training, air monitoring, dust control, exclusionary zones, the use of personal protective equipment, and appropriate handling and containment procedures. Mitigative measures to reduce exposure would also reduce the risk to the community and the environment.

Because Alternative 6 requires that fill material, topsoil, and asphalt pavement be brought to the site and that PCB-containing soil be transported off-site, this alternative would pose a greater risk of transportation related injuries than Alternatives 1 and 2. In addition, the off-site locations from which the fill and topsoil are obtained would be altered.

Alternative 6 would also cause short-term damage to the existing habitat in the former landfill areas to be covered with additional topsoil and replanted, although the ecosystem would rebound as the new plants mature. The short-term disruption to the habitat areas would be minimized by the phased installation of the agronomic cover. Installation of the additional seep control measures and the air sparge curtains would cause additional disruption to the habitat areas.

Long-Term Effectiveness

A properly designed, functioning agronomic cover can be more effective than a clay or synthetic landfill cover in the long term, while avoiding irreparable damage to existing habitats associated with a constructed cap. With time, the forces of nature work to break down a man-made cap. In contrast, the performance of an agronomic cover should improve with time as plants mature and the ecosystem develops into a self-sustaining, regenerative system. Unlike a man-made cap, this living cap system would have the ability to propagate and regenerate, thereby sustaining itself. As the plants mature, their capacity to evapotranspirate water would increase, thereby reducing the volume of leachate produced, which would protect groundwater quality. The agronomic cover may also provide phytoremediation in the root zone, thus reducing the mass and mobility of the contaminants.

In addition, the ecological richness and diversity inherent at the site would be further enhanced by the elements integral to the agronomic cover. Niche environments would be encouraged and both floral and faunal diversity expanded.

Operating the groundwater stripping wells at the site boundary would reduce contaminant levels and would prevent potential migration of contaminants from the site toward the Mohawk River. Long-term operation of the groundwater stripping wells would be required to maintain the effectiveness of this alternative. Given the dissolved iron concentrations in the groundwater, a robust maintenance program would be required. As shown in Appendix B, this alternative would reduce contaminant concentrations near the Mohawk River within eight years, and groundwater standards would be met near the Mohawk River within approximately 24 years.

The possible impacts of VOC-containing groundwater on the on-site surface water bodies would be reduced by the increased protection of groundwater quality provided by the agronomic cover, air sparging curtains along the former East Landfill, and the removal of free-product.

With proper maintenance, the manufacturing area cover should continue to function to break the direct contact exposure pathway, particularly when coupled with institutional controls.

Reduction of Toxicity, Mobility, and Volume

Because Alternative 6 includes remedial measures that remove or treat contamination, Alternative 6 provides greater reduction of toxicity, mobility, and volume than Alternatives 1 through 3. The boundary groundwater treatment systems in Alternative 6, combined with the expanded seep systems and the groundwater treatment system along the former East Landfill, would provide approximately the same reduction in toxicity and volume of wastes as the groundwater protection and treatment measures included in Alternatives 4 and 5. However, with Alternative 6, because the groundwater treatment would be located along the site boundaries and there is no active treatment for the principal source areas, it would take much longer to achieve the reduction in toxicity and volume. The seep control measures, in conjunction with the agronomic cover, would reduce the migration of contaminants to the Poentic Kill.

Alternative 6 would reduce the volume of PCBs in soils through targeted removal and proper off-site disposal. The seep control and treatment measures and the air sparging curtains along the former East Landfill would reduce the toxicity and volume of VOCs and PCBs that are currently present in the fill and detected in seep water from the former East Landfill Area. The agronomic cover would reduce contact with shallow or exposed waste by forming a barrier. The agronomic cove would also reduce the mobility of constituents in the former landfills due to reduced infiltration of precipitation and stabilization of surface soils. In addition, the agronomic cover has the potential to provide phytoremediation, thus reducing the mass and mobility of contaminants within the root zone. The removal of free-product would reduce the petroleum constituents present in the groundwater in the fill and floodplain deposits.

Implementability

Alternative 6 would be technically feasible to implement. Most of the technologies applied in this alternative are readily available and there would be only minimal concerns regarding contractor availability. Installation of the horizontal air sparge curtains, seep control measures, and groundwater stripping wells have been accomplished at numerous other sites and can be applied at this site.

Community Acceptance

Community interest in the site focuses heavily on the desire to reuse the already developed land for economic benefit, address significant risks to the environment, and preserve and enhance the existing habitats. Community acceptance of this alternative would likely be favorable. The preservation of the existing ecosystems is expected to be well received by the community. Ecosystems could eventually serve as nature preserves or educational observation areas. Some public concern may arise regarding the time required to achieve groundwater standards in the channel fill deposits beneath the site, because this alternative does not include measures to actively treat the principal VOC source areas. However, this is likely to be tempered by the control of contaminants at the property boundary.

Cost

Table 7-1 summarizes the estimated cost for the remedial measures GE has completed to date. As shown in Table 7-7, GE has already invested an estimated $16.4 million toward cleaning up the Main Plant site. As shown in Table 7-5, the estimated present worth of the actions proposed in Alternative 6 is approximately $53,000,000. This includes direct and indirect capital costs of approximately $16,700,000 and annual operation and maintenance costs that range from approximately $2,200,000 to $2,900,000. Thus, the total present worth cost of this alternative, including the cost of the completed remedial actions, and abatement measures is approximately $69,400,000. The details of the cost estimate are presented in Table 7-5.

7.3 COMPARISON OF ALTERNATIVES

This section presents a comparison of the results of the evaluation of the six alternatives. Table 7-8 presents a summary of these remedial alternatives. The relative merits of the six alternatives with regard to the eight evaluation criteria are described in the remainder of this section.

Comparison with SCGs

Alternatives 6 will enable the channel fill groundwater at the site boundary to meet groundwater standards in a shorter time than Alternatives 1 through 5 will, but will not provide treatment of the principal VOC source areas. Alternatives 3 through 5 are likely to achieve groundwater standards at the site boundary in a shorter time than Alternatives 1 and 2 because of the measures that target areas of elevated VOC concentrations. Alternatives 3, 4, and 5 will enable on-site groundwater to achieve groundwater standards before Alternatives 1, 2, and 6 because Alternatives 3, 4, and 5 include treatment of the principal VOC source areas. With Alternatives 1, 2, and 6, the channel fill groundwater beneath the site would not achieve groundwater standards for the foreseeable future.

Data has shown that the water quality of the Mohawk River has not been adversely impacted by the VOCs that are present in the on-site groundwater and, that the water in the Mohawk River is currently in compliance with Class A surface water standards for VOCs. Alternatives 3 through 6 include groundwater treatment measures that would aid in protecting the surface water quality of the Mohawk River.

Alternatives 3, 4, 5, and 6 all include measures to address the VOC containing shallow groundwater migrating from the former East Landfill to the Poentic Kill and the seeps. These measures would provide increasing degrees of protection so that the water in the Poentic Kill continues to meet surface water standards for VOCs.

Alternatives 3, 4, and 6, which include targeted removal of PCB impacted surface soils in the former East and West Landfills, and Alternatives 3 through 6, which include targeted removal of PCB-impacted soils in the manufacturing area, would comply with TSCA disposal regulations. The earthwork that is part of Alternatives 3, 4, 5, and 6 would employ appropriate dust control measures.

Alternatives 4, 5, and 6 include treatment systems that would have air and water discharges. These systems would be designed to comply with air and water discharge requirements.

Alternative 5 includes capping soil and groundwater at the former landfill areas with man-made landfill caps of various designs based on RCRA and NYSDEC guidance. The agronomic cover included in Alternatives 3, 4, and 6, in conjunction with the other remedial measures, would provide equivalent protection of the environment as a traditional man-made cap.

Protectiveness of Human Health and the Environment

Each of the alternatives provides some protection of the environment. Alternatives 1 and 2 provide the least disruption to the existing resources and ecosystems. However, they also provide no active measures to protect the natural resources (soil, groundwater, surface water) beyond the continuation of existing IRMs. The agronomic cover, included as part of

Alternatives 3, 4, and 6, will act to enhance the habitats, while protecting the on-site fauna from direct contact with contaminants.

Alternatives 2 through 6 include institutional controls that will protect the human health of both site workers and adjacent residents. These controls will also continue the no risk condition that was shown in the HHRA.

Alternatives 4, 5, and 6 include the most measures to add levels of protection to the Poentic Kill and the Mohawk River. Alternatives 4 and 6 achieve this with measures that enhance the habitat areas, causing only limited temporary disruption to the existing habitats during implementation. Construction of Alternative 5 would cause the complete destruction of the site habitats and destroy portions of adjacent wetlands.

Alternatives 4 through 6, which include measures to address seepage along the former East Landfill Area, as well as measures to prevent erosion of PCB-impacted surface soils, would provide better control of the migration of PCB-containing particles and dissolved contaminants to the Poentic Kill than Alternatives 1 through 3, where only the Seep IRM is continued. Control of suspended and dissolved contaminants provides greater protection to the surface water, sediment quality, and biota of the Poentic Kill.

Alternatives 4 and 5 include more measures to protect and improve the quality of on-site groundwater than Alternatives 1, 2, 3, and 6. Thus, the Mohawk River, which is the downgradient receptor of groundwater, would continue to be unaffected by site activities.

Short-Term Effectiveness

Alternatives 2 through 6 provide immediate protection to human health with varying degrees of short-term risk. Alternative 6 provides a more immediate reduction in the concentrations of VOCs in the groundwater in the channel fill deposits along the northern site boundary, but does not treat VOC source areas or reduce concentrations of contaminants in on-site groundwater.

The manufacturing area cover, which is included in Alternatives 3 through 6, would require that a substantial quantity of cover be brought to the site. This is likely to lead to increased risk to the public and workers through transportation injuries. However, in contrast to Alternative 3, 4, and 6, Alternative 5 includes bringing an additional 1.7 million cubic yards of material to the site to construct the caps in the former landfill areas, which would significantly increase the risk of transportation injuries and cause a broader array of impacts (noise, dust, traffic) to people living near the site and the borrow areas. Alternative 5 would cause irreparable damage to more than 130 acres of existing habitats in the western portion of the site and would adversely impact much of the 90 acres of habitat that surrounds the former landfill areas.

Long-Term Effectiveness

In some areas of the site, contaminants in the groundwater appear to be naturally attenuating. This process would be allowed to continue with all of the alternatives. The measures included in Alternatives 3, 4, and 5, especially the treatment of the principal VOC source areas, would reduce the levels of contaminants, leading to an increased reduction of VOCs throughout the on-site groundwater.

In Alternatives 1 and 2, which do not include treatment of the principal source areas, groundwater in the channel fill deposits upgradient of the Mohawk River would not meet groundwater standards in the foreseeable future. Implementation of treatment systems for the principal VOC source areas in Alternatives 3, 4, and 5, would reduce the time needed to meet groundwater standards near the Mohawk River to 30 years, although concentrations of VOCs in groundwater near the Mohawk River would begin to decline after 10 years. With Alternative 6, the use of groundwater stripping wells at the northern site boundary would reduce the time needed to meet groundwater standards near the Mohawk River to 24 years. However, the stripping wells would need to be operated for considerably longer than 30 years until all the contaminants in the principal VOC source areas migrated to the groundwater stripping wells. With Alternatives 3, 4, and 5, in-situ anaerobic biodegradation would be enhanced at, or immediately downgradient of principal VOC source areas. Depending upon the design of the system, the source areas could be completely degraded, based on the results of the bench-scale laboratory studies, within as little as five years.

The agronomic cover over the former East and West Landfill Areas, included as part of Alternatives 3, 4, and 6, would effectively prevent site fauna from direct contact with the remaining waste mass. The cover would also serve to reduce infiltration of precipitation, and thus leachate production. In addition, the agronomic cover would treat and reduce the mobility of the wastes. The agronomic cover system is likely to be increasingly effective as time passes and the plants mature. The agronomic cover is less likely to degrade over time, as compared to man-made caps. Alternative 5 would permanently destroy wetlands, as well as riparian and upland habitats. Thus, there is no long- or short-term effectiveness with respect to the habitats.

Reduction of Mobility, Toxicity, and Volume

Alternatives 1 and 2 provide no active measures to reduce the mobility, toxicity, or volume of the wastes present at the site beyond the reduction in mobility and toxicity gained through continuation of the free-product and Seep IRMs. The agronomic cover included in Alternatives 3, 4, and 6 would reduce the mobility of the waste by reducing infiltration through the waste, reducing erosion of PCB impacted soils, and potentially through phytoremediation. Phytoremediation would also potentially serve to reduce the toxicity of the waste. The man-made caps included in Alternative 5 would reduce the mobility of the wastes in the habitat areas, but would do nothing to reduce the volume of waste present.

The additional seep control systems and air sparge curtain along the Poentic Kill, which are included in Alternatives 4 and 6, would provide greater reduction in the mobility, toxicity, and volume of contaminants than simply continuing the Seep IRM (Alternatives 1 through 3). The groundwater collection and treatment for the shallow groundwater in the former East Landfill, which is included in Alternative 5, would provide similar reduction in toxicity, mobility, and volume as the combined measures included in Alternatives 4 and 6.

Continuation of the on-going IRMs and the free-product SOP, which are included in Alternatives 3 through 6, would also reduce the volume of the waste. Placement of asphalt caps over soil that is impacting groundwater, which are included in Alternatives 3, 4, and 5, would reduce the mobility of contaminants. The treatment of the primary VOC source areas at the former Wire Mill Area and the former Propeller Test Building Area, in conjunction with treatment of saturated soil and groundwater at the DM-405F Area, in Alternatives 4 and 5, would provide a greater reduction in the volume of contaminants than Alternative 3, which treats only the principal VOC source areas.

The boundary groundwater treatment systems in Alternative 6, combined with the expanded seep systems and the groundwater treatment system along the former East Landfill, would, like Alternatives 4 and 5, reduce the toxicity and volume of contaminants in groundwater, but would not provide for the destruction of the contaminants like Alternatives 4 and 5, depending upon the manner in which the VOCs recovered from the stripping wells are treated. Alternative 6 would eventually provide a similar reduction in toxicity and volume of contaminants as the groundwater protection and treatment measures included in Alternatives 4 and 5. However, with Alternative 6, because the groundwater treatment would be located along the site boundaries, it would take decades longer to achieve a similar reduction in toxicity and volume. In Alternatives 4 and 5, the treatment of the principal chlorinated VOC source areas at the former Wire Mill and the former Propeller Test Building Areas, treatment of groundwater near the soil with elevated VOCs near DM-405F, the use of asphalt caps over soil that may be impacting groundwater near DM-401F and the City Water Main IRM Area, and the treatment or collection measures for shallow groundwater along the former East Landfill Area would result in a more rapid reduction in the toxicity and volume of contaminants than the boundary systems included in Alternative 6 because of the proximity of the treatment and protective measures to the impacted areas. In addition, the groundwater collection, treatment, and protective measures in Alternatives 4 and 5 would reduce the mobility of wastes, while the boundary measures in Alternative 6 would not reduce the mobility of contaminants until the contaminants had migrated to the systems. The groundwater treatment and protective measures in Alternative 3 would provide a reduction in the toxicity, volume, and mobility of wastes more quickly than the measures included in Alternative 6, but the groundwater treatment and protective measures in Alternatives 4 and 5 would provide the most rapid reductions in toxicity, volume, and mobility of wastes.

Implementability

Alternative 1 would be easy to implement. The off-site groundwater and surface water use restrictions proposed as part of Alternatives 2 through 5 would require coordination with various agencies and landowners. In general, the technologies proposed for Alternatives 3 through 6 would not be difficult to implement. Construction of remedial measures within the saturated zone would be challenging, although similar measures have been constructed at many sites. However, the tremendous quantity of fill and capping materials needed to construct the caps for Alternative 5 are likely to be difficult to obtain locally. Additional threatened and endangered species surveys may result in information that would delay the implementation of Alternative 5.

Community Acceptance

Community acceptance of Alternatives 1 and 2 is likely to be unfavorable because these alternatives do not contain or reduce the on-site contaminants beyond continuing existing IRMs. Alternative 4 is likely to be viewed more favorably than Alternative 3 because it provides additional protection of the surface water quality in the Poentic Kill. Alternative 5 may be viewed more favorably by some because it includes capping measures that may be viewed as more traditional by a portion of the public. However, the destruction of the habitat areas, displacement of fauna, and the importing of large quantities of fill material required to construct man-made caps are likely to reduce public acceptance of Alternative 5 and may be strongly opposed by people focused on preservation of habitat areas and wildlife. Alternative 6 may be viewed more favorably by some because groundwater standards would be met at the site boundaries more quickly than with Alternatives 4 and 5, even though Alternatives 4 and 5 will destroy contaminants in groundwater more rapidly than Alternative 6.

Cost

Table 7-9 presents a summary of the estimated costs of the six alternatives. Alternative 1 would cost the least to implement because it requires no action beyond continuing existing IRMs. Alternative 2 would cost slightly more to implement because it includes institutional controls. Alternatives 3, 4, and 6 are comparable in cost. The components of Alternatives 3, 4, and 6 which contribute most to the cost increase over Alternative 2 is the soil and asphalt needed for the manufacturing area cover and the removal and off-site disposal of PCB-impacted soils. The increased cost to implement Alternative 4 over Alternative 3 reflects the addition of measures to treat the VOCs in the shallow groundwater in the former East Landfill Area before the groundwater migrates to the Poentic Kill and the additional seep control and treatment measures. Alternatives 4 and 6 are very similar in cost, despite their approaches for treating groundwater. The proposed remedial actions in Alternative 5 would cost approximately two times more to implement than the remedial actions proposed in Alternatives 3, 4, or 6. The primary component of this increased cost is the purchase and placement of sufficient fill to achieve the designed minimum slopes for the man-made caps and the cost of materials to construct caps over more than 130 acres.

8.0 RECOMMENDED ALTERNATIVE

URS recommends implementation of Alternative 4: Institutional Controls, Elimination of Exposure Pathways in the Manufacturing Area, Targeted Soil Removal from the Manufacturing Area, Focused Placement of Asphalt Caps in the Manufacturing Area, Targeted Surface Soil Removal from the Former East and West Landfill Areas, Enhancement of Ground Cover at the Former Landfill Areas with Agronomic Cover Systems, Enhancement and Preservation of Habitat Areas, Shallow Groundwater and Seep Water Treatment Along the Former East Landfill Area, Treatment of Principal VOC Source Areas, Removal of Free-Product, Monitored Natural Attenuation of Groundwater, and Monitoring (Incorporates Remedial Actions Already Implemented and Currently Underway). The first part of this section provides a brief description of Alternative 4 and the second part provides the reasoning for the selection of Alternative 4 as the recommended remedial action for the Main Plant site.

8.1 SUMMARY OF RECOMMENDED ALTERNATIVE

Alternative 4 includes the IRMs and abatement measures GE has already undertaken to meet some of the remedial objectives. These measures include several programs to abate potential sources, such as removal of PCB-containing transformers, closure of the permitted hazardous waste TSDF at former Building 259, closure of RCRA Storage Areas, bioremediation of the Building 262 soil pile, and removal of storage tanks.

Remedial actions have been implemented to remove free-product encountered during abatement activities or other site work, such as the former Stark Oil Facility and City Water Main IRMs. Free-product recovery has also taken place at the former IMPS Area, as well as at Building 49/53. GE has also conducted several sewer cleaning programs. During the mid-1990's, a site-wide assessment of storm sewer flow and sewer sediments was completed, which resulted in the removal of more than an additional 200 tons of PCB-contaminated sediments.

The risk of exposure for site workers and environmental receptors has been reduced through removal of mercury at Building 265, armoring of the stream bank adjacent to the former East Landfill Area, implementation of an agronomic cover system at the former East Landfill Area, and on-going site-wide renovations. In addition, GE has conducted habitat improvement activities, such as seep control measures (including the Seep IRM), habitat enhancements at all three former landfill areas, and the removal of approximately 6,800 tons of impacted sediment from the former Sector R Holding Pond.

Alternative 4 includes institutional controls to protect human health. These include imposing restrictive covenants and access controls and developing a comprehensive *Health and Safety Plan* for site workers. GE would develop and implement a *Contingency Plan* to evaluate and address areas where suspected contamination is identified during normal site operations. GE would also implement programs to operate and maintain the elements that are a part of this alternative.

With Alternative 4, GE would continue to implement on-going remedial actions and IRMs until they are completed. GE would continue to abate potential sources, such as removing free-product, decommissioning abandoned buildings, and removing historic underground storage tanks. GE would also continue their efforts to reduce and eliminate potential exposure of site workers and the environment through site-wide renovations and continuation of seep control measures (including the Seep IRM).

As part of the site-wide renovations, soil or asphalt cover would be placed over portions of the manufacturing area that have not already been rehabilitated. Asphalt caps would be constructed over two areas (the City Water Main IRM Area and near monitoring well DM-401F, which is adjacent to the former Binnie Kill Channel) of the manufacturing area where soil appears to be impacting groundwater.

The groundwater with elevated chlorinated VOC concentrations near the former Wire Mill and near the former Propeller Test Building at the WWTP Area would be treated by adding amendments to enhance and accelerate the naturally occurring in-situ anaerobic bioremediation. Amendments would be added to the area near DM-405F, where VOCs in saturated soil may be impacting groundwater, to enhance in-situ aerobic biodegradation.

GE would also implement a free-product recovery and monitoring SOP to address areas where product is encountered during the course of standard business operations and those areas known as of the date of the *RI Report*, including open spills. The SOP would establish the actions that GE would take if product is encountered at a thickness greater than approximately 0.1 feet or greater than approximately 0.02 feet within approximately 50 feet of a surface water body.

In the manufacturing area, GE would perform targeted removal and off-site disposal of surface soil where PCBs have been detected at concentrations greater than one mg/kg. Subsurface soil in the manufacturing area where PCBs have been detected at concentrations greater than 10 mg/kg would also be removed and disposed at a properly licensed off-site facility.

Alternative 4 includes placement of an agronomic cover to address soil and groundwater at portions of the former East and West Landfill Areas. The agronomic cover would break potential exposure pathways for the site fauna, reduce leachate production and contaminant migration, potentially phytoremediate contaminants in root zone, and enhance, rather than destroy, the existing habitats.

Alternative 4 would enhance the existing wildlife habitats by increasing the ecological diversity and richness within the former landfill areas. An ecological monitoring program would document the natural ecological evolution of the plant and animal communities on the former landfills, as well as the changes in diversity and richness brought about by the habitat enhancements.

Surface soil locations in the former East and West Landfills Areas where PCB concentrations greater than 10 mg/kg have been detected would be excavated and disposed off-site. Surface soil locations in the former East and West Landfill Areas where PCB concentrations between one mg/kg and 10 mg/kg have been detected would be covered with one to two feet of fill.

GE would continue the Seep IRM and construct expanded seep collection and treatment systems for the other seeps along the former East Landfill Areas. An air sparge curtain would be constructed along portions of the Poentic Kill to prevent shallow groundwater perched within the former East Landfill Area from impacting the kill.

The seep control and treatment measures, in conjunction with removing or covering locations where PCBs have been detected in surface soils, would mitigate potential further impacts to surface water and sediment quality in the Poentic Kill, thus serving to protect site fauna.

For Alternative 4, performance monitoring of the enhanced in-situ anaerobic bioremediation areas, the air sparge curtains, and the enhanced in-situ aerobic bioremediation area would be conducted to evaluate the effectiveness of these treatment systems. Vapor samples would also be collected from the air sparge curtain systems to monitor the mass of VOCs that the systems are removing. In addition, groundwater monitoring would be conducted near the two areas with asphalt caps.

Alternative 4 also includes an extensive monitoring program. The natural attenuation occurring in the channel fill groundwater beneath the site and the perched groundwater within the former East Landfill Area would be monitored annually. Groundwater quality would also be monitored upgradient of the Mohawk River, adjacent to on-site surface water bodies, and near the treatment areas (the former Wire Mill Area, the former Propeller Test Building at the WWTP Area, the sparge curtain areas, and the DM-405F Area). Each new seep collection and treatment system would be monitored quarterly, and the Seep IRM would be monitored monthly. In addition, surface water quality in the Poentic and Poenties Kills would be monitored annually. A sampling plan to evaluate the phytoremediation component of the agronomic cover would also be implemented. The monitoring data collected at Main Plant would be used to evaluate the remedial program as a whole, for regions, such as the former East Landfill Area, as well as for individual system components. The on-going performance assessment would include recommendations for enhancements to the remedial systems if they are not achieving the RAOs. The reporting frequency for the on-going assessment would be determined during the design phase, but would occur at least once every five years.

Every five years, the biota and wildlife habitats would be surveyed as part of the review of the effectiveness of the remedial alternative.

8.2 RECOMMENDATION

URS recommends implementation of Alternative 4 for the Main Plant because Alternative 4 is the least destructive, provides active treatment of source areas, preserves the habitat areas, remediates site groundwater, and is the most cost-effective alternative that will achieve the remedial objectives for the site. The reasons Alternative 4 was selected over other alternatives are discussed below.

Alternatives 1 and 2 have been ruled out because they do not achieve the remedial objectives. However, these alternatives have the lowest cost and would be the quickest to implement.

Alternatives 3, 4, and 6 are similar. Alternative 4 has been chosen over Alternative 3 because it provides additional levels of protection for the surface water, sediment, and groundwater and will allow groundwater at the site boundaries to achieve groundwater standards in a shorter timeframe. URS estimates that contaminant concentrations in groundwater near the Mohawk River would be reduced in 10 years and that groundwater quality standards would be achieved within 30 years after completion of construction of Alternative 4. The seep collection and treatment measures combined with air sparge curtains will prevent shallow groundwater within the former East Landfill from degrading the surface water quality in the Poentic Kill. The VOC source treatment measures near the former Wire Mill and near the former Propeller Test Building at the WWTP Area will reduce the concentration of VOCs in these areas, thus reducing the overall concentration of VOCs in the groundwater in the channel fill deposits. Addressing these VOC sources will enable the natural attenuation occurring in the groundwater to reduce VOC concentrations to meet groundwater standards and prevent potential degradation of surface water quality in the Mohawk River.

Alternative 4 has been chosen over Alternative 6 because the groundwater treatment and protective measures in Alternative 4 will reduce the volume and mobility of contaminants in groundwater at the site in a shorter time frame. The groundwater treatment measures in Alternative 4, which focus on the interior of the site, will remove or degrade approximately the same volume of contaminants as the boundary groundwater treatment systems in Alternative 6 would eventually remove. However, over a span of 30 years, Alternative 4 will achieve a much greater reduction in contaminant concentrations than Alternative 6 because the groundwater treatment measures in Alternative 4 target the VOC source areas, thereby reducing the volume of impacted media at the site and enabling on-site groundwater to achieve groundwater standards. Alternative 6 would not achieve groundwater standards within the site boundaries for the foreseeable future because the boundary groundwater treatment measures in Alternative 6 will only remove the contaminants that migrate to the system. Although Alternative 6 is likely to begin to reduce VOC concentrations in groundwater near the Mohawk River in a shorter time frame (eight years as opposed to 10 years for Alternative 4), the proposed land use restrictions in Alternative 4 will prevent human consumption of potentially contaminated groundwater. The proposed land use restrictions are not expected to pose an undue burden because most of the affected off-site area is covered by Interstate 890 and is not an area in which further development is expected. The proposed land use restrictions for the areas north of the site are consistent with the current and anticipated future uses of these areas. Because the Mohawk River has not been impacted by the site, both alternatives continue to protect the river. Thus, URS believes that Alternative 4 provides a significant benefit over Alternative 6 for protection of the environment because it incorporates treatment measures that will degrade the principal VOC source areas and reduce the volume of contaminants at the site more rapidly.

Alternatives 3, 4, and 6 would each result in an increase in the ecological diversity and richness within the former landfill areas. The implementation of the agronomic cover would reduce infiltration of precipitation and cut off exposure pathways while also focusing on the preservation and enhancement of niche environments that offer refuge to a diverse wildlife population. Alternative 5 would destroy these existing environments and remove mature habitats that have established themselves for over 80 years on the site. Hardwood stands, many of which have been relatively unaffected since the last logging of the Mohawk Valley in the early 20th century, are found along the riparian corridors throughout the site. These hardwood stands and habitat areas, which provide shade for emergent flora and shelter for a variety of fauna, would be destroyed by implementation of Alternative 5. In Alternatives 3, 4, and 6, these areas would be preserved and enhanced to promote regeneration, thus revitalizing bordering communities. As examples, the upland areas are being colonized by a rich assemblage of grasses and shrubs and are a vital component of the local bird-feeding niche space; red tailed hawks nesting in the hardwoods hunt daily within these grass communities; turkeys forage in the sandy upland soils among the introduced native willows and poplars; and deer browse preferentially on the native willows planted as part of the agronomic cover test plot. Further afield, the diverse communities on the site have a functional role in the local and regional ecology, providing habitat for migrating birds as well as ranging mammals. Alternatives 3, 4, and 6 incorporate effective remedial actions without destroying the vibrant habitats.

Under Alternative 5, the habitats would be bulldozed, graded, and buried under traditional landfill capping systems. The caps would be covered by a monoculture of grass, and the contribution of the site to the local ecology would be severely diminished. Alternatives 3, 4, and 6 would preserve the link between the site and the seven neighboring wildlife habitats identified by Dames and Moore in their 1996 study. Further, under Alternatives 3, 4, and 6, the inherent robustness of the ecosystems, along the ecological gradient from wetland communities through riparian to upland grass and shrub communities, would be preserved. Alternative 5 would result in the destruction of this gradient and a corresponding decrease in the value of the open space from an ecological perspective.

Alternative 4 has been chosen over Alternative 5 based on environmental impact and cost-effectiveness. While Alternative 5 is capable of achieving most of the remedial objectives, the higher costs do not provide an equivalent increased level of protection over the long term. More importantly, Alternative 5 would ruin rather than preserve and enhance the existing habitats. Alternative 5 requires the destruction of over 130 acres of habitat and displacing the wildlife at the site. Alternative 4 will cause only temporary disruption and no permanent damage to existing ecosystems and will pose fewer risks to the community in the form of noise, traffic, and transportation-related injuries. A properly designed agronomic cover system is expected to be effective in eliminating exposures and reducing leachate generation. Man-made caps have design lives of 30 years, and little data is available regarding degradation of these caps with exposure to the elements beyond 30 years. The agronomic cover will mature into a self sustaining ecosystem that requires minimal maintenance and additional capital expenditures. The ability of agronomic cover to reduce infiltration, and hence, migration of contaminants should be sufficient to control contaminant migration. While not a requirement of the cover system, the agronomic cover has the additional potential benefit of phytoremediating contaminants in the root zone, resulting in a potential reduction of contaminants through phytoaccumulation, phytostabilization, and rhizodegradation.

In summary, Alternative 4 is recommended because it is protective of human health and the environment, preserves and enhances habitats, and meets the remedial objectives. Alternative 4 is easier to implement, provides similar protection, and meets more of the remedial objectives than the more costly Alternative 5. Alternative 4, which incorporates groundwater treatment measures that degrade VOCs at or near the principal source areas, provides greater contaminant reduction in a shorter timeframe than Alternative 6.

Once GE and the NYSDEC reach an agreement, the design, review, and approval of the elements of Alternative 4 could be completed in an estimated time frame of two to three years. Implementation of Alternative 4, including the installation and startup of the remedial systems and the supplemental replanting of the habitat areas, would take approximately two years to complete. However, maintenance to ensure sufficient survival would be performed for several more years after planting. URS estimates that within five years of approval of Alternative 4 by the NYSDEC, GE could complete construction of the remedy at the site.

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6 NYCRR Part 257 – Air Quality Standards

6 NYCRR Part 360 – Solid Waste Management Facilities

6 NYCRR Part 370-373 – Hazardous Waste Generated Disposal

6 NYCRR Part 375 – Inactive Hazardous Waste Disposal Sites

6 NYCRR Part 608 – Use and Protection of Waters

6 NYCRR Part 701 – Classification of Groundwater & Surface Water

6 NYCRR Part 703 – Groundwater Standards

29 CFR Part 1910 – Occupational Safety and Health Standards

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10.0 ACRONYM LIST

ACOE	New York State – United States Army Corps of Engineers
AOCs	Areas of Concern
ARARs	Applicable or Relevant and Appropriate Regulations
ARM	ARM Group, Inc.
BBE	Blasland and Bouck, Engineers
BBL	Blasland, Bouck, & Lee
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BMP	Best Management Practice
B/N SVOCs	Base / Neutral Semi Volatile Organic Compounds
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPCs	Chemicals of Potential Concern
DCE	Dichloroethlybenzene
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DP SVE	Dual Phase Soil Vapor Extraction
ECL	New York Environmental Conservation Law
EPS	Environmental Products and Services Inc.
ERAGS	Ecological Risk Assessment Guidance for Superfund
FS	Feasibility study
GAC	Granular-Activated Carbon
GE	General Electric Energy
GEGR	General Electric Global Research
gpm	Gallons Per Minute
HDPE	High Density Polyethylene
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HRC	Hydrogen Release Compound

IMPS	Insulating Material Products Section
IRMs	Interim Remedial Measures
ISChem-Ox	In-Situ Chemical Oxidation
LEL	Lowest Effect Level
LNAPL	Light Non-Aqueous Phase Liquid
MCLs	Maximum Concentration Levels
MH	Manhole
MNA	Monitored Natural Attenuation
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
NYCRR	New York Codes of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OHM	OHM Remediation Services, Corp
ORC	Oxygen Releasing Compound
ORP	Oxidation-Reduction Potential
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PELs	Permissible Exposure Limits
PRB	Permeable Reactive Barrier
RAMM	Reduced Anaerobic Mineral Media
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROCs	Receptors of Concern
ROD	Record of Decision
ROI	Radius of Influence
RSCO	Recommended Soil Clean-up Objectives
RTDF	Remedial Technology Development Forum
SCGs	New York State Standards, Criteria, and Guidelines
SLERA	Screening Level Ecological Risk Assessment

SMDP	Scientific Management Decision Point
SOM	Soil Organic Matter
SOP	Standard Operating Procedure
SPDES	State Pollution Discharge Elimination System
SVE	Soil Vapor Extraction
SVOCs	Semi-Volatile Organic Compounds
TAGM	Technical and Administrative Guidance Memorandum
TAGM HWR	Technical and Administrative Guidance Memorandum Division of Hazardous Waste Remediation
TBC	To Be Considered
TCA	Trichloroethane
TCE	Trichloroethlybenzene
TOC	Total Organic Carbon
TOGS	Technical and Operational Guidance Series
TSCA	Toxic Substance Control Act (40 CFR Part 761)
TSDF	Treatment, Storage, and Disposal Facility
URS	URS Corporation
USACE	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UV	Ultraviolet
VOCs	Volatile Organic Compounds
WWTP	Waste Water Treatment Plant

TABLES

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	113-5	113-6	DM-305S	DM-306S	DM-400FP	DM-401F	DM-402FP	DM-403F	DM-403FP
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	17	550	-	-	-	-	-	-	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	69	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	6	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	7	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	33	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	29	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	24	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	84	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	7	-	-	-	-	-	-	-
Ethylbenzene	5*	-	540	-	-	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	470	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	98	16	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	1,000	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	31	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	0.9	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	1	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	113-5	113-6	DM-305S	DM-306S	DM-400FP	DM-401F	DM-402FP	DM-403F	DM-403FP
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	2	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	1	-	-	-
Chrysene	[0.002]	-	-	-	-	-	1	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	48	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	2.1	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	1.1	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	1	-	-	-
Total PCBs	0.09	-	-	-	-	-	4.2	-	-	-
Metals										
Antimony	3	-	-	-	-	-	4.7	-	9.5	4.7
Antimony-Filtered	3	-	-	-	-	6.1	4	3.8	-	4.2
Arsenic	25	-	-	38	-	36.2	120	34.7	-	41.3
Arsenic-Filtered	25	-	-	-	-	33.5	47.3	35.7	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	3.2
Cadmium	5	-	-	-	-	5.8	30.2	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	77.3	-	-	88.3	-	-	89.9
Copper	200	-	-	246	-	-	516	-	575	440
Iron	300	2,640	1,760	35,100	12,500	27,300	122,000	16,700	126,000	143,000
Iron-Filtered	300	1,840	490	4,020	-	22,900	25,500	17,900	20,000	6,610
Lead	25	-	-	31	-	-	548	-	165	155
Magnesium	[35,000]	42,000	42,600	-	-	-	-	-	-	51,600
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	415	496	7,540	2,990	5,680	1,890	2,860	1,350	1,870
Manganese-Filtered	300	-	-	1,180	-	5,510	324	3,150	718	382
Mercury	0.7	-	-	-	-	-	4.5	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	126

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	113-5	113-6	DM-305S	DM-306S	DM-400FP	DM-401F	DM-402FP	DM-403F	DM-403FP
Selenium	10	-	-	-	-	-	-	-	-	11.6
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	49,200	31,700	194,000	108,000	-	238,000	216,000	37,700	35,400
Sodium-Filtered	[20,000]	-	-	187,000	-	-	232,000	227,000	42,700	38,000
Thallium	[0.5]	-	-	-	-	-	8.7	-	-	6.4
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-404FP	DM-405F	DM-406F	DM-406FP	DM-407F	DM-407FP	DM-408F	DM-408FP	DM-409FP
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	35	-	-	-	-	-	62	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	71	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	9	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	10	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	6	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	60	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	22	-	-	-	-	-	150	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-404FP	DM-405F	DM-406F	DM-406FP	DM-407F	DM-407FP	DM-408F	DM-408FP	DM-409FP
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	16	-	-	-	18	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	2.7	-	-	-	1.42	-	-	-
Aroclor-1260	0.09	-	1.1	-	-	-	0.366	-	-	-
Total PCBs	0.09	-	3.8	-	-	-	3.57	-	-	-
Metals										
Antimony	3	-	-	-	5.3	4	-	-	7.5	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	71.8	386	581	-	-	-	81.8	-
Arsenic-Filtered	25	-	-	-	94	-	-	-	52.8	-
Barium	1000	-	1,180	2,260	1,540	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	4.9	16.9	14.5	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	495	153	156	-	-	-	-	-
Copper	200	-	1,320	-	284	-	-	-	-	-
Iron	300	8640	124,000	175,000	258,000	32,500	25,000	-	82,700	17,800
Iron-Filtered	300	-	20,500	442	17,900	33,200	398	-	56,500	6,640
Lead	25	-	471	101	156	-	-	27.5	26.9	-
Magnesium	[35,000]	38300	37,600	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	37100	-	-	-	-	-	-	-	35,600
Manganese	300	2480	2,530	656	1,650	1,040	1,000	-	4,700	2,340
Manganese-Filtered	300	3290	1,620	-	914	1,170	-	-	4,930	3,880
Mercury	0.7	-	-	170	927	5	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	122	118	126	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	DM-404FP	DM-405F	DM-406F	DM-406FP	DM-407F	DM-407FP	DM-408F	DM-408FP	DM-409FP
Selenium	10	-	-	44.9	21.5	-	-	-	-	-
Selenium-Filtered	10	-	-	10.2	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	31500	25,400	-	31,000	234,000	134,000	302,000	118,000	35,200
Sodium-Filtered	[20,000]	39100	24,300	-	29,700	264,000	194,000	325,000	129,000	44,100
Thallium	[0.5]	-	-	17.5	28.4	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-410FP	DM-411FP	DM-412FP	DM-413F	DM-413FP	DM-414F	DM-414FP	DM-415F	DM-415FP
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	5	-	-	-	23	4
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	120	10
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	11	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	21	8
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	550	72
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	2	-	0.3	-	0.1	-
Benzo(a)pyrene	[0.002]	-	-	-	2	-	0.2	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-410FP	DM-411FP	DM-412FP	DM-413F	DM-413FP	DM-414F	DM-414FP	DM-415F	DM-415FP
Benzo(b)fluoranthene	[0.002]	-	-	-	3	-	0.4	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	3	-	0.3	-	-	-
Chrysene	[0.002]	-	-	-	2	-	0.4	-	0.1	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	2	-	0.2	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	1.4	0.22
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	0.67	-	-	-	3.1	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	0.7	-
Total PCBs	0.09	-	-	-	0.67	-	-	-	5.2	0.22
Metals										
Antimony	3	-	-	10.2	12.1	-	-	-	-	-
Antimony-Filtered	3	10.5	-	15.1	-	-	-	-	-	-
Arsenic	25	-	-	-	-	31.9	-	-	83.7	70.3
Arsenic-Filtered	25	-	-	-	-	34.4	-	-	-	76.4
Barium	1000	-	-	2,940	-	-	-	-	1,970	-
Barium-Filtered	1000	-	-	-	-	-	-	-	1,140	-
Beryllium	[3]	-	-	13.4	-	-	-	-	3.1	-
Cadmium	5	-	-	13.5	-	-	-	-	11.1	11.2
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	6.1
Chromium	50	-	-	52.2	-	-	-	-	-	-
Copper	200	-	-	371	-	-	-	-	-	-
Iron	300	7,290	1,360	139,000	11,500	11,500	16,200	11,200	79,300	86,100
Iron-Filtered	300	-	-	4,490	-	10,000	452	-	63,100	91,700
Lead	25	-	-	211	81.3	-	120	-	78.4	-
Magnesium	[35,000]	41,500	-	59,700	47,400	55,300	-	-	97,100	210,000
Magnesium-Filtered	[35,000]	43,400	-	43,900	48,700	58,300	-	-	95,800	209,000
Manganese	300	5,190	1,730	15,800	460	1,330	1,730	1,850	2,100	1,660
Manganese-Filtered	300	4,860	1,680	6,520	-	1,300	1,450	880	1,560	1,570
Mercury	0.7	-	-	1.9	2.7	-	1.7	-	15.1	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	112	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-410FP	DM-411FP	DM-412FP	DM-413F	DM-413FP	DM-414F	DM-414FP	DM-415F	DM-415FP
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	22,100	31,300	58,000	34,600	45,100	28,400	31,900	27,100	64,900
Sodium-Filtered	[20,000]	23,400	28,000	57,800	35,200	46,700	28,300	28,400	22,100	64,000
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)
-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	DM-416FP	DM-417F	DM-417FP	DM-418FP	DM-421FP	DM-422FP	DM-423F	DM-426F	DM-426FP
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	15	-	-	-	-	-	-	-	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	100	-	5.8	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	40	-	-	-	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	7	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	1,200	-	-	-	-	-	-	192	-
Trichloroethene	5*	-	-	-	13	39	-	57	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	89.5	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	2.3	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	100	6	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	0.2	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	0.2	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-416FP	DM-417F	DM-417FP	DM-418FP	DM-421FP	DM-422FP	DM-423F	DM-426F	DM-426FP
Benzo(b)fluoranthene	[0.002]	-	0.2	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	0.2	-	-	-	-	-	-	-
Chrysene	[0.002]	-	0.2	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	14.3	14	40	10.8
Indeno(1,2,3-cd)pyrene	[0.002]	-	0.2	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	0.33	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	0.78	-	-	-	-	-	-	-
Aroclor-1260	0.09	0.5	-	-	-	-	-	-	-	-
Total PCBs	0.09	0.5	1.11	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	11	-	-	-	-	-	-
Arsenic	25	45.9	38.5	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	1,370	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	9.3	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	81,200	54,000	30,800	-	-	-	-	9,790	4,370
Iron-Filtered	300	72,600	44,400	-	-	-	-	-	442	-
Lead	25	-	78.5	-	-	-	-	-	53.8	-
Magnesium	[35,000]	60,200	-	42,400	-	-	-	-	412,000	103,000
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	401,000	106,000
Manganese	300	3,940	1,210	11,100	-	1,530	-	-	644	14,600
Manganese-Filtered	300	-	904	-	-	1,500	-	-	518	1,460
Mercury	0.7	-	4.6	1.4	-	-	-	-	1.81	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-416FP	DM-417F	DM-417FP	DM-418FP	DM-421FP	DM-422FP	DM-423F	DM-426F	DM-426FP
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	62,500	22,800	21,100	-	-	-	-	-	92,100
Sodium-Filtered	[20,000]	-	20,900	-	-	-	-	-	-	91,500
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-428F	DM-429F	DM-430F	GE-103	GE-116	GE-120	GE-121	GE-122	GE-14
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	12	860	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	17.1	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	10	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	870	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	300	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	8.11	1.17	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	9.95	1.14	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	DM-428F	DM-429F	DM-430F	GE-103	GE-116	GE-120	GE-121	GE-122	GE-14
Benzo(b)fluoranthene	[0.002]	-	-	-	11.4	1.37	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	3.6	-	-	-	-	-
Chrysene	[0.002]	-	-	-	7.56	1.17	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	107	24.5	-	16.9	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	4.6	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	456	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	0.7	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	1.21	-	-	-	-	-
Total PCBs	0.09	-	-	-	1.91	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	32.6	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	4.47	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	109	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	105,000	43,800	9,370	-	-	-	-	-	3,250
Iron-Filtered	300	450	997	9,120	-	-	-	-	-	540
Lead	25	45	-	-	-	-	-	-	-	-
Magnesium	[35,000]	43,000	-	-	-	-	-	-	-	59,700
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	3,700	1,180	1,420	-	-	-	-	-	811
Manganese-Filtered	300	1,510	-	1,380	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	DM-428F	DM-429F	DM-430F	GE-103	GE-116	GE-120	GE-121	GE-122	GE-14
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	163,000	68,100	332,000	-	-	-	-	-	24,200
Sodium-Filtered	[20,000]	156,000	72,200	387,000	-	-	-	-	-	27,000
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GE-213M	GE-214M	GE-215M	GE-216M	GE-217M	GE-22	GE-23	GE-24	GE-26
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	3	-	-	-	-	27	5	26
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	33	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	580
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	5	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	6	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	6	-	-	3	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-	15
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GE-213M	GE-214M	GE-215M	GE-216M	GE-217M	GE-22	GE-23	GE-24	GE-26
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	6	-	6	8	-	-	-	-
Antimony-Filtered	3	4	5	12.4	-	4	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	-	13,800	-	-	4,320	384	45,800	41,800	32,700
Iron-Filtered	300	-	12,400	-	-	1,440	410	52,400	41,900	42,500
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	49,900	-	51,600
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	3,050	3,500	-	-	1,200	-	1,000	1,130	717
Manganese-Filtered	300	2,980	3,380	-	-	879	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GE-213M	GE-214M	GE-215M	GE-216M	GE-217M	GE-22	GE-23	GE-24	GE-26
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	25,000	157,000	51,100	71,100	88,200	-	36,100	35,200	29,500
Sodium-Filtered	[20,000]	27,300	157,000	70,700	77,300	92,200	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GE-27	GE-28	GE-3	GE-31	GE-32	GE-34	GE-35	GE-43	GE-P2
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GE-27	GE-28	GE-3	GE-31	GE-32	GE-34	GE-35	GE-43	GE-P2
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	0.51	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	0.27	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	0.78	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	8
Antimony-Filtered	3	-	-	11.1	-	25	-	-	-	6.1
Arsenic	25	-	-	-	-	26.6	-	-	47	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	1,430	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	5.2	-	-	-	-
Cadmium	5	-	-	-	-	18.5	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	246	-	-	-	-
Iron	300	20,200	21,700	15,400	965	70,400	24,100	8,440	11,000	15,200
Iron-Filtered	300	-	-	4,560	-	-	-	9,070	-	14,200
Lead	25	-	-	-	-	76.2	-	-	37	-
Magnesium	[35,000]	-	95,400	-	-	219,000	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	546	4,280	614	2,500	13,900	11,300	541	420	1,940
Manganese-Filtered	300	-	-	-	-	-	-	-	-	2,260
Mercury	0.7	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GE-27	GE-28	GE-3	GE-31	GE-32	GE-34	GE-35	GE-43	GE-P2
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	28,300	57,200	20,700	66,700	23,100	26,200	67,000	25,700	48,900
Sodium-Filtered	[20,000]	-	-	21,000	-	-	-	-	24,100	55,500
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GPWM-1	GPWM-2	GPWM-3	GPWM-4	GPWM-5	GPWM-6	GPWM-7	GPWM-8	GPWM-9
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	166
Benzene	1	77.9	6.54	493	886	366	43.2	1,660	385	848
2-Butanone	[50]	-	-	-	-	-	-	86.8	-	66.1
n-Butylbenzene	5*	8.52	-	10.9	-	10	13.7	19.5	13.9	18.7
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	13.5	10.4	18.7	41	14.3	83.2
Isopropylbenzene	5*	57.5	5.29	83.6	75.8	91.4	88.8	130	113	112
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	10.1	-	15.3	-	8.16	-	22.9	16.6	21.1
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	18.4	37.1	35	-	-	11	19.4
o-Xylene	5*	-	-	-	-	6.14	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GPWM-1	GPWM-2	GPWM-3	GPWM-4	GPWM-5	GPWM-6	GPWM-7	GPWM-8	GPWM-9
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GPWM-1	GPWM-2	GPWM-3	GPWM-4	GPWM-5	GPWM-6	GPWM-7	GPWM-8	GPWM-9
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	ORW-53-1	P-1	P-10	P-11	P-12	P-13	P-14	P-15	P-16	P-17
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	25	4	5	-	-	12	27	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	7	-
Chloroethane	5*	-	-	-	-	-	-	-	-	10	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	61	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	680	-	410	-	-	-	-	-
Isopropylbenzene	5*	-	-	15	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	6	-	-	-	-	-
n-Propylbenzene	5*	-	-	21	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	530	-	9	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	76	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	33	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	45	-	-	-
m&p-Xylene	5*	-	-	2,700	-	-	-	-	-	-	-
o-Xylene	5*	-	-	770	-	-	-	-	-	-	-
Xylene	5*	-	-	24,000	-	1,200	10	-	10	8	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	5	0.5	-	-	-	1
Benzo(a)pyrene	[0.002]	1.64	-	-	-	7	0.4	-	-	-	1

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	ORW-53-1	P-1	P-10	P-11	P-12	P-13	P-14	P-15	P-16	P-17
Benzo(b)fluoranthene	[0.002]	1.71	-	-	-	8	0.5	-	-	-	0.9
Benzo(k)fluoranthene	[0.002]	-	-	-	-	7	0.5	-	-	-	1
Chrysene	[0.002]	1.43	-	-	-	8	0.5	-	-	-	1
bis(2-Ethylhexyl)phthalate	5	39.5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	4	-	-	-	-	0.7
Naphthalene	[10]	-	-	27	-	-	-	28	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	1.3	-	-	-	-	0.49	-
Aroclor-1242	0.09	-	-	-	-	0.4	0.31	-	0.41	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	2.1	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	0.56	-	0.26	-	0.19
Total PCBs	0.09	-	-	-	1.3	2.5	0.87	-	0.67	0.49	0.19
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	12.4	-	-	-	-	-
Arsenic	25	-	-	-	-	78.1	-	-	154	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	1,420	-	-	15,400	1,410	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	6.9	-	-
Cadmium	5	-	-	6.5	-	20.7	-	-	65.3	5.9	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	248	514	-	353	-	-
Copper	200	-	-	-	-	526	-	-	7,830	-	-
Iron	300	-	30,000	53,300	36,400	155,000	22,600	11,500	104,000	63,500	-
Iron-Filtered	300	-	-	39,700	35,400	50,700	10,400	-	141,000	-	-
Lead	25	-	-	-	-	457	3,100	-	1,220	-	-
Magnesium	[35,000]	-	47,000	72,200	-	107,000	-	64,100	46,200	83,600	-
Magnesium-Filtered	[35,000]	-	-	-	-	105,000	-	-	41,400	-	-
Manganese	300	-	2,750	16,900	1,050	2,500	400	935	5,970	1,090	-
Manganese-Filtered	300	-	-	-	-	846	-	-	3,830	-	-
Mercury	0.7	-	-	-	-	-	3.1	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	5.5	-	-	-	-	-
Nickel	100	-	-	-	-	203	-	-	261	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	ORW-53-1	P-1	P-10	P-11	P-12	P-13	P-14	P-15	P-16	P-17
Selenium	10	-	-	-	-	12.4	-	-	121	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	322	-	-
Sodium	[20,000]	-	67,500	45,800	32,500	57,800	36,400	25,200	68,700	50,600	-
Sodium-Filtered	[20,000]	-	-	-	-	58,400	36,300	-	20,400	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	12,700	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	30	19	-	10	-	-	-	41	68	14
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	32	-	-	-	-	-	-	64	-
Chloroethane	5*	-	120	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	6	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	230	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	780	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	20	-	-	-	-	-	-	-	7	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	24	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	7	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	100	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	31	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-	-
Xylene	5*	34	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	-	-	-	-	-	-	0.228	0.442	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	0.18	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	0.18	0.16	-	0.24	-	-	-	-	-	-
Total PCBs	0.09	0.18	0.16	-	0.24	-	0.125	0.317	0.702	-	-
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	59.5	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	1,440	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	4.2	-	-	-	-	-	-	-	-
Cadmium	5	-	24.6	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	130	-	-	-	-	-	-	-	-
Copper	200	-	258	-	-	-	-	-	-	-	-
Iron	300	-	241,000	11,600	43,800	110,000	65,000	64,000	83,000	440,000	300,000
Iron-Filtered	300	-	60,300	-	-	52,000	25,000	52,000	53,000	54,000	50,000
Lead	25	-	147	-	-	-	-	-	-	-	-
Magnesium	[35,000]	49,800	78,200	-	51,400	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	49,600	-	-	-	-	-	-	-	-
Manganese	300	-	14,800	1,280	1,830	-	-	-	-	-	-
Manganese-Filtered	300	-	11,400	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	204	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26
Selenium	10	-	21.2	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	41,100	96,400	37,300	35,800	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	87,700	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	20.3	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-27	P-28	P-29	P-3	P-30	P-31	P-32	P-33	P-35	P-36
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	1.6	-	-	3.4	-	1.7	1.3	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	7.5	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	14	-	-	-	-	-	82	6.3	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	2.04	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-27	P-28	P-29	P-3	P-30	P-31	P-32	P-33	P-35	P-36
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	2.98	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	1.04	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	13.3	-	14.6	11.6	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	1.21	0.478	0.322	-	-	0.699	-	-	0.318	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	0.214	0.16	-	-	-	0.117	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	0.334	-	-	48.3	-	-
Aroclor-1254	0.09	-	-	-	-	0.528	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	1.42	0.638	0.395	-	1.0218	0.816	-	48.3	0.3918	-
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-
Iron	300	44,000	28,400	33,500	13,200	70,100	37,700	21,100	39,100	25,700	897
Iron-Filtered	300	30,000	29,100	33,800	-	35,300	37,000	18,800	24,400	26,100	908
Lead	25	-	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	47,900	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	-
Manganese	300	-	866	1,050	2,420	1,410	1,010	718	862	709	-
Manganese-Filtered	300	-	875	1,050	-	1,090	1,010	713	699	706	-
Mercury	0.7	-	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-27	P-28	P-29	P-3	P-30	P-31	P-32	P-33	P-35	P-36
Selenium	10	-	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	40,300	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-37	P-38	P-4	P-5	P-7	P-9	P-BK-14	P-BK-2	P-BK-4	P-BK-5
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	1,800	-	-	-	-	-	-	-	20	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	290	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	470	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	780	-	-	-	-	-	-	-	55	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	39,000	-	-	-	-	-	-	-	860	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	120	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	26.3	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	6.4	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	4,300	15	-	-	-	-	-	-	540	-
o-Xylene	5*	810	-	-	-	-	-	-	-	180	-
Xylene	5*	-	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	0.1	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	0.1	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-37	P-38	P-4	P-5	P-7	P-9	P-BK-14	P-BK-2	P-BK-4	P-BK-5
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	0.2	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	3,400	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	0.51	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	1.28	-	1.87
Aroclor-1260	0.09	-	-	-	-	-	-	-	0.632	-	0.282
Total PCBs	0.09	-	0.51	-	-	-	-	-	1.912	-	2.152
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-
Iron	300	-	-	11,000	11,300	38,000	-	-	-	-	-
Iron-Filtered	300	-	-	4,980	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	52,300	-	-	36,900	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	-
Manganese	300	-	-	820	8,620	11,000	11,300	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	1.25	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-37	P-38	P-4	P-5	P-7	P-9	P-BK-14	P-BK-2	P-BK-4	P-BK-5
Selenium	10	-	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	47,100	67,900	28,100	82,200	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)
-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-BK-7	P-BK-9	P-HP-1	P-HP-2	P-HP-3	P-IMPS-3	P-IMPS-5	P-PK-1	P-PK-2	P-PK-3
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	12	43	39	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	6.84	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	120	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	17	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	15	-	-	-	-	-	160	-	-	-
o-Xylene	5*	-	-	-	-	-	-	50	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-BK-7	P-BK-9	P-HP-1	P-HP-2	P-HP-3	P-IMPS-3	P-IMPS-5	P-PK-1	P-PK-2	P-PK-3
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	0.246	3.93	-	0.099	-	-	-	-	-	-
Aroclor-1260	0.09	-	0.857	-	0.239	0.112	-	-	-	-	-
Total PCBs	0.09	0.246	4.787	-	0.338	0.1782	-	-	-	-	-
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	165	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	4.44	4.25	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	100	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	3,260	3,570	1,900
Iron-Filtered	300	-	-	-	-	-	-	-	3,190	3,470	1,600
Lead	25	-	-	72.5	-	61.6	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	536	544	1,440
Manganese-Filtered	300	-	-	-	-	-	-	-	541	543	1,400
Mercury	0.7	-	-	-	7.95	0.719	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-BK-7	P-BK-9	P-HP-1	P-HP-2	P-HP-3	P-IMPS-3	P-IMPS-5	P-PK-1	P-PK-2	P-PK-3
Selenium	10	-	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-PK-5	P-PK-6	R-1	R-3	R-4	R-5	R-7	R-9	RW-2A	RW-5
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	-	-	-	-	-
Benzene	1	5.9	1.1	5	3,300	62	32	750	7	-	13
2-Butanone	[50]	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	9.1	7.6	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	4.27	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	900	-	-	90	-	-	-
Isopropylbenzene	5*	-	-	-	-	-	11.5	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	12.1	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-	-	-	-
Xylene	5*	-	-	-	1,700	-	-	150	-	-	-
SemiVolatile Organic Compounds (SVOCs)											
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	P-PK-5	P-PK-6	R-1	R-3	R-4	R-5	R-7	R-9	RW-2A	RW-5
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	37.4	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	52.6	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)											
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	0.351	-	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	0.738	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	1.089	-	-	-	-	-	-	-	-	-
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-
Iron	300	941	2,320	-	-	-	-	-	-	15,700	12,400
Iron-Filtered	300	606	2,250	-	-	-	-	-	-	-	9,820
Lead	25	-	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-	54,200
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	45,600
Manganese	300	-	375	-	-	-	-	-	-	1,260	7,580
Manganese-Filtered	300	-	371	-	-	-	-	-	-	-	6,260
Mercury	0.7	-	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	P-PK-5	P-PK-6	R-1	R-3	R-4	R-5	R-7	R-9	RW-2A	RW-5
Selenium	10	-	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	56,300	108,000
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	96,500
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	RW-5A	T-87-1	T-87-4	WLF-14B	WLF-5A	WLF-8	WP-1
Volatile Organic Compounds (VOCs)								
Acetone	[50]	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	7.73	140
2-Butanone	[50]	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	4
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	-	2,300
Isopropylbenzene	5*	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	37,000
Trichloroethene	5*	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	-	-	-	-	-
o-Xylene	5*	-	-	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	12,000
SemiVolatile Organic Compounds (SVOCs)								
Acenaphthene	[20]	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	RW-5A	T-87-1	T-87-4	WLF-14B	WLF-5A	WLF-8	WP-1
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	14.3	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	1,100
Polychlorinated Biphenyls (PCBs)								
Aroclor-1221	0.09	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	1.9
Total PCBs	0.09	-	-	-	-	-	-	1.9
Metals								
Antimony	3	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	6.12	-	-	-
Arsenic	25	-	-	-	-	-	-	55.5
Arsenic-Filtered	25	-	-	-	-	73.1	-	61
Barium	1000	-	1,090	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	10.2
Cadmium-Filtered	5	-	-	-	-	-	-	6.8
Chromium	50	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-
Iron	300	51,300	45,400	3,250	-	-	-	104,000
Iron-Filtered	300	33,800	8,620	5,270	-	-	-	107,000
Lead	25	44.1	-	-	-	-	-	-
Magnesium	[35,000]	121,000	37,100	45,600	-	-	-	46,500
Magnesium-Filtered	[35,000]	102,000	-	-	-	-	-	49,200
Manganese	300	1,170	512	524	-	-	-	6,140
Manganese-Filtered	300	616	365	-	-	-	-	6,380
Mercury	0.7	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	RW-5A	T-87-1	T-87-4	WLF-14B	WLF-5A	WLF-8	WP-1
Selenium	10	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-
Sodium	[20,000]	-	32,100	47,100	-	-	-	38,700
Sodium-Filtered	[20,000]	-	28,600	-	-	-	-	37,600
Thallium	[0.5]	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-2 (4'-8')	GW-IRM-3 (6'-10')	GW-IRM-3 (12'-16')	GW-IRM-3 (17'-21')	GW-IRM-3 (22'-26')	GW-IRM-4 (5'-10')	GW-IRM-4 (11'-15')	GW-IRM-4 (16'-20')	GW-IRM-4 (21'-25')
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	1.32	1.94	147	-	-	-	276	-	-
2-Butanone	[50]	-	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	1,710	-	-	5,860	1,580	-	6.32
Isopropylbenzene	5*	-	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-	-
Toluene	5*	-	-	64,500	37.7	8.75	93,600	19,600	14	30.6
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
m&p-Xylene	5*	-	-	9,140	13.9	6.27	30,700	7,830	10	23.6
o-Xylene	5*	-	-	2,050	-	-	6,320	1,540	-	-
Xylene	5*	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Acenaphthene	[20]	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-2 (4'-8')	GW-IRM-3 (6'-10')	GW-IRM-3 (12'-16')	GW-IRM-3 (17'-21')	GW-IRM-3 (22'-26')	GW-IRM-4 (5'-10')	GW-IRM-4 (11'-15')	GW-IRM-4 (16'-20')	GW-IRM-4 (21'-25')
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)										
Aroclor-1221	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-2 (4'-8')	GW-IRM-3 (6'-10')	GW-IRM-3 (12'-16')	GW-IRM-3 (17'-21')	GW-IRM-3 (22'-26')	GW-IRM-4 (5'-10')	GW-IRM-4 (11'-15')	GW-IRM-4 (16'-20')	GW-IRM-4 (21'-25')
Selenium	10	-	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-4B (6'-10')	GW-IRM-4B (11'-15')	GW-IRM-4B (16'-20')	GW-IRM-4B (21'-25')	GW-IRM-5 (6'-10')	GW-IRM-7 (12'-16')	GW-IRM-8 (11'-15')	GW-IRM-9 (6'-10')
Volatile Organic Compounds (VOCs)									
Acetone	[50]	-	-	-	-	-	-	-	-
Benzene	1	1,480	404	-	-	-	6.09	476	-
2-Butanone	[50]	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-
Ethylbenzene	5*	7,300	5,470	50.7	6.88	-	1,500	2,800	4,920
Isopropylbenzene	5*	-	-	-	-	-	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	410
Tetrachloroethene	5*	-	-	-	-	-	-	-	-
Toluene	5*	76,000	29,100	68.2	15.2	19.4	5,820	109,000	-
Trichloroethene	5*	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	1,950
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	500
Vinyl Chloride	2	-	-	-	-	-	-	-	-
m&p-Xylene	5*	28,500	21,600	130	22.1	10.9	7,560	15,500	24,100
o-Xylene	5*	6,000	3,220	29.5	-	-	2,270	4,100	3,610
Xylene	5*	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)									
Acenaphthene	[20]	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-4B (6'-10')	GW-IRM-4B (11'-15')	GW-IRM-4B (16'-20')	GW-IRM-4B (21'-25')	GW-IRM-5 (6'-10')	GW-IRM-7 (12'-16')	GW-IRM-8 (11'-15')	GW-IRM-9 (6'-10')
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)									
Aroclor-1221	0.09	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-
Metals									
Antimony	3	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-4B (6'-10')	GW-IRM-4B (11'-15')	GW-IRM-4B (16'-20')	GW-IRM-4B (21'-25')	GW-IRM-5 (6'-10')	GW-IRM-7 (12'-16')	GW-IRM-8 (11'-15')	GW-IRM-9 (6'-10')
Selenium	10	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-9 (12'-16')	GW-IRM-9 (24'-28')	GW-IRM-10 (7'-11')	GW-IRM-10 (13'-17')	GW-IRM-12 (13'-17')	GW-IRM-12 (19'-23')	GW-IRM-13 (14'-18')	GW-IRM-13 (20'-24')
Volatile Organic Compounds (VOCs)									
Acetone	[50]	-	-	-	-	-	-	-	-
Benzene	1	167	-	-	-	3.14	-	-	-
2-Butanone	[50]	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	-
sec-Butylbenzene	5*	-	-	-	-	-	-	-	-
Chlorobenzene	5*	223	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	6.32	6.39	5.06
Chloroform	7	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	10.8	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-
Ethylbenzene	5*	6.38	8.64	9.89	-	-	-	-	-
Isopropylbenzene	5*	-	-	-	-	7.47	-	-	-
Methylene Chloride	5*	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	-
Tetrachloroethene	5*	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	12.1	-	-	-	-	-
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-
m&p-Xylene	5*	24.9	42.2	51.2	5.95	-	-	-	-
o-Xylene	5*	-	6.58	11.1	-	-	-	-	-
Xylene	5*	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)									
Acenaphthene	[20]	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-9 (12'-16')	GW-IRM-9 (24'-28')	GW-IRM-10 (7'-11')	GW-IRM-10 (13'-17')	GW-IRM-12 (13'-17')	GW-IRM-12 (19'-23')	GW-IRM-13 (14'-18')	GW-IRM-13 (20'-24')
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls (PCBs)									
Aroclor-1221	0.09	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-
Metals									
Antimony	3	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-9 (12'-16')	GW-IRM-9 (24'-28')	GW-IRM-10 (7'-11')	GW-IRM-10 (13'-17')	GW-IRM-12 (13'-17')	GW-IRM-12 (19'-23')	GW-IRM-13 (14'-18')	GW-IRM-13 (20'-24')
Selenium	10	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-13 (26'-30')	GW-IRM-14 (23'-27')	GW-IRM-15 (18'-22')	GW-IRM-15 (24'-28')	GW-IRM-15 (30'-34')	GW-IRM-16 (22'-26')	GW-IRM-16 (28'-32')	GW-WWTP-2 (16'-20')
Volatile Organic Compounds (VOCs)									
Acetone	[50]	-	-	-	-	-	-	-	-
Benzene	1	-	4.26	3.18	1.1	-	11.8	3.1	630
2-Butanone	[50]	-	-	-	-	-	-	-	-
n-Butylbenzene	5*	-	-	-	-	-	-	-	16
sec-Butylbenzene	5*	-	-	8.37	-	-	-	-	-
Chlorobenzene	5*	-	-	-	8.78	-	-	7.9	120
Chloroethane	5*	6.02	-	-	6.89	16.4	-	-	-
Chloroform	7	-	-	-	-	-	-	-	-
p-Cymene	5*	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	4.06	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	100,000
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-
1,2-Dichloropropane	1	-	-	-	-	-	-	-	-
Ethylbenzene	5*	-	-	-	-	-	5.77	-	420
Isopropylbenzene	5*	-	-	45	-	-	-	-	16
Methylene Chloride	5*	-	-	-	-	-	-	-	-
n-Propylbenzene	5*	-	-	-	-	-	-	-	16
Tetrachloroethene	5*	-	-	-	-	-	-	-	-
Toluene	5*	-	-	-	-	-	-	-	4,500
Trichloroethene	5*	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5*	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	240
1,3,5-Trimethylbenzene	5*	-	-	-	-	-	-	-	72
Vinyl Chloride	2	-	-	-	-	-	12.5	-	13,000
m&p-Xylene	5*	-	-	-	-	-	-	-	2,400
o-Xylene	5*	-	-	-	-	-	-	-	920
Xylene	5*	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)									
Acenaphthene	[20]	-	-	-	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-13 (26'-30')	GW-IRM-14 (23'-27')	GW-IRM-15 (18'-22')	GW-IRM-15 (24'-28')	GW-IRM-15 (30'-34')	GW-IRM-16 (22'-26')	GW-IRM-16 (28'-32')	GW-WWTP-2 (16'-20')
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-	-	-	-
Naphthalene	[10]	-	-	-	-	-	-	-	98
Polychlorinated Biphenyls (PCBs)									
Aroclor-1221	0.09	-	-	-	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-	-	-	-
Metals									
Antimony	3	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-
Manganese	300	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-IRM-13 (26'-30')	GW-IRM-14 (23'-27')	GW-IRM-15 (18'-22')	GW-IRM-15 (24'-28')	GW-IRM-15 (30'-34')	GW-IRM-16 (22'-26')	GW-IRM-16 (28'-32')	GW-WWTP-2 (16'-20')
Selenium	10	-	-	-	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-	-	-	-
Silver	50	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard[1] (ug/L)	GW-WWTP-3 (16'-20')	GW-WWTP-4 (16'-20')	SEWER-109-2 (7'-11')	SO-1	SO-8
Volatile Organic Compounds (VOCs)						
Acetone	[50]	-	-	-	-	-
Benzene	1	3	31	-	405	1.38
2-Butanone	[50]	-	-	-	-	-
n-Butylbenzene	5*	-	59	-	-	-
sec-Butylbenzene	5*	-	14	-	-	-
Chlorobenzene	5*	8	-	-	-	-
Chloroethane	5*	-	-	-	-	-
Chloroform	7	-	-	-	-	-
p-Cymene	5*	-	18	-	-	-
1,2-Dichlorobenzene	3	6	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	84	-	-
1,2-Dichloropropane	1	-	-	-	-	-
Ethylbenzene	5*	-	390	-	690	-
Isopropylbenzene	5*	12	30	-	-	-
Methylene Chloride	5*	-	-	-	-	-
n-Propylbenzene	5*	9	44	-	-	-
Tetrachloroethene	5*	-	-	-	-	-
Toluene	5*	-	700	-	-	-
Trichloroethene	5*	-	-	17	-	-
Trichlorofluoromethane	5*	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	16	860	-	-	-
1,3,5-Trimethylbenzene	5*	-	270	-	-	-
Vinyl Chloride	2	-	-	-	-	-
m&p-Xylene	5*	-	2,000	-	50.9	-
o-Xylene	5*	-	1,000	-	-	-
Xylene	5*	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)						
Acenaphthene	[20]	-	-	-	-	-
Benzo(a)anthracene	[0.002]	-	-	-	-	-
Benzo(a)pyrene	[0.002]	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-WWTP-3 (16'-20')	GW-WWTP-4 (16'-20')	SEWER-109-2 (7'-11')	SO-1	SO-8
Benzo(b)fluoranthene	[0.002]	-	-	-	-	-
Benzo(k)fluoranthene	[0.002]	-	-	-	-	-
Chrysene	[0.002]	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	5	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	[0.002]	-	-	-	-	-
Naphthalene	[10]	-	270	-	-	-
Polychlorinated Biphenyls (PCBs)						
Aroclor-1221	0.09	-	-	-	-	-
Aroclor-1232	0.09	-	-	-	-	-
Aroclor-1242	0.09	-	-	-	-	-
Aroclor-1248	0.09	-	-	-	-	-
Aroclor-1254	0.09	-	-	-	-	-
Aroclor-1260	0.09	-	-	-	-	-
Total PCBs	0.09	-	-	-	-	-
Metals						
Antimony	3	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-
Arsenic	25	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-
Barium	1000	-	-	-	-	-
Barium-Filtered	1000	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-
Cadmium	5	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-
Chromium	50	-	-	-	-	-
Copper	200	-	-	-	-	-
Iron	300	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-
Lead	25	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-
Manganese	300	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-
Mercury	0.7	-	-	-	-	-
Mercury-Filtered	0.7	-	-	-	-	-
Nickel	100	-	-	-	-	-

TABLE 4-1
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
FILL AND FLOODPLAIN DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard[1] (ug/L)	GW-WWTP-3 (16'-20')	GW-WWTP-4 (16'-20')	SEWER-109-2 (7'-11')	SO-1	SO-8
Selenium	10	-	-	-	-	-
Selenium-Filtered	10	-	-	-	-	-
Silver	50	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-
Zinc	[2000]	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-301I	DM-301S	DM-302D	DM-302S	DM-303D	DM-303I	DM-303S	DM-304D	DM-304I
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	18	-	8
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	240	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	4	-	200	19	140	9
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	5.6	3.8	-	4.1	4.3	3.5	9	5
Antimony-Filtered	3	6.3	-	5.9	8.1	3.2	-	6.3	14.6	4.9
Arsenic	25	-	-	-	-	-	-	47.3	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	11	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	181	-	-	-	185	-	-	494	72.4
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	5,350	12,900	1,960	8,740	1,670	8,130	56,400	6,430	2,350
Iron-Filtered	300	4,940	12,200	580	4,400	-	9,590	12,100	-	2,950
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	DM-301I	DM-301S	DM-302D	DM-302S	DM-303D	DM-303I	DM-303S	DM-304D	DM-304I
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	2,750	3,280	369	4,950	-	828	4,430	-	892
Manganese-Filtered	300	2,900	3,380	361	5,380	-	813	4,260	-	486
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	117	-	-	-	113	-	-	981	-
Sodium	[20,000]	109,000	112,000	27,500	104,000	23,100	105,000	106,000	95,900	96,400
Sodium-Filtered	[20,000]	115,000	117,000	30,500	111,000	27,800	108,000	110,000	103,000	107,000
Thallium	[0.5]	-	-	-	-	-	-	-	10.2	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-304S	DM-305D	DM-305I	DM-306D	DM-306I	DM-311D	DM-400CF	DM-400CFD	DM-400CFS
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	7	-	24	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	6.1	-	-	-	-	4	-	5.6	-
Antimony-Filtered	3	4.3	-	-	-	-	-	3.6	8.5	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	7.6	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	1,400	1,010	6,580	2,310	3,230	5,020	-	14,800	17,200
Iron-Filtered	300	350	-	5,760	-	-	5,240	17,400	17,000	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	DM-304S	DM-305D	DM-305I	DM-306D	DM-306I	DM-311D	DM-400CF	DM-400CFD	DM-400CFS
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	8,100	-	522	-	-	-	2,020	757	-
Manganese-Filtered	300	1,840	-	382	-	-	-	1,720	775	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	127,000	133,000	120,000	47,300	21,300	106,000	-	-	-
Sodium-Filtered	[20,000]	141,000	133,000	114,000	-	-	115,000	-	20,800	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-404CF	DM-404G	DM-405CF	DM-407CF	DM-408CF	DM-409CF	DM-410CF	DM-411CF
Volatile Organic Compounds (VOCs)									
Acetone	[50]	-	-	-	-	-	-	-	-
Benzene	1	-	-	1.75	-	-	-	-	-
Chlorobenzene	5*	-	-	28.3	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	5.61	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	26	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	1.45	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	19.3	-	16.1	-	10	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	18	-	-	-	6	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-
Vinyl Chloride	2	13.3	-	25.4	-	48	-	-	-
SemiVolatile Organic Compounds (SVOCs)									
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-
Metals									
Antimony	3	-	4.2	-	-	5.3	-	-	-
Antimony-Filtered	3	-	5.7	-	-	-	-	-	-
Arsenic	25	-	288	-	-	-	-	-	-
Arsenic-Filtered	25	-	33.5	-	-	-	-	-	-
Barium	1000	-	2,120	-	-	-	-	-	-
Beryllium	[3]	-	12.4	-	-	-	-	-	-
Cadmium	5	-	9.1	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-
Chromium	50	-	376	-	-	-	-	-	-
Copper	200	-	1,190	-	-	-	-	-	-
Iron	300	36,300	795,000	15,900	10,300	31,600	7,560	44,100	27,300
Iron-Filtered	300	23,000	-	14,800	9,010	16,300	-	23,500	24,400
Lead	25	-	272	-	-	-	-	36.7	-
Magnesium	[35,000]	-	524,000	-	-	38,400	-	39,200	64,200

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-404CF	DM-404G	DM-405CF	DM-407CF	DM-408CF	DM-409CF	DM-410CF	DM-411CF
Magnesium-Filtered	[35,000]	-	-	-	-	37,700	-	-	61,800
Manganese	300	1,530	23,700	1,250	876	1,300	3,810	3,010	2,110
Manganese-Filtered	300	1,530	-	1,220	1,130	1,180	-	2,250	1,960
Mercury	0.7	-	-	-	-	-	-	-	-
Nickel	100	-	573	-	-	-	-	-	-
Sodium	[20,000]	45,400	105,000	50,000	85,900	47,200	43,300	50,400	77,700
Sodium-Filtered	[20,000]	46,900	87,000	52,100	101,000	50,400	-	48,300	78,600
Thallium	[0.5]	-	55.8	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-412CF	DM-413CF	DM-415CF	DM-416CF	DM-418CF	DM-419CF	DM-420G	DM-421G
Volatile Organic Compounds (VOCs)									
Acetone	[50]	-	-	-	-	-	-	-	-
Benzene	1	-	1.62	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	7	6.9	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	10	-	5,690
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	31
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	1,500
cis-1,3-Dichloropropene	0.4**	-	-	-	-	1	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	9	17	-	4
SemiVolatile Organic Compounds (SVOCs)									
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	5.45
Metals									
Antimony	3	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-
Barium	1000	2,500	-	-	-	-	-	-	-
Beryllium	[3]	10.8	-	-	-	-	-	-	-
Cadmium	5	16.6	-	-	-	-	-	-	-
Cadmium-Filtered	5	21.2	-	-	-	-	-	-	-
Chromium	50	56.8	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-
Iron	300	180,000	10,100	25,600	3,120	-	-	37,900	14,800
Iron-Filtered	300	28,100	9,730	25,100	1,860	-	-	-	-
Lead	25	115	-	-	-	-	-	-	-
Magnesium	[35,000]	112,000	47,300	43,600	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-412CF	DM-413CF	DM-415CF	DM-416CF	DM-418CF	DM-419CF	DM-420G	DM-421G
Magnesium-Filtered	[35,000]	63,300	46,700	-	-	-	-	-	-
Manganese	300	9,880	969	867	567	-	-	830	1,950
Manganese-Filtered	300	4,470	929	-	-	-	-	-	1,650
Mercury	0.7	1.2	-	-	-	-	-	-	-
Nickel	100	142	-	-	-	-	-	-	-
Sodium	[20,000]	79,400	36,100	53,300	35,500	-	-	-	-
Sodium-Filtered	[20,000]	72,400	36,600	-	-	-	-	-	-
Thallium	[0.5]	9.1	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-423CFS	DM-424CF	DM-425CF	DM-432CF	DM-433G	DM-435	GE-1	GE-10	GE-12
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	4.8	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	36.6	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	80	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	11	-	95.8	310	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	360	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	55	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	10	-	-	-
Vinyl Chloride	2	13	-	-	23	60	-	-	2.45	-
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	6.13	5.13	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	97.2	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	8.91	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	204	-	-	-	-
Copper	200	-	-	-	-	301	-	-	-	-
Iron	300	-	-	15,900	23,400	274,000	-	16,300	18,700	30,700
Iron-Filtered	300	-	-	35,300	13,200	4,310	-	21,700	18,200	9,180
Lead	25	-	-	-	-	138	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	DM-423CFS	DM-424CF	DM-425CF	DM-432CF	DM-433G	DM-435	GE-1	GE-10	GE-12
Magnesium-Filtered	[35,000]	-	-	72,100	-	-	-	-	-	-
Manganese	300	-	-	1,260	1,300	9,860	-	1,860	1,170	1,420
Manganese-Filtered	300	-	-	3,670	1,270	944	-	1,760	1,340	1,210
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	229	-	-	-	-
Sodium	[20,000]	-	-	51,200	-	-	-	24,600	47,200	30,700
Sodium-Filtered	[20,000]	-	-	83,300	-	-	-	24,400	55,400	31,200
Thallium	[0.5]	-	-	-	-	-	-	-	-	7.6
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GE-13	GE-15	GE-16	GE-17	GE-19	GE-203D	GE-204D	GE-206D	GE-207	GE-208	GE-210D
Volatile Organic Compounds (VOCs)												
Acetone	[50]	-	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	68.1	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	10.2	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	1.48	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	21	-	140	9.1	-	-	5.31	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	24	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	4	-	10	19.6	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)												
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-	-
Metals												
Antimony	3	-	-	-	7	4	-	-	4.5	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	3.8	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	490	-	-	-	-	-	-	-
Iron	300	4,150	16,000	42,600	49,600	17,800	13,500	17,800	10,000	10,100	3,120	6,640
Iron-Filtered	300	-	15,300	54,600	6,210	13,400	12,800	16,500	10,900	-	1,370	3,670
Lead	25	-	-	-	48	-	-	-	-	-	-	-
Magnesium	[35,000]	-	59,400	87,500	-	-	43,400	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GE-13	GE-15	GE-16	GE-17	GE-19	GE-203D	GE-204D	GE-206D	GE-207	GE-208	GE-210D
Magnesium-Filtered	[35,000]	-	59,600	-	-	-	47,600	-	-	-	-	-
Manganese	300	724	4,180	4,460	1,880	1,890	4,230	1,820	1,330	4,670	-	733
Manganese-Filtered	300	-	4,030	-	1,410	1,880	4,470	1,890	1,340	-	-	750
Mercury	0.7	-	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	51,300	55,800	58,600	41,300	74,300	120,000	101,000	28,400	-	85,200
Sodium-Filtered	[20,000]	-	51,100	-	57,200	43,300	81,000	129,000	103,000	-	-	93,500
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	4	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GE-213D	GE-214D	GE-215D	GE-216D	GE-217D	GE-218D	GE-219D	GE-219M	GE-220
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	2	-	4	-	-	-	-	-
Chlorobenzene	5*	-	56	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	9	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	7	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	14	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	62	-	-	-
Trichloroethene	5*	-	-	-	-	-	7	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	10	9	14	15	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	6	4	-	7	5	-	-	-	-
Antimony-Filtered	3	-	-	4.2	-	-	-	10.2	3.1	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	23,500	12,400	4,430	9,170	9,380	14,200	8,040	-	36,200
Iron-Filtered	300	6,250	12,100	3,070	7,880	9,450	11,800	8,650	-	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	47,900

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GE-213D	GE-214D	GE-215D	GE-216D	GE-217D	GE-218D	GE-219D	GE-219M	GE-220
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-
Manganese	300	3,810	4,040	1,440	1,620	1,550	932	1,250	1,640	12,000
Manganese-Filtered	300	3,840	4,160	1,770	1,510	1,530	933	1,430	1,490	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	29,700	118,000	133,000	140,000	130,000	244,000	124,000	324,000	132,000
Sodium-Filtered	[20,000]	32,800	127,000	148,000	139,000	134,000	280,000	137,000	312,000	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GE-221	GE-29	GE-30	GE-33	GE-4	GE-5	GE-50	GE-72S	GE-8
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	52.3
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	7	8	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	25,000	30,800	12,400	12,600	7,620	25,300	20,100	27,200	17,600
Iron-Filtered	300	22,500	25,800	-	-	3,190	2,700	22,600	15,200	21,300
Lead	25	-	-	-	44.2	-	-	-	-	-
Magnesium	[35,000]	-	50,200	-	-	-	73,500	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GE-221	GE-29	GE-30	GE-33	GE-4	GE-5	GE-50	GE-72S	GE-8
Magnesium-Filtered	[35,000]	-	46,200	-	-	-	-	-	-	-
Manganese	300	3,510	1,470	2,780	1,510	438	2,700	2,320	2,450	1,880
Manganese-Filtered	300	3,140	1,300	-	-	-	-	2,560	2,120	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	67,700	71,000	50,000	50,500	20,600	29,200	45,200	44,500	47,000
Sodium-Filtered	[20,000]	62,300	67,900	-	-	23,800	21,500	50,200	41,400	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	P-421G-1	P-421G-2	P-421G-3	RW-1	RW-1A	RW-4	T-6
Volatile Organic Compounds (VOCs)								
Acetone	[50]	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	11	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	27,000	22	12,000	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-
Trichloroethene	5*	19,000	170	16,000	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-
Vinyl Chloride	2	160	-	-	-	-	-	-
SemiVolatile Organic Compounds (SVOCs)								
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-
Metals								
Antimony	3	-	-	-	-	-	-	5.5
Antimony-Filtered	3	-	-	-	-	-	-	5.4
Arsenic	25	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-
Iron	300	-	-	-	924	7,570	39,300	10,200
Iron-Filtered	300	-	-	-	500	-	-	5,660
Lead	25	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	45,400	86,200	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	P-421G-1	P-421G-2	P-421G-3	RW-1	RW-1A	RW-4	T-6
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-
Manganese	300	-	-	-	314	2,850	5,140	4,510
Manganese-Filtered	300	-	-	-	-	-	-	4,040
Mercury	0.7	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	35,800	68,600	60,100
Sodium-Filtered	[20,000]	-	-	-	-	-	-	55,100
Thallium	[0.5]	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-

Notes:

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TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GW-1	GW-2	GW-3	GW-9	GW-11	GW-109-1 (26'-30')	GW-109-1 (36'-40')	GW-109-1 (46'-50')	GW-109-2 (36'-40')	GW-109-3 (6'-10')	GW-109-3 (16'-20')
Volatile Organic Compounds (VOCs)												
Acetone	[50]	-	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	-	-	-	-	-	110	420	15	160	55	16
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	8.72	7.62	4.61	3.74	17.9	8	39	13	-	29	46
SemiVolatile Organic Compounds (SVOCs)												
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-	-
Metals												
Antimony	3	-	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GW-1	GW-2	GW-3	GW-9	GW-11	GW-109-1 (26'-30')	GW-109-1 (36'-40')	GW-109-1 (46'-50')	GW-109-2 (36'-40')	GW-109-3 (6'-10')	GW-109-3 (16'-20')
Manganese	300	-	-	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GW-109-3 (26'-30')	GW-109-3 (36'-40')	GW-109-3 (46'-50')	GW-109-4 (46'-50')	GW-109-4 (56'-60')	GW-109-6 (26'-30')	GW-109-6 (36'-40')	GW-109-6 (46'-50')	GW-109-6 (56'-60')
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	76	-	-	-	-	-	8	82	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5*	38	-	-	-	-	-	-	20	-
cis-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	1,900	-	-	-	-	83	460	2,400	26
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	790	7	14	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	67	-	-	28	14	-	-	-	110
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GW-109-3 (26'-30')	GW-109-3 (36'-40')	GW-109-3 (46'-50')	GW-109-4 (46'-50')	GW-109-4 (56'-60')	GW-109-6 (26'-30')	GW-109-6 (36'-40')	GW-109-6 (46'-50')	GW-109-6 (56'-60')
Manganese	300	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GW-109-8 (6'-10')	GW-109-8 (26'-30')	GW-109-9 (26'-30')	GW-109-10 (26'-30')	GW-2E-12	GW-2W-1	GW-2W-2	GW-2W-5	GW-2W-6	GW-2W-7
Volatile Organic Compounds (VOCs)											
Acetone	[50]	-	-	-	-	-	206	221	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-	7.88
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	29	-	-	-	-	-	-
1,2-Dichloroethane	0.6	-	-	-	-	-	-	-	-	1.2	-
1,1-Dichloroethene	5*	-	-	-	15	-	-	-	-	-	-
cis-1,2-Dichloroethene	5*	-	-	-	-	19	3,090	828	-	33.5	8.91
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene, total	5*	12	120	13	10	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	592	7,560	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	-	-	-	-	-	-	-	7.83	41.5	3.66
SemiVolatile Organic Compounds (SVOCs)											
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-	-
Metals											
Antimony	3	-	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GW-109-8 (6'-10')	GW-109-8 (26'-30')	GW-109-9 (26'-30')	GW-109-10 (26'-30')	GW-2E-12	GW-2W-1	GW-2W-2	GW-2W-5	GW-2W-6	GW-2W-7
Manganese	300	-	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GW-2W-8	GW-2W-9	GW-2W-10	GW-2W-11	GW-2W-12	GW-2W-14	GW-2W-15	GW-2W-16	GW-2W-17
Volatile Organic Compounds (VOCs)										
Acetone	[50]	-	-	-	-	-	-	-	-	-
Benzene	1	-	25.1	18.7	-	-	-	-	-	-
Chlorobenzene	5*	-	-	-	-	-	-	-	-	-
Chloroethane	5*	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	3	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5*	-	-	-	-	-	-	-	-	183
1,2-Dichloroethane	0.6	-	-	-	-	-	-	1.37	-	1.03
1,1-Dichloroethene	5*	-	-	-	-	-	-	-	-	12.9
cis-1,2-Dichloroethene	5*	13.5	-	-	5.33	9.14	79.3	14.6	21.3	946
trans-1,2-Dichloroethene	5*	-	-	-	-	-	-	-	-	11.3
1,2-Dichloroethene, total	5*	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-	-	-	-	-	-	-
Trichloroethene	5*	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-	-	-	-	-	-	-
Vinyl Chloride	2	2.3	-	-	-	-	14.3	6.46	25.7	109
SemiVolatile Organic Compounds (SVOCs)										
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	-	-	-
Metals										
Antimony	3	-	-	-	-	-	-	-	-	-
Antimony-Filtered	3	-	-	-	-	-	-	-	-	-
Arsenic	25	-	-	-	-	-	-	-	-	-
Arsenic-Filtered	25	-	-	-	-	-	-	-	-	-
Barium	1000	-	-	-	-	-	-	-	-	-
Beryllium	[3]	-	-	-	-	-	-	-	-	-
Cadmium	5	-	-	-	-	-	-	-	-	-
Cadmium-Filtered	5	-	-	-	-	-	-	-	-	-
Chromium	50	-	-	-	-	-	-	-	-	-
Copper	200	-	-	-	-	-	-	-	-	-
Iron	300	-	-	-	-	-	-	-	-	-
Iron-Filtered	300	-	-	-	-	-	-	-	-	-
Lead	25	-	-	-	-	-	-	-	-	-
Magnesium	[35,000]	-	-	-	-	-	-	-	-	-
Magnesium-Filtered	[35,000]	-	-	-	-	-	-	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GW-2W-8	GW-2W-9	GW-2W-10	GW-2W-11	GW-2W-12	GW-2W-14	GW-2W-15	GW-2W-16	GW-2W-17
Manganese	300	-	-	-	-	-	-	-	-	-
Manganese-Filtered	300	-	-	-	-	-	-	-	-	-
Mercury	0.7	-	-	-	-	-	-	-	-	-
Nickel	100	-	-	-	-	-	-	-	-	-
Sodium	[20,000]	-	-	-	-	-	-	-	-	-
Sodium-Filtered	[20,000]	-	-	-	-	-	-	-	-	-
Thallium	[0.5]	-	-	-	-	-	-	-	-	-
Thallium-Filtered	[0.5]	-	-	-	-	-	-	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (µg/L)	NYSDEC GW Standard (ug/L)	GW-2W-28	GW-HP-1 (28'-32')	GW-HP-2 (28'-32')
Volatile Organic Compounds (VOCs)				
Acetone	[50]	-	-	-
Benzene	1	-	2	4
Chlorobenzene	5*	7	25	13
Chloroethane	5*	-	-	-
1,2-Dichlorobenzene	3	17	-	-
1,3-Dichlorobenzene	3	-	-	-
1,4-Dichlorobenzene	3	-	-	9
1,1-Dichloroethane	5*	-	-	-
1,2-Dichloroethane	0.6	-	-	-
1,1-Dichloroethene	5*	-	-	-
cis-1,2-Dichloroethene	5*	-	17	11
trans-1,2-Dichloroethene	5*	-	-	-
1,2-Dichloroethene, total	5*	-	-	-
cis-1,3-Dichloropropene	0.4**	-	-	-
Trichloroethene	5*	-	-	-
1,2,4-Trimethylbenzene	5*	-	-	-
Vinyl Chloride	2	-	26	10
SemiVolatile Organic Compounds (SVOCs)				
Bis(2-ethylhexyl)phthalate	5	-	-	-
Metals				
Antimony	3	-	-	-
Antimony-Filtered	3	-	-	-
Arsenic	25	-	-	-
Arsenic-Filtered	25	-	-	-
Barium	1000	-	-	-
Beryllium	[3]	-	-	-
Cadmium	5	-	-	-
Cadmium-Filtered	5	-	-	-
Chromium	50	-	-	-
Copper	200	-	-	-
Iron	300	-	-	-
Iron-Filtered	300	-	-	-
Lead	25	-	-	-
Magnesium	[35,000]	-	-	-
Magnesium-Filtered	[35,000]	-	-	-

TABLE 4-2
SUMMARY OF COMPOUNDS DETECTED ABOVE THE NYSDEC GROUNDWATER STANDARD
CHANNEL FILL AND GLACIOLACUSTRINE DEPOSITS
FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter (μg/L)	NYSDEC GW Standard (ug/L)	GW-2W-28	GW-HP-1 (28'-32')	GW-HP-2 (28'-32')
Manganese	300	-	-	-
Manganese-Filtered	300	-	-	-
Mercury	0.7	-	-	-
Nickel	100	-	-	-
Sodium	[20,000]	-	-	-
Sodium-Filtered	[20,000]	-	-	-
Thallium	[0.5]	-	-	-
Thallium-Filtered	[0.5]	-	-	-

Notes:

1. New York State Groundwater Quality Standard from Division of Water Technical and Operational Guidance Series (NYSDEC, TOGS 1.1.1)

-: Compound was either not detected above the NYSDEC GW Standard or was not analyzed for.

TABLE 6-1
POTENTIAL REMEDIAL TECHNOLOGIES FOR SOIL
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
No-Action	No-Action	Do nothing.		Not effective in controlling risk.	Easy to implement.	Retained for baseline comparison.
Institutional Control	Land Use and Access Restrictions	Restrictions in form of Health and Safety Plan and policies limiting access to certain areas. Restrictive covenants to deed for long-term protection. May also include physical barriers such as fences.	Often used with other remedial actions.	Effective in reducing human contact.	Easy to implement.	Will be considered.
Removal and Off-Site Disposal of Contaminants	Removal and Off-Site Disposal	Remove contaminated soils and backfill excavation with clean fill.	Off-site disposal at a properly licensed facility or with an ex-situ treatment method.	Effective for removal of contaminated media. However, the levels of contaminants in surface soils in the manufacturing area do not generally pose a significant threat to human health, and therefore, do not warrant excavation and off-site disposal.	Easy to implement for shallow soils.	Will be considered for discrete areas of soil in the manufacturing area. Will be considered for exposed wastes and discrete areas of soil in the former landfill areas.
Control and Isolation of Contaminants	Soil Cover	Place clean soil over contaminated areas and plant with grasses or other vegetation to protect against erosion.	Use with restrictive covenants to prohibit disruption of cover.	Effective for reducing human contact.	Easy to implement, although it would result in the destruction of habitat areas in the former landfill areas.	Will be considered.
	Asphalt Cover	Place asphalt cover over impacted soil to break direct contact exposure pathway.	Use with restrictive covenants to prohibit disruption of cover.	Effective for reducing human contact.	Easy to implement.	Will be considered for soils in the manufacturing area. Will not be considered for soils in the former landfill areas because it would be incongruous with protecting the site habitats.
	Asphalt Caps	Place asphalt over impacted soil to break direct contact exposure pathway and reduce infiltration of precipitation through impacted soil.	Use with restrictive covenants to prohibit disruption of cover.	Effective for reducing human contact and protecting groundwater.	Easy to implement.	Will be considered for soils in the manufacturing area. Will not be considered for soils in the former landfill areas because it would be incongruous with protecting the site habitats.
	Agronomic Cover	Use an engineered biosystem of plants and soil to reduce infiltration and percolation of precipitation, encourage evaporation and transpiration, and enhance soil stabilization and prevent soil erosion. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone.	Use with restrictive covenants to prohibit disruption of cover.	An agronomic cover system can be as effective as prescriptive landfill covers in eliminating exposure to waste and minimizing migration of contaminants from the waste mass.	Easy to implement, although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques.	Will be considered for soils in the former landfill areas. Will not be considered for soils in the manufacturing area because it would restrict the future use of the property.

TABLE 6-1
POTENTIAL REMEDIAL TECHNOLOGIES FOR SOIL
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
Control and Isolation of Contaminants (continued)	Cap	Construct a low permeability liner, a drainage layer, and a soil cover capable of supporting vegetation to protect groundwater quality.	Use with restrictive covenants to prohibit disruption of cover.	Effective for protection of groundwater and reducing human contact. However, the low levels of contaminants in the surface soils are widely dispersed in the manufacturing area, further the soil impacts do not generally pose a significant threat to human health and therefore, do not warrant construction of a cap.	Easy to implement. However, existing site habitats would be completely destroyed and large quantities of fill material from off-site sources would be required, resulting in additional land consumption and large scale hauling of fill.	Will be considered for soils in the former landfill areas. Will not be considered for soils in the manufacturing area because it would restrict the future use of the property.
Separation or Treatment of Contaminants	Soil Vapor Extraction	Remove and collect volatile organic vapors from the subsurface using a vacuum system.	Treatment system such as GAC or catalytic oxidation.	Effectiveness dependent upon permeability of soil. Effective for VOCs and SVOCs from the vadose zone.	Easy to implement.	Will not be considered for soil in floodplain or channel fill deposits. Will be considered for VOC-impacts in fill.

TABLE 7-8
SUMMARY OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY – MAIN PLANT
SCHENECTADY, NEW YORK

ALTERNATIVES		AREAS OF CONCERN			
		SOIL	GROUNDWATER	SEEPS	HABITATS
Alternative 1	No further action, other than monitoring (incorporates remedial actions already implemented and currently underway)	• No action	• No action	• No action • Collection and treatment of seep water	• No action
Alternative 2	Institutional controls with monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions	• Land use and access restrictions • Groundwater monitoring	• Land use and access restrictions • Collection and treatment of seep water • Monitoring	• Land use and access restrictions
Alternative 3	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Groundwater monitoring • Monitored natural attenuation • Asphalt cover • Asphalt caps • Enhanced in-situ anaerobic bioremediation • Agronomic cover • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement
Alternative 4	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Monitored natural attenuation • Asphalt cover • Agronomic cover • Air sparging • Soil vapor extraction • Enhanced in-situ anaerobic biodegradation • Enhanced in-situ aerobic biodegradation • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement

TABLE 7-8
SUMMARY OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY – MAIN PLANT
SCHENECTADY, NEW YORK

ALTERNATIVES		AREAS OF CONCERN			
		SOIL	GROUNDWATER	SEEPS	HABITATS
Alternative 5	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, capping of the former landfill areas with clay or synthetic cover systems, collection and treatment of shallow groundwater along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Clay or Synthetic caps	• Land use and access restrictions • Groundwater monitoring • Asphalt cover • Groundwater collection trenches • Groundwater collection wells • Enhanced in-situ anaerobic biodegradation • Enhanced in-situ aerobic biodegradation • Clay or Synthetic caps • Groundwater treatment • Product removal • Asphalt caps	• Land use and access restrictions • Monitoring • Groundwater collection wells • Groundwater collection trenches • Groundwater treatment	• Land use and access restrictions • Constructed wetland
Alternative 6	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, removal of free-product, treatment of groundwater at the northern property boundary, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Groundwater monitoring • Asphalt cover • Air sparging • Soil vapor extraction • Groundwater circulating wells • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement

TABLE 6-2
POTENTIAL REMEDIAL TECHNOLOGIES FOR GROUNDWATER AND FREE-PRODUCT
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
No-Action	No-Action	Do nothing.		Not effective in controlling risk.	Easy to implement.	Retained for baseline comparison.
Institutional Control	Land Use and Access Restrictions	Land use restrictions and prohibiting the use of groundwater as a potable water source may be added to property deeds. Access may be limited by physical barriers.	Often used with other remedial actions.	Effective in reducing human contact.	Requires involvement of government agencies.	Will be considered to prohibit the use of groundwater as a potable water source at and near the Main Plant.
Monitoring	Groundwater Monitoring	Periodic sampling of groundwater from monitoring wells within and surrounding the contaminated area.	Containment, Treatment or Removal Technologies.	Effective for evaluating the effectiveness of other contaminant and treatment measures.	Requires periodic groundwater sampling.	Will be considered to evaluate groundwater in the channel fill deposits and in the shallow groundwater.
Control and Isolation of Contaminants	Asphalt Cover	Place asphalt cover over impacted soils to break the direct contact exposure pathway and limit infiltration of precipitation through impacted soil.	Use with restrictive covenants to prohibit disruption of cover.	Effective for reducing human contact and provides some protection for groundwater. At Main Plant, asphalt cover would be more effective at limiting contaminant migration in the fill because the underlying floodplain deposits act as a confining layer.	Easy to implement, although it would result in the destruction of habitat areas in the former landfill areas.	Will be considered for shallow groundwater in the manufacturing area. Will not be considered for the former landfills.
	Asphalt Caps	Place asphalt over impacted soils to break the direct contact exposure pathway and reduce infiltration of precipitation through impacted soil.	Use with groundwater monitoring and restrictive covenants to prohibit disruption of cover.	Effective for reducing human contact and provides some protection for groundwater. At Main Plant, asphalt cover would be more effective at limiting contaminant migration in the fill because the underlying floodplain deposits act as a confining layer.	Easy to implement, although it would result in the destruction of habitat areas in the former landfill areas.	Will be considered for shallow groundwater in the manufacturing area. Will not be considered for the former landfills.
	Agronomic Cover	Use an engineered biosystem of plants and soil to reduce infiltration and percolation of precipitation, encourage evaporation and transpiration, and enhance soil stabilization and prevent soil erosion. The combination of evapotranspiration and enhanced storage in the soil cover can be sufficient to prevent percolation beyond the root zone.	Use with restrictive covenants to prohibit disruption of cover and groundwater monitoring.	An agronomic cover system can be as effective as prescriptive landfill covers in eliminating exposure to waste and minimizing migration of contaminants from the waste mass.	Easy to implement, although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques.	Will be considered for the former landfill areas. Will not be considered for the manufacturing area.
	Caps	Construct a low permeability liner, a drainage layer, and a soil cover capable of supporting vegetation to protect groundwater quality.	Use with restrictive covenants to prohibit disruption of cover and groundwater monitoring.	Effective for protection of groundwater and reducing human contact. However, the low levels of contaminants in the surface soils are widely dispersed in the manufacturing area. Further, the soil impacts do not generally pose a significant threat to human health and therefore, do not warrant construction of a cap.	Easy to implement. However, existing site habitats would be completely destroyed and large quantities of fill material from off-site sources would be required, resulting in additional land consumption and large scale hauling of fill.	Will be considered for the former landfill areas. Will not be considered for the manufacturing area.

TABLE 6-2
POTENTIAL REMEDIAL TECHNOLOGIES FOR GROUNDWATER AND FREE-PRODUCT
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
Removal and Off-Site Disposal of Contaminants	Groundwater Collection	Groundwater collection trenches are constructed to intercept the flow of contaminated groundwater. Perforated pipes allow water to flow to collection sumps. The water may be pumped or collected from the sumps before being treated and discharged. Groundwater collection wells are pumped to control the hydraulic gradient and prevent contaminated groundwater from leaving the area, or to remove contaminated groundwater. The water pumped from the wells is collected and discharged.	Ex-situ treatment and groundwater monitoring. .	Groundwater collection trenches are an effective method of collecting shallow groundwater. Groundwater collection wells may take a long time to achieve remedial goals.	Ease of implementability of groundwater collection trenches is dependent on site-specific conditions, such as the existing hydraulic gradient and depth to groundwater. Groundwater collection wells are easy to implement. However, the collection system to hydraulically control groundwater migration in the channel fill deposits would result in closely spaced wells and treatment of significant quantities of water every day.	Groundwater collection trenches will be considered to collect the shallow groundwater under the former East Landfill Area before it reaches the Poentic Kill. Groundwater collection trenches will not be considered for the groundwater in the channel fill deposits. Groundwater collection wells will be considered for the channel fill groundwater in localized areas. Groundwater collection wells will be considered for shallow groundwater in the former East Landfill Area and shallow groundwater at other areas of the site.
	Groundwater Treatment	Different treatment methods for various types of contaminants.	Groundwater collection.	Effective at reducing contaminant concentrations.	Easy to implement.	Will be considered as a companion technology for groundwater collection.
	Source Removal of LNAPL	Involves excavation and off-site disposal of impacted materials or free product recovery.	Ex-situ treatment or off-site disposal and monitoring.	Removal of impacted material or free-product. Thus, very effective to reduce concentration of dissolved constituents.	Easy to implement when areas are clearly defined.	Will be considered to remove free-product.
Separation or Treatment of Contaminants	Monitored Natural Attenuation of Groundwater	Naturally occurring processes occur in the subsurface allowing attenuation of contaminants.	Groundwater monitoring to confirm that contaminants are naturally attenuating. Bioremediation can be enhanced.	Effective at reducing contaminant mass provided site conditions are conducive to natural attenuation.	Easy to implement.	Will be considered for impacted groundwater everywhere at the site except the former Wire Mill Area.
	Air Sparging	Pressurized air is injected into the groundwater causing volatilization of VOCs in groundwater and promotes desorption.	Vacuum extraction system and groundwater monitoring.	Effective for removing VOCs from groundwater.	Low permeability and cohesive deposits would not distribute the air evenly. Would be difficult to implement in the floodplain deposits. Easy to implement in channel fill deposits (dependent on channel fill thickness).	Will be considered for the shallow groundwater in the former East Landfill Area and localized areas within the channel fill deposits, where the floodplain deposits are missing.

TABLE 6-2
POTENTIAL REMEDIAL TECHNOLOGIES FOR GROUNDWATER AND FREE-PRODUCT
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
Separation or Treatment of Contaminants (Continued)	Soil Vapor Extraction	Removal and collection of volatile organic vapors from gaseous phase contaminants in the subsurface using a vacuum system.	Air sparging or other treatment technologies and groundwater monitoring.	Not effective for removing contaminants from groundwater but is effective for removing gaseous phase contaminants.	Easy to implement in areas where floodplain deposits are missing.	Will be considered for use as a companion technology for air sparging and groundwater stripping wells for localized areas with impacts limited to the fill deposits, or where the floodplain deposits are missing.
	Enhanced In-Situ Aerobic Biodegradation	Enhancement of natural attenuation by making subsurface conditions more aerobic. Often by adding oxygen or an Oxygen Releasing Compound (ORC) .	Groundwater monitoring.	Not likely to be effective by itself. The addition of oxygen would cause dissolved iron to precipitate out of solution resulting in the clogging of soil pores.	Easy to implement depending on site characteristics.	Will be considered.
	Enhanced In-Situ Anaerobic Biodegradation	Enhancement of natural attenuation by making subsurface conditions more anaerobic. Often by adding hydrogen, a Hydrogen Releasing Compound (HRC), or a carbon source.	Groundwater monitoring.	Effective. HRC has proven to be effective at accelerating degradation of TCE and DCE.	Easy to implement.	Will be considered. Some contaminants in the groundwater beneath Main Plant are already anaerobically degrading.
	Hot Water or Stream Flushing/Stripping	Steam is forced into an aquifer through injection wells to vaporize volatile and semi-volatile contaminants.	Vacuum extraction system and groundwater monitoring.	Most effective for NAPL sources and will only be marginally effective in treating dissolved phase contaminants.	Easy to implement.	Will not be considered. There has been no extensive source of NAPL identified at the Main Plant.
	Groundwater Stripping Wells	Uses air to vaporize volatile and semi-volatile contaminants by aerating the groundwater within specially configured groundwater stripping wells. Aeration occurs by injecting air into an inner well casing. The vaporized gases are collected with an SVE system attached to the outer well casing.	Vacuum extraction system and groundwater monitoring.	Effective at removing VOCs from groundwater depending on depth of treatment zone.	Implementation depends on site characteristics such as depth of treatment zone and off-gas collection.	In-situ groundwater stripping will be considered for the groundwater in the channel fill deposits. In-situ groundwater stripping will not be considered for the shallow groundwater areas.
	Permeable Reactive Barriers	Passive in-situ treatment zone that degrades or immobilizes contaminants as groundwater passes through a reactive material.	Periodic groundwater monitoring.	Effective.	The channel fill deposits at Main Plant extend approximately 70 feet below ground surface. Installation of a PRB to this depth would be challenging.	Will not be considered for channel fill groundwater along the northern site boundary or north of the WWTP Area. Will be considered for those areas that are shallow enough to allow construction of the PRB without encountering significant technical difficulties.

TABLE 6-2
POTENTIAL REMEDIAL TECHNOLOGIES FOR GROUNDWATER AND FREE-PRODUCT
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
Separation or Treatment of Contaminants (Continued)	Dual-Phase Soil Vapor Extraction (DP SVE)	Dual phase SVE simultaneously extracts contaminated groundwater, immiscible phase contaminants, and gaseous phase contaminants using a high vacuum system. Groundwater extraction depresses the water table while simultaneously increasing the volume of the unsaturated zone. The water and air are separated by an air/water separator. The extracted groundwater and soil vapors would be treated and discharged.	Groundwater monitoring.	Effective for shallow materials above the floodplain deposits. The low permeability floodplain deposits would hinder migration of air though the subsurface. DP SVE equipment is susceptible to iron fouling in areas where dissolved iron is abundant.	Easy to implement when the source area is clearly defined.	Will be considered for source areas above the floodplain deposits. Will not be considered for source areas in the channel fill deposits or for the former East Landfill.
	In-Situ Chemical Oxidation	Involves the injection of chemicals (oxidants) into the subsurface to promote the destruction of contaminants.	Groundwater monitoring.	Effective to destroy organic contaminants.	Difficult to obtain injection permits and there are a limited number of available vendors. Also difficult to characterize underground obstructions since the site is over 100 years old.	Will not be considered.

TABLE 6-3
POTENTIAL REMEDIAL TECHNOLOGIES FOR SEEPS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
No-Action	No-Action	Do nothing.		Not effective in controlling risk.	Easy to implement.	Retained for baseline comparison.
Institutional Control	Land Use And Access Restrictions	Land use restrictions to require future owners to maintain access restrictions and maintain remedial systems. Restrictive covenants to prohibit disruption to areas. Access may be limited by physical barriers.	Often used with other remedial actions.	Effective in reducing human contact.	Easy to implement.	Will be considered.
Monitoring	Monitoring	Periodically monitor the seeps to evaluate changes in the magnitude, size, or chemical composition of the seep water. Appropriate for gauging the effectiveness of other technologies.	Containment, Treatment or Removal Technologies.	Useful for evaluating the effectiveness of containment and treatment measures, but is not itself a containment or treatment technology.	Requires periodic sampling.	Will be considered.
Control and Isolation of Contaminants	Agronomic Cover	Consists of an engineered biosystem composed of plants and soil, designed to reduce infiltration and percolation of precipitation and encourage evaporation and transpiration.	Use with restrictive covenants to prohibit disruption of cover.	Effective for reducing infiltration into, and percolation through, waste, thereby reducing leachate generation and lateral migration of groundwater and seepage.	Technically easy to implement although it would result in temporary disruption of portions of the site habitats. The disruption could be minimized through careful construction techniques.	Will be considered.
	Cap	The design of the cap depends on the regulations for the waste in the landfill. A cap would reduce infiltration and reduce the volume of leachate.	Use with restrictive covenants to prohibit disruption of cover.	Effective at containing wastes and reducing leachate.	Difficult to implement without destruction of the existing habitat areas. Large quantities of fill material would be needed resulting in additional land consumption and large scale hauling of fill.	Will be considered.
Separation or Treatment of Contaminants	Collection and Treatment of Seep Water	Provides a preferential path from area of seepage to sump locations. The seep water may be pumped or passively collected from the sumps before being treated and discharged.	Monitoring.	Effective for most dissolved organic contaminants.	Implementation depends upon the site conditions and available head in each seep area.	This technology has already been implemented for Seeps 2 through 4 and will be considered further.

TABLE 6-3
POTENTIAL REMEDIAL TECHNOLOGIES FOR SEEPS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
Removal and Off-Site Disposal of Contaminants	Groundwater Collection	Groundwater collection wells are pumped to control the hydraulic gradient and prevent contaminated groundwater from leaving the area or to remove contaminated groundwater. The water pumped from the wells is collected, treated, and discharged. Groundwater collection trenches are constructed to intercept the flow of contaminated groundwater. Perforated pipes installed in trenches allow the water to flow to collection sumps. The water is pumped from the sumps, treated and discharged.	Treatment Technologies and monitoring.	Effective for controlling or collecting groundwater, thereby reducing or eliminating seepage.	Groundwater collection wells are easy to implement. Implementation of groundwater collection trenches depends on site-specific conditions such as the existing hydraulic gradient and depth to groundwater.	Will be considered for the shallow groundwater in the former East Landfill before it emerges as seeps.
	Groundwater Treatment	Different treatment methods for various types of contaminants.	Groundwater collection.	Effective at reducing contaminant concentrations.	Easy to implement.	Will be considered.

TABLE 6-4
POTENTIAL REMEDIAL TECHNOLOGIES FOR PROTECTION OF EXISTING HABITATS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

GENERAL RESPONSE ACTION	TECHNOLOGY	DESCRIPTION	USED IN CONJUNCTION WITH	EFFECTIVENESS	IMPLEMENTABILITY	STATUS
No-Action	No-Action	Leaves the site in its current state.		Not effective in controlling risk.	Easy to implement.	Retained for baseline comparison.
Institutional Control	Land Use And Access Restrictions	Land use restrictions, protection of habitats with physical barriers, such as fences, and with restrictive covenants.	Often used with other remedial actions.	Effective in reducing human contact. However, institutional controls do not contain or treat contamination or actively enhance the sensitive habitats.	Easy to implement.	Will be considered.
Monitoring	Habitat Monitoring	Surveying biota and wildlife environments to evaluate whether these resources are being adversely impacted. A visual inspection as well as random sampling of fauna and observation of mammals. Also soil cover integrity, vegetation cover density, and overall system development would be monitored.	Containment, Treatment or Removal Technologies.	Useful for evaluating the effectiveness of containment and treatment measures, but is not itself a containment or treatment technology.	Requires periodic sampling.	Will be considered.
Control and Isolation of Contaminants	Agronomic Cover	Consists of an engineered biosystem composed of plants, root systems, and soil microbes designed to reduce infiltration, encourage evaporation and transpiration, and enhance soil stabilization and prevent erosion.	Use with restrictive covenants to prohibit disruption of cover.	Effective at reducing risks to fauna and providing an enhanced habitat.	Easy to implement ecosystem rehabilitation or enhancement of existing habitats.	Will be considered.
Compensatory Actions	Constructed Wetland	Engineered systems that replicate naturally occurring wetland conditions to treat waste waters or replace wetlands that were destroyed by other actions.	Use with restrictive covenants.	Effective for treatment of wastewater streams and to provide new or replacement habitats.	There is little room to construct wetlands near the Poentic Kill and Poenties Kill. Compensatory wetlands could be constructed off site.	Will be considered.

TABLE 6-5
PRELIMINARY ALTERNATIVE SCREENING FOR SOIL
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	Soil Which Exceeds NYSDEC's RSCOs and is Impacting Groundwater	Soil with PCBs Above NYSDEC's RSCOs	Other Soil Which Exceeds NYSDEC's RSCOs
No-Action	Retained for baseline comparison.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.
Land Use and Access Restrictions	Will be considered for all site-wide alternatives, except the No-Action Alternative.	Will be included for all site-wide alternatives, except the No-Action Alternative.	Will be included for all site-wide alternatives, except the No-Action Alternative.	Will be included for all site-wide alternatives, except the No-Action Alternative.
Removal and Off-Site Disposal	Will be considered for discrete areas of soil in the manufacturing area. Will be considered for exposed wastes and discrete areas of soil in the former landfill areas.	Evaluated and eliminated.	Included in site-wide containment and treatment alternatives.	Evaluated and eliminated.
Soil Cover	Will be considered.	Considered and eliminated.	Included in site-wide containment and treatment alternatives.	Included in site-wide containment and treatment alternatives.
Asphalt Cover	Will be considered for soils in the manufacturing area. Will not be considered for soils in the former landfill areas because it would be incongruous with protecting the site habitats.	Considered and eliminated.	Included in site-wide containment and treatment alternatives for manufacturing area.	Included in site-wide containment and treatment alternatives.
Asphalt Cap	Will be considered for soils in the manufacturing area. Will not be considered for soils in the former landfill areas because it would be incongruous with protecting the site habitats	Included in site-wide containment and treatment alternatives for vadose zone soil in manufacturing area.	Considered and eliminated.	Considered and eliminated.
Agronomic Cover	Will be considered for soils in the former landfill areas. Will not be considered for soils in the manufacturing area because it would restrict the future use of the property.	Included in site-wide treatment and containment alternatives for former landfill areas.	Included in site-wide containment and treatment alternatives for former landfill areas.	Not considered.
Cap	Will be considered for soils in the former landfill areas. Will not be considered for soils in the manufacturing area because it would restrict the future use of the property.	Included in site-wide alternative.	Included in site-wide alternative.	Not considered.

TABLE 6-5
PRELIMINARY ALTERNATIVE SCREENING FOR SOIL
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	Soil Which Exceeds NYSDEC's RSCOs and is Impacting Groundwater	Soil with PCBs Above NYSDEC's RSCOs	Other Soil Which Exceeds NYSDEC's RSCOs
Soil Vapor Extraction	Will not be considered for soil in floodplain or channel fill deposits. Will be considered for VOC impacts in fill.	Evaluated and eliminated.	Not considered.	Evaluated and eliminated.
Dual-Phase Soil Vapor Extraction	Will be considered for multi-media impacts above the floodplain deposits.	Evaluated and eliminated.	Not considered.	Not considered.
Enhanced In-Situ Aerobic and Anaerobic Biodegradation	Will be considered for groundwater and for soil in the saturated zone.	Included in site-wide treatment and containment alternatives for saturated soil in manufacturing area.	Not considered.	Not considered.

TABLE 6-6
PRELIMINARY ALTERNATIVE SCREENING SUMMARY FOR EXISTING HABITATS AND FORMER LANDFILL AREAS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	FORMER LANDFILL AND HABITAT AREAS
No-Action	Retained for baseline comparison.	Retained for baseline comparison.
Land Use And Access Restrictions	Will be considered.	Will be included for all site-wide alternatives, except the No-Action Alternative.
Habitat Monitoring	Will be considered.	Included in site-wide containment and treatment alternatives.
Agronomic Cover	Will be considered	Included in site-wide containment and treatment alternatives.
Constructed Wetland	Will be considered.	May be incorporated if on-site wetlands are destroyed.
Soil Cover	Will be considered.	Included in site-wide containment alternatives.
Cap	Will be considered.	Included in site-wide containment alternative.

TABLE 6-7
PRELIMINARY ALTERNATIVE SCREENING FOR GROUNDWATER
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	PRINCIPAL CONTRIBUTORS TO CHLORINATED ETHENES IN CHANNEL FILL DEPOSITS	CHANNEL FILL GROUNDWATER NORTH OF THE WWTP	SHALLOW GROUNDWATER IN THE FORMER EAST LANDFILL	VOC-IMPACTED GROUNDWATER NEAR SITE BOUNDARIES	PRODUCT AREAS	REMAINING GROUNDWATER
No-Action	Retained for baseline comparison.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.	Included in site-wide No-Action Alternative.
Land Use and Access Restrictions	Will be considered to prohibit the use of groundwater as a potable water source at and near the Main Plant.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative except the No-Action alternative.
Groundwater Monitoring	Will be considered to evaluate groundwater in the channel fill deposits and in the shallow groundwater.	Included in every site-wide alternative except the No-Action alternative.	Included in every site-wide alternative.	Included in every site-wide alternative.	Included in every site-wide alternative except the No-Action alternative.	Product monitoring included in site-wide treatment and containment alternatives.	Included in every site-wide alternative except the No-Action alternative.
Asphalt Cover	Will be considered for shallow groundwater in the manufacturing area. Will not be considered for the former landfills.	Considered and eliminated.	Not considered.	Not considered.	Not considered.	Not considered.	Considered and eliminated.
Asphalt Caps	Will be considered for shallow groundwater in the manufacturing area. Will not be considered for the former landfills	Considered and eliminated.	Not considered.	Not considered.	Not considered.	Not considered.	Considered and eliminated.
Agronomic Cover	Will be considered for the former landfill areas. Will not be considered for the manufacturing area.	Not considered.	Not considered.	Included in site-wide treatment and containment alternatives.	Considered and eliminated.	Not considered.	Not considered.
Caps	Will be considered for the former landfill areas. Will not be considered for the manufacturing area.	Not considered.	Not considered.	Included in a site-wide containment alternative.	Considered and eliminated.	Not considered.	Not considered.

TABLE 6-7
PRELIMINARY ALTERNATIVE SCREENING FOR GROUNDWATER
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	PRINCIPAL CONTRIBUTORS TO CHLORINATED ETHENES IN CHANNEL FILL DEPOSITS	CHANNEL FILL GROUNDWATER NORTH OF THE WWTP	SHALLOW GROUNDWATER IN THE FORMER EAST LANDFILL	VOC-IMPACTED GROUNDWATER NEAR SITE BOUNDARIES	PRODUCT AREAS	REMAINING GROUNDWATER
Groundwater Collection	Groundwater collection wells will be considered for the channel fill groundwater in localized areas. Groundwater collection wells will be considered for shallow groundwater in the former East Landfill and shallow groundwater at other areas of the site. Groundwater collection trenches will be considered to collect the shallow groundwater under the former East Landfill before it reaches the Poentic Kill. Groundwater collection trenches will not be considered for the groundwater in the channel fill deposits.	Groundwater collection wells were evaluated, but not incorporated into alternatives. Groundwater collection trenches were considered for site-wide treatment and containment alternative.	Groundwater collection wells were evaluated, but not incorporated into alternatives. Groundwater collection trenches were not considered.	Included in a site-wide treatment alternative.	Groundwater collection wells were considered for site-wide treatment and containment alternative. Groundwater collection trenches were not considered.	Not considered.	Groundwater collection wells were evaluated, but not incorporated into alternatives. Groundwater collection trenches were not considered.
Source Removal of LNAPL	Will be considered to remove free-product.	Not considered.	Not considered.	Not considered.	Not considered.	Included in site-wide treatment and containment alternatives.	Not considered.
Monitored Natural Attenuation of Groundwater	Will be considered for impacted groundwater everywhere at the site except the former Wire Mill Area.	Evaluated but not incorporated into alternatives.	Included in site-wide treatment and containment alternatives.	Included in site-wide treatment and containment alternatives.	Included in site-wide treatment and containment alternatives.	Not considered.	Included in site-wide treatment and containment alternatives.
Air Sparging	Will be considered for the shallow groundwater in the former East Landfill Area and localized areas within the channel fill deposits, where the floodplain deposits are missing.	Not considered.	Not considered.	Included in site-wide treatment and containment alternatives.	Included in site-wide treatment and containment alternatives.	Not considered.	Evaluated but not incorporated into alternatives.
Soil Vapor Extraction	Will be considered for use as a companion technology for air sparging and groundwater stripping wells for localized areas with impacts limited to the fill deposits, or where the floodplain deposits are missing.	Not considered.	Not considered.	Included in site-wide treatment and containment alternatives.	Included in site-wide treatment and containment alternatives.	Not considered.	Evaluated but not incorporated into alternatives.

TABLE 6-7
PRELIMINARY ALTERNATIVE SCREENING FOR GROUNDWATER
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	PRINCIPAL CONTRIBUTORS TO CHLORINATED ETHENES IN CHANNEL FILL DEPOSITS	CHANNEL FILL GROUNDWATER NORTH OF THE WWTP	SHALLOW GROUNDWATER IN THE FORMER EAST LANDFILL	VOC-IMPACTED GROUNDWATER NEAR SITE BOUNDARIES	PRODUCT AREAS	REMAINING GROUNDWATER
Enhanced In-Situ Aerobic Biodegradation	Will be considered.	Not considered.	Evaluated but not incorporated into alternatives.	Evaluated and eliminated.	Not considered.	Not considered.	Evaluated but not incorporated into alternatives.
Enhanced In-Situ Anaerobic Biodegradation	Will be considered. Some contaminants in the groundwater beneath Main Plant are already anaerobically degrading.	Considered for site-wide treatment alternative.	Evaluated but not incorporated into alternatives.	Evaluated and eliminated.	Considered for site-wide treatment alternative.	Not considered.	Evaluated but not incorporated into alternatives.
Hot Water or Stream Flushing/Stripping	Will not be considered. There has been no extensive source of NAPL identified at the Main Plant.	Not considered.	Not considered.	Not considered.	Not considered.	Not considered.	Not considered.
Groundwater Stripping Wells	In-situ groundwater stripping will be considered for the groundwater in the channel fill deposits. In-situ groundwater stripping will not be considered for the shallow groundwater areas.	Not considered.	Evaluated but not incorporated into alternatives.	Not considered.	Considered for site-wide treatment alternative.	Not considered.	Evaluated but not incorporated into alternatives.
Permeable Reactive Barriers	Will not be considered for channel fill groundwater along the northern site boundary or north of the WWTP Area. Will be considered for those areas that are shallow enough to allow construction of the PRB without encountering significant technical difficulties.	Evaluated but not incorporated into alternatives.	Not considered.	Considered and eliminated.	Evaluated but not incorporated into alternatives.	Not considered.	Evaluated but not incorporated into alternatives.
Groundwater Treatment	Will be considered as a companion technology for groundwater collection.	Evaluated but not incorporated into alternatives.	Evaluated but not incorporated into alternatives.	Included in site-wide treatment alternative.	Considered for site-wide treatment alternative.	Not considered.	Evaluated but not incorporated into alternatives.
Dual-Phase Soil Vapor Extraction (DP SVE)	Will be considered for source areas above the floodplain deposits. Will not be considered for source areas in the channel fill deposits or for the former East Landfill.	Not considered.	Not considered.	Not considered.	Not considered.	Not considered.	Evaluated but not incorporated into alternatives.

TABLE 6-7
PRELIMINARY ALTERNATIVE SCREENING FOR GROUNDWATER
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	PRINCIPAL CONTRIBUTORS TO CHLORINATED ETHENES IN CHANNEL FILL DEPOSITS	CHANNEL FILL GROUNDWATER NORTH OF THE WWTP	SHALLOW GROUNDWATER IN THE FORMER EAST LANDFILL	VOC-IMPACTED GROUNDWATER NEAR SITE BOUNDARIES	PRODUCT AREAS	REMAINING GROUNDWATER
In-Situ Chemical Oxidation	Will not be considered.	Not considered.	Not considered.	Not considered.	Not considered.	Not considered.	Not considered.

TABLE 6-8
PRELIMINARY ALTERNATIVE SCREENING SUMMARY FOR SEEPS
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	TECHNOLOGY SCREENING CONSIDERATION STATUS	SEEP AREAS
No-Action	Retained for baseline comparison.	Included in site-wide No-Action Alternative.
Land Use And Access Restrictions	Will be considered.	Included in every site-wide alternative except the No-Action alternative.
Monitoring	Will be considered.	Included in every site-wide alternative except the No-Action alternative.
Agronomic Cover	Will be considered.	Included in site-wide containment and treatment alternatives.
Cap	Will be considered.	Included in a site-wide alternative.
Collection and Treatment of Seep Water	This technology has already been implemented for Seeps 2 through 4 and will be considered further.	Included in site-wide containment and treatment alternative.
Groundwater Collection	Will be considered for the shallow groundwater in the former East Landfill before it emerges as seeps.	Included in site-wide containment and treatment alternative.
Groundwater Treatment	Will be considered.	Included in site-wide containment and treatment alternative.

TABLE 6-9
REMEDIAL TECHNOLOGIES FOR
SOIL INCLUDED IN ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	INCLUSION IN SITE-WIDE ALTERNATIVES	REASON FOR SELECTION
No-Action	Alternative 1	The no-action alternative (Alternative 1) is included, in accordance with guidance materials, because it provides a baseline to which the other alternatives are compared.
Land Use and Access Restrictions	Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Land use and access restrictions have been included in the institutional control alternative (Alternative 2) and subsequent alternatives. Application of this technology at Main Plant should ensure that the assumptions used in the HHRA for future use remain valid and protect the remedial measures that are incorporated into the alternatives.
Removal and Off-Site Disposal	Alternative 3, Alternative 4, Alternative 5, and Alternative 6	As part of the previously conducted remedial actions taken at the site, GE has already removed some exposed wastes from the landfill area for off-site disposal. Removal and off-site disposal of exposed wastes is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included in Alternatives 3, 4, and 6 to address portions of the former landfill areas where elevated concentrations of PCBs in surface soil may pose a risk to environmental receptors. Because the traditional landfill caps included in Alternative 5 for the former landfill areas would contain the surface waste, as well as the landfilled wastes, removal of exposed wastes, which would create short-term risks to construction workers and increase implementation costs while providing no additional benefit, is not included in Alternative 5. Removal and off-site disposal is included in Alternatives 3 through 6 for soils in discrete portions of the manufacturing area where concentrations of PCBs greater than NYSDEC's RSCOs have been detected in soil.
Soil Cover	Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Soil cover is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included in Alternatives 3-6 in the manufacturing area because soil cover is effective for breaking potential exposure pathways (direct contact) even though, based on the HHRA, surface soil at Main Plant does not pose a significant threat to human health. Soil cover will provide an additional level of protection as well as compliment recent efforts to make the manufacturing portion of the site a more attractive work environment.
Asphalt Cover	Alternative 3, Alternative 4, Alternative 5, and Alternative 6	GE has already used asphalt cover to effectively break potential exposure pathways and enhance the appearance of the manufacturing areas of the site. Placement of additional asphalt cover is not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included for the manufacturing area soils in Alternatives 3 through 6 because asphalt cover is effective for breaking exposure pathways (direct contact) even though, based on the HHRA, surface soil does not pose a significant threat to human health. Asphalt cover will provide an additional level of protection.
Asphalt Cap	Alternative 3, Alternative 4, and Alternative 5	Asphalt caps are not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included for soil that may be impacting groundwater quality near the City Water Main IRM Area and the former Binnie Kill Channel Area near monitoring well DM-401F in Alternatives 3 through 5 because asphalt caps will protect groundwater quality by reducing infiltration and provide an additional level of protection even though, based on HHRA, surface soil does not pose a significant threat to human health. This technology has not been included in Alternative 6 because the measures included in Alternative 6 will address groundwater impacts at the site boundaries.
Agronomic Cover	Alternative 3, Alternative 4, and Alternative 6	Agronomic cover is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Alternative 5 does not include an agronomic cover because the presumptive remedy for landfills was included in Alternative 5. A properly designed, constructed, and maintained agronomic cover over the former landfill areas should provide protection equivalent to a traditional cover system by reducing infiltration of precipitation and serving as a barrier to the potential direct contact exposure pathway. While not a requirement of the cover system, a potential added benefit of the agronomic cover would be to reduce the mobility and volume of waste through phytoaccumulation, rhizodegradation, and phytostabilization. Agronomic cover has been included for the former landfill areas in Alternatives 3, 4, and 6 because it will cause much less disruption to the habitats than construction of traditional landfill caps while providing equivalent protection.
Cap	Alternative 5	Traditional landfill caps are not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Traditional landfill caps have not been included Alternatives 3, 4, and 6 because a technology which should provide protection equivalent to traditional landfill caps has been selected. Traditional landfill caps have been included for the former landfill areas in Alternative 5 because they are the presumptive remedy for landfills.

TABLE 6-10
REMEDIAL TECHNOLOGIES FOR GROUNDWATER INCLUDED IN ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	INCLUSION IN SITE-WIDE ALTERNATIVES	REASON FOR SELECTION
No-Action	Alternative 1	The no-action alternative (Alternative 1) is included, in accordance with guidance materials, because it provides a baseline to which the other alternatives are compared.
Land Use and Access Restrictions	Alternative 2, Alternative 3, Alternative 4, Alternative 5 and Alternative 6	Land use and access restrictions have been included in the institutional control alternative (Alternative 2) and subsequent alternatives. Application of this technology at Main Plant should ensure that the assumptions used in the HHRA for future use remain valid and protect the remedial measures that are incorporated into the alternatives.
Groundwater Monitoring and Monitored Natural Attenuation of Groundwater	Alternative 1, Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Groundwater monitoring is an effective way to evaluate conditions and contaminant levels, and as such, is included in all the alternatives. Although natural attenuation is occurring and will continue, the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), and a treatment and containment alternative (Alternative 6) do not explicitly incorporate MNA. Alternative 3, Alternative 4, and Alternative 5 incorporate MNA in conjunction with source treatment measures.
Asphalt Cover	Alternative 3, Alternative 4, Alternative 5, and Alternative 6	GE has already used asphalt cover to effectively break potential exposure pathways and enhance the appearance of the manufacturing areas of the site. Placement of additional asphalt cover is not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included for the manufacturing area soils in Alternatives 3 through 6 because asphalt cover is effective for breaking exposure pathways (direct contact) even though, based on the HHRA, surface soil does not pose a significant threat to human health. Asphalt cover will provide an additional level of protection.
Asphalt Cap	Alternative 3, Alternative 4, and Alternative 5	Asphalt caps are not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is included for soil that may be impacting groundwater quality near the City Water Main IRM Area and the former Binnie Kill Channel Area near monitoring well DM-401F in Alternatives 3 through 5 because asphalt caps will protect groundwater quality by reducing infiltration and provide an additional level of protection even though, based on HHRA, surface soil does not pose a significant threat to human health. This technology has not been included in Alternative 6 because the measures included in Alternative 6 will address groundwater impacts at the site boundaries.
Agronomic Cover	Alternative 3, Alternative 4, and Alternative 6	Agronomic cover is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Alternative 5 does not include an agronomic cover because the presumptive remedy for landfills was included in Alternative 5. A properly designed, constructed, and maintained agronomic cover over the former landfill areas should provide protection equivalent to a traditional cover system by reducing infiltration of precipitation and serving as a barrier to the potential direct contact exposure pathway. While not a requirement of the cover system, the agronomic cover would likely reduce the mobility and volume of waste through phytoaccumulation, rhizodegradation, and phytostabilization. Agronomic cover has been included in Alternatives 3, 4, and 6 because it will cause much less disruption to the habitats than construction of traditional landfill caps while providing equivalent protection.
Caps	Alternative 5	Traditional landfill caps are not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Traditional landfill caps have not been included in Alternatives 3, 4, and 6 because a technology which should provide protection equivalent to traditional landfill caps has been selected. Traditional landfill caps have been included in Alternative 5 for the former landfill areas because they are the presumptive remedy for landfills.
Groundwater Collection	Alternative 5	Groundwater collection wells are not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Groundwater collection wells were not selected for inclusion in Alternative 4 and Alternative 6 because air sparging should be effective for treating the areas of VOCs in shallow groundwater in the former East Landfill Area before the groundwater reaches the Poentic Kill. Groundwater collection wells have been included in Alternative 5 for the shallow groundwater in the former East Landfill Area because it is a technology that compliments the presumptive remedy for landfills. Groundwater collection trenches are not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Groundwater collection trenches were not selected for inclusion in Alternative 4 and Alternative 6 because air sparging will treat the VOC-impacted shallow groundwater in the former East Landfill Area before the groundwater reaches the Poentic Kill. Groundwater collection trenches have been included in Alternative 5 for the shallow groundwater in the former East Landfill Area because this technology is frequently part of the presumptive remedy for landfills.

TABLE 6-10
REMEDIAL TECHNOLOGIES FOR
GROUNDWATER INCLUDED IN ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	INCLUSION IN SITE-WIDE ALTERNATIVES	REASON FOR SELECTION
Source Removal of LNAPL	Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Source removal of LNAPL is not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2). Continued operation of the on-going free-product recovery IRMs has been selected for inclusion in Alternatives 1 through 6. In addition, for Alternatives 3 through 6, a free-product SOP program will be developed to remove free-product. The SOP program will likely involve the use of vacuum removal, which has been shown to be an effective method to extract free-product quickly.
Air Sparging	Alternative 4 and Alternative 6	Air sparging is not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Alternatives 4 and 6 incorporate air sparging to treat areas of elevated VOCs. Air sparging is not included in Alternative 5 because another technology was selected to treat areas of elevated VOCs.
Soil Vapor Extraction	Alternative 4 and Alternative 6	Soil vapor extraction is not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Alternative 4 and Alternative 6 incorporate SVE in conjunction with air sparging to treat areas of elevated VOCs. As air sparging was not included in Alternative 5, vapor extraction is not needed.
Enhanced In-Situ Anaerobic Biodegradation	Alternative 3, Alternative 4, and Alternative 5	Enhanced in-situ anaerobic biodegradation is not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2), because this technology does not match the general response scenarios for these alternatives. Anaerobic biodegradation of VOCs in groundwater is already on-going, and accelerating the in-situ bioremediation will enhance existing site conditions to reduce the VOCs in the groundwater. Therefore, this technology has been included in Alternative 3, Alternative 4, and Alternative 5. This technology has not been included in Alternative 6 because the measures included in Alternative 6 will address groundwater impacts at the site boundaries.
Stripping Wells	Alternative 6	Stripping wells are not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. This technology was not selected for Alternative 4 and Alternative 5 because the accelerated in-situ anaerobic biodegradation included for principal VOC source areas included in Alternative 4 and Alternative 5 is expected to reduce the overall concentration of VOCs in the groundwater in the channel fill deposits. Groundwater stripping wells are included in Alternative 6 to treat impacted groundwater along the site boundaries.
Permeable Reactive Barriers	Alternative 3, Alternative 4, and Alternative 5	Permeable reactive barriers are not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. This technology is not explicitly included in Alternative 3, Alternative 4, and Alternative 5, but may be incorporated in the design phase as a method of applying ammendments for enhanced in-situ anaerobic biodegradation. This technology has not been included in Alternative 6 because the measures included in Alternative 6 will address groundwater impacts at the site boundaries.
Groundwater Treatment	Alternative 5	Groundwater treatment is not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. As no groundwater collection technology was included in Alternative 4 and Alternative 6, groundwater treatment is not needed. Groundwater treatment is included in Alternative 5 for use in conjunction with collection of shallow groundwater in the former East Landfill Area.
Dual-Phase Soil Vapor Extraction (DPSVE)	Not Selected	Dual-phase soil vapor extraction is not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. DP SVE was not selected for product removal in Alternative 4, Alternative 5, and Alternative 6 because a more aggressive technology has been selected for product removal.

TABLE 6-11
REMEDIAL TECHNOLOGIES FOR
SEEPS INCLUDED IN ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	INCLUSION IN SITE-WIDE ALTERNATIVES	REASON FOR SELECTION
No-Action	Alternative 1	The no-action alternative (Alternative 1) is included, in accordance with guidance materials, because it provides a baseline to which the other alternatives are compared.
Land Use And Access Restrictions	Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Land use and access restrictions have been included in the institutional control alternative (Alternative 2) and subsequent alternatives. Application of this technology at Main Plant should ensure that the assumptions used in the HHRA for future use remain valid and protect the remedial measures that are incorporated into the alternatives.
Monitoring	Alternative 1, Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Monitoring is an effective way to evaluate conditions and contaminant levels and as such, is included in all the alternatives. Alternatives 3 through 6 incorporate monitoring of the seeps in conjunction with increasingly aggressive treatment measures.
Agronomic Cover	Alternative 3, Alternative 4, and Alternative 6	Agronomic cover is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Alternative 5 does not include an agronomic cover because the presumptive remedy for landfills was included in Alternative 5. A properly designed, constructed, and maintained agronomic cover over the former landfills should provide protection equivalent to a traditional cover system by reducing infiltration of precipitation, thus reducing seepage, and serving as a barrier to the potential direct contact exposure pathway. While not a requirement of the cover system, an agronomic cover would likely reduce the mobility and volume of waste through phytoaccumulation, rhizodegradation, and phytostabilization. Agronomic cover has been included in Alternatives 3, 4, and 6 because it will cause much less disruption to the habitats than construction of traditional landfill caps.
Caps	Alternative 5	Traditional landfill caps are not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Traditional landfill caps have not been included in Alternatives 3, 4, and 6 because a technology that should provide protection equivalent to traditional landfill caps has been selected. Traditional landfill caps have been included in Alternative 5 for the former landfill areas because they are the presumptive remedy for landfills.
Collection and Treatment of Seep Water	Alternative 3, Alternative 4, and Alternative 6	For Alternative 1 and Alternative 2, the Seep IRM would be continued. Collection and treatment of additional seep water is not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. For Alternative 3, the Seep IRM would be continued, which should be sufficient for the Poentic Kill to continue to meet surface water standards for VOCs. In keeping with the approach of progressively more protective measures, Alternative 4 and Alternative 6 would include construction of seep collection and treatment systems at Seeps 5 through 8, as well as continuation of the Seep IRM. Collection and treatment of seep water has not been included in Alternative 5 because a technology that compliments the caps has been selected to control the shallow groundwater associated with the seeps near the former landfills.
Groundwater Collection	Alternative 5	Groundwater collection wells are not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Groundwater collection wells were not selected for inclusion in Alternative 4 and Alternative 6 because air sparging should be effective for treating the areas of VOCs in shallow groundwater near the seeps along the former East Landfill Area before the groundwater reaches the Poentic Kill. Groundwater collection wells have been included in Alternative 5 for the shallow groundwater near some of the seeps along the former East Landfill Area because collection wells are a technology that compliments the presumptive remedy for landfills. Groundwater collection trenches are not included in the no-action alternative (Alternative 1), the institutional control alternative (Alternative 2), or the containment alternative (Alternative 3) because this technology does not match the general response scenarios for these alternatives. Groundwater collection trenches were not selected for inclusion in Alternative 4 and Alternative 6 because air sparging will treat the VOC-impacted shallow groundwater near the seeps along the former East Landfill Area before the groundwater reaches the Poentic Kill. Groundwater collection trenches have been included in Alternative 5 near some of the seeps because they are a technology which is frequently part of the presumptive remedy for landfills.

TABLE 6-12
REMEDIAL TECHNOLOGIES FOR
EXISTING HABITATS
INCLUDED IN ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

TECHNOLOGY	INCLUSION IN SITE-WIDE ALTERNATIVES	REASON FOR SELECTION
No-Action	Alternative 1	The no-action alternative (Alternative 1) is included, in accordance with guidance materials, because it provides a baseline to which the other alternatives are compared.
Land Use And Access Restrictions	Alternative 2, Alternative 3, Alternative 4, Alternative 5, and Alternative 6	Land use and access restrictions have been included in the institutional control alternative (Alternative 2) and subsequent alternatives. Application of this technology at Main Plant should ensure that the biota and sensitive habitats that remain at the site after implementation of remediations are protected.
Habitat Monitoring	Alternative 1, Alternative 2, Alternative 3, Alternative 4, and Alternative 6	Monitoring is an effective way to evaluate the overall health of the habitats and as such is included in Alternative 1, Alternative 2, Alternative 3, Alternative 4, and Alternative 6. Habitat monitoring is not included in Alternative 5 because the habitat areas would be destroyed during construction of the caps.
Agronomic Cover	Alternative 3, Alternative 4, and Alternative 6	Agronomic cover is not included in either the no-action alternative (Alternative 1), or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Alternative 5 does not include an agronomic cover because the presumptive remedy for landfills was included in Alternative 5. A properly designed, constructed, and maintained agronomic cover over the former landfill areas should provide protection equivalent to a traditional cover system by reducing infiltration of precipitation and serving as a barrier to the potential direct contact exposure pathway. While not a requirement of the cover system, the agronomic cover would likely reduce the mobility and volume of waste through phytoaccumulation, rhizodegradation, and phytostabilization. Agronomic cover has been included in Alternatives 3, 4, and 6 because it will cause much less disruption to the habitats than construction of traditional landfill caps while providing equivalent protection.
Constructed Wetland	Alternative 5	Constructed wetlands are not included in either the no-action alternative (Alternative 1) or the institutional control alternative (Alternative 2) because this technology does not match the general response scenarios for these alternatives. Constructed wetlands are frequently employed when destruction of existing wetlands is unavoidable during implementation of a project. Construction of compensatory wetlands is not included in Alternative 3, Alternative 4, and Alternative 6 because implementation of these alternatives will not destroy existing wetlands. Construction of compensatory wetlands is included in Alternative 5 because the construction of caps over the former landfill areas will result in the destruction of existing wetlands.

TABLE 7-1
COST ESTIMATE FOR REMEDIAL MEASURES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements		Cost	Cost Source
Completed Remedial Actions			
Environmental Risk Reduction (including transformer removals)	**$**	**1,270,000**	Estimate
Closure of RCRA Part A Permitted Storage Area	**$**	**250,000**	Estimate
Closure of RCRA 90-Day Storage Areas	**$**	**225,000**	Estimate
Storm Sewer Cleaning Program	**$**	**2,000,000**	Estimate
Former Building 269 Storm Sewer Cleaning IRM	**$**	**90,000**	Estimate
Mercury Project - Building 265	**$**	**400,000**	Estimate
Hi-Yard Storm Sewer Cleaning IRM	**$**	**400,000**	Estimate
Streambank Armoring	**$**	**53,000**	Estimate
Remediate Building 262 Soil	**$**	**93,000**	Estimate
Free Product Recovery System at Insulating Materials Products Section	**$**	**30,000**	Estimate
Free Product Recovery at Stark Oil	**$**	**510,000**	Estimate
Soil and Free Product Removal IRM at City Water Main IRM	**$**	**510,000**	Estimate
Holding Pond IRM	**$**	**1,330,000**	Estimate
Completed Remedial Actions Subtotal:	**$**	**7,200,000**	
On-going Remedial Actions			
Free Product Recovery at 49/53	**$**	**190,000**	Estimate
Storage Tank Removals			
Storage Tanks	**$**	**350,000**	Estimate
Landfill Tanks	**$**	**250,000**	Estimate
Habitat Enhancement at the former Landfills	**$**	**250,000**	Estimate
Seep Management IRM along Poentic Kill	**$**	**300,000**	Estimate
Site-Wide Renovations	**$**	**7,100,000**	Estimate
IRM for the Former East Landfill	**$**	**800,000**	Estimate
On-going Remedial Actions Subtotal:	**$**	**9,200,000**	
Total Cost for Remedial Work Completed Through 2003:	**$**	**16,400,000**	

Note:
Costs are based on information provided by GE.

TABLE 7-2
PRELIMINARY COST ESTIMATE
ALTERNATIVE 1
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Remedial Actions Completed to Date						
See Table 7-1 for details						
			Completed Remedial Actions Total	**$**	**16,400,000**	
Capital Costs						
Install Monitoring Wells - Upgradient of On-Site Surface Water Bodies						
Drill overburden & install casing, 20'	25	WELL	$ 1,798.00	$	45,000	Estimate
Well development	25	WELL	$ 1,500.00	$	37,500	Estimate
			Subtotal	**$**	**82,500**	
			Capital Cost Subtotal	**$**	**82,500**	
	Project Management and Engineering Design		15%	$	12,400	
		Miscellaneous	10%	$	8,300	
		Contingency	20%	$	16,500	
			Capital Cost Total	**$**	**120,000**	
Annual Operation and Maintenance						
Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River						
Sampling labor, 1 time/yr	410	MH	$ 50.00	$	20,500	Estimate
Analytical costs: VOCs, 1 time/yr	116	WELL	$ 130.00	$	15,100	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$	5,000	Estimate
			Subtotal	**$**	**40,600**	
Surface Water and Seep Monitoring						
Sampling labor, 1 time/yr	80	MH	$ 50.00	$	4,000	Estimate
Surface water analytical: PCBs, BTEX and Fe	10	LOCATION	$ 150.00	$	1,500	Vendor
Seep analytical: BTEX and PCBs	5	SEEPS	$ 85.00	$	400	Vendor
Reporting, 1 time/yr	1	EA	$ 5,000.00	$	5,000	Estimate
Seep IRM monitoring, monthly						
Sampling labor, 4 MH, 12 times/yr	48	MH	$ 50.00	$	2,400	Estimate
Influent						
Analytical costs: PCBs and pH, 12 times/yr	12	SEEPS	$ 65.00	$	800	Vendor
Effluent						
Analytical costs: PCBs, Fe, and aromatic VOCs, 12 times/yr	12	SEEPS	$ 175.00	$	2,100	Vendor
Seep IRM, quarterly monitoring, influent						
Analytical costs: BTEX and Fe, 4 times/yr	4	SEEPS	$ 85.00	$	300	Vendor
			Subtotal	**$**	**16,500**	

TABLE 7-2
PRELIMINARY COST ESTIMATE
ALTERNATIVE 1
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Seep IRM						
System maintenance	1,000	MH	$ 50.00	$	50,000	Estimate
Electric	6,539	KWH	$ 0.06	$	400	ECHOS
Replace filters, twice monthly	24	EA	$ 110.00	$	2,600	Vendor
Dispose used filters	12	DRUM	$ 550.00	$	6,600	Estimate
			Subtotal	**$**	**59,600**	
			Annual O&M Subtotal	**$**	**116,700**	
	Project Management		15%	$	17,500	
	Miscellaneous		10%	$	11,700	
	Contingency		20%	$	23,300	
			Annual O&M Total	**$**	**169,000**	
	Present Worth of Annual O&M, 30 Years, 5% Interest			**$**	**2,600,000**	
Annual Operation and Maintenance for Five Years						
Continue Free-Product Removal						
Assume 3 locations, 1 requiring 4 additional extractions						
Vacuum truck, includes decontamination	9	EA	$ 5,000.00	$	45,000	Estimate
Disposal, 3,000 gallons each	27,000	GAL	$ 4.00	$	108,000	Estimate
Characterization, 1 per location	3	EA	$ 494.00	$	1,500	Estimate
Gauging: 2 areas 6 months, 1 areas 24 months						
Labor, assume 4 hours/area/month	144	MH	$ 50.00	$	7,200	Estimate
Equipment	36	EA	$ 100.00	$	3,600	Estimate
			Subtotal	**$**	**165,000**	
			Annual O&M Subtotal for 5 Years	**$**	**165,000**	
	Project Management		15%	$	25,000	
	Miscellaneous		10%	$	17,000	
	Contingency		20%	$	33,000	
			Annual O&M for 5 Years Total	**$**	**240,000**	
	Present Worth of Annual O&M for 5 Years, 5% Interest				**$1,000,000**	
Five-Year Event Operation and Maintenance						
Habitat and Biota Monitoring						
Habitat review - biologist	40	MH	$ 65.00	$	2,600	Estimate
Biota monitoring						
Sampling labor and equipment	1	EVENT	$ 2,500.00	$	2,500	Estimate
Analytical						
Composite fish: PCBs and lipids	4	EACH	$ 230.00	$	900	Vendor, Estimate
Composite macroinvertbrate: PCBs	4	EACH	$ 210.00	$	800	Vendor
			Subtotal	**$**	**6,800**	

TABLE 7-2
PRELIMINARY COST ESTIMATE
ALTERNATIVE 1
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Additional Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River 1 time/5 years						
Sampling labor, additional time	116	MH	$ 50.00	$	5,800	Estimate
Analytical costs: B/N SVOCs, PCBs, PPL Metals	116	WELL	$ 430.00	$	49,900	Vendor
			Subtotal	**$**	**55,700**	
CERCLA Effectiveness Evaluation	1	EACH	$ 30,000.00	$	30,000	Estimate
			Subtotal	**$**	**30,000**	
			Five-Year Event O&M Subtotal	**$**	**92,500**	
		Project Management	15%	$	13,900	
		Miscellaneous	10%	$	9,300	
		Contingency	20%	$	18,500	
			Five-Year Event O&M Total	**$**	**134,000**	
			Present Worth of Five-Year Event O&M, 30 Years, 5% Interest	**$**	**370,000**	
			Total Present Worth for Proposed Remedial Actions	**$**	**4,100,000**	
			Total Present Worth of Alternative 1 (including completed remedial actions)	**$**	**20,500,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-3
PRELIMINARY COST ESTIMATE
ALTERNATIVE 2
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Remedial Actions Completed to Date						
See Table 7-1 for details						
	Completed Remedial Actions Total			**$**	**16,400,000**	
Capital Costs						
Restrictive Covenants						
Deed recording fees	1	LS	$ 200.00	$	200	Estimate
Coordination	80	HR	$ 50.00	$	4,000	Estimate
Attorney fees	80	HR	$ 200.00	$	16,000	Estimate
			Subtotal	**$**	**20,200**	
Comprehensive *Health and Safety Plan*						
Prepare and begin implementing	1	LS	$ 10,000.00	$	10,000	Estimate
			Subtotal	**$**	**10,000**	
Contingency Plan						
Prepare and begin implementing	1	LS	$ 10,000.00	$	10,000	Estimate
			Subtotal	**$**	**10,000**	
Program to Maintain Campus Rehabilitations						
Prepare and begin implementing	1	LS	$ 15,000.00	$	15,000	Estimate
			Subtotal	**$**	**15,000**	
Install Monitoring Wells Upgradient of On-Site Surface Water Bodies						
			Subtotal from Alternative 1	**$**	**82,500**	
			Capital Cost Subtotal	**$**	**137,700**	
	Project Management and Engineering Design		15%	$	21,000	
	Miscellaneous		10%	$	14,000	
	Contingency		20%	$	28,000	
			Capital Cost Total	**$**	**200,000**	

TABLE 7-3
PRELIMINARY COST ESTIMATE
ALTERNATIVE 2
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Annual Operation and Maintenance						
Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River						
			Subtotal from Alternative 1	**$**	**40,600**	
Surface Water and Seep Monitoring						
			Subtotal from Alternative 1	**$**	**16,500**	
Seep IRM						
			Subtotal from Alternative 1	**$**	**59,600**	
Comprehensive *Health and Safety Plan*						
Training	1,000	MH	$ 50.00	$	50,000	Estimate
			Subtotal	**$**	**50,000**	
Pavement Replacement						
Replace - 10% per year of 109 acres						
Binder course, 3" thick	52,998	SY	$ 5.60	$	296,800	Means
Top course, 3" thick	52,998	SY	$ 6.25	$	331,200	Means
			Subtotal	**$**	**628,000**	
Maintain Campus Green Spaces (97.3 acres)						
Additional topsoil - 3% per year	14,128	SY	$ 6.28	$	88,700	Means
Replant grass - 5% per year	212	MSF	$ 98.77	$	20,900	Means, ECHOS
Mowing,16 times per year	67,814	MSF	$ 0.44	$	29,800	Means
			Subtotal	**$**	**139,400**	
Fence Replacement						
Replace 5% of existing perimeter and landfill fences per year. (7' galvanized chain link)	1,470	LF	$ 29.01	$	42,600	ECHOS
			Subtotal	**$**	**42,600**	
			Annual O&M Subtotal	**$**	**977,000**	
	Project Management		15%	$	147,000	
	Miscellaneous		10%	$	98,000	
	Contingency		20%	$	195,000	
			Annual O&M Total	**$**	**1,417,000**	
	Present Worth of Annual O&M, 30 Years, 5% Interest				**$21,800,000**	

TABLE 7-3
PRELIMINARY COST ESTIMATE
ALTERNATIVE 2
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Annual Operation and Maintenance for Five Years						
Continue Free-Product Removal						
	Subtotal from Alternative 1			**$**	**165,000**	
	Annual O&M for 5 Years Subtotal			**$**	**165,000**	
	Project Management		15%	$	25,000	
	Miscellaneous		10%	$	17,000	
	Contingency		20%	$	33,000	
	Annual O&M for 5 Years Total			**$**	**240,000**	
Present Worth of Annual O&M for 5 Years, 5% Interest					**$1,000,000**	
Five-Year Event Operation and Maintenance						
Habitat and Biota Monitoring						
	Subtotal from Alternative 1			**$**	**6,800**	
Additional Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River						
	Subtotal from Alternative 1			**$**	**55,700**	
CERCLA Effectiveness Evaluation						
	Subtotal from Alternative 1			**$**	**30,000**	
	Five-Year Event O&M Subtotal			**$**	**92,500**	
	Project Management		15%	$	13,900	
	Miscellaneous		10%	$	9,300	
	Contingency		20%	$	18,500	
	Five-Year Event O&M Total			**$**	**134,000**	
Present Worth of Five-Year Event O&M, 30 Years, 5% Interest					**$370,000**	
Total Present Worth for Proposed Remedial Actions					**$23,400,000**	
Total Present Worth of Alternative 2 (including completed remedial actions)					**$39,800,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Remedial Actions Completed to Date					
See Table 7-1 for details					
			Completed Remedial Actions Total	**$ 16,400,000**	
Capital Costs					
Restrictive Covenants					
			Subtotal from Alternative 2	**$ 20,200**	
Comprehensive *Health and Safety Plan*					
			Subtotal from Alternative 2	**$ 10,000**	
Contingency Plan					
Prepare and begin implementing	1	LS	$ 15,000.00	$ 15,000	
			Subtotal	**$ 15,000**	
Program to Maintain Campus Rehabilitations					
			Subtotal from Alternative 2	**$ 15,000**	
Manufacturing Area Cover					
Assume exposed soil covered with soil and					
replacement of 30% of the older asphalt.					
Soil cover - 92 acres					
Furnish and place sandy loam topsoil mix	148,440	CY	$ 9.79	$ 1,453,200	ECHOS
Hydro/air seeding	4,010	MSF	$ 65.00	$ 260,700	Means
Trees, 10 per acre	920	EACH	$ 200.00	$ 184,000	Estimate
Watering, 3,000 gal tank truck, 3 events	276	ACRE	$ 63.56	$ 17,500	ECHOS
Asphalt cover - 27.6 acres					
Base course, 6" thick	70,580	SY	$ 4.24	$ 299,300	Means
Binder course, 3" thick	70,580	SY	$ 5.60	$ 395,200	Means
Wearing course, 3" thick	70,580	SY	$ 6.25	$ 441,100	Means
Site-wide renovations					
Add improvements to covered areas	1	LS	$ 150,000.00	$ 150,000	Estimate
			Subtotal	**$ 3,201,000**	
Asphalt Caps Where Soil Quality May Be Impacting Groundwater					
Base course, 6" thick	10,400	SY	$ 4.24	$ 44,100	Means
Binder course, 3" thick	10,400	SY	$ 5.60	$ 58,200	Means
Wearing course, 3" thick	10,400	SY	$ 6.25	$ 65,000	Means
Install additional monitoring wells - City Water Main IRM Area					
Drill overburden & install casing, 15'	2	WELL	$ 1,558.00	$ 3,100	ECHOS
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
Install additional monitoring wells - DM-401F Area					
Drill overburden & install casing, 15'	2	WELL	$ 1,558.00	$ 3,100	ECHOS
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
			Subtotal	**$ 179,500**	
Removal of PCB-Containing (>10 mg/kg)					
Surface Soil from Seven Areas in East Landfill					
12,400 square feet (0.3 acres)					
Clear and grub brush including stumps	0.15	ACRE	$ 4,300.00	$ 600	Means
Cut and chip medium, trees to 12" diam	0.15	ACRE	$ 4,150.00	$ 600	Means
Grub stumps and remove	0.15	ACRE	$ 2,775.00	$ 400	Means
Excavate soil to one foot (except at drainage ditch, 2 ft)	850	CY	$ 6.20	$ 5,300	Estimate
Transport and dispose soil - Model City (PCB > 50 mg/kg)	1,400	TON	$ 167.50	$ 234,500	Estimate
Transport and dispose soil (PCB < 50 mg/kg)	102	TON	$ 120.00	$ 12,200	Estimate
			Subtotal	**$ 253,600**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Removal of PCB-Containing (>10 mg/kg)					
Surface Soil from One Area in West Landfill					
314 square feet (0.01 acres)					
Clear and grub brush including stumps	0.01	ACRE	$ 4,300.00	$ 40	Means
Cut and chip medium, trees to 12" diam	0.01	ACRE	$ 4,150.00	$ 40	Means
Grub stumps and remove	0.01	ACRE	$ 2,775.00	$ 30	Means
Excavate soil to one foot	10	CY	$ 6.20	$ 100	Estimate
Transport and dispose soil - Model City	20	TON	$ 120.00	$ 2,400	Estimate
			Subtotal	**$ 2,600**	
Removal of PCB Containing Soils in Manufacturing Area					
Removal of PCB-containing surface soil (>1 mg/kg) and subsurface soil (>10 mg/kg) from ten areas in the Manufacturing Area					
Clear and grub	0.05	ACRE	$ 4,300.00	$ 200	Means
Remove and reset fencing	100	LF	$ 16.30	$ 1,600	Means
Remove concrete	172	CY	$ 78.50	$ 13,500	Means
Excavate soil	2,641	CY	$ 6.20	$ 16,400	Estimate
Transport and dispose soil	4,173	TON	$ 120.00	$ 500,700	Estimate
Transport and dispose soil - TSCA Landfill	752	TON	$ 167.50	$ 125,900	Estimate
Backfill with Select Fill	1,244	CY	$ 18.00	$ 22,400	Estimate
Topsoil	371	CY	$ 28.00	$ 10,400	Vendor
Place Topsoil	371	CY	$ 0.87	$ 300	Means
Grass	10	MSF	$ 52.00	$ 500	Means
Place and compact gravel	5,449	SF	$ 0.49	$ 2,700	Means
Plant Wildflowers	20	MSF	$ 40.50	$ 800	Means
Confirmatory sampling (PCB)	50	EA	$ 65.00	$ 3,300	Estimate
			Subtotal	**$ 698,700**	
Bioremediation of Source Areas at Former Wire Mill Area					
Install new monitoring wells					
Drill overburden & install casing, 50'	9	WELL	$ 3,000.00	$ 27,000	ECHOS
Well development	9	WELL	$ 1,500.00	$ 13,500	Estimate
Place amendments					
Biopolymer slurry trench	11,520	SF	$ 25.00	$ 288,000	Means, Estimate
Mobilization/demobilization	1	LS	$ 60,000.00	$ 60,000	
Place chitin/sand/pea gravel mixture	1,067	CY	$ 1.17	$ 1,200	ECHOS
Chitin/sand	800	CY	$ 243.59	$ 194,900	Vendor
Pea gravel	267	CY	$ 65.50	$ 17,500	Means
Clamshell	1,067	CY	$ 5.30	$ 5,700	Means, Estimate
Backfill	213	CY	$ 0.87	$ 200	Means
Pump water	1,800	CF	$ 4.65	$ 8,400	Estimate, ECHOS
Treat water on-site					
24,480 GPD, Package Water Treatment Plant	1	EA	$ 21,464.00	$ 21,500	ECHOS
Dewater Soil					
Build structure (75' by 75')	1	DAY	$ 1,011.50	$ 1,000	Means, Estimate
Sand (2 - 6" layers)	70	CY	$ 12.00	$ 800	Vendor
Gravel (1 - 6" layer)	50	CY	$ 12.00	$ 600	Vendor
Liner (80 mil HDPE)	5,625	SF	$ 2.52	$ 14,200	ECHOS
Drying agent (5% portland cement)	2,240	CWT	$ 4.76	$ 10,700	Means, ECHOS
Soil Disposal					
Off-site disposal					
Load	1,980	TON	$ 2.86	$ 5,700	Estimate
Mix in drying agent	17	DAY	$ 800.00	$ 13,600	Vendor, Estimate
Dispose	1,980	TON	$ 120.00	$ 237,600	Estimate
			Subtotal	**$ 922,100**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost		Cost Source
Bioremediation of Source Areas at WWTP Area							
Pump shack (heated, incl. electrical & water hookup)	1	LS	$	15,000	$	15,000	Estimate
Metering pumps installed with check/gate valves (incl. labour)	4	EA	$	2,250	$	9,000	Estimate
Remote programming/alarm capabilities	1	LS	$	10,000	$	10,000	Estimate
Wells							
Extraction wells (6-inch, incl. surface completion)	4	WELL	$	3,093	$	12,400	Estimate
Injection wells (6-inch, incl. surface completion)	12	WELL	$	3,093	$	37,100	Estimate
Pump/controls (incl. labour)	4	EA	$	4,000	$	16,000	Estimate
Sodium Lactate							
Electron donor tank (2,500 gal), nozzles, support skirt	1	LS	$	4,500	$	4,500	Estimate
Mixer	1	EA	$	500	$	500	Estimate
Float sensor relay switch	4	EA	$	450	$	1,800	Estimate
In-line static mixer (2 inch)	4	EA	$	250	$	1,000	Estimate
Solenoid valve (2 inch, normally closed)	4	EA	$	600	$	2,400	Estimate
Pressure gauge (analog output)	4	EA	$	500	$	2,000	Estimate
Flowmeter with display & totalizer (incl. labour)	4	EA	$	1,150	$	4,600	Estimate
Piping							
Pipe (1.5-inch, 3-inch PVC doublewall)	400	LF	$	29.52	$	11,800	ECHOS
Manifold piping, 1" PVC	600	LF	$	3.32	$	2,000	ECHOS
Labor	128	MH	$	50.00	$	6,400	Estimate
Trench							
Excavation	593	CY	$	15.90	$	9,400	Means
Backfill	593	CY	$	0.87	$	500	Means
Disposal	1,038	TON	$	120.00	$	124,600	Estimate
Install new monitoring wells							
Drill overburden & install casing, 20'	2	WELL	$	1,798.00	$	3,600	Estimate
Well development	2	WELL	$	1,500.00	$	3,000	Estimate
Drill overburden & install casing, 25'	4	WELL	$	1,974.00	$	7,900	ECHOS
Well development	4	WELL	$	1,500.00	$	6,000	Estimate
				Subtotal	**$**	**291,500**	
Agronomic Cover - East & West Landfills							
Clear and grub							
Clear and grub brush including stumps	5.6	ACRE	$	4,450.00	$	24,700	Means
Clear and grub light trees to 6" diam	1.9	ACRE	$	2,900.00	$	5,400	Means
Grub stumps and remove	1.9	ACRE	$	1,400.00	$	2,600	Means
Additional soil							
Topsoil, 1' to 1.5' deep	70,800	CY	$	28.00	$	1,982,400	Vendor
Lawn bed preparation (whole area)	1,511	MSF	$	25.50	$	38,500	Estimate
Planting							
Trees (bagged and burlaped, by hand)							
400 per acre, for 30 acres	12,000	EA	$	32.13	$	385,600	Means, ECHOS
Plants (bare root seedlings 6-10")							
2,500 per acre, for 30 acres	77,000	EA	$	0.84	$	64,700	Means, ECHOS
Grass (seed), 1/3 treed area + grass space	654	MSF	$	98.77	$	64,600	Means, ECHOS
Power mulcher (large)	1,511	MSF	$	51.00	$	77,000	Means
Watering with 3,000 gal tank truck, 3 passes	105	ACRE	$	63.56	$	6,700	ECHOS
				Subtotal	**$**	**2,652,200**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Install Monitoring Wells					
Monitored natural attenuation areas					
Drill overburden & install casing, 20'	9	WELL	$ 1,798.00	$ 16,200	Estimate
Well development	9	WELL	$ 1,500.00	$ 13,500	Estimate
Drill overburden & install casing, 40'	4	WELL	$ 2,571.00	$ 10,300	Estimate
Well development	4	WELL	$ 1,500.00	$ 6,000	Estimate
Drill overburden & install casing, 50'	1	WELL	$ 2,993.00	$ 3,000	Estimate
Well development	1	WELL	$ 1,500.00	$ 1,500	Estimate
Upgradient of on-site surface water bodies					
Drill overburden & install casing, 20'	14	WELL	$ 1,798.00	$ 25,200	Estimate
Well development	14	WELL	$ 1,500.00	$ 21,000	Estimate
			Subtotal	**$ 96,700**	
			Capital Cost Subtotal	**$ 8,358,000**	
Project Management and Engineering Design		15%		$ 1,254,000	
Miscellaneous		10%		$ 836,000	
Contingency		20%		$ 1,672,000	
			Capital Cost Total	**$ 12,100,000**	
Annual Long-Term Operation and Maintenance					
Groundwater Monitoring for Natural Attenuation Areas					
Sampling labor, 1 time/yr	190	MH	$ 50.00	$ 9,500	Estimate
Analytical costs: VOCs, 1 time/yr	53	WELL	$ 130.00	$ 6,900	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 21,400**	
Twice Yearly Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River					
Sampling labor, 2 time/yr	720	MH	$ 50.00	$ 36,000	Estimate
Analytical costs: VOCs, 2 time/yr	102	WELL	$ 130.00	$ 13,300	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 54,300**	
Performance Monitoring of Asphalt Caps					
Sampling labor, 1 time/yr	40	MH	$ 50.00	$ 2,000	Estimate
Analytical costs: VOCs, 1 time/yr	9	WELL	$ 130.00	$ 1,200	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 8,200**	
Pavement Replacement - Asphalt Caps					
Replace - 5% per year of 2.1 acres					
Base course, 6" thick	500	SY	$ 4.24	$ 2,100	Means
Binder course, 3" thick	500	SY	$ 5.60	$ 2,800	Means
Wearing course, 3" thick	500	SY	$ 6.25	$ 3,100	Means
			Subtotal	**$ 8,000**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit		Unit Cost		Cost	Cost Source
Surface Water and Seep Monitoring							
				Subtotal from Alternative 1	**$**	**16,500**	
Comprehensive *Health and Safety Plan* Training							
				Subtotal from Alternative 2	**$**	**50,000**	
Pavement Replacement - Asphalt Cover							
Replace - 5% per year of 158 acres							
Binder course, 3" thick	38,260	SY	$	5.60	$	214,300	Means
Top course, 3" thick	38,260	SY	$	6.25	$	239,100	Means
				Subtotal	**$**	**453,400**	
Maintain Campus Green Spaces (192 acres)							
Additional topsoil - 3% per year	27,900	SY	$	6.28	$	175,200	Means
Replant grass - 5% per year	420	MSF	$	98.77	$	41,500	Means, ECHOS
Mowing, 16 times per year	133,816	MSF	$	0.44	$	58,900	Means
				Subtotal	**$**	**275,600**	
Fence Replacement							
				Subtotal from Alternative 2	**$**	**42,600**	
Maintain Agronomic Cover - Former East and West Landfills							
Inspection and plant replacement							
Labor - 1/2 man/year	1,040	MH	$	35.00	$	36,400	Estimate
Replant - 5% per year							
Plants (bare root seedlings 6-10")	3,588	EA	$	0.84	$	3,000	Means, ECHOS
Grass (seed)	4	MSF	$	98.77	$	400	Means, ECHOS
Power mulcher (large)	66	MSF	$	51.00	$	3,400	Means
				Subtotal	**$**	**43,200**	
Performance Monitoring of Bioremediation at Former Wire Mill Area							
Sampling labor, 1 time/yr	40	MH	$	50.00	$	2,000	Estimate
Analytical costs, VOCs, 1 time/yr	9	WELL	$	130.00	$	1,200	Vendor
Reporting, 1 time/yr	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**8,200**	
Performance Monitoring of Bioremediation at WWTP Area							
Sampling labor, 1 time/yr	30	MH	$	50.00	$	1,500	Estimate
Analytical costs, VOCs, 1 time/yr	6	WELL	$	130.00	$	800	Vendor
Reporting, 1 time/yr	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**7,300**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	**Quantity**	**Unit**	**Unit Cost**		**Cost**	**Cost Source**
Groundwater Monitoring for PCB-Containing Saturated Soil						
Sampling labor, 1 time/yr	10	MH	$ 50.00	$	500	Estimate
Analytical costs, VOCs, 1 time/yr	1	WELL	$ 130.00	$	100	Vendor
Reporting, 1 time/yr	1	REPORT	$ 1,000.00	$	1,000	Estimate
			Subtotal	**$**	**1,600**	
Seep IRM						
			Subtotal from Alternative 1	**$**	**59,600**	
			Annual O&M Subtotal	**$**	**1,050,000**	
	Project Management	15%		$	158,000	
	Miscellaneous	10%		$	105,000	
	Contingency	20%		$	210,000	
			Annual O&M Total	**$**	**1,523,000**	
	Present Worth of Annual O&M, 30 Years, 5% Interest				**$23,400,000**	
Annual Operation and Maintenance for 15 Years						
Bioremediation at WWTP Area						
Sodium lactate	95,600	LB	$ 1.00	$	95,600	
System maintenance	400	MH	$ 50.00	$	20,000	
Electricity	12,534	KWH	$ 0.06	$	800	
			Subtotal	**$**	**116,400**	
			Annual O&M Subtotal for 15 Years	**$**	**116,000**	
	Project Management	15%		$	17,000	
	Miscellaneous	10%		$	12,000	
	Contingency	20%		$	23,000	
			Annual O&M for 15 Years Total	**$**	**168,000**	
	Present Worth of Annual O&M, 15 Years, 5% Interest				**$1,700,000**	
Annual Operation and Maintenance for Five Years						
Free-Product SOP						
Assume 5 locations, 2 requiring 4 additional extractions						
Vacuum truck, includes decontamination	13	EA	$ 5,000.00	$	65,000	Estimate
Disposal, 3,000 gallons each	39,000	GAL	$ 4.00	$	156,000	Estimate
Characterization, 1 per location	5	EA	$ 494.00	$	2,500	Estimate
Gauging: 3 areas 6 months, 2 areas 12 months						
Labor, assume 4 hours/area/month	168	MH	$ 50.00	$	8,400	Estimate
Equipment	42	EA	$ 100.00	$	4,200	Estimate
			Subtotal	**$**	**236,100**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Quarterly Performance Monitoring for Bioremediation						
at Former Wire Mill Area						
Sampling labor, 3 time/yr	100	MH	$ 50.00	$	5,000	Estimate
Analytical costs: VOCs, 3 time/yr	27	WELL	$ 130.00	$	3,500	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$	5,000	Estimate
			Subtotal	**$**	**13,500**	
			Annual O&M Subtotal for 5 Years	**$**	**250,000**	
		Project Management	15%	$	38,000	
		Miscellaneous	10%	$	25,000	
		Contingency	20%	$	50,000	
			Annual O&M for 5 Years Total	**$**	**363,000**	
			Present Worth of Annual O&M for 5 Years, 5% Interest		**$1,600,000**	
Annual Operation and Maintenance for Three Years						
Quarterly Performance Monitoring of Bioremediation						
at WWTP Area for the First 3 yrs						
Sampling labor, 3 time/yr	70	MH	$ 50.00	$	3,500	Estimate
Analytical costs: VOCs, 3 time/yr	18	WELL	$ 130.00	$	2,300	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$	5,000	Estimate
			Subtotal	**$**	**10,800**	
Ecological Monitoring						
Annual for first 3 years						
Ground survey and review	50	MH	$ 65.00	$	3,300	Estimate
Aerial photograph	1	EACH	$ 3,000.00	$	3,000	Estimate
			Subtotal	**$**	**6,300**	
			Annual O&M Subtotal for 3 Years	**$**	**17,000**	
		Project Management	15%	$	3,000	
		Miscellaneous	10%	$	2,000	
		Contingency	20%	$	3,000	
			Annual O&M for 3 Years Total	**$**	**25,000**	
			Present Worth of Annual O&M for 3 Years, 5% Interest		**$70,000**	
Annual Operation and Maintenance for Two Years						
Groundwater Monitoring for Natural Attenuation Areas						
Quarterly for first 2 yrs						
(3 additional sampling events/yr)						
Sampling labor, 3 time/yr	560	MH	$ 50.00	$	28,000	Estimate
Analytical costs: VOCs, 3 time/yr	159	WELL	$ 130.00	$	20,700	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$	5,000	Estimate
			Subtotal	**$**	**53,700**	
			Annual O&M Subtotal for 2 Years	**$**	**54,000**	
		Project Management	15%	$	8,000	
		Miscellaneous	10%	$	5,000	
		Contingency	20%	$	11,000	
			Annual O&M for 2 Years Total	**$**	**78,000**	
			Present Worth of Annual O&M for 2 Years, 5% Interest		**$100,000**	

TABLE 7-4
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Five-Year Event Operation and Maintenance						
Ecological Monitoring						
1 time every 5 years, after first 3 years						
Ground survey and review	50	MH	$ 65.00	$	3,300	Estimate
Aerial photograph	1	EACH	$ 3,000.00	$	3,000	Estimate
			Subtotal	**$**	**6,300**	
Biota Monitoring						
Sampling Labor and Equipment	1	EVENT	$ 2,500.00	$	2,500	Estimate
Analytical						
Composite fish: PCBs and lipids	4	EACH	$ 230.00	$	900	Vendor
Composite macroinvertbrate: PCBs	4	EACH	$ 210.00	$	800	Vendor
			Subtotal	**$**	**4,200**	
Additional Groundwater Monitoring						
Upgradient of On-Site Surface Water Bodies,						
Mohawk River and Select Interior Wells						
One time/5 years						
Sampling labor, additional time	63	MH	$ 50.00	$	3,200	Estimate
Analytical costs: B/N SVOCs, PCBs, & PPL metals	63	WELL	$ 430.00	$	27,100	Vendor
			Subtotal	**$**	**30,300**	
CERCLA Effectiveness Evaluation						
			Subtotal from Alternative 1	**$**	**30,000**	
			Five-Year Event O&M Subtotal	**$**	**70,800**	
	Project Management		15%	$	10,600	
	Miscellaneous		10%	$	7,100	
	Contingency		20%	$	14,200	
			Five-Year Event O&M Total	**$**	**103,000**	
Present Worth of Five-Year Event O&M, 30 Years, 5% Interest					**$290,000**	
Total Present Worth for Proposed Remedial Actions					**$39,300,000**	
Total Present Worth of Alternative 3 (including completed remedial actions)					**$55,700,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Remedial Actions Completed to Date						
See Table 7-1 for details						
			Completed Remedial Actions Total	**$**	**16,400,000**	
Capital Costs						
Restrictive Covenants						
			Subtotal from Alternative 2	**$**	**20,200**	
Comprehensive *Health and Safety Plan*						
			Subtotal from Alternative 2	**$**	**10,000**	
Contingency Plan						
			Subtotal from Alternative 3	**$**	**15,000**	
Program to Maintain Campus Rehabilitations						
			Subtotal from Alternative 2	**$**	**15,000**	
Manufacturing Area Cover Assume exposed soil covered with soil and replacement of 30% of the older asphalt						
			Subtotal from Alternative 3	**$**	**3,201,000**	
Asphalt Caps Where Soil Quality May Be Impacting Groundwater						
			Subtotal from Alternative 3	**$**	**179,500**	
Bioremediation at DM-405F (ORC Assumed)						
Design phase investigation and pilot testing	1	EA	$ 30,000.00	$	30,000	Estimate
Additives (ORC assumed)	13,740	LB	$ 9.10	$	125,000	Estimate
Injection	1,536	FT	$ 4.56	$	7,000	Estimate
Install additional monitoring wells						
Drill overburden & install casing, 20'	3	WELL	$ 1,800.00	$	5,400	Estimate
Well development	3	WELL	$ 1,500.00	$	4,500	Estimate
Retreatment, assume 20%						Estimate
Additives (ORC assumed)	2,748	LB	$ 9.10	$	25,000	Estimate
Injection	307	FT	$ 4.56	$	1,400	Estimate
			Subtotal	**$**	**198,300**	
Removal of PCB-Containing (>10 mg/kg) Surface Soil from Seven Areas in East Landfill						
			Subtotal from Alternative 3	**$**	**253,600**	
Removal of PCB-Containing (>10 mg/kg) Surface Soil from One Area in West Landfill						
			Subtotal from Alternative 3	**$**	**2,600**	
Removal of PCB-Containing (>1 mg/kg in Surface Soil and >10 in Subsurface Soil) in the Manufacturing Area						
			Subtotal from Alternative 3	**$**	**698,700**	
Bioremediation of Source Areas at Former Wire Mill Area						
			Subtotal from Alternative 3	**$**	**922,100**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Bioremediation of Source Areas at WWTP Area					
			Subtotal from Alternative 3	**$ 291,500**	
Agronomic Cover - East and West Landfills					
			Subtotal from Alternative 3	**$ 2,652,200**	
Seep Collection System					
Four systems for Seeps 1, 5, 7, and 8					
Earth work - channels	4	EA	$ 1,955.48	$ 7,800	Estimate
Precast concrete sump, installed	4	EA	$ 7,694.00	$ 30,800	Estimate
Pump, automated system, filter, totalizer, & housing	4	EA	$ 9,308.09	$ 37,200	Estimate
Dispose removed soil	27.3	TONS	$ 167.50	$ 4,600	Estimate
System for Seep 6					
Sheet piling, installed along 30', 9' depth	300	SF	$ 8.76	$ 2,600	Means
Earth work - channels, 20' gravel filled	1	EA	$ 9,463.33	$ 9,500	Estimate
Precast concrete sump, installed	1	EA	$ 7,694.00	$ 7,700	Estimate
Pump, automated system, filter, totalizer, & housing	1	EA	$ 9,308.09	$ 9,300	Estimate
Liquid phase GAC (5GPM, 85lb. Fill)	1	EA	$ 581.64	$ 600	ECHOS
Dispose removed soil	15.6	TONS	$ 167.50	$ 2,600	Estimate
			Subtotal	**$ 112,700**	
Sparge Curtains Along Portions of Poentic Kill					
Earthwork, both curtains					
Trenching, adverse conditions	1,000	LF	$ 107.28	$ 107,300	ECHOS
Dispose removed soil	16	TONS	$ 167.50	$ 2,700	Estimate
Crushed stone	1,433	CY	$ 23.87	$ 34,200	ECHOS
Restore surface	15,000	SF	$ 5.00	$ 75,000	Estimate
Sparge system hardware, both curtains, assume bundled tubing					
Well screen, 2" stainless steel	1,000	LF	$ 24.40	$ 24,400	ECHOS
Well plug, 2" stainless steel	3	EA	$ 76.02	$ 200	ECHOS
Stainless steel tubing, 1/8"	1,000	LF	$ 19.70	$ 19,700	Estimate
Elbows, sweeps	12	EA	$ 94.73	$ 1,100	ECHOS
Connector pipe, 2" stainless steel	105	LF	$ 30.04	$ 3,200	ECHOS
Installation labor	480	MH	$ 50.00	$ 24,000	Estimate
SVE system (collection), southwest curtain					
Manifold piping, 4" Schedule 80 PVC	2,000	LF	$ 8.52	$ 17,000	ECHOS
Collection pipe, 4" Schedule 80 PVC well screen	340	LF	$ 25.00	$ 8,500	ECHOS
Well plug, 2" PVC	2	EA	$ 24.29	$ 100	ECHOS
Tees, 2" Schedule 80 PVC	102	EA	$ 11.30	$ 1,200	ECHOS
Couplers	145	EA	$ 12.03	$ 1,700	Estimate
Ball valve, 4" Schedule 80 PVC	34	EA	$ 251.08	$ 8,500	ECHOS
Elbows, sweeps, 4" Schedule 90 PVC	45	EA	$ 12.70	$ 600	ECHOS
Pressure gauges	36	EA	$ 104.21	$ 3,800	ECHOS
Installation labor	408	MH	$ 50.00	$ 20,400	Estimate
Blower, 426 SCFM, 84 HP, 30 PSI	3	EA	$ 12,225.00	$ 36,700	ECHOS
Trailer, 8' x 32'	3	EA	$ 8,397.00	$ 25,200	ECHOS
Vapor recovery system, 1000 SCFM	1	EA	$ 23,702.00	$ 23,700	ECHOS
Liquid phase GAC (100GPM, 1760lb. Fill)	1	EA	$ 13,817.00	$ 13,800	ECHOS
Vapor phase GAC (1000/2000CFM, 2000lb. Fill)	1	EA	$ 20,291.00	$ 20,300	ECHOS
Labor for installation	192	MH	$ 50.00	$ 9,600	Estimate
Install additional monitoring wells					
Drill overburden & install casing, 20'	10	WELL	$ 1,798.00	$ 18,000	Estimate
Well development	10	WELL	$ 1,500.00	$ 15,000	Estimate
			Subtotal	**$ 515,900**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Electric Power Supply					
For seep collection and sparge curtain					
Poles, 30', to bring 3,300'	33	EA	$ 770.00	$ 25,400	Means
String cable	3,300	LF	$ 1.50	$ 5,000	Estimate
			Subtotal	**$ 30,400**	
Install Monitoring Wells					
Monitored natural attenuation areas					
Drill overburden & install casing, 20'	2	WELL	$ 1,798.00	$ 3,600	Estimate
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
Drill overburden & install casing, 50'	1	WELL	$ 2,993.00	$ 3,000	Estimate
Well development	1	WELL	$ 1,500.00	$ 1,500	Estimate
Upgradient of On-Site Surface Water Bodies					
Drill overburden & install casing, 20'	14	WELL	$ 1,798.00	$ 25,200	Estimate
Well development	14	WELL	$ 1,500.00	$ 21,000	Estimate
			Subtotal	**$ 57,300**	
			Capital Cost Subtotal	**$ 9,176,000**	
	Project Management and Engineering Design		15%	$ 1,376,000	
	Miscellaneous		10%	$ 918,000	
	Contingency		20%	$ 1,835,000	
			Capital Cost Total	**$ 13,300,000**	
Annual Operation and Maintenance					
Performance Groundwater Monitoring of Sparge Curtain					
Sampling labor, 1 time/yr	120	MH	$ 50.00	$ 6,000	Estimate
Analytical costs: VOCs, 1 time/yr	34	WELL	$ 130.00	$ 4,400	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 15,400**	
Groundwater Monitoring for Natural Attenuation Areas					
Sampling labor, 1 time/yr	50	MH	$ 50.00	$ 2,500	Estimate
Analytical costs: VOCs, 1 time/yr	14	WELL	$ 130.00	$ 1,800	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 9,300**	
Twice Yearly Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River					
			Subtotal from Alternative 3	**$ 54,300**	
Performance Monitoring for Asphalt Caps					
			Subtotal from Alternative 3	**$ 8,200**	
Pavement Replacement - Asphalt Caps					
			Subtotal from Alternative 3	**$ 8,000**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Surface Water and Seep Monitoring					
10 Surface water, 1 time/yr					
Sampling labor, 40 MH, 1 time/yr	40	MH	$ 50.00	$ 2,000	Estimate
Analytical costs: PCBs, BTEX, & Fe, 1 time/yr	10	LOCATION	$ 150.00	$ 1,500	Vendor
Reporting, 1 time/yr	1	EA	$ 5,000.00	$ 5,000	Estimate
Existing Seep IRM monitoring, monthly					
Sampling labor, 4 MH, 12 times/yr	48	MH	$ 50.00	$ 2,400	Estimate
Influent					
Analytical costs: PCBs and pH, 12 times/yr	12	SEEPS	$ 65.00	$ 800	Vendor
Effluent					
Analytical costs: PCBs, Fe, and aromatic VOCs, 12 times/yr	12	SEEPS	$ 175.00	$ 2,100	Vendor
5 New seep systems, 4 times/year					
Sampling labor, 2 MH each, 3 at 4 times/yr, 2 at 2 times/yr	32	MH	$ 50.00	$ 1,600	Estimate
Analytical costs: BTEX, PCBs, 3 at 4 times/yr, 2 at 2 times/yr	16	SEEPS	$ 85.00	$ 1,400	Vendor
			Subtotal	**$ 16,800**	
Comprehensive *Health and Safety Plan* Training					
			Subtotal from Alternative 2	**$ 50,000**	
Pavement Replacement - Asphalt Cover					
			Subtotal from Alternative 3	**$ 453,400**	
Performance Monitoring of ORC Injection					
Monitoring at DM-405F					
Sampling labor, 1 time/yr	20	MH	$ 50.00	$ 1,000	Estimate
Analytical costs: VOCs, 1 time/yr	5	WELL	$ 130.00	$ 700	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 6,700**	
Maintain Non-Landfill Green Spaces					
			Subtotal from Alternative 3	**$ 275,600**	
Fence Replacement					
			Subtotal from Alternative 2	**$ 42,600**	
Maintain Agronomic Cover - Former East and West Landfills					
			Subtotal from Alternative 3	**$ 43,200**	
Performance Monitoring for Bioremediation at the Former Wire Mill Area					
			Subtotal from Alternative 3	**$ 8,200**	
Performance Monitoring of Bioremediation at WWTP Area					
			Subtotal from Alternative 3	**$ 7,300**	
Groundwater Monitoring for PCB-Containing Saturated Soil					
			Subtotal from Alternative 3	**$ 1,600**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Seep Collection Systems					
System maintenance	2,000	MH	$ 50.00	$ 100,000	Estimate
Electric	19,618	KWH	$ 0.06	$ 1,200	ECHOS
Replace filters, twice monthly	144	EA	$ 110.00	$ 15,800	Vendor
Replace GAC, twice annually	2	EA	$ 581.64	$ 1,200	ECHOS
Dispose used filters	24	DRUM	$ 550.00	$ 13,200	Estimate
			Subtotal	**$ 131,400**	
Sparge Curtains Along Portions of Poentic Kill					
System maintenance	500	MH	$ 50.00	$ 25,000	Estimate
Electric	1,778,727	KWH	$ 0.06	$ 106,700	ECHOS
Replace GAC	1	LS	$ 6,000.00	$ 6,000	Estimate
Performance monitoring					
Monthly inspection	100	MH	$ 50.00	$ 5,000	Estimate
Vapor, twice monthly	96	EA	$ 100.00	$ 9,600	Vendor
Water discharge, twice monthly	24	EA	$ 185.00	$ 4,400	Vendor
			Subtotal	**$ 156,700**	
			Annual O&M Subtotal	**$ 1,289,000**	
		Project Management	15%	$ 193,000	
		Miscellaneous	10%	$ 129,000	
		Contingency	20%	$ 258,000	
			Annual O&M Total	**$ 1,869,000**	
	Present Worth of Annual O&M, 30 Years, 5% Interest			**$28,700,000**	
Annual Operation and Maintenance for 15 Years					
Bioremediation at the WWTP					
			Subtotal from Alternative 3	**$116,400**	
			Annual O&M Subtotal for 15 Years	**$ 116,000**	
		Project Management	15%	$ 17,400	
		Miscellaneous	10%	$ 11,600	
		Contingency	20%	$ 23,200	
			Annual O&M for 15 Years Total	**$ 168,000**	
	Present Worth of Annual O&M, 15 Years, 5% Interest			**$1,700,000**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Annual Operation and Maintenance for Five Years					
Free-Product SOP					
			Subtotal from Alternative 3	**$ 236,100**	
Quarterly Performance Monitoring for ORC Injection at DM-405F					
Sampling labor, 3 time/yr	30	MH	$ 50.00	$ 1,500	Estimate
Analytical costs: VOCs, 3 time/yr	6	WELL	$ 130.00	$ 800	Vendor
Reporting, 3 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 7,300**	
Quarterly Performance Monitoring for Bioremediation at the Former Wire Mill Area					
			Subtotal from Alternative 3	**$ 13,500**	
			Annual O&M Subtotal for 5 Years	**$ 256,900**	
		Project Management	15%	$ 39,000	
		Miscellaneous	10%	$ 26,000	
		Contingency	20%	$ 51,000	
			Annual O&M for 5 Years Total	**$ 373,000**	
	Present Worth of Annual O&M for 5 Years, 5% Interest			**$1,600,000**	
Annual Operation and Maintenance for Three Years					
Quarterly Performance Monitoring for Bioremediation at the WWTP Area					
			Subtotal from Alternative 3	**$ 10,800**	
Ecological Monitoring					
			Subtotal from Alternative 3	**$ 6,300**	
			Annual O&M Subtotal for 3 Years	**$ 17,000**	
		Project Management	15%	$ 3,000	
		Miscellaneous	10%	$ 2,000	
		Contingency	20%	$ 3,000	
			Annual O&M for 3 Years Total	**$ 25,000**	
	Present Worth of Annual O&M for 3 Years, 5% Interest			**$70,000**	
Annual Operation and Maintenance for Two Years					
Monitoring for Natural Attenuation Areas Quarterly for first 2 yrs (3 additional sampling events/yr)					
Sampling labor, 3 times/year	150	MH	$ 50.00	$ 7,500	Estimate
Analytical costs: VOCs, 3 times/year	42	WELL	$ 130.00	$ 5,500	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 18,000**	

TABLE 7-5
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Quarterly Performance Groundwater Monitoring of Sparge curtain					
Sampling labor, 3 time/yr	360	MH	$ 50.00	$ 18,000	Estimate
Analytical costs: VOCs, 3 time/yr	102	WELL	$ 130.00	$ 13,300	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 36,300**	
			Annual O&M Subtotal for 2 Years	**$ 54,000**	
		Project Management	15%	$ 8,000	
		Miscellaneous	10%	$ 5,000	
		Contingency	20%	$ 11,000	
			Annual O&M for 2 Years Total	**$ 78,000**	
			Present Worth of Annual O&M for 2 Years, 5% Interest	**$100,000**	
Five-Year Event Operation and Maintenance					
Ecological Monitoring					
			Subtotal from Alternative 3	**$ 6,300**	
Biota Monitoring					
			Subtotal from Alternative 3	**$ 4,200**	
Additional Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River and Select Interior Wells					
			Subtotal from Alternative 3	**$ 30,300**	
CERCLA Effectiveness Evaluation					
			Subtotal from Alternative 1	**$ 30,000**	
			Five-Year Event O&M Subtotal	**$ 70,800**	
		Project Management	15%	$ 10,600	
		Miscellaneous	10%	$ 7,100	
		Contingency	20%	$ 14,200	
			Five-Year Event O&M Total	**$ 103,000**	
			Present Worth of Five-Year Event O&M, 30 Years, 5% Interest	**$290,000**	
			Total Present Worth for Proposed Remedial Actions	**$45,800,000**	
			Total Present Worth of Alternative 4 (including completed remedial actions)	**$62,200,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Remedial Actions Completed to Date					
See Table 7-1 for details					
			Completed Remedial Actions Total $	**16,400,000**	
Capital Costs					
Restrictive Covenants					
			Subtotal from Alternative 2 $	**20,200**	
Comprehensive *Health and Safety Plan*					
			Subtotal from Alternative 2 $	**10,000**	
Contingency Plan					
			Subtotal from Alternative 3 $	**15,000**	
Program to Maintain Campus Rehabilitations					
			Subtotal from Alternative 2 $	**15,000**	
Manufacturing Area Cover Assume exposed soil covered with soil and replacement of 30% of the older asphalt					
			Subtotal from Alternative 3 $	**3,201,000**	
Asphalt Caps Where Soil Quality May Be Impacting Groundwater					
			Subtotal from Alternative 3 $	**179,500**	
Bioremediation at DM-405F (ORC assumed)					
			Subtotal from Alternative 4 $	**198,300**	
Removal of PCB-Containing (>1 mg/kg in Surface Soil and >10 in Subsurface Soil) in the Manufacturing Area					
			Subtotal from Alternative 3 $	**698,700**	
Bioremediation of Source Areas at Former Wire Mill Area					
			Subtotal from Alternative 3 $	**922,100**	
Bioremediation of Source Areas at the WWTP Area					
			Subtotal from Alternative 3 $	**291,500**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost		Cost Source
Part 360 Caps - West Landfill and Binnie Kill Landfill							
Clear and grub							
Clear and grub light trees to 6" diam	61	ACRE	$	2,900.00	$	176,900	Means
Grub stumps and remove	61	ACRE	$	1,400.00	$	85,400	Means
Earthwork (to meet minimum slope requirements)							
Sand, 6" lifts, off-site	285,000	CY	$	11.21	$	3,194,900	ECHOS
Gas venting system							
Sand, 12" layer, 6" lifts, off-site	98,444	CY	$	11.21	$	1,103,600	ECHOS
Risers, 13', 1/acre (gas venting piping sys.)	810	LF	$	21.16	$	17,100	ECHOS
Low permeability barrier soil							
Clay, k = 10^{-7} cm/s, 18" layer, 6" lifts, off-site	147,667	CY	$	20.59	$	3,040,500	ECHOS
Protection layer							
Sand, 24" layer, 6" lifts, off-site	196,889	CY	$	11.21	$	2,207,100	ECHOS
Topsoil, 6" layer, 6" lifts, off-site	49,222	CY	$	26.05	$	1,282,300	Vendor
Seeding, vegetative cover	61	ACRE	$	3,494.00	$	213,200	ECHOS
Watering with 3,000 gallon tank truck, per pass (3)	183	ACRE	$	63.56	$	11,600	ECHOS
Riprap ditching, 3' bottom, 3' deep, 2:1 side slopes	6,000	LF	$	18.08	$	108,500	ECHOS
				Subtotal	**$**	**11,441,100**	
RCRA Cap - East Landfill and PCBs							
Over 2,602,600 square feet (59.75 acres)							
Clear and grub							
Clear and grub brush including stumps	12.2	ACRE	$	4,450.00	$	54,300	Means
Clear and grub light trees to 6" diam	35.4	ACRE	$	2,900.00	$	102,700	Means
Grub stumps and remove	35.4	ACRE	$	1,400.00	$	49,600	Means
Cut and chip medium, trees to 12" diam	12.2	ACRE	$	4,150.00	$	50,600	Means
Grub stumps and remove	12.2	ACRE	$	2,775.00	$	33,900	Means
Earthwork (to meet minimum slope requirements)							
Sand, 6" lifts, off-site	253,170	CY	$	11.21	$	2,838,000	ECHOS
Gas venting system							
Sand, 12" layer, 6" lifts, off-site	96,407	CY	$	11.21	$	1,080,700	ECHOS
Risers, 15', 1 per acre (gas venting piping sys.)	900	LF	$	21.16	$	19,000	ECHOS
HDPE liner (80 mil polymeric liner)	2,603,000	SF	$	2.67	$	6,950,000	ECHOS
Low permeability barrier soil							
Clay, k = 10^{-7} cm/s, 24" layer, 6" lifts, off-site	192,815	CY	$	20.59	$	3,970,100	ECHOS
Geotextile, 80 mil, non-woven (drainage filter fabric)	289,222	SY	$	1.16	$	335,500	ECHOS
Drainage layer							
Gravel, 12" layer, 6" lifts, off-site	96,407	CY	$	10.81	$	1,042,200	ECHOS
Protection layer							
Sand, 30" layer, 6" lifts, off-site	241,019	CY	$	11.21	$	2,701,800	ECHOS
Topsoil, 6" layer, 6" lifts, off-site	48,204	CY	$	26.05	$	1,255,700	Vendor
Seeding, vegetative cover	60	ACRE	$	3,494.00	$	208,800	ECHOS
Watering with 3,000 gallon tank truck, per pass	60	ACRE	$	63.56	$	3,800	ECHOS
Riprap ditching, 3' bottom, 3' deep, 2:1 side slopes	6,000	LF	$	18.08	$	108,500	ECHOS
				Subtotal	**$**	**20,805,200**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Electric Power Supply					
For groundwater collection					
			Subtotal from Alternative 4	**$ 30,400**	
Groundwater Collection Trench					
Clear and grub (medium brush)	2.1	ACRE	$ 9,151.00	$ 19,200	ECHOS
Construction labor				$ -	
Earthwork (to construct collection trenches)					
Excavation	780	CY	$ 5.17	$ 4,000	ECHOS, Estimate
Pull trench box	780	CY	$ 3.17	$ 2,500	ECHOS
Backfill	330	CY	$ 1.17	$ 400	ECHOS
Compact	330	CY	$ 2.27	$ 700	ECHOS
Restore area (final grading/erosion protection)					
Dewater soil (for disposal)					
Build structure (50' by 50')	1	DAY	$ 1,011.50	$ 1,000	Means, Estimate
Sand (2 - 6" layers)	90	CY	$ 12.00	$ 1,100	Vendor
Gravel (1 - 6" layer)	45	CY	$ 12.00	$ 500	Vendor
Liner (80 mil HDPE)	2,500	SF	$ 2.52	$ 6,300	ECHOS
Drying agent (5% portland cement)	1,500	CWT	$ 4.76	$ 7,100	Means, ECHOS
Off-site disposal					
Load, transport, dispose	1,170	TON	$ 167.50	$ 196,000	Estimate
Mix in drying agent	10	DAY	$ 800.00	$ 8,000	Vendor, Estimate
Collection materials					
Stone	450	CY	$ 22.04	$ 9,900	ECHOS
Perforated pipe (6" dia PVC)	1,500	LF	$ 9.04	$ 13,600	ECHOS
HDPE liner (80 mil polymeric liner)	6,000	SF	$ 2.67	$ 16,000	ECHOS
Geofabric (drainage filter fabric)	1,500	SY	$ 1.89	$ 2,800	ECHOS
Grass (seed)	92.5	MSF	$ 98.77	$ 9,100	Means, ECHOS
Sump points					
Risers, 8" Schedule 40 PVC casing	40	LF	$ 22.86	$ 900	ECHOS
Caps	4	EA	$ 100.00	$ 400	Estimate
Pumps, 4" submersible, 26-37 GPM	4	EA	$ 2,566.00	$ 10,300	ECHOS
Water level sensor	4	EA	$ 682.23	$ 2,700	ECHOS
Convey water to treatment					
Piping, 2", 4" PVC with fittings	2,200	LF	$ 33.68	$ 74,100	ECHOS
High sump level switch	4	EA	$ 357.17	$ 1,400	ECHOS
Pipe trench					
Excavate	300	CY	$ 4.70	$ 1,400	ECHOS
Backfill	300	CY	$ 1.17	$ 400	ECHOS
Compact	300	CY	$ 2.27	$ 700	ECHOS
Collection wells for Seep-8 Area					
Drill overburden & install casing, 20'	2	WELL	$ 1,798.00	$ 3,600	Estimate
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
Recovery system installation	2	WELL	$ 3,500.00	$ 7,000	Estimate
Piping, 2", 4" PVC with fittings	400	LF	$ 33.68	$ 13,500	ECHOS
			Subtotal	**$ 417,600**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Groundwater Treatment - 50 gpm					
Process piping, 4" Class 200 PVC	600	LF	$ 7.05	$ 4,200	ECHOS
Metals pretreatment					
pH adjustment/flow equilization					
2,000-gal steel tank	1	EA	$ 3,150.00	$ 3,200	ECHOS
Chemical feed	1	EA	$ 574.67	$ 600	ECHOS
Aeration					
550-gal steel tank	1	EA	$ 1,333.00	$ 1,300	ECHOS
Blower (50CFM, 7" pressure)	1	EA	$ 1,001.00	$ 1,000	ECHOS
Coagulation/precipitation					
Flocculators					
Contact clarifier, 15" diam	1	EA	$ 110,666.00	$ 110,700	ECHOS
Chemical feed	1	EA	$ 574.67	$ 600	ECHOS
Sludge					
Pumps	4	EA	$ 600.00	$ 2,400	Means, Estimate
1,000-gal tank (37.7sf, 3', 13HP)	1	EA	$ 1,693.00	$ 1,700	ECHOS
Vacuum dewatering unit	1	EA	$ 54,732.00	$ 54,700	ECHOS
Centrifugal pumps	2	EA	$ 875.93	$ 1,800	ECHOS
Multimedia filters	4	EA	$ 11,680.00	$ 46,700	ECHOS
pH adjustment					
550-gal tank	1	EA	$ 1,333.00	$ 1,300	ECHOS
Chemical feed	1	EA	$ 574.67	$ 600	ECHOS
Air Stripper					
550-gal sump	1	EA	$ 1,333.00	$ 1,300	ECHOS
High level switch	1	EA	$ 357.17	$ 400	ECHOS
Sump pumps	2	EA	$ 2,952.00	$ 5,900	ECHOS
Stripper					
Shell w/ blower, 2' x 15'	1	EA	$ 19,748.52	$ 19,700	ECHOS
Internal parts	91	FT	$ 3,184.00	$ 290,100	ECHOS
Packing (1"-3.5")	46	CF	$ 15.65	$ 700	ECHOS
Air/water separator	1	EA	$ 5,000.00	$ 5,000	Estimate
Air GAC system					
Adsorber units (250CFM, 400lb. fill)	3	EA	$ 1,606.00	$ 4,800	ECHOS
GAC, coconut based 4x8 sieve	1,200	LB	$ 1.40	$ 1,700	ECHOS
Centrifugal pumps	2	EA	$ 875.93	$ 1,800	ECHOS
Polishing					
Prefilters	5	EA	$ 328.54	$ 1,600	ECHOS
Carbon adsorber	2	EA	$ 4,772.00	$ 9,500	ECHOS
GAC, coal based, 8x30 sieve, general purpose	2,100	lb	$ 1.23	$ 2,600	ECHOS
Saturation indicator	1	EA	$ 45.00	$ -	ECHOS
pH adjustment					
1,000-gal tank	1	EA	$ 1,693.00	$ 1,700	ECHOS
Chemical feed	1	EA	$ 574.67	$ 600	ECHOS
Flow measurement	1	EA	$ 2,500.00	$ 2,500	Estimate
			Subtotal	**$ 580,700**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Construct Compensatory Wetlands					
25 acres, assume elsewhere					
Purchase land, assume flat and lightly wooded	30	ACRES	$ 1,500.00	$ 45,000	Estimate
Permitting	1	LS	$ 10,000.00	$ 10,000	Estimate
Clear and grub					
Clear and grub brush including stumps	15	ACRE	$ 4,300.00	$ 64,500	Means
Cut and chip medium, trees to 12" diam	10	ACRE	$ 4,150.00	$ 41,500	Means
Excavate soil to one foot	11,980	CY	$ 6.20	$ 74,300	Estimate
Final grading, prepare for plants	1,080	MSF	$ 25.50	$ 27,500	Estimate
Plants - wetland species, 16,500 square feet					
Trees (bagged/burlaped by hand) avg. 10/acre	250	EA	$ 32.13	$ 8,000	Means, ECHOS
Plants (bare root seedlings 6-10") avg. 1 per 2 sf	538,750	EA	$ 0.84	$ 452,600	Means, ECHOS
Grass (seed)	1,080	MSF	$ 52.00	$ 56,200	Means
Deed to State - legal fees	1	LS	$ 10,000.00	$ 10,000	Estimate
			Subtotal	**$ 789,600**	
Install Monitoring Wells					
Monitored natural attenuation areas					
Drill overburden & install casing, 20'	2	WELL	$ 1,798.00	$ 3,600	Estimate
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
Drill overburden & install casing, 50'	1	WELL	$ 2,993.00	$ 3,000	Estimate
Well development	1	WELL	$ 1,500.00	$ 1,500	Estimate
Upgradient of on-site surface water bodies					
Drill overburden & install casing, 20'	14	WELL	$ 1,798.00	$ 25,200	Estimate
Well development	14	WELL	$ 1,500.00	$ 21,000	Estimate
			Subtotal	**$ 57,300**	
			Capital Cost Subtotal	**$ 39,673,000**	
Project Management and Engineering Design			15%	$ 5,951,000	
Miscellaneous			10%	$ 3,967,000	
Contingency			20%	$ 7,935,000	
			Capital Cost Total	**$ 57,500,000**	
Annual Operation and Maintenance					
Groundwater Monitoring for Natural Attenuation Areas					
Sampling labor, 1 time/yr	50	MH	$ 50.00	$ 2,500	Estimate
Analytical costs: VOCs, 1 time/yr	14	WELL	$ 130.00	$ 1,800	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 9,300**	
Twice Yearly Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River					
112 monitoring wells total, 10 water levels only					
Sampling labor, 2 time/yr	720	MH	$ 50.00	$ 36,000	Estimate
Water levels: 10 wells along groundwater Collection trench	2	MH	$ 50.00	$ 100	Estimate
Analytical costs: VOCs, 2 time/yr	102	WELL	$ 130.00	$ 13,300	Vendor
Reporting, 1 time/yr	1	REPORT	$ 5,000.00	$ 5,000	Estimate
			Subtotal	**$ 54,400**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit		Unit Cost		Cost	Cost Source
Performance Monitoring for Asphalt Caps							
		Subtotal from Alternative 3			**$**	**8,200**	
Pavement Replacement - Asphalt Caps							
		Subtotal from Alternative 3			**$**	**8,000**	
Surface Water Monitoring							
10 Surface Water, 1 time/yr							
Sampling labor, 40 MH, 1 time/yr	40	MH	$	50.00	$	2,000	Estimate
Analytical costs: PCBs, BTEX, & Fe, 1 time/yr	10	LOCATION	$	150.00	$	1,500	Vendor
Reporting, 1 time/yr	1	EA	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**8,500**	
Comprehensive *Health and Safety Plan* Training							
		Subtotal from Alternative 2			**$**	**50,000**	
Pavement Replacement - Asphalt Cover							
		Subtotal from Alternative 3			**$**	**453,400**	
Performance Monitoring of ORC Injection							
		Subtotal from Alternative 4			**$**	**6,700**	
Maintain Non-Landfill Green Spaces							
		Subtotal from Alternative 3			**$**	**275,600**	
Fence Replacement							
		Subtotal from Alternative 2			**$**	**42,600**	
Performance Monitoring for Bioremediation at the Former Wire Mill Area							
		Subtotal from Alternative 3			**$**	**8,200**	
Performance Monitoring of Bioremediation at WWTP Area							
		Subtotal from Alternative 3			**$**	**7,300**	
Groundwater Monitoring for PCB-Containing Saturated Soil							
		Subtotal from Alternative 3			**$**	**1,600**	
Part 360 Caps - West Landfill and Binnie Kill Landfill							
Inspection, 48 MH, 2 times/yr	96	MH	$	50.00	$	4,800	
Maintenance	61	ACRE	$	1,500.00	$	91,500	
				Subtotal	**$**	**96,300**	
RCRA Cap - East Landfill							
Inspection,48 MH, 2 times/yr	96	MH	$	50.00	$	4,800	
Maintenance	60	ACRE	$	1,500.00	$	89,600	
				Subtotal	**$**	**94,400**	
Groundwater Collection Along Poentic Kill							
Pump maintenance and repair	2	EA	$	444.16	$	900	ECHOS
Inspection	8	MH	$	50.00	$	400	Estimate
Electricity	13,100	kWh	$	0.13	$	1,700	Estimate
				Subtotal	**$**	**3,000**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost		Cost Source
Groundwater Treatment							
Labor							
1 Full-time weekdays	2,080	MH	$	20.00	$	41,600	Estimate
1 Weekend watch	416	MH	$	25.00	$	10,400	Estimate
Chemicals							
Soda ash (50lb. bag)	20,500	EA	$	15.99	$	327,800	ECHOS
Sulfuric acid	11,400	EA	$	37.11	$	423,100	ECHOS
Polymer	230	LB	$	3.50	$	800	Estimate
Sludge							
Disposal, 4 times per year	4	EA	$	4,820.16	$	19,300	Estimate
Air Stripper							
Packing recondition	2	EA	$	2,866.00	$	5,700	ECHOS
Blower and motor maintenance	1	EA	$	444.16	$	400	ECHOS
Polishing filter							
Recondition GAC	4,200	LB	$	0.94	$	3,900	ECHOS
Air Treatment							
Recondition GAC	4,800	LB	$	0.94	$	4,500	ECHOS
Electricity	163,000	kWh	$	0.13	$	21,200	Estimate
				Subtotal	**$**	**858,700**	
				Annual O&M Subtotal	**$**	**1,986,000**	
		Project Management	15%		$	298,000	
		Miscellaneous	10%		$	199,000	
		Contingency	20%		$	397,000	
				Annual O&M Total	**$**	**2,880,000**	
		Present Worth of Annual O&M, 30 Years, 5% Interest				**$44,300,000**	
Annual Operation and Maintenance for 15 Years							
Bioremediation at WWTP Area							
				Subtotal from Alternative 3	**$**	**116,400**	
				Annual O&M Subtotal for 15 Years	**$**	**116,000**	
		Project Management	15%		$	17,000	
		Miscellaneous	10%		$	12,000	
		Contingency	20%		$	23,000	
				Annual O&M for 15 Years Total	**$**	**168,000**	
		Present Worth of Annual O&M, 15 Years, 5% Interest				**$1,700,000**	
Annual Operation and Maintenance for Five Years							
Free-Product SOP							
				Subtotal from Alternative 3	**$**	**236,100**	
Quarterly Performance Monitoring for ORC Injection at DM-405F							
				Subtotal from Alternative 4	**$**	**7,300**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Quarterly Performance Monitoring for Bioremediation at the Former Wire Mill Area						
			Subtotal from Alternative 3	**$**	**13,500**	
			Annual O&M Subtotal for 5 Years	**$**	**256,900**	
		Project Management	15%	$	39,000	
		Miscellaneous	10%	$	26,000	
		Contingency	20%	$	51,000	
			Annual O&M for 5 Years Total	**$**	**373,000**	
	Present Worth of Annual O&M for 5 Years, 5% Interest				**$1,600,000**	
Annual Operation and Maintenance for Three Years						
Quarterly Performance Monitoring for Bioremediation at WWTP Area						
			Subtotal from Alternative 3	**$**	**10,800**	
Ecological Monitoring						
			Subtotal from Alternative 3	**$**	**6,300**	
			Annual O&M Subtotal for 3 Years	**$**	**17,000**	
		Project Management	15%	$	3,000	
		Miscellaneous	10%	$	2,000	
		Contingency	20%	$	3,000	
			Annual O&M for 3 Years Total	**$**	**25,000**	
	Present Worth of Annual O&M for 3 Years, 5% Interest				**$70,000**	
Annual Operation and Maintenance for Two Years						
Monitoring for Natural Attenuation Areas						
Quarterly for first 2 yrs						
(3 additional sampling events/yr)						
Sampling labor, 3 times/year	150	MH	$ 50.00	$	7,500	Estimate
Analytical costs: VOCs, 3 times/year	42	WELL	$ 130.00	$	5,500	Vendor
Reporting, additional cost/year	1	REPORT	$ 5,000.00	$	5,000	Estimate
			Subtotal	**$**	**18,000**	
			Annual O&M Subtotal for 2 Years	**$**	**18,000**	
		Project Management	15%	$	3,000	
		Miscellaneous	10%	$	2,000	
		Contingency	20%	$	4,000	
			Annual O&M for 2 Years Total	**$**	**27,000**	
	Present Worth of Annual O&M for 2 Years, 5% Interest				**$100,000**	

TABLE 7-6
PRELIMINARY COST ESTIMATE
ALTERNATIVE 5
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Five-Year Event Operation and Maintenance						
Ecological Monitoring						
		Subtotal from Alternative 3		**$**	**6,300**	
Biota Monitoring						
		Subtotal from Alternative 3		**$**	**4,200**	
Additional Groundwater Monitoring Upgradient of On-Site Surface Water Bodies, Mohawk River and Select Interior Wells						
		Subtotal from Alternative 3		**$**	**30,300**	
CERCLA Effectiveness Evaluation						
		Subtotal from Alternative 1		**$**	**30,000**	
		Five-Year Event O&M Subtotal		**$**	**70,800**	
		Project Management	15%	$	10,600	
		Miscellaneous	10%	$	7,100	
		Contingency	20%	$	14,200	
		Five-Year Event O&M Total		**$**	**103,000**	
Present Worth of Five-Year Event O&M, 30 Years, 5% Interest					**$290,000**	
Total Present Worth for Proposed Remedial Actions					**$105,600,000**	
Total Present Worth of Alternative 4 (including completed remedial actions)					**$122,000,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Remedial Actions Completed to Date					
See Table 7-1 for details					
			Completed Remedial Actions Total	**$ 16,400,000**	
Capital Costs					
Restrictive Covenants					
Deed recording fees	1	LS	$ 200.00	$ 200	Estimate
Coordination	40	HR	$ 50.00	$ 2,000	Estimate
Attorney fees	40	HR	$ 200.00	$ 8,000	Estimate
			Subtotal	**$ 10,200**	
Comprehensive *Health and Safety Plan*					
			Subtotal from Alternative 2	**$ 10,000**	
Contingency Plan					
			Subtotal from Alternative 3	**$ 15,000**	
Program to Maintain Campus Rehabilitations					
			Subtotal from Alternative 2	**$ 15,000**	
Manufacturing Area Cover Assume exposed soil covered with soil and replacement of 30% of the older asphalt					
			Subtotal from Alternative 3	**$ 3,201,000**	
Removal of PCB-Containing (>10 mg/kg) Surface Soil from Seven Areas in East Landfill					
			Subtotal from Alternative 3	**$ 253,600**	
Removal of PCB-Containing (>10 mg/kg) Surface Soil from One Area in West Landfill					
			Subtotal from Alternative 3	**$ 2,600**	
Removal of PCB-Containing (>1 mg/kg in Surface Soil and >10 in Subsurface Soil) in the Manufacturing Area					
			Subtotal from Alternative 3	**$ 698,700**	
Agronomic Cover - East and West Landfills					
			Subtotal from Alternative 3	**$ 2,652,200**	
Seep Collection System					
			Subtotal from Alternative 4	**$ 112,700**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Groundwater Stripping Wells					
North site boundary					
Pilot test	1	LS	$ 100,000.00	$ 100,000	Estimate
Install groundwater stripping well	56	EA	$ 37,300.00	$ 2,088,800	ECHOS, Estimate
Above-hole air sparge equipment					
Ball valves, 2" Schedule 80 PVC	112	EA	$ 79.01	$ 8,800	ECHOS
Pressure gauges	56	EA	$ 104.21	$ 5,800	ECHOS
Manifold pipe, 2" Schedule 40 PVC	3,000	LF	$ 4.86	$ 14,600	ECHOS
Elbows, tees	56	WELL	$ 75.00	$ 4,200	Estimate
Installation labor	448	MH	$ 50.00	$ 22,400	Estimate
Above-hole SVE equipment					
Ball valves, 4" Schedule 80 PVC	112	EA	$ 251.08	$ 28,100	ECHOS
Pressure gauges	56	EA	$ 104.21	$ 5,800	ECHOS
Manifold pipe, 4" Schedule 40 PVC	3,000	LF	$ 10.95	$ 32,900	ECHOS
Elbows, tees	56	WELL	$ 100.00	$ 5,600	Estimate
Installation labor	448	MH	$ 50.00	$ 22,400	Estimate
Blower, 426 SCFM, 84 HP, 30 PSI	2	EA	$ 12,225.00	$ 24,500	ECHOS
Trailer, 8' x 32'	2	EA	$ 8,397.00	$ 16,800	ECHOS
Vapor recovery system, 500 SCFM	2	EA	$ 18,423.00	$ 36,800	ECHOS
Liquid phase GAC (100GPM, 1706lb. fill)	2	EA	$ 13,817.00	$ 27,600	ECHOS
Vapor phase GAC (500CFM, 1000lb. fill)	2	EA	$ 12,068.00	$ 24,100	ECHOS
Labor for installation	160	MH	$ 50.00	$ 8,000	Estimate
Install monitoring wells					
Drill overburden & install casing, 50'	17	WELL	$ 2,993.00	$ 50,900	Estimate
Well development	17	WELL	$ 1,500.00	$ 25,500	Estimate
Drill overburden & install casing, 60'	2	WELL	$ 3,342.00	$ 6,000	Estimate
Well development	2	WELL	$ 1,500.00	$ 3,000	Estimate
Drill overburden & install casing, 70'	29	WELL	$ 3,764.00	$ 109,200	
West site boundary					
Pilot test	1	LS	$ 100,000.00	$ 100,000	Estimate
Install groundwater stripping well	26	EA	$ 18,300.00	$ 475,800	ECHOS, Estimate
Above-hole air sparge equipment					
Ball valves, 2" Schedule 80 PVC	52	EA	$ 79.01	$ 4,100	ECHOS
Pressure gauges	26	EA	$ 104.21	$ 2,700	ECHOS
Manifold pipe, 2" Schedule 40 PVC	1,500	LF	$ 4.86	$ 7,300	ECHOS
Elbows, tees	26	WELL	$ 75.00	$ 2,000	Estimate
Installation labor	208	MH	$ 50.00	$ 10,400	Estimate
Above-hole SVE equipment					
Ball valves, 4" Schedule 80 PVC	52	EA	$ 251.08	$ 13,100	ECHOS
Pressure gauges	26	EA	$ 104.21	$ 2,700	ECHOS
Manifold pipe, 4" Schedule 40 PVC	1,500	LF	$ 10.95	$ 16,400	ECHOS
Elbows, tees	26	WELL	$ 100.00	$ 2,600	Estimate
Installation labor	208	MH	$ 50.00	$ 10,400	Estimate
Blower, 426 SCFM, 84 HP, 30 PSI	1	EA	$ 12,225.00	$ 12,200	ECHOS
Trailer, 8' x 32'	1	EA	$ 8,397.00	$ 8,400	ECHOS
Vapor recovery system, 500 SCFM	1	EA	$ 18,423.00	$ 18,400	ECHOS
Liquid phase GAC (100GPM, 1706lb. fill)	1	EA	$ 13,817.00	$ 13,800	ECHOS
Vapor phase GAC (500CFM, 1000lb. fill)	1	EA	$ 12,068.00	$ 12,100	ECHOS
Labor for installation	80	MH	$ 50.00	$ 4,000	Estimate
Install monitoring wells					
Drill overburden & install casing, 20'	15	WELL	$ 1,798.00	$ 27,000	Estimate
Well development	15	WELL	$ 1,500.00	$ 22,500	Estimate
			Subtotal	**$ 3,437,700**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost	Cost	Cost Source
Sparge Curtain Along Portion of Eastern Site Boundary					
Pilot Test	1	LS	$ 100,000.00	$ 100,000	Estimate
Assume 250', sparge ROI of 15', SVE ROI of 30'					
Install air sparge points					
Drill overburden & install casing, 35'	17	WELL	$ 3,342.00	$ 56,800	Estimate
Well development	17	WELL	$ 1,500.00	$ 25,500	Estimate
Above-hole air sparge equipment					
Ball valves, 2" Schedule 80 PVC	34	EA	$ 79.01	$ 2,700	ECHOS
Pressure gauges	17	EA	$ 104.21	$ 1,800	ECHOS
Manifold pipe, 2" Schedule 40 PVC	1,400	LF	$ 4.86	$ 6,800	ECHOS
Elbows, tees	17	WELL	$ 75.00	$ 1,300	Estimate
Installation labor	136	MH	$ 50.00	$ 6,800	Estimate
Install vapor extraction points	9	WELL	$ 2,660.00	$ 23,900	Estimate
Above-hole SVE equipment					
Ball valves, 4" Schedule 80 PVC	18	EA	$ 251.08	$ 4,500	ECHOS
Pressure gauges	9	EA	$ 104.21	$ 900	ECHOS
Manifold pipe, 4" Schedule 40 PVC	1,100	LF	$ 10.95	$ 12,000	ECHOS
Elbows, tees	9	WELL	$ 100.00	$ 900	Estimate
Installation labor	72	MH	$ 50.00	$ 3,600	Estimate
Blower, 426 SCFM, 84 HP, 30 PSI	1	EA	$ 12,225.00	$ 12,200	ECHOS
Trailer, 8' x 32'	2	EA	$ 8,397.00	$ 16,800	ECHOS
Vapor recovery system, 500 SCFM	1	EA	$ 18,423.00	$ 18,400	ECHOS
Liquid phase GAC (100GPM, 1706lb. fill)	1	EA	$ 13,817.00	$ 13,800	ECHOS
Vapor phase GAC (500CFM, 1000lb. fill)	1	EA	$ 12,068.00	$ 12,100	ECHOS
Labor for installation	120	MH	$ 50.00	$ 6,000	Estimate
Install monitoring wells					
Drill overburden & install casing, 35'	15	WELL	$ 2,323.00	$ 34,800	Estimate
Well development	15	WELL	$ 1,500.00	$ 22,500	Estimate
			Subtotal	**$ 384,100**	
Seep Collection System					
			Subtotal from Alternative 4	**$ 112,700**	
Sparge Curtains Along Portions of Poentic Kill					
For seep collection system and sparge curtain					
			Subtotal from Alternative 4	**$ 515,900**	
Electric Power Supply					
			Subtotal from Alternative 4	**$ 30,400**	
Install Monitoring Wells					
Upgradient of on-site surface water bodies					
Drill overburden & install casing, 20'	14	WELL	$ 1,798.00	$ 25,200	Estimate
Well development	14	WELL	$ 1,500.00	$ 21,000	Estimate
			Subtotal	**$ 46,200**	
			Capital Cost Subtotal	**$ 11,498,000**	
Project Management and Engineering Design			15%	$ 1,725,000	
Miscellaneous			10%	$ 1,150,000	
Contingency			20%	$ 2,300,000	
			Capital Cost Total	**$ 16,700,000**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost		Cost Source
Annual Operation and Maintenance							
Performance Groundwater Monitoring of Sparge Curtain - Poentic Kill							
		Subtotal from Alternative 4			**$**	**15,400**	
Groundwater Monitoring for Natural Attenuation Areas							
Sampling labor, 1 time/yr	10	MH	$	50.00	$	500	Estimate
Analytical costs: VOCs, 1 time/yr	1	WELL	$	130.00	$	100	Vendor
Reporting, 1 time/yr	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**5,600**	
Twice Yearly Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River							
		Subtotal from Alternative 3			**$**	**54,300**	
Surface Water and Seep Monitoring							
		Subtotal from Alternative 4			**$**	**16,800**	
Comprehensive *Health and Safety Plan* Training							
		Subtotal from Alternative 2			**$**	**50,000**	
Pavement Replacement - Asphalt Cover							
		Subtotal from Alternative 3			**$**	**453,400**	
Maintain Non-Landfill Green Spaces							
		Subtotal from Alternative 3			**$**	**275,600**	
Fence Replacement							
		Subtotal from Alternative 2			**$**	**42,600**	
Maintain Agronomic Cover - Former East and West Landfills							
		Subtotal from Alternative 3			**$**	**43,200**	
Seep Collection Systems							
		Subtotal from Alternative 4			**$**	**131,400**	
Stripping Wells - North Site Boundary							
System maintenance	500	MH	$	50.00	$	25,000	Estimate
Electric	1,229,414	KWH	$	0.06	$	73,800	ECHOS
Replace GAC	1	LS	$	6,000.00	$	6,000	Estimate
Performance monitoring							
Monthly inspection	100	MH	$	50.00	$	5,000	Estimate
Vapor, twice monthly	96	EA	$	100.00	$	9,600	Vendor
Water discharge, twice monthly	48	EA	$	185.00	$	8,900	Vendor
Groundwater monitoring							
Labor	160	MH	$	50.00	$	8,000	Estimate
Analyitcal costs: VOCs	70	WELL	$	130.00	$	9,100	Vendor
				Subtotal	**$**	**145,400**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit		Unit Cost		Cost	Cost Source
Stripping Wells - West Site Boundary							
System maintenance	300	MH	$	50.00	$	15,000	Estimate
Electric	614,707	KWH	$	0.06	$	36,900	ECHOS
Replace GAC	1	LS	$	6,000.00	$	6,000	Estimate
Performance monitoring							
Monthly inspection	100	MH	$	50.00	$	5,000	Estimate
Vapor, twice monthly	48	EA	$	100.00	$	4,800	Vendor
Water discharge, twice monthly	24	EA	$	185.00	$	4,400	Vendor
Groundwater monitoring							
Labor	112	MH	$	50.00	$	5,600	Estimate
Analyitcal costs: VOCs	17	WELL	$	130.00	$	2,200	Vendor
				Subtotal	**$**	**79,900**	
Air Sparge - East Site Boundary							
System maintenance	300	MH	$	50.00	$	15,000	Estimate
Electric	549,313	KWH	$	0.06	$	33,000	ECHOS
Performance monitoring							
Groundwater monitoring							
Labor	112	MH	$	50.00	$	5,600	Estimate
Analyitcal costs: VOCs	17	WELL	$	130.00	$	2,200	Vendor
				Subtotal	**$**	**55,800**	
Sparge Curtains Along Portions of Poentic Kill							
				Subtotal from Alternative 4	**$**	**156,700**	
				Annual O&M Subtotal	**$**	**1,530,000**	
			Project Management	15%	$	230,000	
			Miscellaneous	10%	$	153,000	
			Contingency	20%	$	306,000	
				Annual O&M Total	**$**	**2,220,000**	
				Present Worth of Annual O&M, 30 Years, 5% Interest		**$34,100,000**	
Annual Operation and Maintenance for Five Years							
Free-Product SOP							
				Subtotal from Alternative 3	**$**	**236,100**	
				Annual O&M Subtotal for 5 Years	**$**	**236,100**	
			Project Management	15%	$	35,000	
			Miscellaneous	10%	$	24,000	
			Contingency	20%	$	47,000	
				Annual O&M for 5 Years Total	**$**	**342,000**	
				Present Worth of Annual O&M for 5 Years, 5% Interest		**$1,500,000**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit		Unit Cost		Cost	Cost Source
Annual Operation and Maintenance for Three Years							
Ecological Monitoring							
				Subtotal from Alternative 3	**$**	**6,300**	
				Annual O&M Subtotal for 3 Years	**$**	**6,000**	
		Project Management		15%	$	1,000	
		Miscellaneous		10%	$	1,000	
		Contingency		20%	$	1,000	
				Annual O&M for 3 Years Total	**$**	**9,000**	
	Present Worth of Annual O&M for 3 Years, 5% Interest					**$20,000**	
Annual Operation and Maintenance for Two Years							
Quarterly Performance Monitoring of Groundwater Stripping Wells - Northern Boundary							
Sampling Labor, 3 times/year	740	MH	$	50.00	$	37,000	Estimate
Analytical: VOCs, 3 times/year	210	WELL	$	130.00	$	27,300	Vendor
Reporting, additional cost/year	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**69,300**	
Quarterly Performance Monitoring of Groundwater Stripping Wells - Western Boundary							
Sampling Labor, 3 times/year	180	MH	$	50.00	$	9,000	Estimate
Analytical: VOCs, 3 times/year	51	WELL	$	130.00	$	6,600	Vendor
Reporting, additional cost/year	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**20,600**	
Quarterly Performance Monitoring of Air Sparge Curtain - Eastern Site Boundary							
Sampling Labor, 3 times/year	180	MH	$	50.00	$	9,000	Estimate
Analytical: VOCs, 3 times/year	51	WELL	$	130.00	$	6,600	Vendor
Reporting, additional cost/year	1	REPORT	$	5,000.00	$	5,000	Estimate
				Subtotal	**$**	**20,600**	
Quarterly Performance Groundwater Monitoring of Sparge Curtain - Poentic Kill							
				Subtotal from Alternative 4	**$**	**36,300**	
				Annual O&M Subtotal for 2 Years	**$**	**147,000**	
		Project Management		15%	$	22,000	
		Miscellaneous		10%	$	15,000	
		Contingency		20%	$	29,000	
				Annual O&M for 2 Years Total	**$**	**213,000**	
	Present Worth of Annual O&M for 2 Years, 5% Interest					**$400,000**	

TABLE 7-7
PRELIMINARY COST ESTIMATE
ALTERNATIVE 6
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

Elements	Quantity	Unit	Unit Cost		Cost	Cost Source
Five-Year Event Operation and Maintenance						
Ecological Monitoring						
			Subtotal from Alternative 3	**$**	**6,300**	
Biota Monitoring						
			Subtotal from Alternative 3	**$**	**4,200**	
Additional Groundwater Monitoring Upgradient of On-Site Surface Water Bodies and Mohawk River Wells 1 time/5 years						
Sampling labor, additional time	51	MH	$ 50.00	$	2,600	Estimate
Analytical costs: B/N SVOCs, PCBs, & PPL metals	51	WELL	$ 430.00	$	21,900	Vendor
			Subtotal	**$**	**24,500**	
CERCLA Effectiveness Evaluation						
			Subtotal from Alternative 1	**$**	**30,000**	
			Five-Year Event O&M Subtotal	**$**	**65,000**	
		Project Management	15%	$	9,800	
		Miscellaneous	10%	$	6,500	
		Contingency	20%	$	13,000	
			Five-Year Event O&M Total	**$**	**94,000**	
Present Worth of Five-Year Event O&M, 30 Years, 5% Interest					**$260,000**	
Total Present Worth for Proposed Remedial Actions					**$53,000,000**	
Total Present Worth of Alternative 6 (including completed remedial actions)					**$69,400,000**	

Notes:
- Estimate - Based on engineering judgement
- Means - Means Heavy Construction Cost Data, 2002
- ECHOS - ECHOS Environmental Restoration Assemblies Cost Book, 2002
- Vendor - Vendor estimate

TABLE 7-8
SUMMARY OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY – MAIN PLANT
SCHENECTADY, NEW YORK

ALTERNATIVES		AREAS OF CONCERN			
		SOIL	GROUNDWATER	SEEPS	HABITATS
Alternative 1	No further action, other than monitoring (incorporates remedial actions already implemented and currently underway)	• No action	• No action	• No action • Collection and treatment of seep water	• No action
Alternative 2	Institutional controls with monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions	• Land use and access restrictions • Groundwater monitoring	• Land use and access restrictions • Collection and treatment of seep water • Monitoring	• Land use and access restrictions
Alternative 3	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Groundwater monitoring • Monitored natural attenuation • Asphalt cover • Asphalt caps • Enhanced in-situ anaerobic bioremediation • Agronomic cover • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement
Alternative 4	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Monitored natural attenuation • Asphalt cover • Agronomic cover • Air sparging • Soil vapor extraction • Enhanced in-situ anaerobic biodegradation • Enhanced in-situ aerobic biodegradation • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement

TABLE 7-8
SUMMARY OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY – MAIN PLANT
SCHENECTADY, NEW YORK

ALTERNATIVES		AREAS OF CONCERN			
		SOIL	GROUNDWATER	SEEPS	HABITATS
Alternative 5	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, focused placement of asphalt caps in the manufacturing area, capping of the former landfill areas with clay or synthetic cover systems, collection and treatment of shallow groundwater along the former East Landfill Area, treatment of principal VOC source areas, removal of free-product, monitored natural attenuation of groundwater, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Clay or Synthetic caps	• Land use and access restrictions • Groundwater monitoring • Asphalt cover • Groundwater collection trenches • Groundwater collection wells • Enhanced in-situ anaerobic biodegradation • Enhanced in-situ aerobic biodegradation • Clay or Synthetic caps • Groundwater treatment • Product removal • Asphalt caps	• Land use and access restrictions • Monitoring • Groundwater collection wells • Groundwater collection trenches • Groundwater treatment	• Land use and access restrictions • Constructed wetland
Alternative 6	Institutional controls, elimination of exposure pathways in the manufacturing area, targeted soil removal from the manufacturing area, targeted surface soil removal from the former East and West Landfill Areas, enhancement of ground cover at the former landfill areas with agronomic cover systems, enhancement and preservation of habitat areas, shallow groundwater and seep water treatment along the former East Landfill Area, removal of free-product, treatment of groundwater at the northern property boundary, and monitoring (incorporates remedial actions already implemented and currently underway)	• Land use and access restrictions • Removal and off-site disposal • Soil cover • Asphalt cover • Agronomic cover	• Land use and access restrictions • Groundwater monitoring • Asphalt cover • Air sparging • Soil vapor extraction • Groundwater circulating wells • Product removal	• Land use and access restrictions • Monitoring • Agronomic cover • Collection and treatment of seep water	• Land use and access restrictions • Agronomic cover • Habitat enhancement

TABLE 7-9
SUMMARY OF ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES
FEASIBILITY STUDY

GENERAL ELECTRIC ENERGY - MAIN PLANT
SCHENECTADY, NEW YORK

ALTERNATIVE	CAPITAL COSTS		ANNUAL O&M COSTS	FIVE-YEAR EVENT O&M COSTS	PRESENT WORTH OF 30 YEARS OF O&M COSTS	TOTAL PRESENT WORTH FOR PROPOSED REMEDIAL ACTIONS	TOTAL PRESENT WORTH FOR PROPOSED AND COMPLETED REMEDIAL ACTIONS
	REMEDIAL ACTIONS COMPLETED TO DATE	ADDITIONAL REMEDIAL ACTIONS					
Alternative 1	$16,400,000	$120,000	$409,000	$134,000	$3,970,000	$4,100,000	$20,500,000
Alternative 2	$16,400,000	$200,000	$1,582,000	$134,000	$23,170,000	$23,400,000	$39,800,000
Alternative 3	$16,400,000	$12,100,000	$2,157,000	$103,000	$27,160,000	$39,300,000	$55,700,000
Alternative 4	$16,400,000	$13,300,000	$2,513,000	$103,000	$32,170,000	$45,800,000	$62,200,000
Alternative 5	$16,400,000	$57,500,000	$3,473,000	$103,000	$47,770,000	$105,600,000	$122,000,000
Alternative 6	$16,400,000	$16,700,000	$2,784,000	$94,000	$36,020,000	$53,000,000	$69,400,000

Note: Annual O&M costs include operations and maintenance costs that will be incurred only in the early years, as well as those that will continue for 30 years.

FIGURES

GRAPHIC SCALE (FEET)

0 0.5 1 MILE

Property Boundary

USGS Schenectady, NY 15' Quadrangle, 1954 (Photorevised 1980)

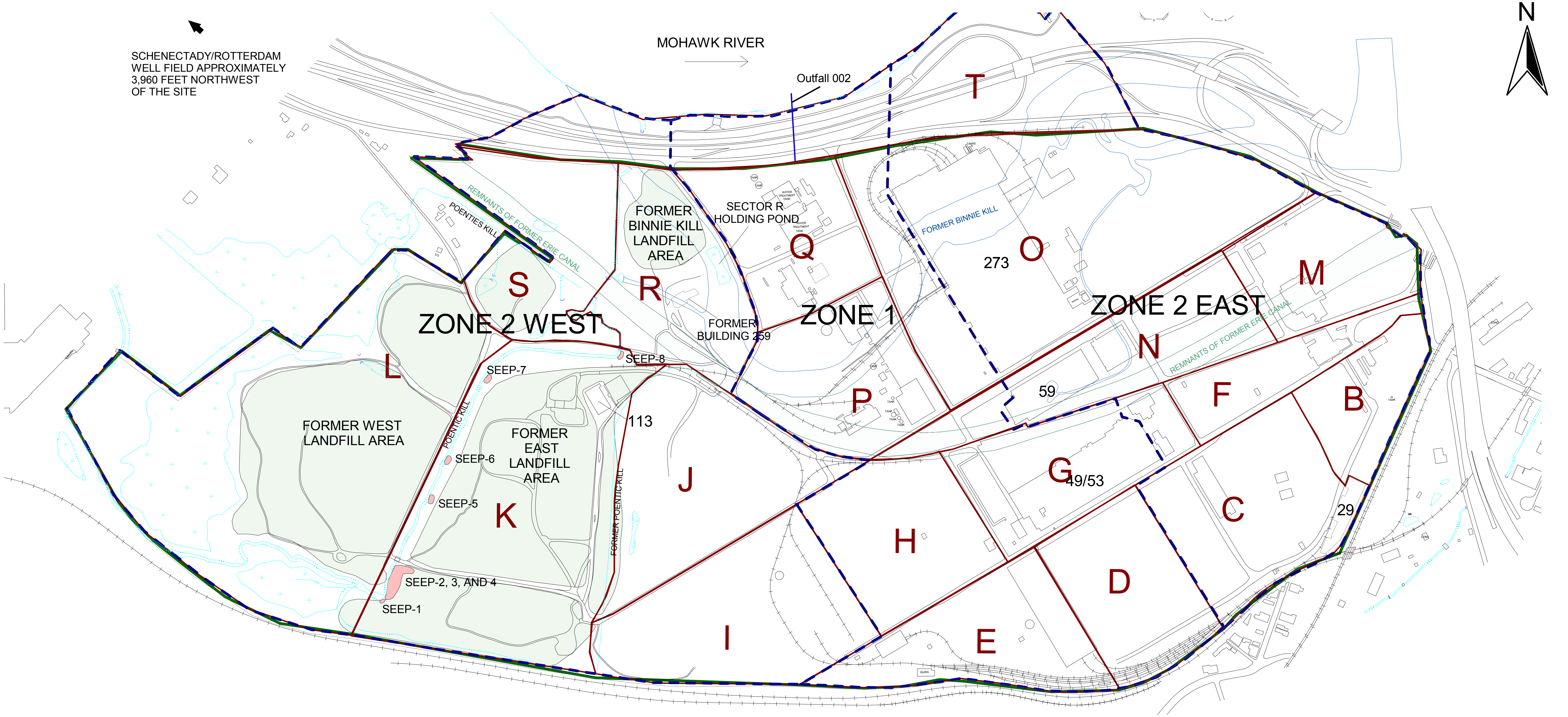
FIGURE 3-1

SITE LOCATION MAP

GENERAL ELECTRIC ENERGY
MAIN PLANT
SCHENECTADY, NEW YORK

URS

28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



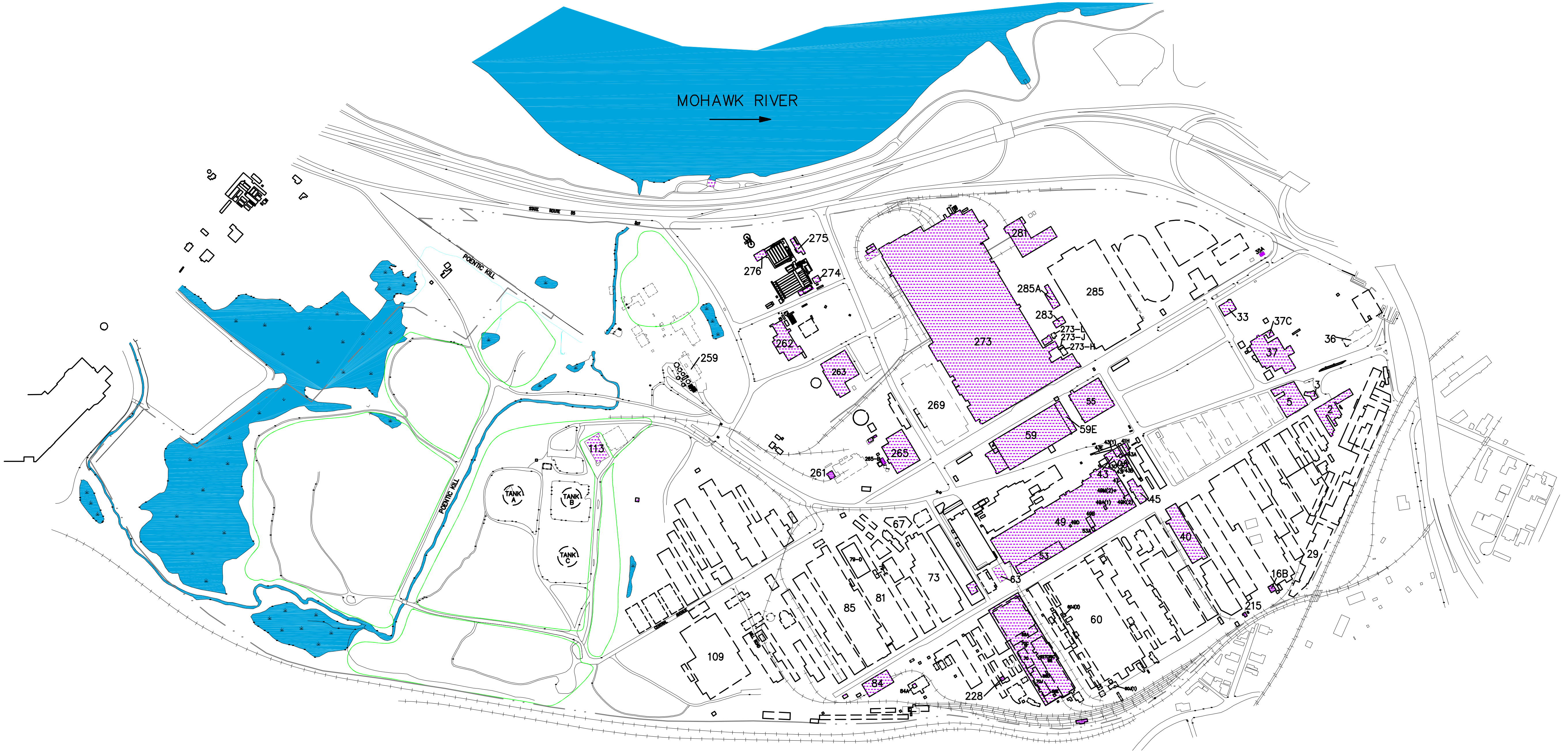
GRAPHIC SCALE

0 400 800 1200 Feet

LEGEND:

- ZONE BOUNDARIES
- SECTOR BOUNDARIES
- A SECTORS
- SEEP LOCATIONS
- FORMER LANDFILL AREAS
- PROPERTY BOUNDARY
- WETLANDS
- 273 SITE BUILDING NUMBERS

FIGURE 3-2	SITE MAP
	GENERAL ELECTRIC COMPANY MAIN PLANT SCHENECTADY, NEW YORK
URS	646 PLANK ROAD SUITE 202 CLIFTON PARK, NEW YORK 12065



LEGEND

- PROPERTY BOUNDARY
- WETLAND AREA
- EXISTING BUILDING
- FORMER BUILDING
- FORMER LANDFILL BOUNDARY

NOTES:

ALL EXISTING BUILDINGS SHOWN PRESENT AS OF MAY 2004.

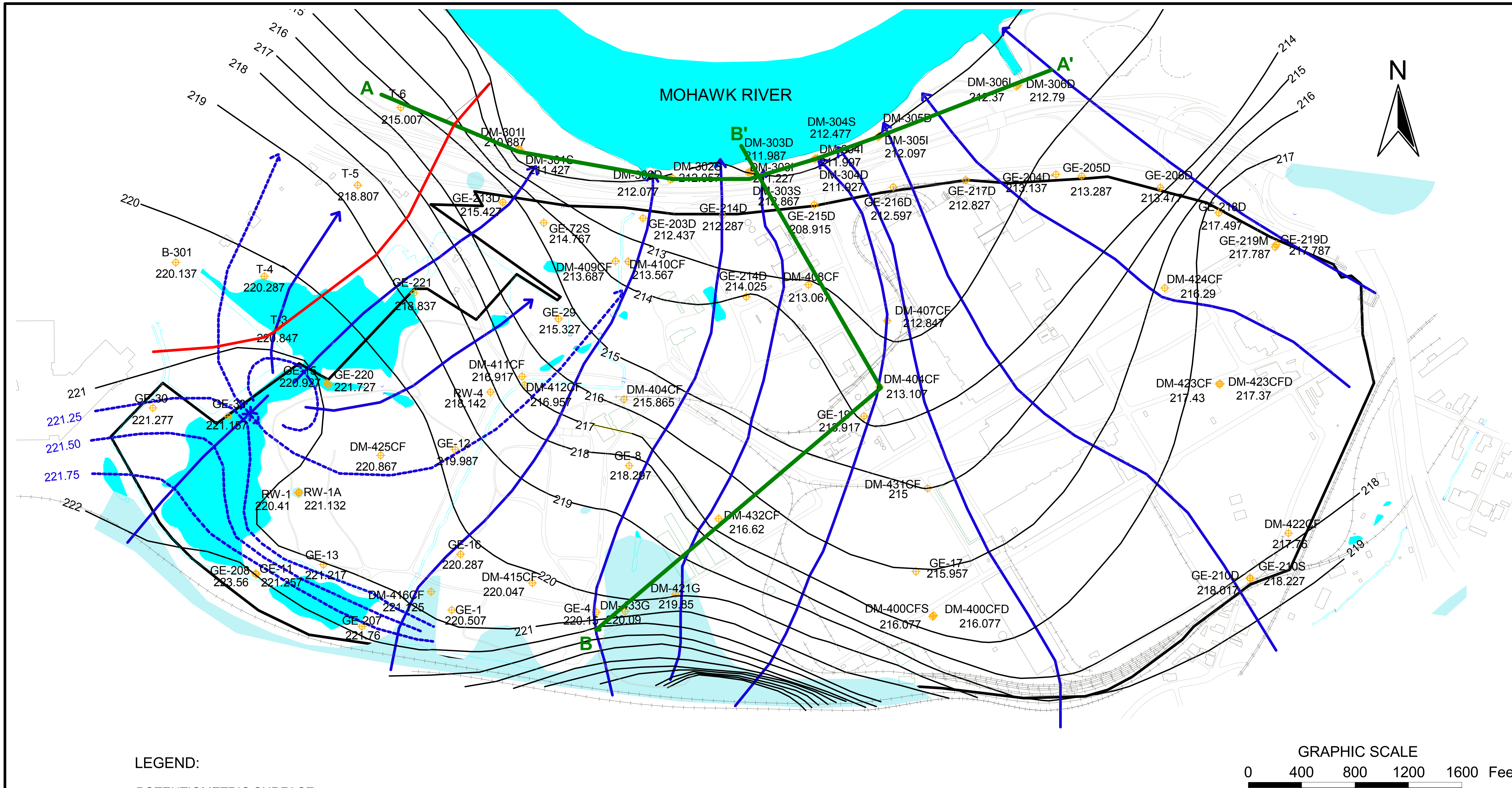
0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

FIGURE 3-3 CURRENT AND FORMER BUILDINGS

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

P: \In Progress\GE\Main Plant\2004 Stuff\FS Revisited\Figures\L7409F3-3.dwg



LEGEND:

POTENTIOMETRIC SURFACE
- SELECTED FLOW LINES
- POTENTIOMETRIC SURFACE CONTOURS (FEET MSL)
- SELECTED SUPPLEMENTAL FLOW LINES (FEET MSL)
- CHANNEL FILL MONITORING WELL LOCATION
- CHANNEL FILL NOT ENCOUNTERED
- PROPERTY BOUNDARY
- SURFACE WATER
- LINE OF SECTION
- HYDROGEOLOGIC DIVIDE

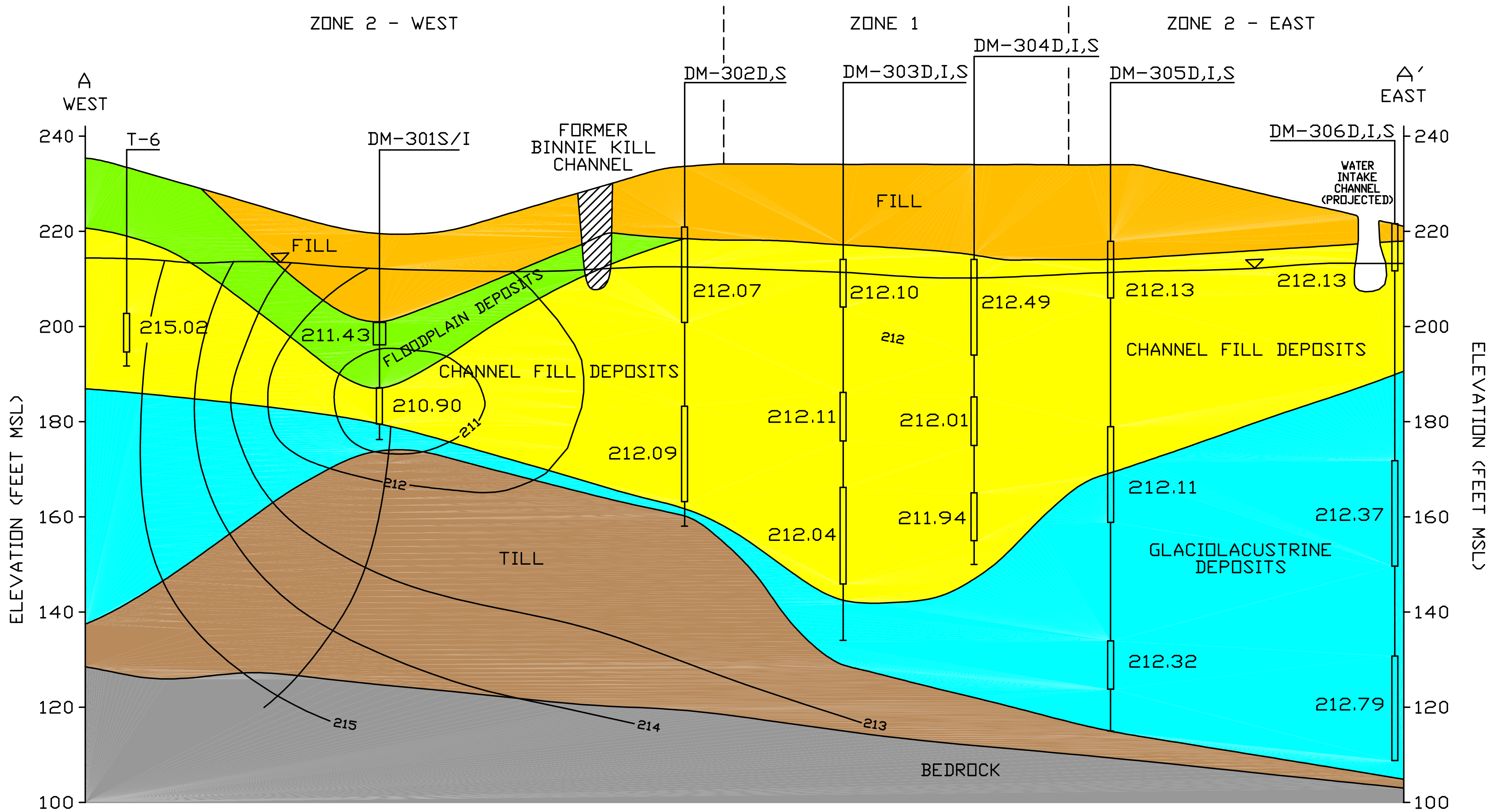
NOTES:
CONTOUR INTERVAL 1 FOOT

FIGURE 3-4

POTENTIOMETRIC SURFACE MAP
CHANNEL FILL DEPOSITS
FEBRUARY 2001

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS
646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065



LEGEND:

DM-301I — WELL DESIGNATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

214.05 — WATER ELEVATION (FEBRUARY 20, 2001)

POTENTIOMETRIC SURFACE OF CHANNEL FILL DEPOSITS (FEBRUARY 20, 2001)

—212— EQUIPOTENTIAL CONTOUR (FEET MSL) DASHED WHERE INFERRED

FILL

FLOODPLAIN, SILTS, CLAYS, FINE GRAINED SANDS, ORGANIC MATTER

CHANNEL FILL DEPOSITS MEDIUM TO COARSE GRAINED SANDS, GRAVEL

GLACIOLACUSTRINE DEPOSITS PRIMARY CLAYS AND SILTS, SILTY FINE SANDS OR LAKE CLAYS IN SOME AREAS

TILL

BEDROCK-CANAJOHARIE FORMATION-SHALE WITH SANDSTONE AND SILTSTONE INTERBEDS

NOTES:

1. REFER TO FIGURE 3-4 FOR THE ORIENTATION OF THE LINE OF SECTION.
2. REFER TO BORING LOGS IN ADC REPORT FOR DETAILED LITHOLOGIC DESCRIPTIONS.
3. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL (FEET MSL) BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29).

GRAPHIC SCALE (IN FEET)
0 350 700

VERTICAL EXAGGERATION = 17.5x

FIGURE 3-5

CONCEPTUAL HYDROGEOLOGIC CROSS-SECTION A-A'
FEBRUARY 20, 2001

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS 28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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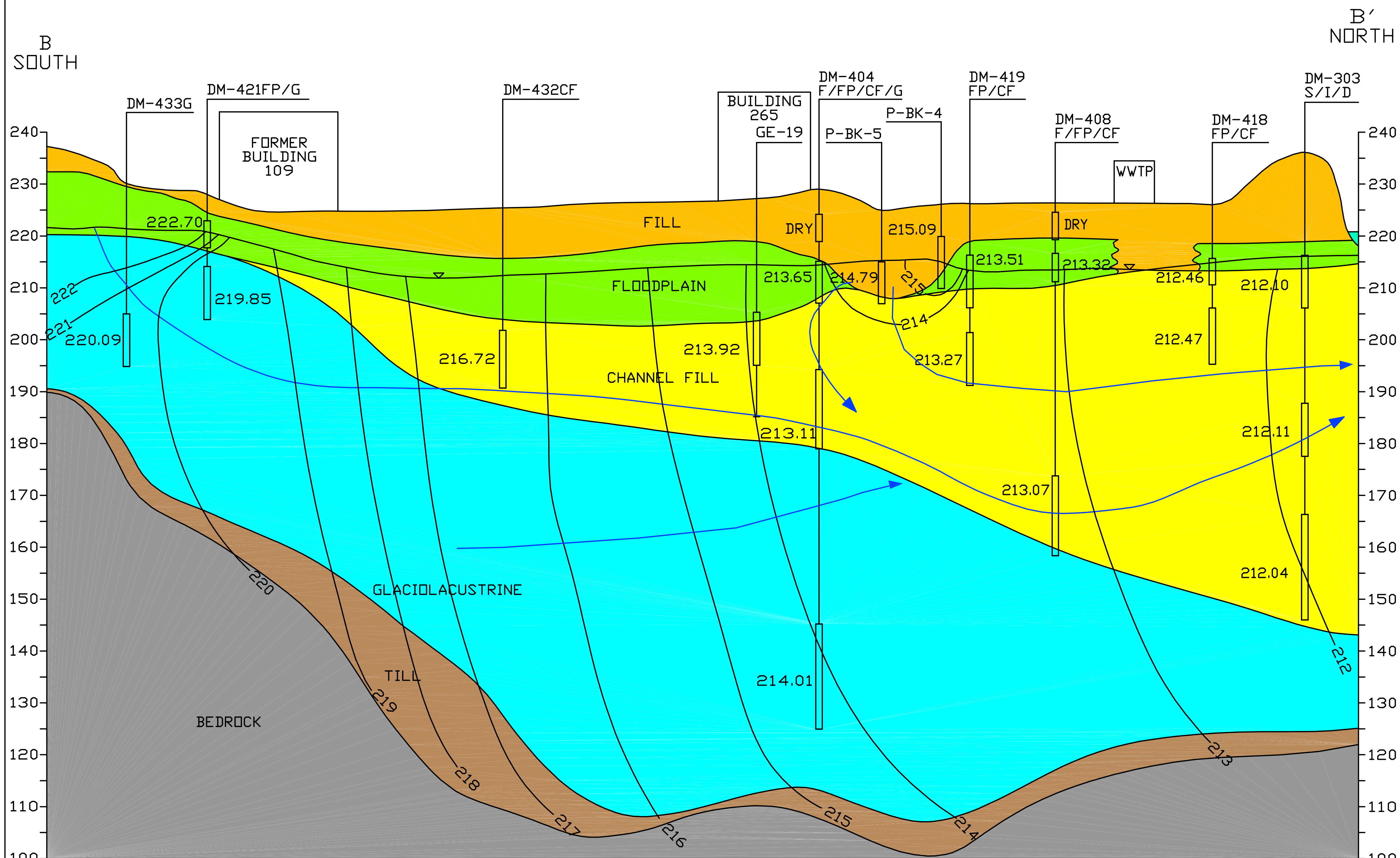

LEGEND

GE-19 WELL DESIGNATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

214.33 WATER ELEVATION (FEET MSL) (FEBRUARY 20, 2001)

INTERPRETED WATER TABLE (FEBRUARY 20, 2001)

215 EQUIPOTENTIAL CONTOUR (FEET MSL) DASHED WHERE INFERRED

FILL

FLOODPLAIN, SILTS, CLAYS, FINE GRAINED SANDS, ORGANIC MATTER

CHANNEL FILL DEPOSITS MEDIUM TO COARSE GRAINED SANDS, GRAVEL

GLACIOLACUSTRINE DEPOSITS PRIMARY CLAYS AND SILTS, SILTY FINE SANDS OR LAKE CLAYS IN SOME AREAS

TILL

BEDROCK-CANAJOHARIE FORMATION-SHALE WITH SANDSTONE AND SILTSTONE INTERBEDS

NOTES:

1. REFER TO FIGURE 3-4 FOR THE ORIENTATION OF THE LINE OF SECTION.
2. REFER TO BORING LOGS IN AOC REPORT FOR DETAILED LITHOLOGIC DESCRIPTIONS.
3. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL (FEET MSL) BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29).

GRAPHIC SCALE (IN FEET)

0 400 800

VERTICAL EXAGGERATION = 20x

FIGURE 3-6

CONCEPTUAL HYDROGEOLOGIC CROSS-SECTION B-B'
FEBRUARY 20, 2001

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS 28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

L7409F3-6

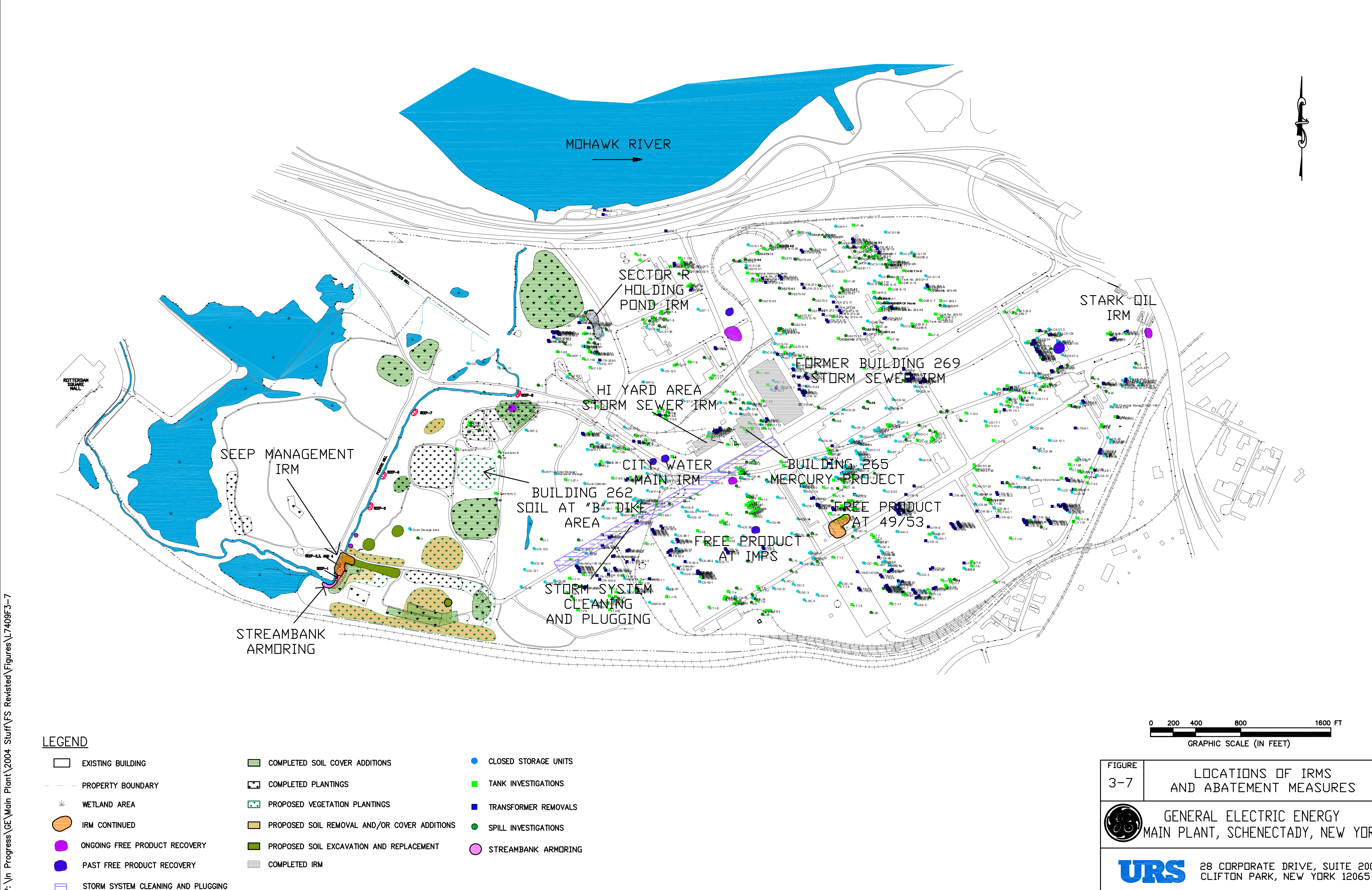

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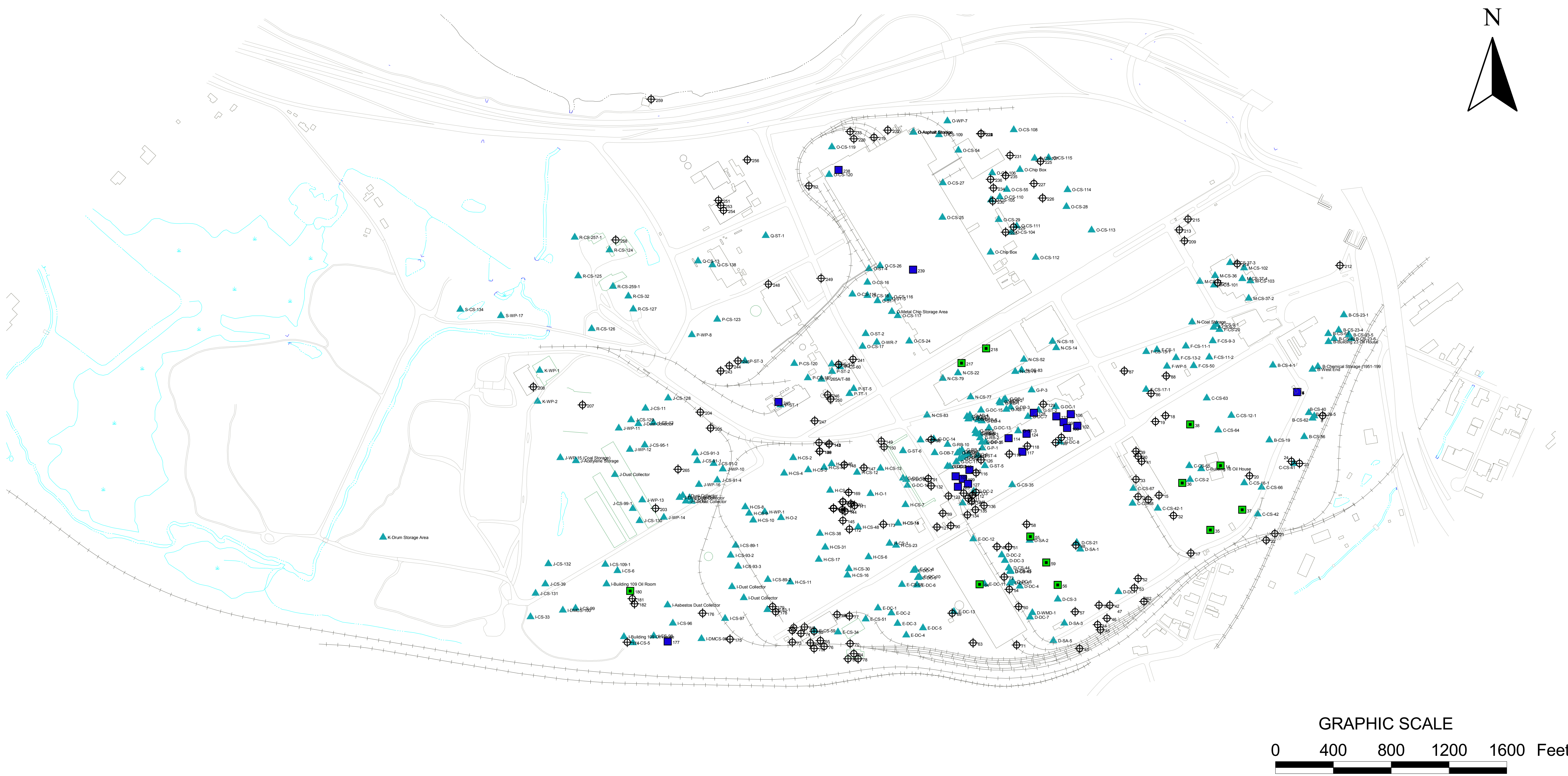
FIGURE 3-7

LOCATIONS OF IRMS AND ABATEMENT MEASURES

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

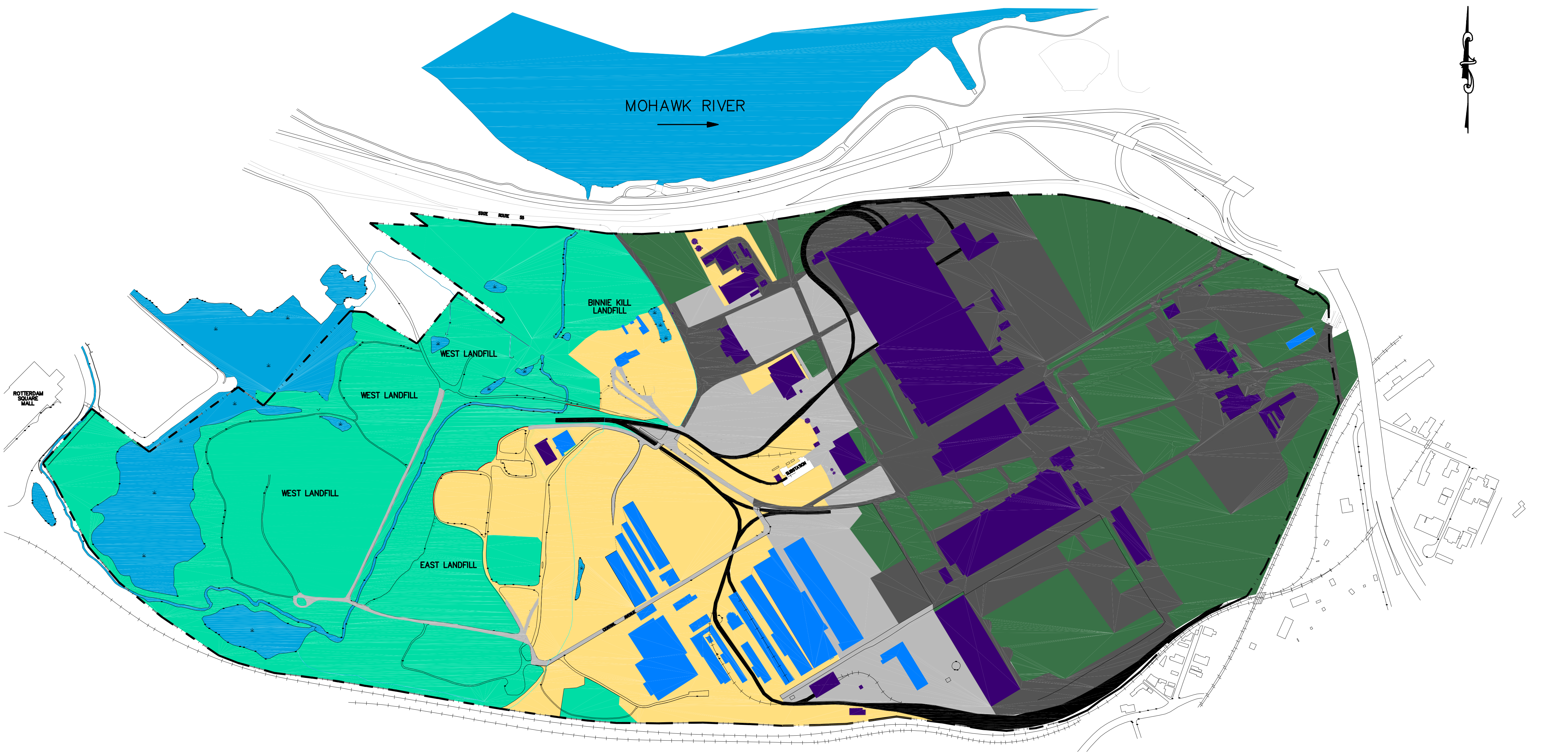
URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



LEGEND:

- INACCESSIBLE POTENTIAL UST
- POTENTIAL LOCATION OF UST WITH SPECIFIC LOCATION UNKNOWN
- REMOVED OR FILLED UST
- CLOSED STORAGE UNITS

FIGURE 3-8	CLOSED STORAGE UNITS AND REMOVED USTs
	GENERAL ELECTRIC ENERGY MAIN PLANT SCHENECTADY, NEW YORK
URS	28 CORPORATE DRIVE, SUITE 200 CLIFTON PARK, NEW YORK 12065



LEGEND

- PROPERTY BOUNDARY
- WETLAND AREA
- WATER (3.1%)
- CONCRETE SLAB (3.6%)
- EXISTING BUILDING (8.6%)
- UNREHABILITATED AREAS (13.3%)
- NEW PAVEMENT (18.2%)
- OLDER PAVEMENT OR GRAVEL (7.2%)
- RECENTLY FILLED AND LANDSCAPED (15.7%)
- EXISTING RAILROAD TRACKS (2.5%)
- WILD OR RENATURALIZED (27.8%)

0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

FIGURE 3–9

EXISTING COVER MAP

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- SEEP LOCATIONS
- PROPOSED AIR SPARGE CURTAIN
- COMPLETED SOIL COVER ADDITIONS
- COMPLETED PLANTINGS
- PROPOSED VEGETATION PLANTINGS
- PROPOSED SOIL REMOVAL AND/OR COVER ADDITIONS
- PROPOSED SOIL EXCAVATION AND REPLACEMENT

0 400 800

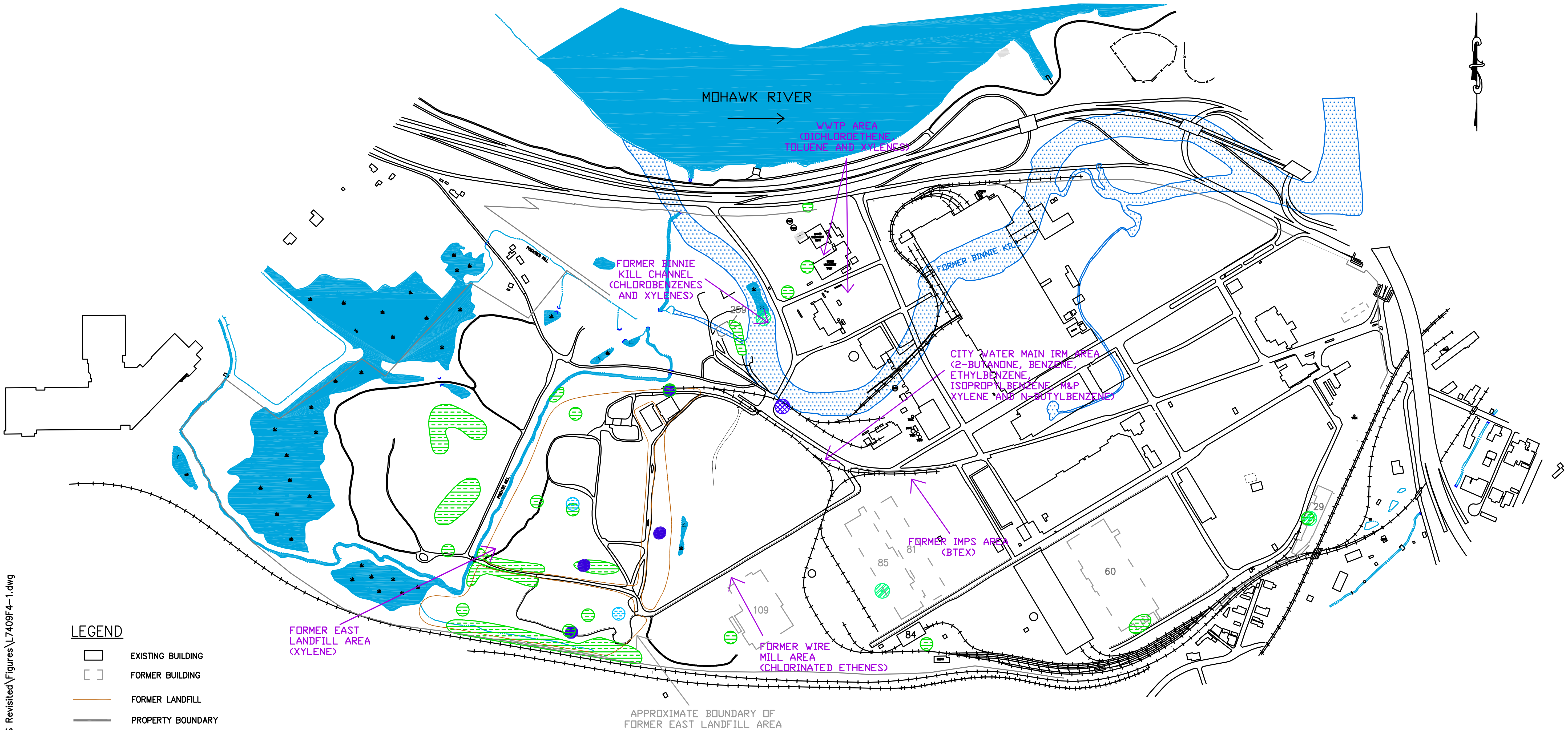
GRAPHIC SCALE (IN FEET)

NOTE

PLANTINGS SHOWN COMPLETED THROUGH JANUARY 2002

L7408F3-1D 5/27/04

FIGURE 3-10	FORMERLY PROPOSED IRM FOR EAST LANDFILL
	GENERAL ELECTRIC ENERGY MAIN PLANT, SCHENECTADY, NEW YORK
URS	28 CORPORATE DRIVE, SUITE 200 CLIFTON PARK, NEW YORK 12065



LEGEND

- EXISTING BUILDING
- FORMER BUILDING
- FORMER LANDFILL
- PROPERTY BOUNDARY
- WETLAND AREA
- AREA WHERE VOCs IN SUBSURFACE SOIL MAY BE IMPACTING GROUNDWATER
- PCB's 1–10 mg/kg IN SURFACE SOIL
- PCB's > 10 mg/kg IN SUBSURFACE SOIL
- SVOC's (PAHs) IN SURFACE SOIL MAY BE IMPACTING GROUNDWATER
- SVOC's (PAHs) IN SUBSURFACE SOIL MAY BE IMPACTING GROUNDWATER
- SVOC's (PAHs) IN SURFACE AND SUBSURFACE SOIL MAY BE IMPACTING GROUNDWATER

NOTES:
1) SEE REMEDIAL INVESTIGATION REPORT FOR SOIL SAMPLING LOCATIONS
2) LOCATIONS OF PCBs > 10 mg/kg IN SUBSURFACE SOIL IN THE FORMER LANDFILL AREAS NOT SHOWN
3) PCB SURFACE SOIL SOUTH OF FORMER BUILDING 60 WAS COVERED WITH FILL DURING SITE RENOVATIONS

0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

FIGURE 4–1

SOIL QUALITY

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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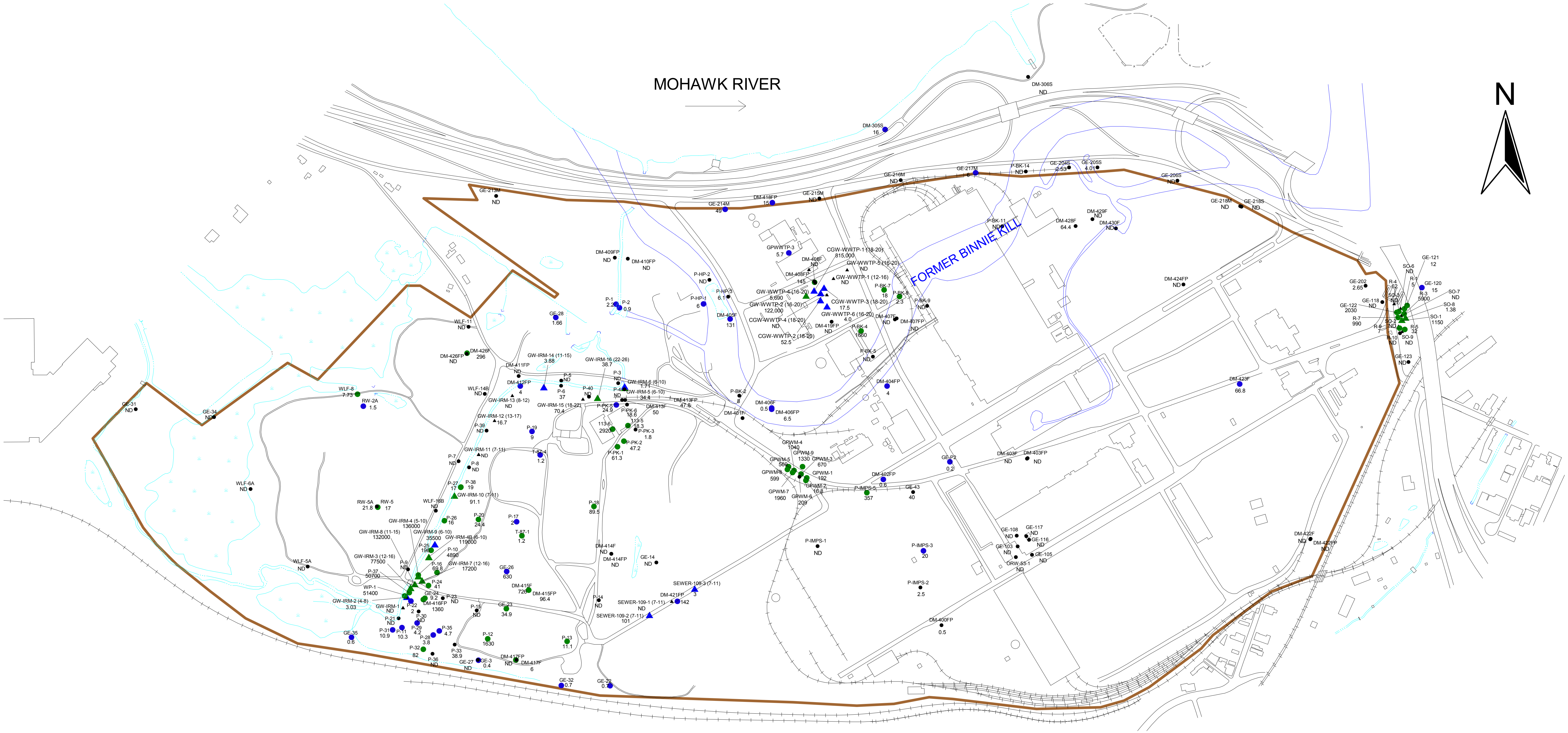


LEGEND:

WELL OR PIEZOMETER GROUNDWATER SAMPLES
- VOCs Comprised Primarily of BTEX
- VOCs Comprised Primarily of Chlorinated VOCs

GROUNDWATER SCREENING SAMPLES
- VOCs Comprised Primarily of BTEX
- VOCs Comprised Primarily of Chlorinated VOCs

Property Boundary

Former Binnie Kill

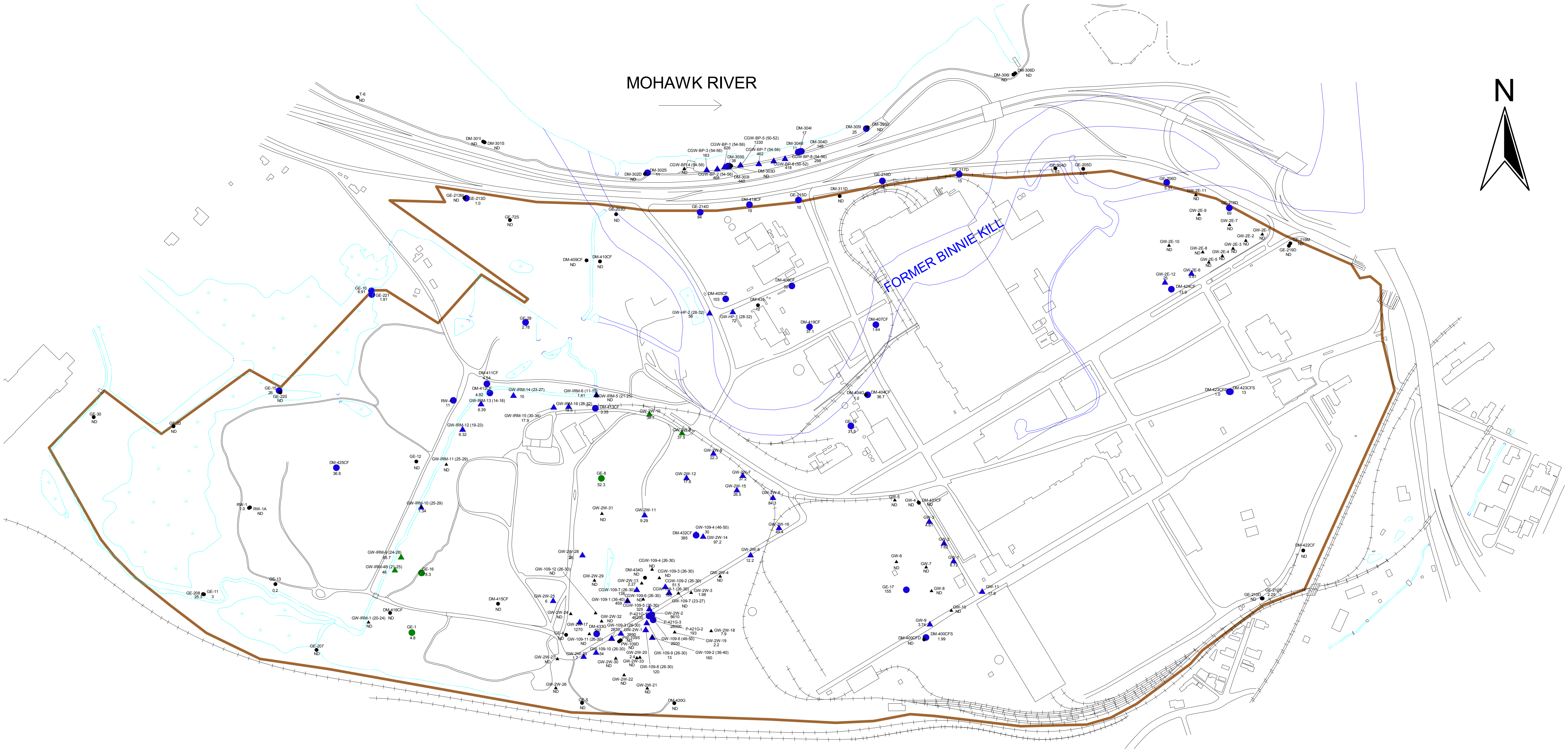
NOTES:
All units in ug/L.

GRAPHIC SCALE
0 500 1000 1500 Feet

FIGURE 4-2	FILL AND FLOODPLAIN GROUNDWATER VOLATILE ORGANIC COMPOUNDS

GENERAL ELECTRIC ENERGY
MAIN PLANT
SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



LEGEND:

WELL OR PIEZOMETER GROUNDWATER SAMPLES
- VOCs Comprised Primarily of BTEX
- VOCs Comprised Primarily of Chlorinated VOCs

GROUNDWATER SCREENING SAMPLES
- VOCs Comprised Primarily of BTEX
- VOCs Comprised Primarily of Chlorinated VOCs

Property Boundary

Former Binnie Kill

NOTES:
All units in ug/L.

GRAPHIC SCALE

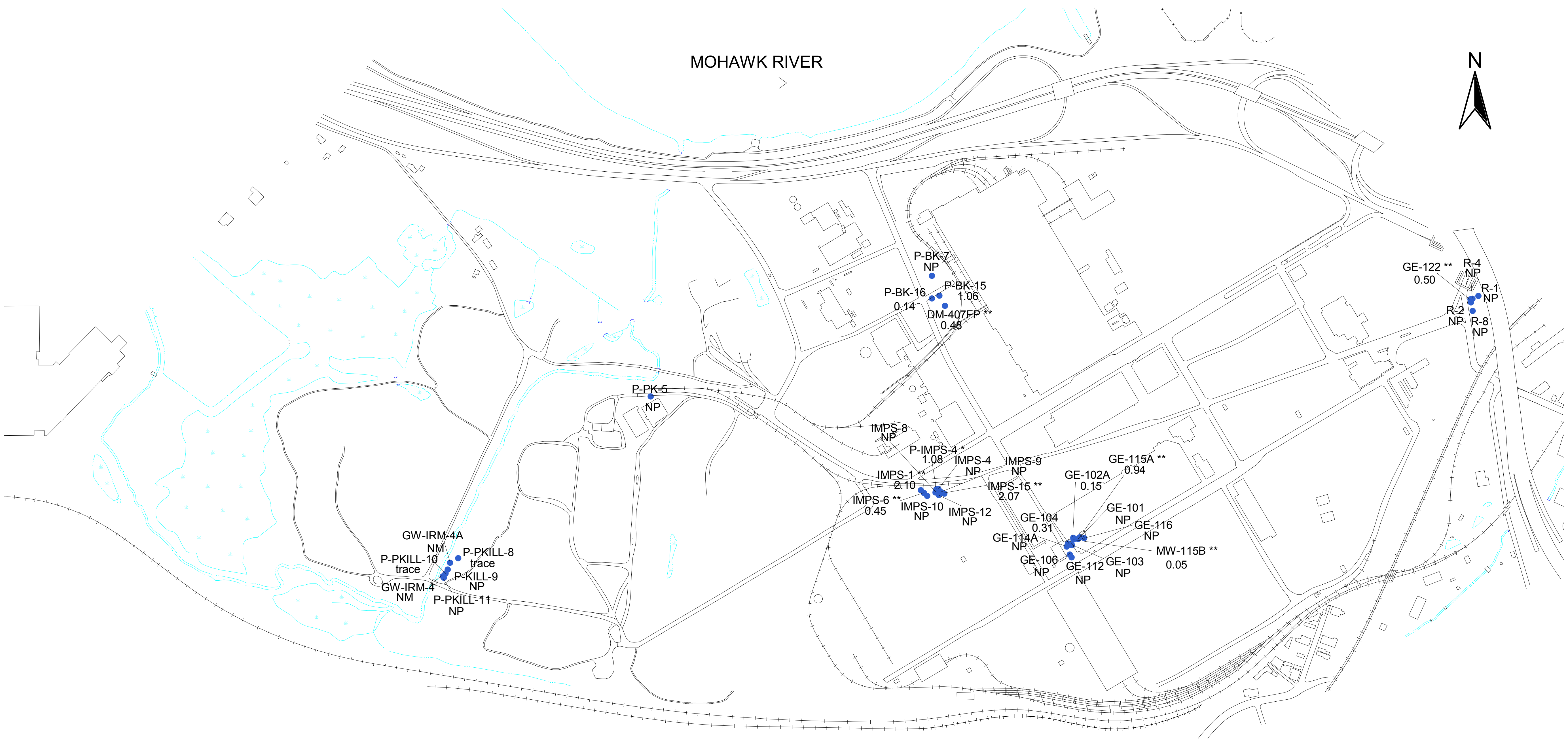
0 500 1000 1500 Feet

FIGURE 4-3	CHANNEL FILL GROUNDWATER VOLATILE ORGANIC COMPOUNDS

GENERAL ELECTRIC ENERGY
MAIN PLANT
SCHENECTADY, NEW YORK

URS

28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



LEGEND:

- LOCATIONS WHERE FREE PRODUCT HAS BEEN ENCOUNTERED
  MOST RECENT PRODUCT THICKNESS (ft) IS NOTED

NOTES:
BASED ON FREE PRODUCT OBSERVATIONS THROUGH APRIL 2003.
* : WELL ABANDONED
NP: PRODUCT NOT DETECTED OR OBSERVED DURING MOST RECENT CHECK
trace: LESS THAN 0.01 FEET OF PRODUCT DETECTED
** : WELL VACUUMED TO REMOVE PRODUCT/VAPOR
NM: PRODUCT THICKNESS NOT MEASURED

GRAPHIC SCALE

0 500 1000 1500 Feet

FIGURE 4-4

FREE-PRODUCT

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS

646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065

LEGEND:

ECOLOGICAL COMMUNITIES

- IA1-Deep Emergent Marsh
- IA2-Shallow Emergent Marsh
- IA3-Shrub Swamp
- IB1-Floodplain Forest
- IB2-Silver Maple-Ash Swamp
- IC1-Red Maple-Tamarack Peat Swamp
- ID1-Reed Grass-Purple Loosetrife Marsh
- ID2-Mine Spoil Wetland
- IIA1-Successional Old Field
- IIA2-Old Field/Shrubland
- IIA3-Open Fill/Spoil
- IIB1-Successional Shrublands
- IIB2-Successional Hardwood Forest
- IIB3-Appalachian Oak-Hickory Forest

NOTE:
SURVEY COMPLETED IN 1996

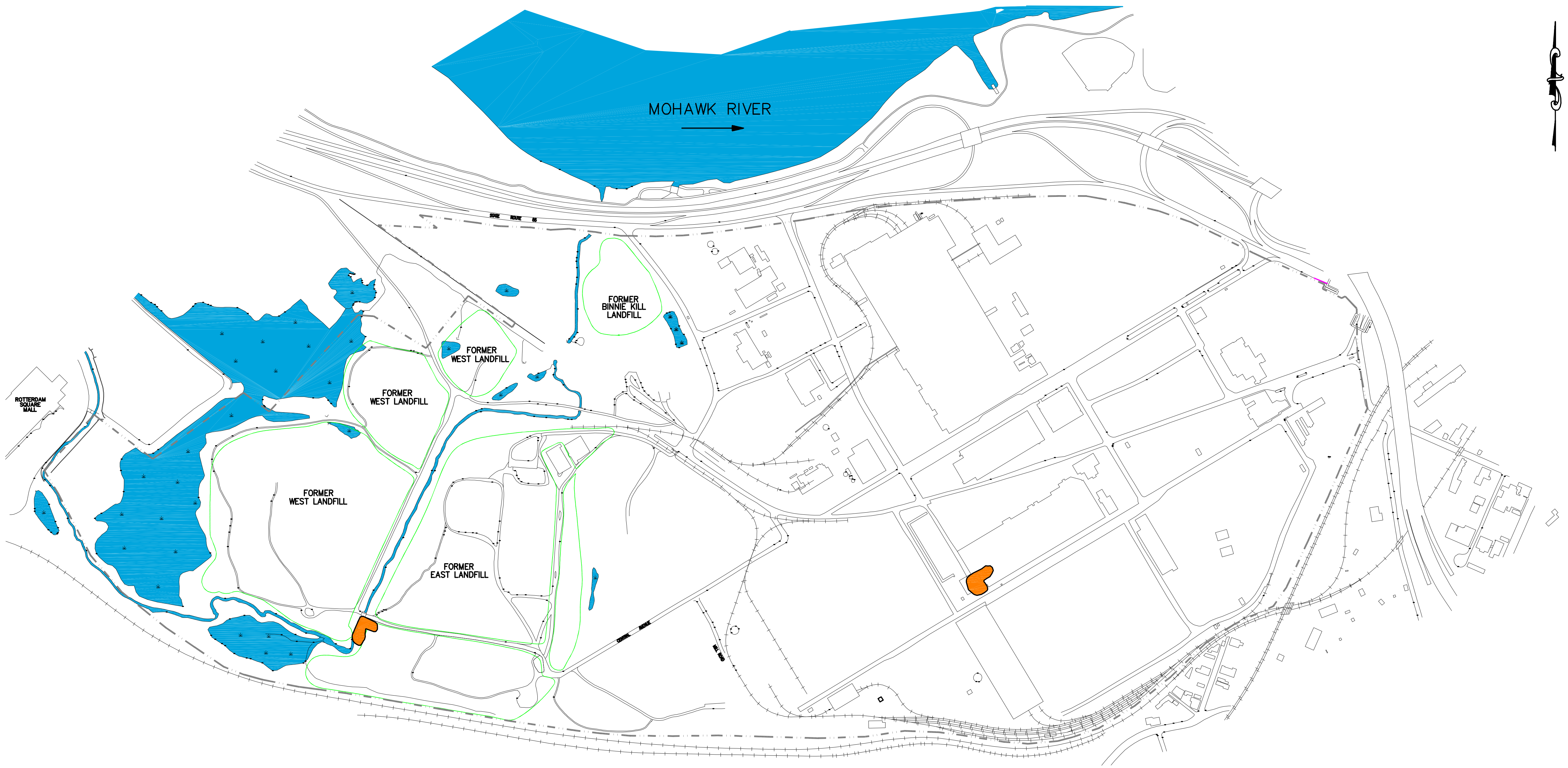
GRAPHIC SCALE
0 400 800 Feet

FIGURE 4-5

SITE HABITATS

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS
646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065



0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- WETLAND AREA
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- IRM CONTINUED

NOTE:
1–REFER TO FIGURE 3–7 FOR COMPLETED IRMS AND ABATEMENT MEASURES

FIGURE 7–1

ALTERNATIVE 1 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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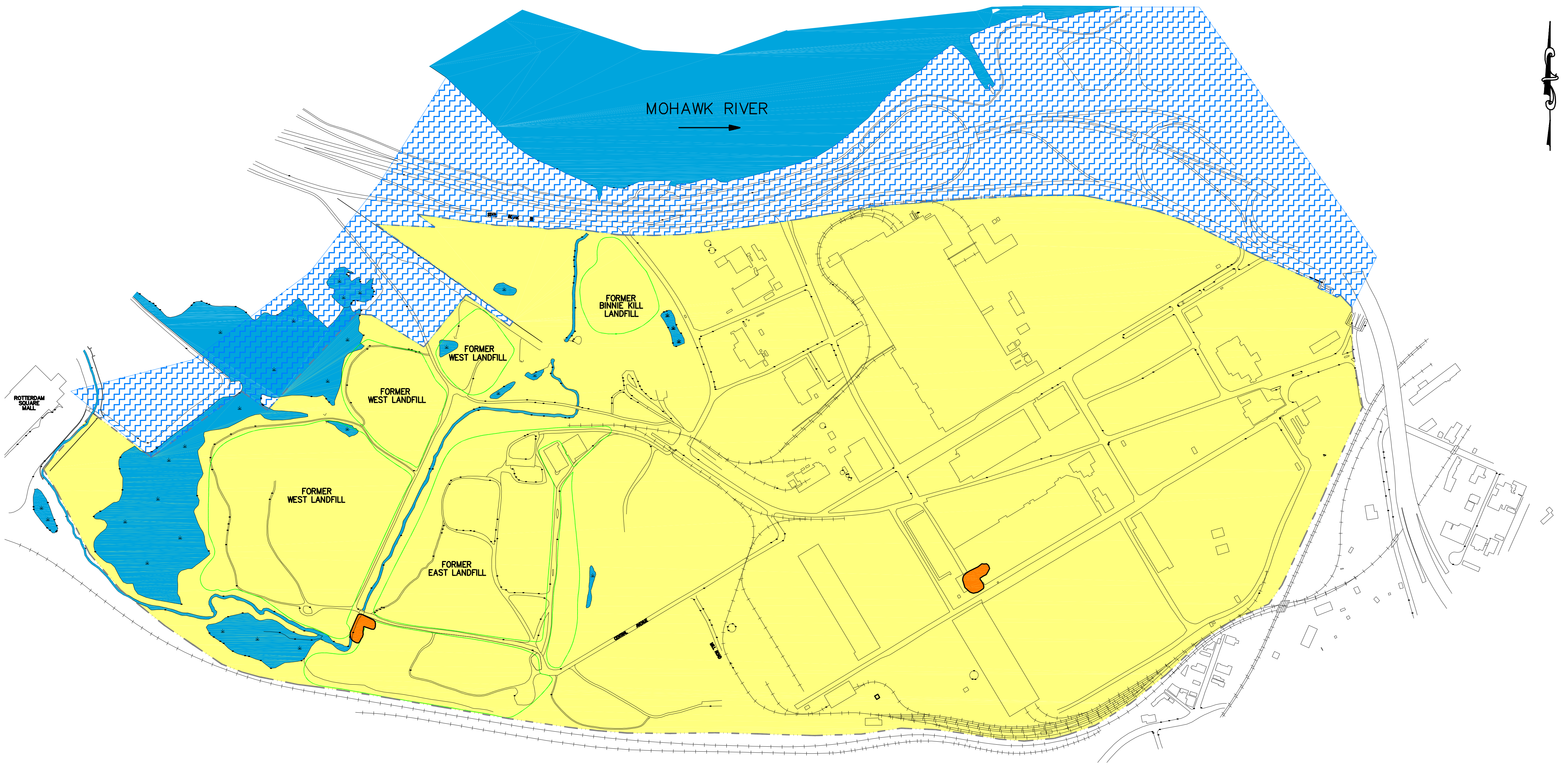

0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- WETLAND AREA
- INSTITUTIONAL CONTROLS AND LAND USE RESTRICTIONS
- LAND USE RESTRICTIONS
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- IRM CONTINUED

NOTE:
1–REFER TO FIGURE 3–7 FOR COMPLETED IRMS AND ABATEMENT MEASURES

FIGURE 7–2

ALTERNATIVE 2 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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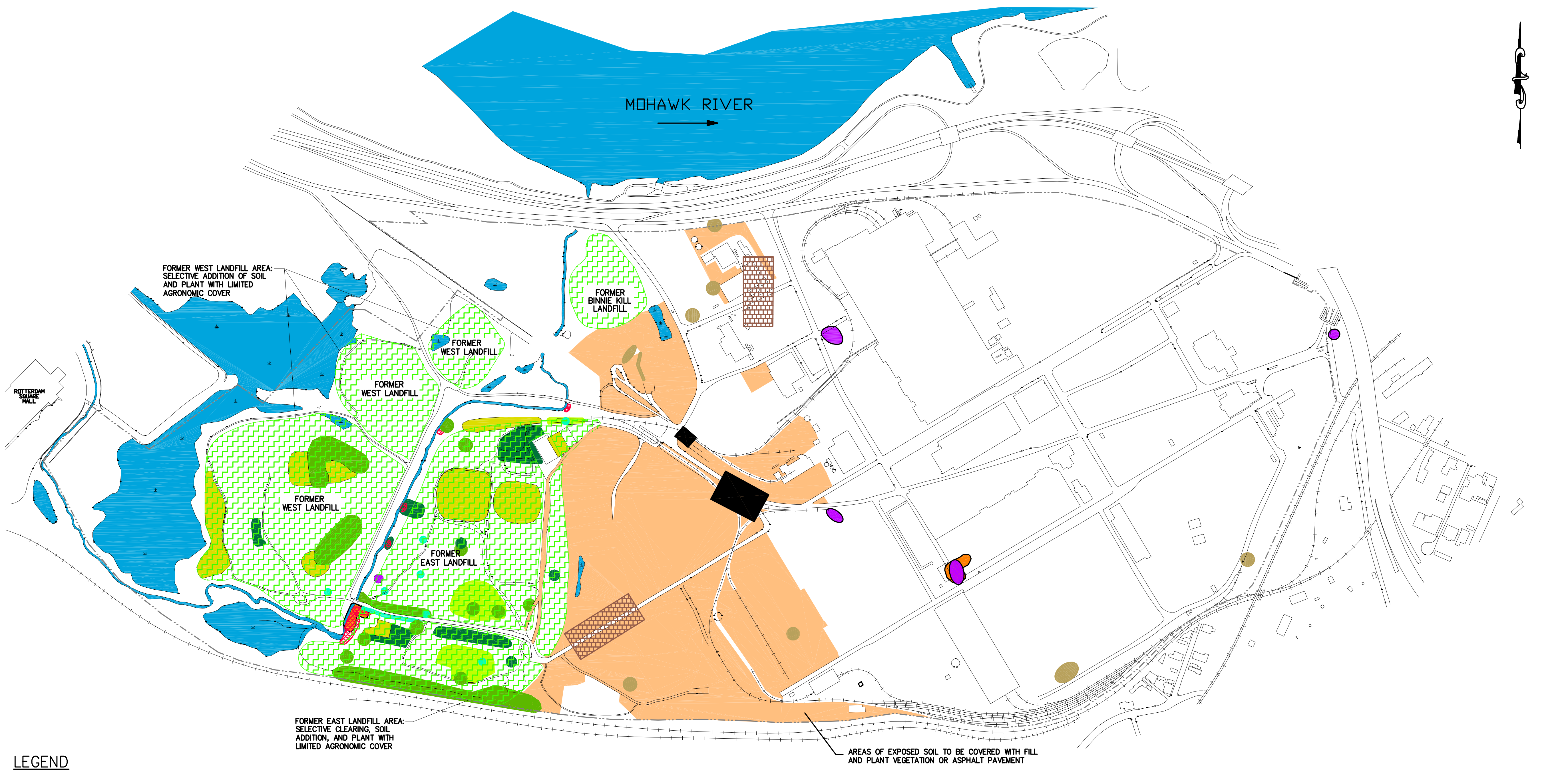

LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- WETLAND AREA
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- AGRONOMIC COVER
- SEEP LOCATIONS
- VEGETATION PLANTINGS
- VEGETATION PLANTINGS AND REMOVAL OF EXPOSED WASTES
- AREAS OF THIN COVER OR POOR ORGANIC MATTER TO RECIEVE SUPPLEMENTAL COVER AND PLANTINGS
- AREAS OF EXPOSED SOIL TO BE COVERED WITH FILL OR ASPHALT PAVEMENT
- AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE COVERED WITH SOIL AND PLANTED
- AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE EXCAVATED, DISPOSED OFF-SITE, AND RESTORED
- AREA WITH PCB's > 10 mg/kg IN SURFACE SOIL TO BE EXCAVATED, DISPOSED OFF-SITE, AND REPLACED WITH SOIL AND PLANTED
- ASPHALT CAP
- ENHANCED ANAEROBIC BIOREMEDIATION
- IRM CONTINUED
- FREE PRODUCT RECOVERY SOP: PRODUCT THICKNESS > 0.1 FEET OR > 0.02 FEET AND WITHIN 50 FEET FROM A SURFACE WATER BODY

NOTES:
1–REFER TO FIGURE 7–2 FOR USE RESTRICTIONS.
2–REFER TO FIGURE 3–7 FOR COMPLETED IRMS AND ABATEMENT MEASURES.
3–EXCAVATION AREAS ARE NOT SHOWN TO SCALE.

FIGURE 7–3

ALTERNATIVE 3 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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FIGURE	
7-4	CONCEPTUAL CROSS-SECTION OF AGRONOMIC COVER

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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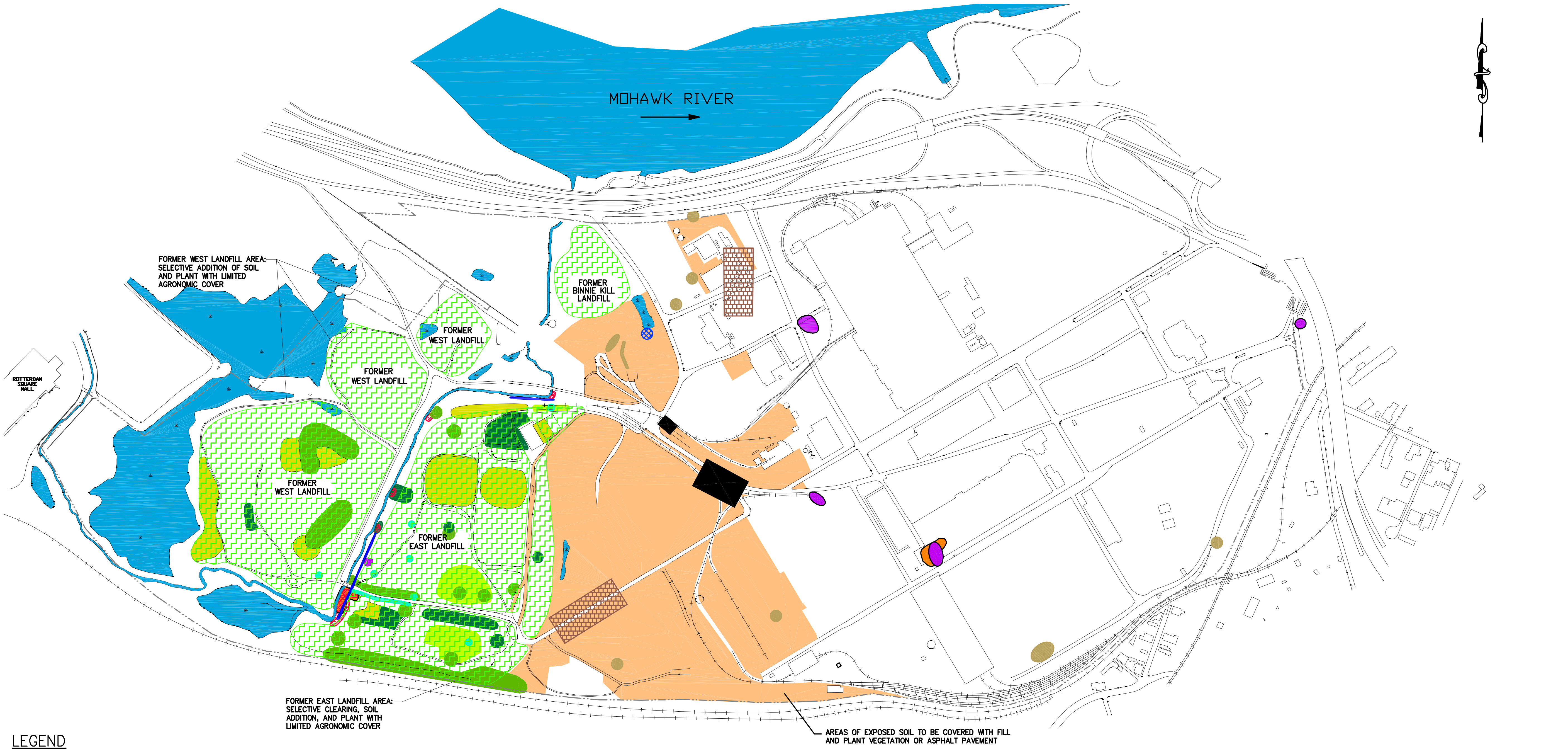

LEGEND

EXISTING BUILDING

PROPERTY BOUNDARY

WETLAND AREA

EXTENT OF FORMER LANDFILL (APPROXIMATE)

AGRONOMIC COVER

SEEP LOCATIONS

VEGETATION PLANTINGS

VEGETATION PLANTINGS AND REMOVAL OF EXPOSED WASTES

AREAS OF THIN COVER OR POOR ORGANIC MATTER TO RECIEVE SUPPLEMENTAL COVER AND PLANTINGS

AREAS OF EXPOSED SOIL TO BE COVERED WITH FILL OR ASPHALT PAVEMENT

AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE EXCAVATED, DISPOSED OFF–SITE, AND RESTORED

AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE COVERED WITH SOIL AND PLANTED – SEE LANDFILL MAP

AREA WITH PCB's > 10 mg/kg IN SURFACE SOIL TO BE EXCAVATED, DISPOSED OFF–SITE, AND REPLACED WITH SOIL AND PLANTED

AIR SPARGE CURTAINS

ASPHALT CAP

ENHANCED AEROBIC BIOREMEMDIATION

IRM CONTINUED

FREE PRODUCT RECOVERY SOP: PRODUCT THICKNESS > 0.1 FEET OR > 0.02 FEET AND WITHIN 50 FEET FROM A SURFACE WATER BODY

ENHANCED ANAEROBIC BIOREMEDIATION

NOTES:
1–REFER TO FIGURE 7–2 IN FEASIBILITY STUDY REPORTFOR USE RESTRICTIONS.
2–COMPLETED IRMS AND ABATEMENT MEASURES NOT SHOWN. REFER TO FIGURE 3–7 IN FEASBILITY STUDY REPORT.
3–EXCAVATION AREAS ARE NOT SHOWN TO SCALE.

FIGURE 7–5

ALTERNATIVE 4 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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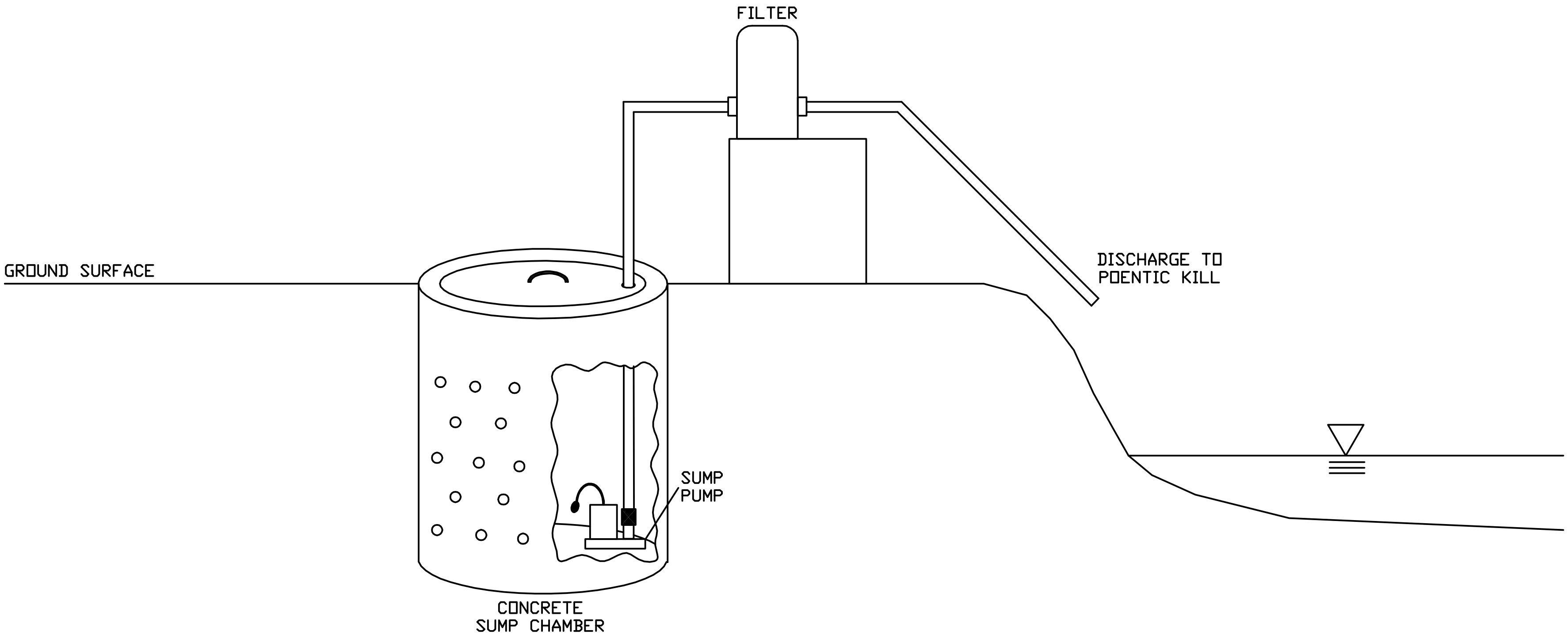
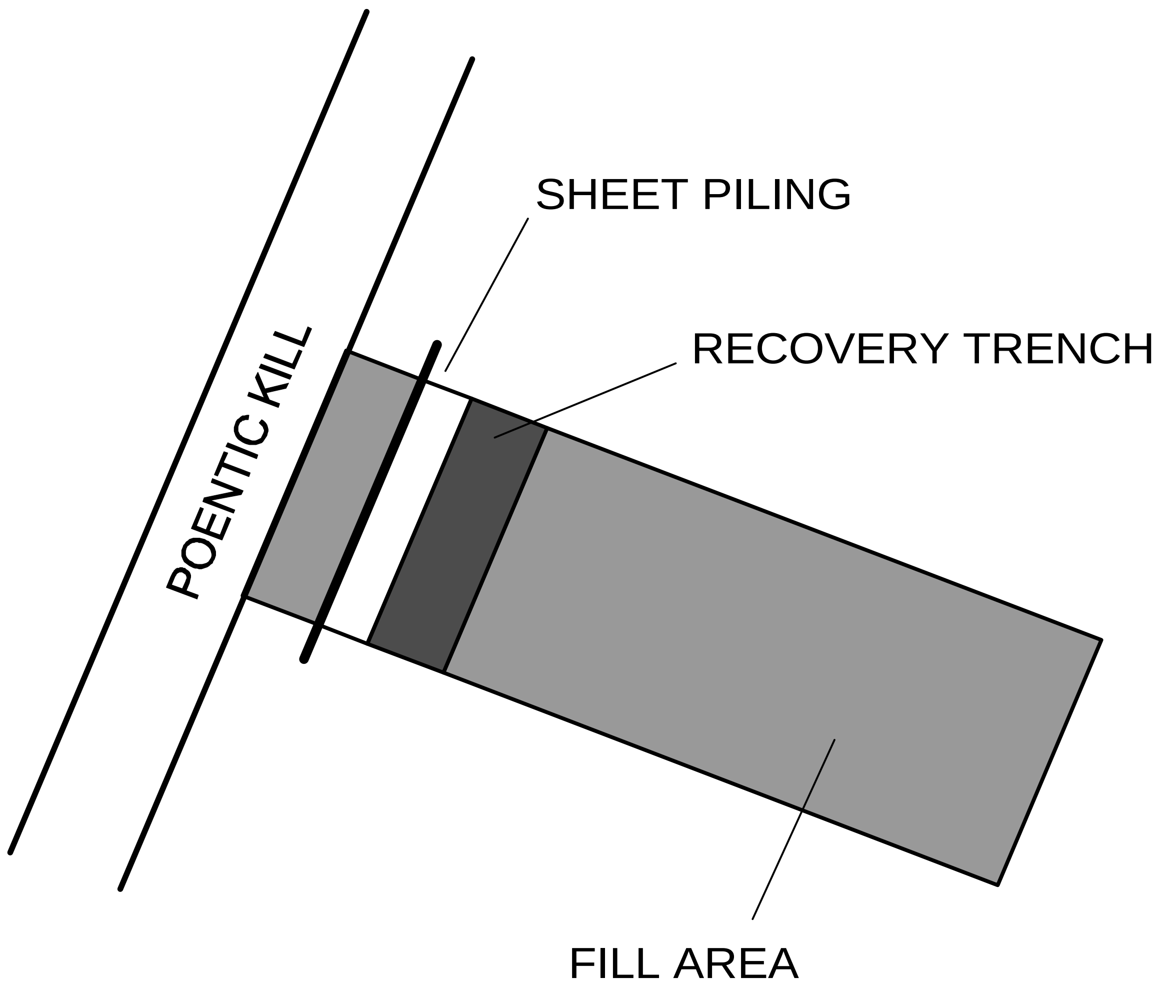


FIGURE 7-6

CONCEPTUAL MECHANICAL
SEEP FILTRATION SYSTEM

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



NOTE:
WATER COLLECTED FROM RECOVERY
TRENCH WILL PASS THROUGH 1-MICRON
FILTER AND GAC PRIOR TO DISCHARGE.

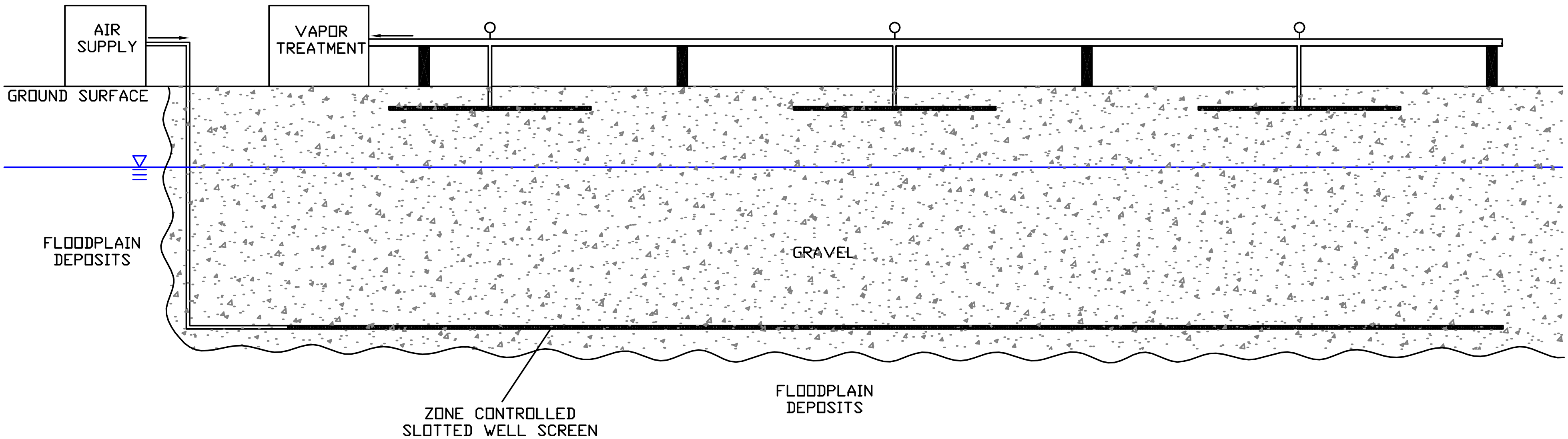
FIGURE 7-7

CONCEPTUAL COLLECTION
SYSTEM FOR SEEP 6

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS

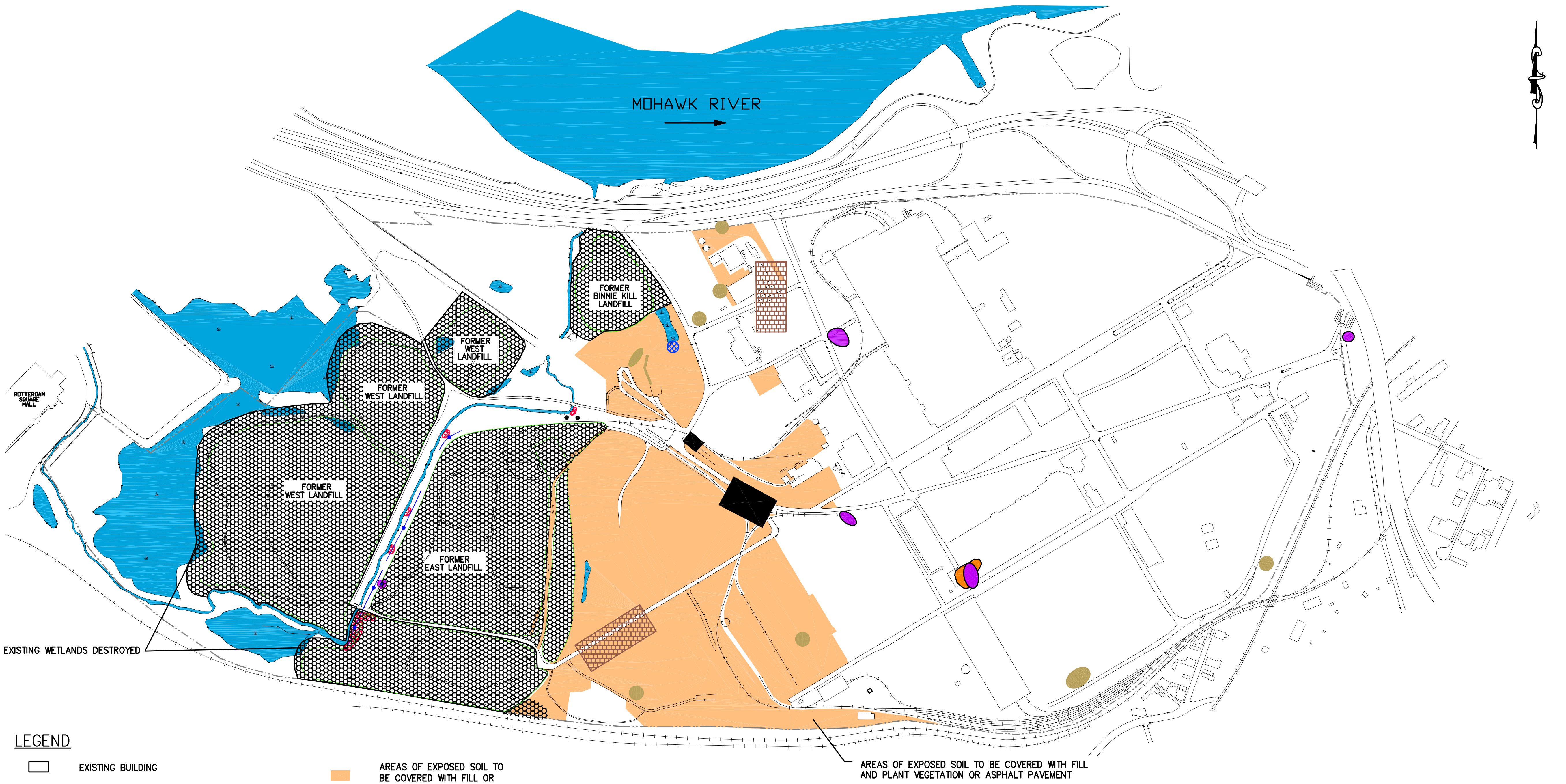
646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065



NOT TO SCALE

FIGURE 7-8	CONCEPTUAL HORIZONTAL SPARGE CURTAIN
	GENERAL ELECTRIC ENERGY MAIN PLANT, SCHENECTADY, NEW YORK
URS	28 CORPORATE DRIVE, SUITE 200 CLIFTON PARK, NEW YORK 12065

NOTES:
PORTION OF CONCEPTUAL CURTAIN FOR WESTERN BOUNDARY OF FORMER EAST LANDFILL SHOWN.
MODIFIED FROM PRELIMINARY DESIGN BY PARSONS ENGINEERING.



LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- WETLAND AREA
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- SEEP LOCATIONS
- GROUNDWATER COLLECTION TRENCH
- GROUNDWATER RECOVERY WELLS
- IRM CONTINUED
- FREE PRODUCT RECOVERY SOP: PRODUCT THICKNESS > 0.1 FEET OR > 0.02 FEET AND WITHIN 50 FEET FROM A SURFACE WATER BODY
- AREAS OF EXPOSED SOIL TO BE COVERED WITH FILL OR ASPHALT PAVEMENT
- AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE EXCAVATED, DISPOSED OFF-SITE, AND RESTORED
- ASPHALT CAP
- MAN-MADE CAP
- ENHANCED ANAEROBIC BIOREMEDIATION
- ENHANCED AEROBIC BIOREMEMDIATION

NOTES:
1–REFER TO FIGURE 7-2 FOR USE RESTRICTIONS.
2–REFER TO FIGURE 7-10 FOR CAP DETAILS.
3–REFER TO FIGURE 3-7 FOR COMPLETED IRMS AND ABATEMENT MEASURES.

FIGURE 7–9

ALTERNATIVE 5 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

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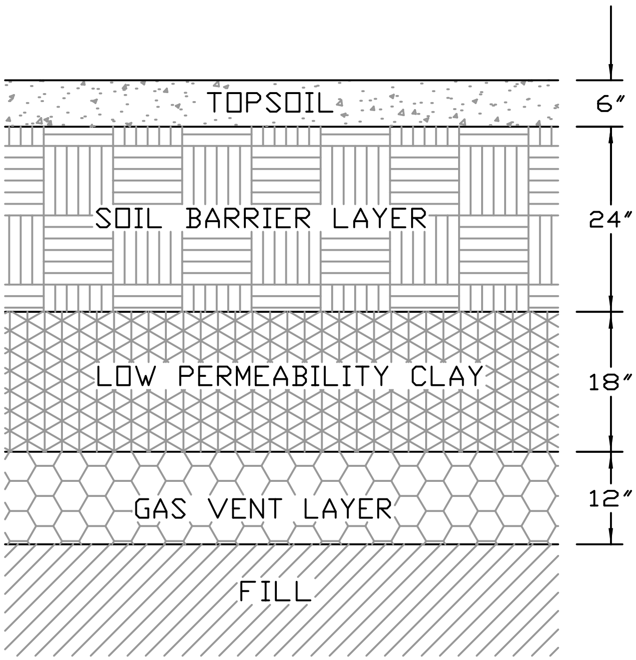
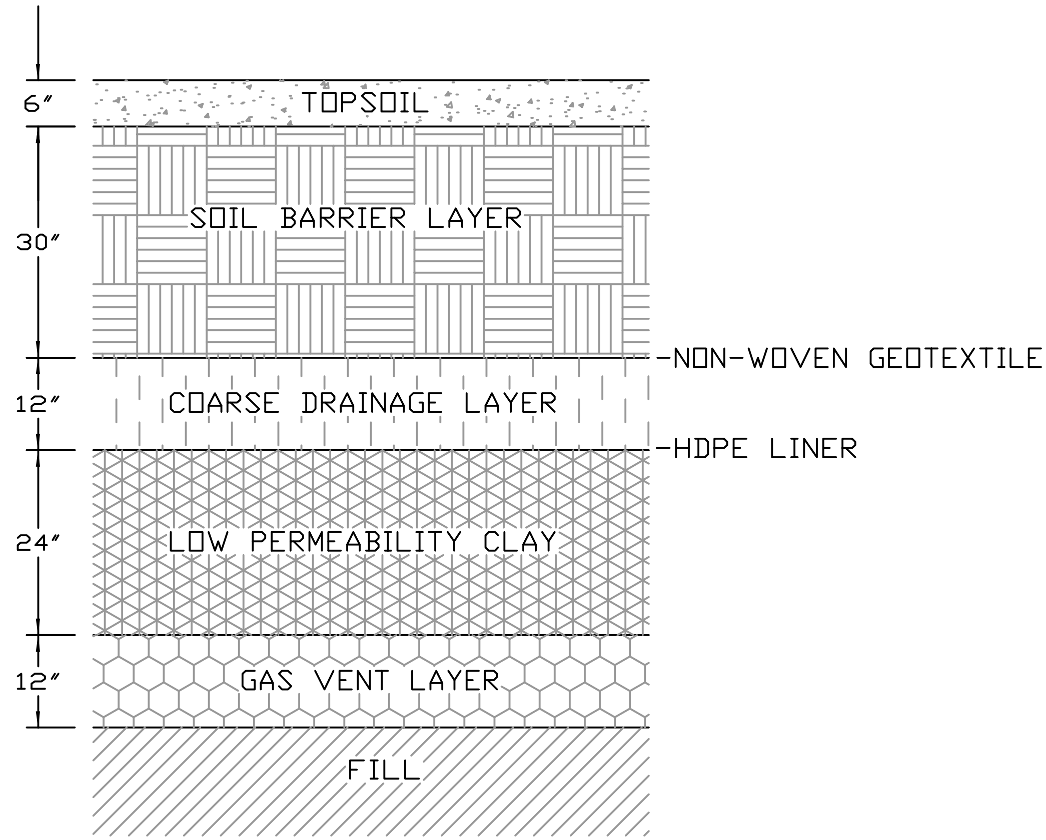


6 NYCRR PART 360 CAP
(FORMER WEST LANDFILL AREA AND
FORMER BINNIE KILL CONSTRUCTION
AND DEMOLITION LANDFILL AREA)



RCRA CAP
(FORMER EAST LANDFILL AREA)

FIGURE	
7-10	SCHEMATICS OF CAP CONSTRUCTION
	GENERAL ELECTRIC ENERGY MAIN PLANT, SCHENECTADY, NEW YORK
URS	28 CORPORATE DRIVE, SUITE 200 CLIFTON PARK, NEW YORK 12065

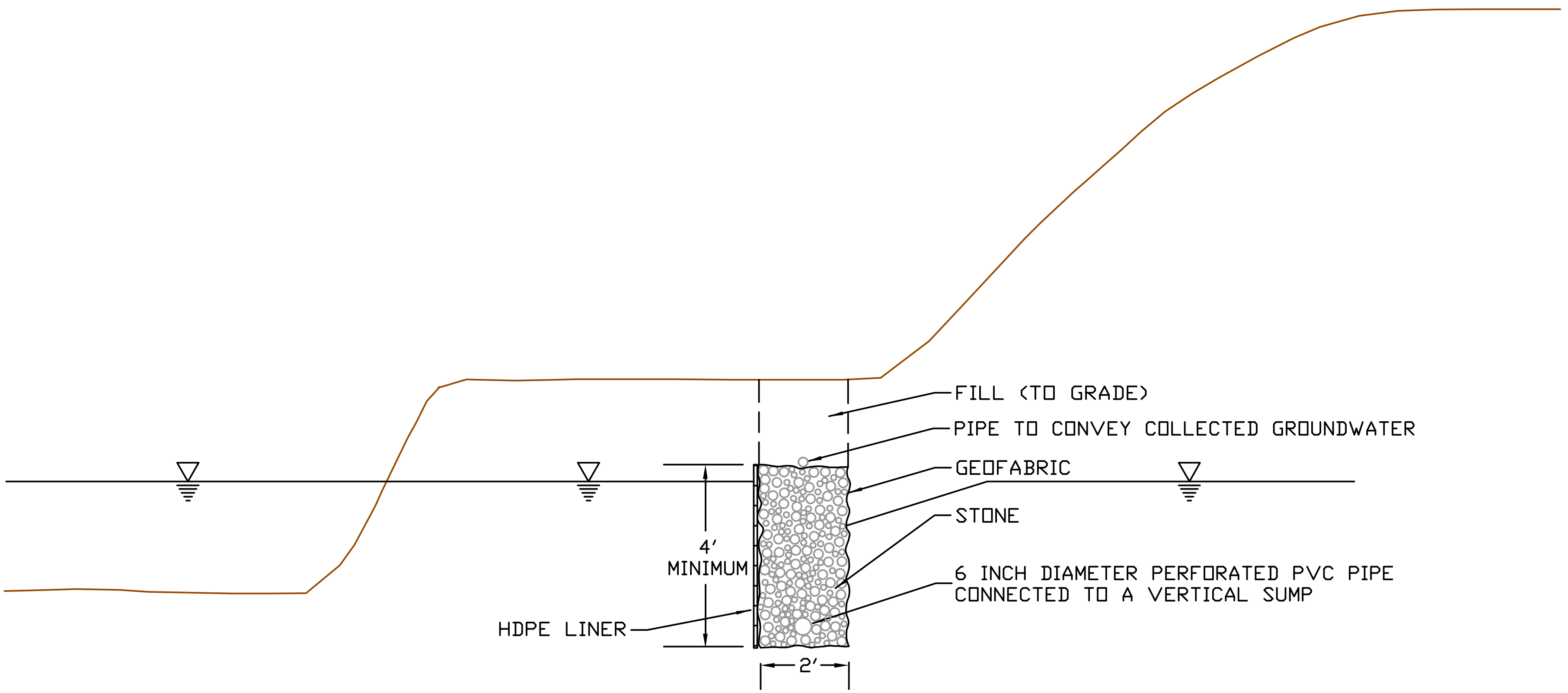


FIGURE 7-11

CONCEPTUAL RECOVERY TRENCH

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS

28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

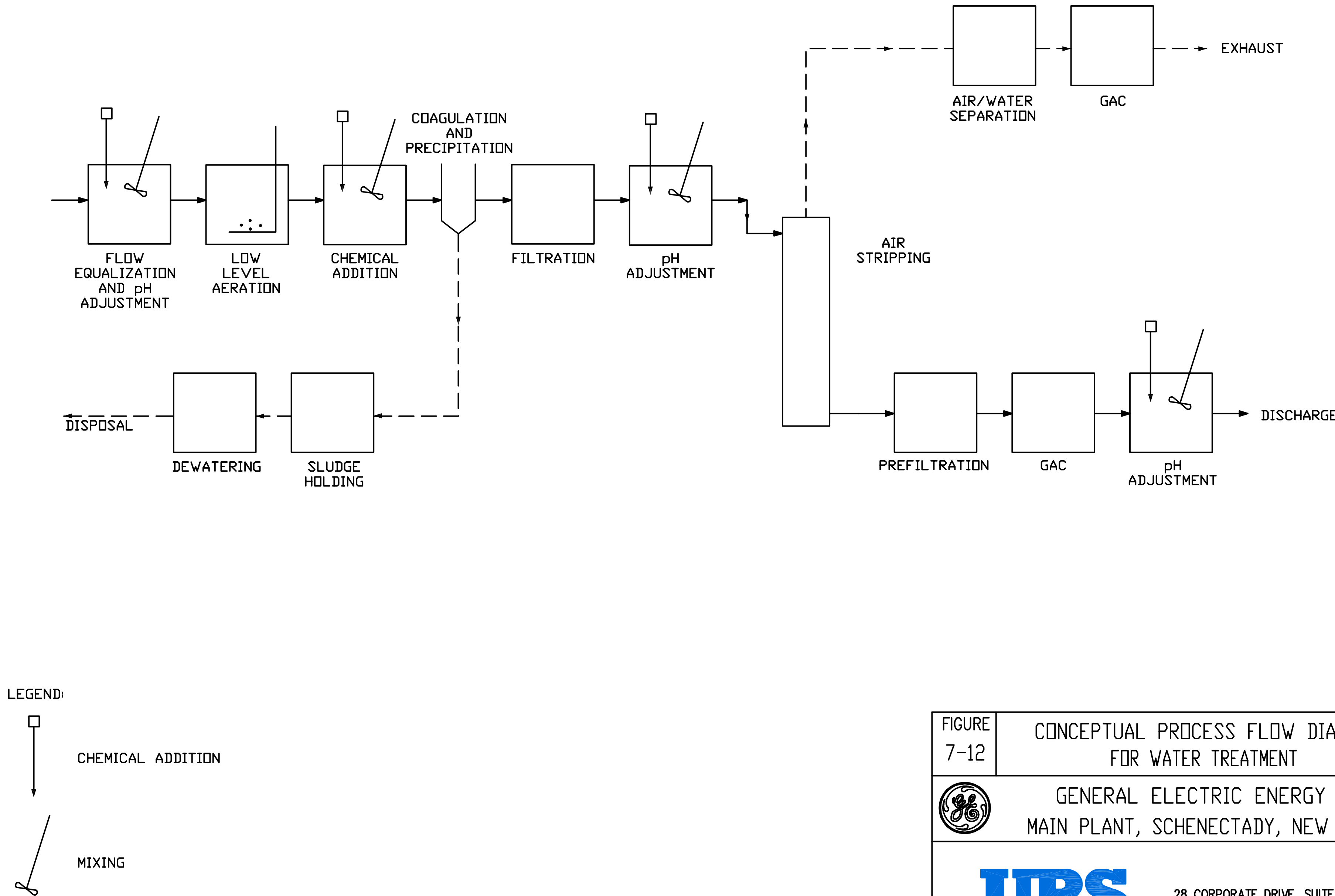
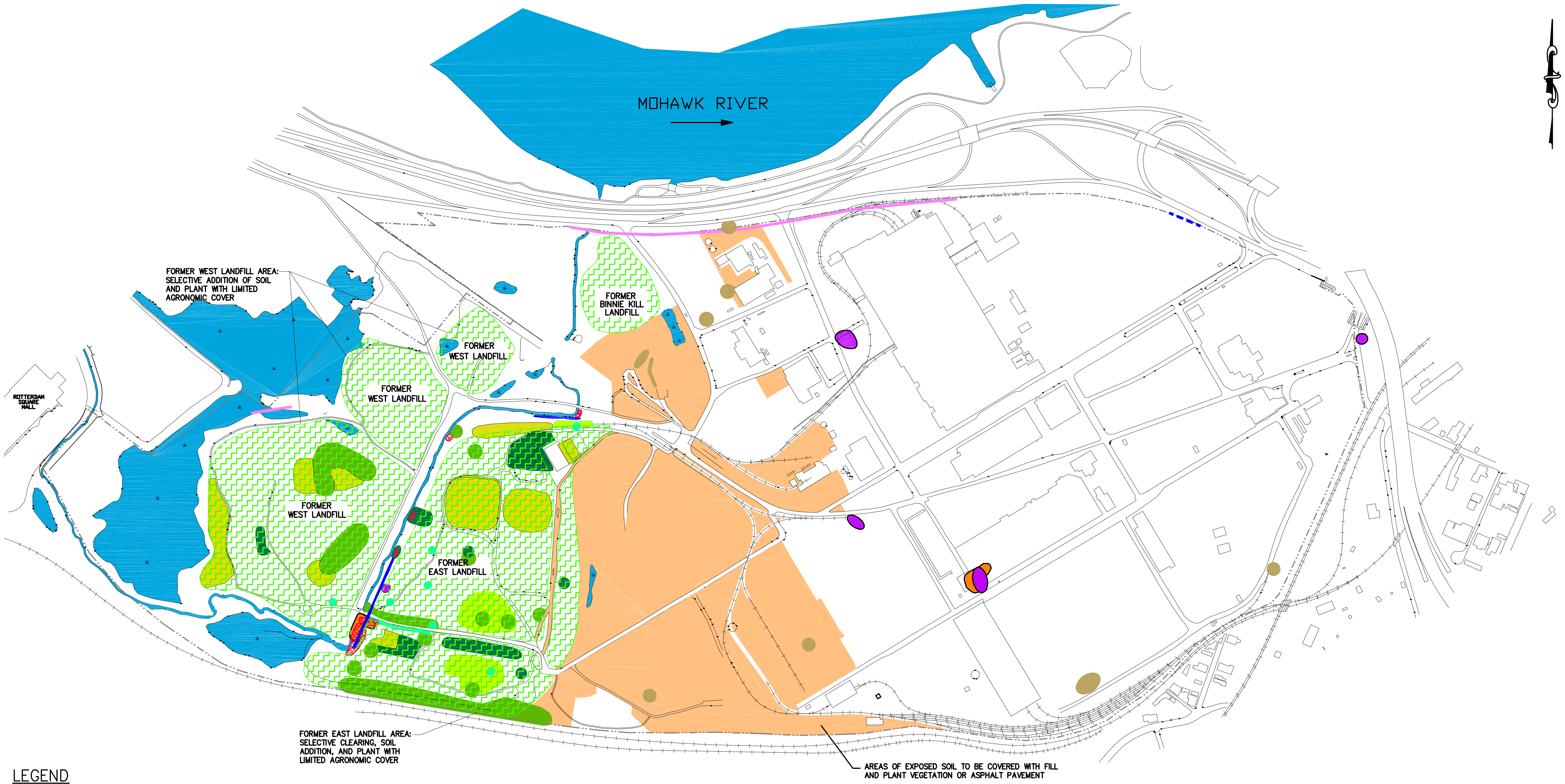


FIGURE 7-12

CONCEPTUAL PROCESS FLOW DIAGRAM FOR WATER TREATMENT

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065



LEGEND

- EXISTING BUILDING
- PROPERTY BOUNDARY
- WETLAND AREA
- EXTENT OF FORMER LANDFILL (APPROXIMATE)
- AGRONOMIC COVER
- SEEP LOCATIONS
- VEGETATION PLANTINGS
- VEGETATION PLANTINGS AND REMOVAL OF EXPOSED WASTES
- AREAS OF THIN COVER OR POOR ORGANIC MATTER TO RECIEVE SUPPLEMENTAL COVER AND PLANTINGS
- AREAS OF EXPOSED SOIL TO BE COVERED WITH FILL OR ASPHALT PAVEMENT
- AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE COVERED WITH SOIL AND PLANTED
- AREA WITH PCB's 1 – 10 mg/kg IN SURFACE SOIL AND PCB's > 10 mg/kg IN SUBSURFACE SOIL TO BE EXCAVATED, DISPOSED OFF-SITE, AND RESTORED
- AREA WITH PCB's > 10 mg/kg IN SURFACE SOIL TO BE EXCAVATED, DISPOSED OFF-SITE, AND REPLACED WITH SOIL AND PLANTED
- AIR SPARGE CURTAINS
- IRM CONTINUED
- FREE PRODUCT RECOVERY SOP: PRODUCT THICKNESS > 0.1 FEET OR > 0.02 FEET AND WITHIN 50 FEET FROM A SURFACE WATER BODY
- AIR SPARGE WELLS
- GROUNDWATER STRIPPING WELLS

NOTES:
1–REFER TO FIGURE 7–2 FOR USE RESTRICTIONS.
2–REFER TO FIGURE 3–7 FOR COMPLETED IRMS AND ABATEMENT MEASURES.
3–EXCAVATION AREAS ARE NOT SHOWN TO SCALE.

0 200 400 800 1600 FT
GRAPHIC SCALE (IN FEET)

FIGURE 7–13

ALTERNATIVE 6 PLAN VIEW

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS
28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

P:\In Progress\GE\Main Plant\2004 Stuff\FS Revisted\Figures\L7409F7-13

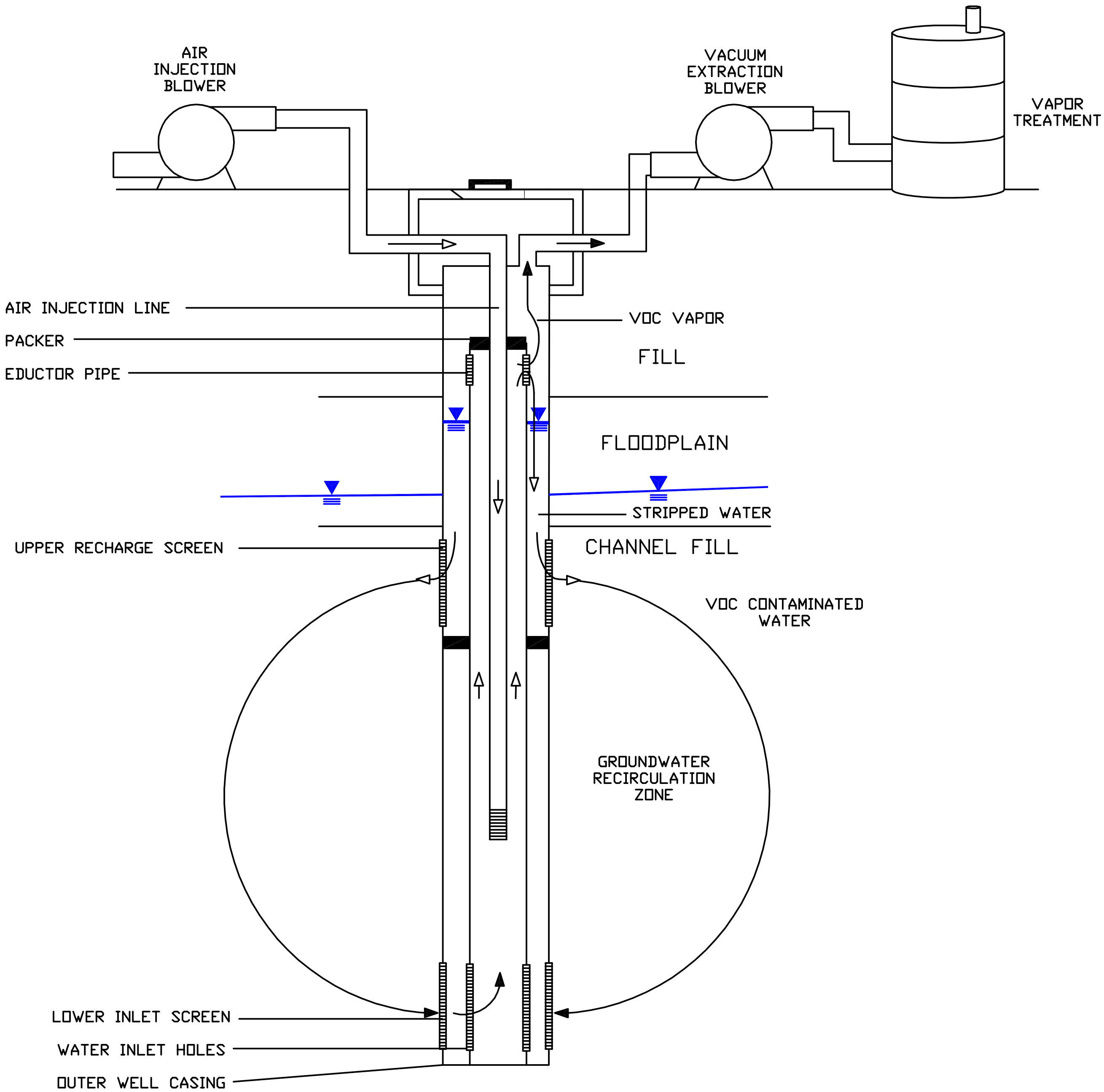


FIGURE 7-14

SCHEMATIC OF GROUNDWATER STRIPPING WELLS

GENERAL ELECTRIC ENERGY
MAIN PLANT, SCHENECTADY, NEW YORK

URS

28 CORPORATE DRIVE, SUITE 200
CLIFTON PARK, NEW YORK 12065

APPENDIX A

EVALUATION OF INDOOR AIR

APPENDIX A
EVALUATION OF INDOOR AIR
REVISED FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

URS used the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil* (*Subsurface Vapor Intrusion Guidance)*, which is a screening tool recently issued by the USEPA, to evaluate whether indoor air at the site poses a significant risk to human health.

The approach used in the *Subsurface Vapor Intrusion Guidance* was developed for use at RCRA Corrective Action, CERCLA, and Brownfield sites. The *Subsurface Vapor Intrusion Guidance* evaluates the vapor intrusion pathway by beginning with simple conservative screening approaches and gradually progresses towards a more complex assessment using site-specific data.

The first step of the screening process is to evaluate whether the potential for vapor intrusion exists at a site. This involves assessing whether: (1) chemicals of sufficient volatility and toxicity are present; and (2) occupied buildings (or buildings that will be occupied in the future) are above or nearby subsurface contamination. Conditions at the Main Plant meet both of these criteria. Therefore, in accordance with the *Subsurface Vapor Intrusion Guidance*, we proceeded to the second step of the screening process.

In the second step of the screening process, available site-specific data for the concentrations of constituents in indoor air, soil gas, and shallow groundwater were compared to target concentrations listed in the *Subsurface Vapor Intrusion Guidance*.

Although the *Subsurface Vapor Intrusion Guidance* was developed for residential scenarios, it states that Occupational Safety and Health Administration (OSHA) guidelines, such as Permissible Exposure Limits (PELs) are appropriate to evaluate indoor air quality at sites, such as the Main Plant, where the only exposures are to workers. Thus, the target concentrations listed in the *Subsurface Vapor Intrusion Guidance*, which are based on residential exposure scenarios, were adjusted on a pro-rata basis using the OSHA PELs to develop site-specific target concentrations for indoor air, soil gas, and shallow groundwater. The results of our comparison of site data to site-specific target concentrations is summarized in the following sections.

Indoor Air

No indoor air quality measurements have been collected as part of the Remedial Investigation (RI) at the Main Plant. The Residential Target Indoor Air concentrations listed in the *Subsurface Vapor Intrusion Guidance* are based on a lifetime cancer risk of $1x10^{-5}$ and a hazard index of 1.0 for non-carcinogenic compounds. Because the anticipated exposures at the site are work place exposures, we used the OSHA PELs as the Target Indoor Air concentrations for the site. The Residential Target Indoor Air concentrations and the OSHA PELs are shown in Tables A-1 through A-3. The OSHA PELs are eight-hour time-weighted averages (TWAs), unless otherwise denoted as a ceiling limit (C).

Soil Gas

The Residential Target Shallow Soil Gas concentrations listed in the *Subsurface Vapor Intrusion Guidance* are conservatively based on a soil gas to indoor air attenuation factor of 0.1. The ratio of the OSHA PEL to the Residential Target Indoor Air concentration was multiplied by the Residential Target Shallow Soil Gas concentration to develop Site-Specific Target Shallow Soil Gas concentrations. If the OSHA PEL was not available, the ratio was assumed to be 1.0 and therefore the Site-Specific Target Shallow Soil Gas concentration was equivalent to the Residential Target Shallow Soil Gas concentration. The Residential and Site-Specific Target Shallow Soil Gas concentrations are shown in Tables A-1 and A-2.

As shown in Table A-1, 13 VOCs were detected in the soil gas samples collected from various locations in the manufacturing area at Main Plant. These concentrations were compared to the Residential Target Shallow Soil Gas concentrations as an initial screening. Although two (tetrachloroethene and trichloroethene) of the 13 VOCs detected in the soil gas samples exceeded the Residential Target Shallow Soil Gas concentrations, none of the VOC concentrations exceeded the Site-Specific Target Shallow Soil Gas concentrations. As shown, the concentrations of the detected VOCs were at least two orders of magnitude less than the Site-Specific Target Shallow Soil Gas concentrations.

As shown in Table A-2, 34 VOCs were detected in the soil gas samples collected from beneath the floor slab of former Building 85, prior to its demolition. These concentrations were compared to the Residential Target Shallow Soil Gas concentrations as an initial screening. Ten VOCs detected in the soil gas from beneath the former manufacturing building exceeded the Residential Target Shallow Soil Gas concentrations. These ten VOCs are: (acetone, 1,3-butadiene, chloroform, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, and vinyl chloride. None of the VOCs detected in the soil gas samples exceeded the Site-Specific Target Shallow Soil Gas concentrations. As shown, the concentrations of the detected VOCs were at least one order of magnitude less than the Site-Specific Target Shallow Soil Gas concentrations.

In summary, all of the VOCs detected in the soil gas samples were below the Site-Specific Target Shallow Soil Gas concentrations.

Shallow Groundwater

The Residential Target Groundwater concentrations listed in the *Subsurface Vapor Intrusion Guidance* is conservatively based on a soil gas to indoor air attenuation factor of 0.001 and that partitioning across the water table obeys Henry's Law. The ratio of the OSHA PEL to the Residential Target Indoor Air concentration was multiplied by the Residential Target Groundwater concentration to develop Site-Specific Target Groundwater concentrations. If the OSHA PEL was not available, the ratio was assumed to be 1.0 and therefore the Site-Specific Target Groundwater concentration was equivalent to the Residential Target Groundwater concentration. The Residential and Site-Specific Target Groundwater concentrations are shown in Table A-3.

As shown in Table A-3, VOCs were detected in the shallow groundwater at the site. The maximum concentration of each VOC detected in the shallow groundwater was used in this evaluation. The concentrations were compared to the Residential Target Groundwater concentrations as an initial screening. Thirteen VOCs detected in the shallow groundwater exceeded the Residential Target Groundwater concentrations. These thirteen VOCs are: benzene, 1,2-dichloroethane, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, trichloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, and xylenes.

These thirteen VOCs were then compared to the Site-Specific Target Groundwater concentrations. As shown, ten of these thirteen VOCs were below the Site-Specific Target Groundwater concentrations. The concentrations of these ten VOCs were at least one order of magnitude less than the Site-Specific Target Groundwater concentrations.

Three VOCs (n-propylbenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene) exceeded their Site-Specific Target Groundwater concentrations. However, OSHA PELs were not available for these compounds. As discussed above, when an OSHA PEL was not available, the Site-Specific Target Groundwater concentration was equivalent to the Residential Target Groundwater concentration. However the residential exposure scenario used in the *Subsurface Vapor Intrusion Guidance* is not appropriate for worker exposure at sites such as the Main Plant. As shown in Table A-3, these three compounds exceed the Residential Target Groundwater concentrations by a factor of approximately 30. Table A-3 also shows that the OSHA PELs are generally five orders of magnitude greater than the Residential Target Indoor Air concentrations. Thus, if the Residential Target Groundwater concentrations were increased by five orders of magnitude, the concentrations of the three VOCs without OSHA PELs (n-propylbenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene) would be far less than these calculated Site-Specific Target Groundwater concentrations.

In summary, from a worker exposure perspective, all of the VOCs detected in the shallow groundwater samples were below the Site-Specific Target Groundwater concentrations.

Summary

Comparison of site soil gas and shallow groundwater to site-specific target concentrations indicates that no further evaluation of the indoor air exposure pathway is needed. Thus, based on the conservative assumptions used in the screening process, indoor air does not pose a significant risk to workers at the site.

TABLE A-1
SOIL GAS SAMPLES - MANUFACTURING AREA

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

PARAMETER	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	SV-001 12/11/01 (ppbv)	SV-002 12/11/01 (ppbv)	SV-003 12/11/01 (ppbv)
Benzene	0.98	10,000	10,204	9.8	100,000	<0.5	**5.3**	<0.5
Bromomethane	1.3	20,000 C	15,385	13	200,000	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.26	10,000	38,462	2.6	100,000	<0.5	<0.5	<0.5
Chlorobenzene	13	75,000	5,769	130	750,000	<0.5	<0.5	<0.5
Chloroethane	3,800	1,000,000	263	38,000	10,000,000	<0.5	<0.5	<0.5
Chloroform	0.22	50,000 C	227,273	2.2	500,000	**1.1**	<0.5	**1.9**
Chloromethane	12	100,000	8,333	120	1,000,000	<0.5	<0.5	<0.5
1,2-Dibromoethane	0.014	20,000	1,428,571	0.14	200,000	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	33	50,000 C	1,515	330	500,000	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	17	n.v.	1	170	170	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	130	75,000	577	1,300	750,000	<0.5	<0.5	<0.5
Dichlorodifluoromethane (freon 12)	40	1,000,000	25,000	400	10,000,000	**0.75**	**0.71**	**0.79**
1,1-Dichloroethane	120	100,000	833	1,200	1,000,000	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.23	50,000	217,391	2.3	500,000	<0.5	<0.5	<0.5
1,1-Dichloroethene	50	n.v.	1	500	500	<0.5	<0.5	**1.3**
cis-1,2-Dichloroethene	8.8	200,000	22,727	88	2,000,000	<0.5	<0.5	**1.2**
1,2-Dichloropropane	0.87	75,000	86,207	8.7	750,000	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	1.3	n.v.	1	13	13	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1.3	n.v.	1	13	13	<0.5	<0.5	<0.5
1,2-Dichlorotetrafluoroethane (freon 114)	n.v.	1,000,000	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5
Ethylbenzene	5.1	100,000	19,608	51	1,000,000	<0.5	<0.5	<0.5
Hexachlorobutadiene	0.1	n.v.	1	1	1	<0.5	<0.5	<0.5
Methylene Chloride	15	25,000	1,667	150	250,000	<0.5	**5.1**	<0.5
Styrene	230	100,000	435	2,300	1,000,000	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.061	5,000	81,967	0.61	50,000	<0.5	<0.5	<0.5
Tetrachloroethene	1.2	100,000	83,333	12	1,000,000	**3.5**	**51**	**22**
Toluene	110	200,000	1,818	1,100	2,000,000	**0.63**	**1.3**	**1.1**

TABLE A-1
SOIL GAS SAMPLES - MANUFACTURING AREA

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

PARAMETER	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	SV-001 12/11/01 (ppbv)	SV-002 12/11/01 (ppbv)	SV-003 12/11/01 (ppbv)
1,2,4-Trichlorobenzene	27	n.v.	1	270	270	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	400	350,000	875	4,000	3,500,000	<0.5	**3.5**	**27**
1,1,2-Trichloroethane	0.28	10,000	35,714	2.8	100,000	<0.5	<0.5	<0.5
Trichloroethene	0.041	100,000	2,439,024	0.41	1,000,000	**9.7**	**21**	**32**
Trichlorofluoromethane (freon 11)	120	1,000,000	8,333	1,200	10,000,000	**0.75**	**4.8**	**0.77**
1,1,2-Trichlorotrifluoroethane (freon 113)	3,900	1,000,000	256	39,000	10,000,000	<0.5	<0.5	<0.5
1,2,4-Trimethylbenzene	1.2	n.v.	1	12	12	**1.7**	<0.5	<0.5
1,3,5-Trimethylbenzene	1.2	n.v.	1	12	12	<0.5	<0.5	<0.5
Vinyl Chloride	1.1	1,000	909	11	10,000	<0.5	<0.5	<0.5
m&p-Xylene	1,600	100,000	63	16,000	1,000,000	**0.71**	<0.5	<0.5
o-Xylene	1,600	100,000	63	16,000	1,000,000	<0.5	<0.5	<0.5

Notes:

1. Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level and the Target Hazard Index ($R=10^{-5}$, HI=1), Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
2. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), 8-hour time-weighted averages (TWAs) unless denoted with a 'C'. 'C' denotes a ceiling limit. 29CFR Part 1910 Subpart Z.
3. Ratio of the OSHA PEL to the Target Indoor Air Concentration. A value of 1 was assigned to those parameters that have a Target Indoor Air Concentration, but do not have an OSHA PEL available for comparison.
4. Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration where the Soil Gas to Indoor Air Attenuation Factor=0.1. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
5. Site Specific Target Shallow Soil Gas Concentration calculated by multiplying the Target Shallow Soil Gas Concentration by the ratio of the OSHA PEL to the Target Indoor Air Concentration.

n.v.: Target Concentration not available.

TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	C-10 6/15/00 (ppbv)	C-16 6/15/00 (ppbv)	D-08 6/15/00 (ppbv)	D-11 6/15/00 (ppbv)	E-16 6/16/00 (ppbv)	F-02 6/16/00 (ppbv)
Acetone	150	1,000,000	6,667	1,500	10,000,000	**37**	**11**	**4.8**	**16**	**6.7**	**1.6**
Benzene	0.98	10,000	10,204	9.8	100,000	**0.67**	<0.5	**0.58**	**0.91**	**0.62**	**0.5**
Benzyl Chloride	0.097	1,000	10,309	0.97	10,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.21	n.v.	1	2.1	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	1.3	20,000 C	15,385	13	200,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Butadiene	0.039	1,000	25,641	0.39	10,000	**13**	**1.3**	**0.96**	**40**	**6.9**	**66**
2-Butanone (MEK)	340	200,000	1	3,400	3,400	**3.3**	<0.5	<0.5	**3.4**	**0.66**	<0.5
Carbon Disulfide	220	20,000	91	2,200	200,000	**0.66**	<0.5	<0.5	**0.57**	**1.5**	<0.5
Carbon Tetrachloride	0.26	10,000	38,462	2.6	100,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	13	75,000	5,769	130	750,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	3,800	1,000,000	263	38,000	10,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	0.22	50,000 C	227,273	2.2	500,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane	12	100,000	8,333	120	1,000,000	<0.5	**0.57**	**0.51**	<0.5	<0.5	<0.5
Cyclohexane	n.v.	300,000	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.12	n.v.	1	1.2	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dibromoethane	0.014	20,000	1,428,571	0.14	200,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dibromopropane	n.v.	n.v.	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	33	50,000 C	1,515	330	500,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	17	n.v.	1	170	170	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	130	75,000	577	1,300	750,000	**1.8**	<0.5	<0.5	**1.6**	**1.4**	<0.5
Dichlorodifluoromethane (freon 12)	40	1,000,000	25,000	400	10,000,000	<0.5	**0.5**	**0.55**	**0.54**	**0.5**	<0.5
1,1-Dichloroethane	120	100,000	833	1,200	1,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	**3.1**
1,2-Dichloroethane	0.23	50,000	217,391	2.3	500,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	50	n.v.	1	500	500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	8.8	200,000	22,727	88	2,000,000	**1.4**	<0.5	<0.5	<0.5	<0.5	**87**
trans-1,2-Dichloroethene	18	200,000	11,111	180	2,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	**14**
cis-1,3-Dichloropropene	1.3	n.v.	1	13	13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1.3	n.v.	1	13	13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorotetrafluoroethane (freon 114)	n.v.	1,000,000	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethanol	n.v.	1,000,000	n.v.	n.v.	n.v.	**10**	**5.3**	<0.5	<0.5	<0.5	<0.5
Ethyl Acetate	870	400,000	460	8,700	4,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	5.1	100,000	19,608	51	1,000,000	**1.6**	<0.5	<0.5	**1.4**	**0.67**	<0.5
4-Ethyltoluene	n.v.	n.v.	n.v.	n.v.	n.v.	**0.91**	<0.5	<0.5	**0.69**	<0.5	<0.5
Heptane	n.v.	500,000	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	0.1	n.v.	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexane	57	500,000	8,772	570	5,000,000	**1.1**	**0.77**	<0.5	**2.6**	**1.4**	**1**
2-Hexanone (MBK)	n.v.	100,000	n.v.	n.v.	n.v.	**7.8**	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropyl Alcohol	n.v.	400,000	n.v.	n.v.	n.v.	**0.91**	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene Chloride	15	25,000	1,667	150	250,000	**1.2 B**	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methyl-2-pentanone (MIBK)	20	100,000	5,000	200	1,000,000	**0.59**	<0.5	<0.5	**1.5**	<0.5	<0.5
MTBE	830	n.v.	1	8,300	8,300	<0.5	<0.5	<0.5	<0.5	<0.5	**8.2**
Propene	n.v.	n.v.	n.v.	n.v.	n.v.	**8.4**	**35**	**63**	**20**	**5**	**31**
Styrene	230	100,000	435	2,300	1,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.061	5,000	81,967	0.61	50,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	1.2	100,000	83,333	12	1,000,000	**11**	<0.5	<0.5	**2.2**	**15**	**1.1**
Tetrahydrofuran	n.v.	200,000	n.v.	n.v.	n.v.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	C-10 6/15/00 (ppbv)	C-16 6/15/00 (ppbv)	D-08 6/15/00 (ppbv)	D-11 6/15/00 (ppbv)	E-16 6/16/00 (ppbv)	F-02 6/16/00 (ppbv)
Toluene	110	200,000	1,818	1,100	2,000,000	**3.8**	**1.6**	**0.62**	**4.8**	**3.2**	**3.1**
1,2,4-Trichlorobenzene	27	n.v.	1	270	270	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	400	350,000	875	4,000	3,500,000	**6.1**	**0.68**	<0.5	**2.8**	**3.9**	<0.5
1,1,2-Trichloroethane	0.28	10,000	35,714	2.8	100,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.041	100,000	2,439,024	0.41	1,000,000	**25**	<0.5	<0.5	**5.4**	**3.6**	**1.6**
Trichlorofluoromethane (freon 11)	120	1,000,000	8,333	1,200	10,000,000	**11**	<0.5	<0.5	**3.8**	**0.87**	<0.5
1,1,2-Trichlorotrifluoroethane (freon 113)	3,900	1,000,000	256	39,000	10,000,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trimethylbenzene	1.2	n.v.	1	12	12	**3.2**	<0.5	<0.5	**2.5**	**2.1**	**0.55**
1,3,5-Trimethylbenzene	1.2	n.v.	1	12	12	**0.91**	<0.5	<0.5	**0.76**	**0.55**	<0.5
Vinyl Chloride	1.1	1,000	909	11	10,000	<0.5	<0.5	<0.5	<0.5	<0.5	**36**
m&p-Xylene	1,600	100,000	63	16,000	1,000,000	**6.5**	**1.2**	<0.5	**6**	**3.5**	**1.7**
o-Xylene	1,600	100,000	63	16,000	1,000,000	**2.3**	<0.5	<0.5	**1.9**	**1.1**	**0.58**

Notes:

1. Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level and the Target Hazard Index ($R=10^{-5}$, HI=1), Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
2. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), 8-hour time-weighted averages (TWAs) unless denoted with a 'C'. 'C' denotes a ceiling limit. 29CFR Part 1910 Subpart Z.
3. Ratio of the OSHA PEL to the Target Indoor Air Concentration. A value of 1 was assigned to those parameters that have a Target Indoor Air Concentration, but do not have an OSHA PEL available for comparison.
4. Target Shallow Soil Gas Concentration Correspo Factor = 0.1. Draft Guidance for Evaluating the V
5. Site Specific Target Shallow Soil Gas Concentrat the OSHA PEL to the Target Indoor Air Concent

n.v.: Target Concentration or OSHA PEL not availa

B: Methylene chloride detected in method blank at

TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	F-06 6/17/00 (ppbv)	F-12 6/16/00 (ppbv)	F-17 6/18/00 (ppbv)	G-17 6/18/00 (ppbv)	H-02 6/16/00 (ppbv)	H-12 6/16/00 (ppbv)
Acetone	150	1,000,000	6,667	1,500	10,000,000	**13,900**	**98**	**6.3**	**5.3**	**34**	**23**
Benzene	0.98	10,000	10,204	9.8	100,000	<12.5	<12.5	**0.74**	**0.82**	<12.5	<12.5
Benzyl Chloride	0.097	1,000	10,309	0.97	10,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Bromodichloromethane	0.21	n.v.	1	2.1	2.1	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Bromomethane	1.3	20,000 C	15,385	13	200,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,3-Butadiene	0.039	1,000	25,641	0.39	10,000	**798**	**21**	**4.4**	<0.5	<12.5	<12.5
2-Butanone (MEK)	340	200,000	1	3,400	3,400	**64**	<12.5	<0.5	<0.5	<12.5	<12.5
Carbon Disulfide	220	20,000	91	2,200	200,000	**24**	<12.5	<0.5	<0.5	<12.5	<12.5
Carbon Tetrachloride	0.26	10,000	38,462	2.6	100,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Chlorobenzene	13	75,000	5,769	130	750,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Chloroethane	3,800	1,000,000	263	38,000	10,000,000	**33**	<12.5	<0.5	<0.5	<12.5	<12.5
Chloroform	0.22	50,000 C	227,273	2.2	500,000	<12.5	<12.5	<0.5	<0.5	**173**	<12.5
Chloromethane	12	100,000	8,333	120	1,000,000	<12.5	<12.5	**0.72**	<0.5	<12.5	<12.5
Cyclohexane	n.v.	300,000	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Dibromochloromethane	0.12	n.v.	1	1.2	1.2	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,2-Dibromoethane	0.014	20,000	1,428,571	0.14	200,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,2-Dibromopropane	n.v.	n.v.	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,2-Dichlorobenzene	33	50,000 C	1,515	330	500,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,3-Dichlorobenzene	17	n.v.	1	170	170	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,4-Dichlorobenzene	130	75,000	577	1,300	750,000	<12.5	<12.5	<0.5	**1.6**	<12.5	<12.5
Dichlorodifluoromethane (freon 12)	40	1,000,000	25,000	400	10,000,000	<12.5	<12.5	**0.58**	<0.5	<12.5	<12.5
1,1-Dichloroethane	120	100,000	833	1,200	1,000,000	**169**	**29**	<0.5	<0.5	**740**	<12.5
1,2-Dichloroethane	0.23	50,000	217,391	2.3	500,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,1-Dichloroethene	50	n.v.	1	500	500	<12.5	<12.5	<0.5	<0.5	**75**	<12.5
cis-1,2-Dichloroethene	8.8	200,000	22,727	88	2,000,000	**76**	<12.5	<0.5	<0.5	**1,185**	<12.5
trans-1,2-Dichloroethene	18	200,000	11,111	180	2,000,000	**16**	<12.5	<0.5	<0.5	**331**	<12.5
cis-1,3-Dichloropropene	1.3	n.v.	1	13	13	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
trans-1,3-Dichloropropene	1.3	n.v.	1	13	13	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,2-Dichlorotetrafluoroethane (freon 114)	n.v.	1,000,000	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Ethanol	n.v.	1,000,000	n.v.	n.v.	n.v.	<12.5	<12.5	**20**	**4.9**	<12.5	<12.5
Ethyl Acetate	870	400,000	460	8,700	4,000,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Ethylbenzene	5.1	100,000	19,608	51	1,000,000	<12.5	<12.5	<0.5	**1.1**	<12.5	**89**
4-Ethyltoluene	n.v.	n.v.	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	**0.61**	<12.5	<12.5
Heptane	n.v.	500,000	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Hexachlorobutadiene	0.1	n.v.	1	1	1	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Hexane	57	500,000	8,772	570	5,000,000	<12.5	<12.5	**2.3**	**2.3**	<12.5	<12.5
2-Hexanone (MBK)	n.v.	100,000	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Isopropyl Alcohol	n.v.	400,000	n.v.	n.v.	n.v.	**146**	<12.5	**1.1**	<0.5	<12.5	<12.5
Methylene Chloride	15	25,000	1,667	150	250,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
4-Methyl-2-pentanone (MIBK)	20	100,000	5,000	200	1,000,000	**183**	**16**	<0.5	<0.5	<12.5	<12.5
MTBE	830	n.v.	1	8,300	8,300	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Propene	n.v.	n.v.	n.v.	n.v.	n.v.	**175**	**110**	**36**	**0.83**	**36**	**17**
Styrene	230	100,000	435	2,300	1,000,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,1,2,2-Tetrachloroethane	0.061	5,000	81,967	0.61	50,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Tetrachloroethene	1.2	100,000	83,333	12	1,000,000	**75**	**40**	<0.5	**1.2**	**18**	<12.5
Tetrahydrofuran	n.v.	200,000	n.v.	n.v.	n.v.	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5

TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	F-06 6/17/00 (ppbv)	F-12 6/16/00 (ppbv)	F-17 6/18/00 (ppbv)	G-17 6/18/00 (ppbv)	H-02 6/16/00 (ppbv)	H-12 6/16/00 (ppbv)
Toluene	110	200,000	1,818	1,100	2,000,000	**16**	<12.5	**3**	**3.7**	<12.5	<12.5
1,2,4-Trichlorobenzene	27	n.v.	1	270	270	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,1,1-Trichloroethane	400	350,000	875	4,000	3,500,000	**23**	**217**	**2.2**	**2.4**	**13,900**	<12.5
1,1,2-Trichloroethane	0.28	10,000	35,714	2.8	100,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
Trichloroethene	0.041	100,000	2,439,024	0.41	1,000,000	**24**	<12.5	<0.5	**0.82**	**61,860**	<12.5
Trichlorofluoromethane (freon 11)	120	1,000,000	8,333	1,200	10,000,000	<12.5	<12.5	**0.52**	**0.74**	<12.5	<12.5
1,1,2-Trichlorotrifluoroethane (freon 113)	3,900	1,000,000	256	39,000	10,000,000	<12.5	<12.5	<0.5	<0.5	<12.5	<12.5
1,2,4-Trimethylbenzene	1.2	n.v.	1	12	12	<12.5	<12.5	<0.5	**2.6**	<12.5	<12.5
1,3,5-Trimethylbenzene	1.2	n.v.	1	12	12	<12.5	<12.5	<0.5	**0.73**	<12.5	<12.5
Vinyl Chloride	1.1	1,000	909	11	10,000	**90**	**37**	<0.5	<0.5	<12.5	<12.5
m&p-Xylene	1,600	100,000	63	16,000	1,000,000	<12.5	**14**	**1.6**	**5.1**	<12.5	**583**
o-Xylene	1,600	100,000	63	16,000	1,000,000	<12.5	<12.5	**0.56**	**1.5**	<12.5	**242**

Notes:

1. Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level and the Target Hazard Index ($R=10^{-5}$, HI=1), Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
2. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), 8-hour time-weighted averages (TWAs) unless denoted with a 'C'. 'C' denotes a ceiling limit. 29CFR Part 1910 Subpart Z.
3. Ratio of the OSHA PEL to the Target Indoor Air Concentration. A value of 1 was assigned to those parameters that have a Target Indoor Air Concentration, but do not have an OSHA PEL available for comparison.

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Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
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TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	**Residential Target Indoor Air Concentration[1] (ppbv)**	**OSHA PEL[2] (ppbv)**	**OSHA PEL/Target Indoor Air Concentration[3]**	**Residential Target Shallow Soil Gas Concentration[4] (ppbv)**	**Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)**	**B-06 6/18/00 (ppbv)**	**E-03 6/18/00 (ppbv)**
Acetone	150	1,000,000	6,667	1,500	10,000,000	**62**	**6.3**
Benzene	0.98	10,000	10,204	9.8	100,000	<25	<5
Benzyl Chloride	0.097	1,000	10,309	0.97	10,000	<25	<5
Bromodichloromethane	0.21	n.v.	1	2.1	2.1	<25	<5
Bromomethane	1.3	20,000 C	15,385	13	200,000	<25	<5
1,3-Butadiene	0.039	1,000	25,641	0.39	10,000	<25	<5
2-Butanone (MEK)	340	200,000	1	3,400	3,400	<25	<5
Carbon Disulfide	220	20,000	91	2,200	200,000	<25	<5
Carbon Tetrachloride	0.26	10,000	38,462	2.6	100,000	<25	<5
Chlorobenzene	13	75,000	5,769	130	750,000	<25	<5
Chloroethane	3,800	1,000,000	263	38,000	10,000,000	<25	<5
Chloroform	0.22	50,000 C	227,273	2.2	500,000	**267**	<5
Chloromethane	12	100,000	8,333	120	1,000,000	<25	<5
Cyclohexane	n.v.	300,000	n.v.	n.v.	n.v.	<25	<5
Dibromochloromethane	0.12	n.v.	1	1.2	1.2	<25	<5
1,2-Dibromoethane	0.014	20,000	1,428,571	0.14	200,000	<25	<5
1,2-Dibromopropane	n.v.	n.v.	n.v.	n.v.	n.v.	<25	<5
1,2-Dichlorobenzene	33	50,000 C	1,515	330	500,000	<25	<5
1,3-Dichlorobenzene	17	n.v.	1	170	170	<25	<5
1,4-Dichlorobenzene	130	75,000	577	1,300	750,000	<25	<5
Dichlorodifluoromethane (freon 12)	40	1,000,000	25,000	400	10,000,000	<25	<5
1,1-Dichloroethane	120	100,000	833	1,200	1,000,000	**33**	<5
1,2-Dichloroethane	0.23	50,000	217,391	2.3	500,000	<25	<5
1,1-Dichloroethene	50	n.v.	1	500	500	<25	<5
cis-1,2-Dichloroethene	8.8	200,000	22,727	88	2,000,000	**2,330**	<5
trans-1,2-Dichloroethene	18	200,000	11,111	180	2,000,000	**681**	<5
cis-1,3-Dichloropropene	1.3	n.v.	1	13	13	<25	<5
trans-1,3-Dichloropropene	1.3	n.v.	1	13	13	<25	<5
1,2-Dichlorotetrafluoroethane (freon 114)	n.v.	1,000,000	n.v.	n.v.	n.v.	<25	<5
Ethanol	n.v.	1,000,000	n.v.	n.v.	n.v.	<25	<5
Ethyl Acetate	870	400,000	460	8,700	4,000,000	<25	<5
Ethylbenzene	5.1	100,000	19,608	51	1,000,000	<25	<5
4-Ethyltoluene	n.v.	n.v.	n.v.	n.v.	n.v.	<25	<5
Heptane	n.v.	500,000	n.v.	n.v.	n.v.	<25	<5
Hexachlorobutadiene	0.1	n.v.	1	1	1	<25	<5
Hexane	57	500,000	8,772	570	5,000,000	<25	<5
2-Hexanone (MBK)	n.v.	100,000	n.v.	n.v.	n.v.	<25	<5
Isopropyl Alcohol	n.v.	400,000	n.v.	n.v.	n.v.	<25	<5
Methylene Chloride	15	25,000	1,667	150	250,000	<25	<5
4-Methyl-2-pentanone (MIBK)	20	100,000	5,000	200	1,000,000	<25	<5
MTBE	830	n.v.	1	8,300	8,300	<25	<5
Propene	n.v.	n.v.	n.v.	n.v.	n.v.	**51**	<5
Styrene	230	100,000	435	2,300	1,000,000	<25	<5
1,1,2,2-Tetrachloroethane	0.061	5,000	81,967	0.61	50,000	<25	<5
Tetrachloroethene	1.2	100,000	83,333	12	1,000,000	**3,400**	**173**
Tetrahydrofuran	n.v.	200,000	n.v.	n.v.	n.v.	<25	<5

TABLE A-2
SOIL GAS SAMPLES - BUILDING 285

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Shallow Soil Gas Concentration[4] (ppbv)	Site Specific Target Shallow Soil Gas Concentration[5] (ppbv)	B-06 6/18/00 (ppbv)	E-03 6/18/00 (ppbv)
Toluene	110	200,000	1,818	1,100	2,000,000	<25	<5
1,2,4-Trichlorobenzene	27	n.v.	1	270	270	<25	<5
1,1,1-Trichloroethane	400	350,000	875	4,000	3,500,000	**72**	**12**
1,1,2-Trichloroethane	0.28	10,000	35,714	2.8	100,000	<25	<5
Trichloroethene	0.041	100,000	2,439,024	0.41	1,000,000	**3,650**	**49**
Trichlorofluoromethane (freon 11)	120	1,000,000	8,333	1,200	10,000,000	<25	<5
1,1,2-Trichlorotrifluoroethane (freon 113)	3,900	1,000,000	256	39,000	10,000,000	<25	<5
1,2,4-Trimethylbenzene	1.2	n.v.	1	12	12	<25	<5
1,3,5-Trimethylbenzene	1.2	n.v.	1	12	12	<25	<5
Vinyl Chloride	1.1	1,000	909	11	10,000	<25	<5
m&p-Xylene	1,600	100,000	63	16,000	1,000,000	<25	<5
o-Xylene	1,600	100,000	63	16,000	1,000,000	<25	<5

Notes:

1. Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level and the Target Hazard Index (R=10^{-5}, HI=1), tenuation
   Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
2. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), 8-hour time-weighted averages (TWAs) unless he ratio of
   denoted with a 'C'. 'C' denotes a ceiling limit. 29CFR Part 1910 Subpart Z.
3. Ratio of the OSHA PEL to the Target Indoor Air Concentration. A value of 1 was assigned to those parameters that have a Target Indoor Air Concentration,
   but do not have an OSHA PEL available for comparison.

TABLE A-3
SHALLOW GROUNDWATER SAMPLES

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

PARAMETER	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Groundwater Concentration[4] (mg/L)	Site-Specific Target Groundwater Concentration[5] (mg/L)	Maximum Cocentration in Shallow Groundwater (mg/L)	Location of Maximum Concentration	Date of Maximum Cocentration
Volatile Organic Compounds								
Acetone	150	1,000,000	6,667	220,000	1,000,000,000**	224	GE-122	8/18/2000
Benzene	0.98	10,000	10,204	14	140,000	3,300	R-3	10/11/2002
2-Butanone	340	200,000	588	440,000	259,000,000	86.8	GPWM-7	9/14/2000
n-Butylbenzene	26	n.v.	1	260	260	19.5	GPWM-7	9/14/2000
sec-Butylbenzene	26	n.v.	1	250	250	8.37	GW-IRM-15 (18-22)	3/16/2001
tert-Butylbenzene	26	n.v.	1	290	290	2.76	GW-IRM-15 (18-22)	3/16/2001
Carbon Disulfide	220	20,000	90.9	560	50,900	0.5	DM-400FP	5/26/1999
Chlorobenzene	13	75,000	5,769	390	2,250,000	223	GW-IRM-9 (12-16)	3/12/2001
Chloroethane	3,800	1,000,000	263	28,000	7,370,000	580	GE-26	4/6/1999
Chloroform	0.22	50,000 C	227,273	80	18,180,000	0.5	DM-406F	5/27/1999
Chloromethane	12	100,000	8,333	67	560,000	3.6	P-BK-4	2/7/2001
p-Cymene	n.v.	n.v.	n.v.	n.v.	n.v.	1	P-10	9/24/2002
1,2-Dichlorobenzene	33	50,000 C	1,515	2,600	3,940,000	6	113-6 & P-10	4/13/99 & 4/21/99
1,3-Dichlorobenzene	17	n.v.	1	830	830	7	113-6	4/13/1999
1,4-Dichlorobenzene	130	75,000	577	8,200	4,730,000	33	113-6	4/13/1999
Dichlorodifluoromethane	40	1,000,000	25,000	14	350,000	3	DM-412FP	10/21/2002
1,1-Dichloroethane	120	100,000	833	2,200	1,830,000	29	113-6	4/13/1999
1,2-Dichloroethane	0.23	50,000	217,391	23	5,000,000	24	113-6	4/13/1999
cis-1,2-Dichloroethene	8.8	200,000	22,727	210	4,770,000	780	P-37	4/25/2001
trans-1,2-Dichloroethene	18	200,000	11,111	180	2,000,000	4.11	DM-408FP	7/31/2000
1,2-Dichloroethene, total	8.8	200,000	22,727	180	4,090,000	84	113-6 & SEWER-109-2 (7'-11')	4/13/99 & 6/25/02
1,2-Dichloropropane	0.87	75,000	86,207	35	3,020,000	7	113-6	4/13/1999
Ethylbenzene	5.1	100,000	19,608	700	13,730,000	7,300	GW-IRM-4B (6-10)	12/20/2000
Isopropylbenzene	81	50,000	617	8.4	5,180	130	GPWM-7	9/14/2000
Methylene Chloride	15	25,000	1,667	580	970,000	122	GE-122	8/18/2000
MTBE	830	n.v.	1	120,000	120,000	3.71	GW-IRM-9 (12-16)	3/12/2001

TABLE A-3
SHALLOW GROUNDWATER SAMPLES

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

PARAMETER	Residential Target Indoor Air Concentration[1] (ppbv)	OSHA PEL[2] (ppbv)	OSHA PEL/Target Indoor Air Concentration[3]	Residential Target Groundwater Concentration[4] (mg/L)	Site-Specific Target Groundwater Concentration[5] (mg/L)	Maximum Cocentration in Shallow Groundwater (mg/L)	Location of Maximum Concentration	Date of Maximum Cocentration
Naphthalene	0.57	10,000	17,544	150	2,630,000	3,400	P-37	9/24/2002
n-Propylbenzene	28	n.v.	1	320	320	410	GW-IRM-9 (6-10)	3/12/2001
Styrene	230	100,000	435	8,900	3,870,000	1	GE-26 & DM-408FP	4/6/99 & 5/27/99
Tetrachloroethene	1.2	100,000	83,333	11	920,000	8.26	GE-120	8/17/2000
1,1,2,2-Tetrachloroethane	0.061	5,000	81,967	30	2,460,000	0.5	P-13	4/14/1999
Toluene	110	200,000	1,818	1,500	2,730,000	109,000	GW-IRM-8 (11-15)	12/21/2000
1,1,1-Trichloroethane	400	350,000	875	3,100	2,710,000	1,600	P-10	4/21/1999
Trichloroethene	0.041	100,000	2,439,024	5	12,200,000	57	DM-423F	12/6/2000
Trichlorofluoromethane	120	1,000,000	8,333	180	1,500,000	89.5	DM-426F	4/27/2000
1,2,4-Trimethylbenzene	1.2	n.v.	1	24	24	1,950	GW-IRM-9 (6-10)	3/12/2001
1,3,5-Trimethylbenzene	1.2	n.v.	1	25	25	500	GW-IRM-9 (6-10)	3/12/2001
Vinyl Chloride	1.1	1,000	909	2.5	2,273	1,010	DM-408FP	7/31/2000
m&p-Xylene	1,600	100,000	63	23,000	1,440,000	28,500	GW-IRM-4B (6-10)	12/20/2000
o-Xylene	1,600	100,000	63	33,000	2,060,000	6,000	GW-IRM-4B (6-10)	12/20/2000
Xylene	1,600	100,000	62.5	23,000	1,440,000	24,000	P-10	4/21/1999

Notes:

1. Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level and the Target Hazard Index ($R=10^{-5}$, HI=1), Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
2. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), 8-hour time-weighted averages (TWAs) unless denoted with a 'C'. 'C' denotes a ceiling limit. 29CFR Part 1910 Subpart Z.
3. Ratio of the OSHA PEL to the Target Indoor Air Concentration. A value of 1 was assigned to those parameters that have a Target Indoor Air Concentration, but do not have an OSHA PEL available for comparison.
4. Target Groundwater Concentration Corresponding to Target Indoor Air Concentration where the Soil Gas to Indoor Air Attenuation Factor=0.001 and Partitioning Across the Water Table Obeys Henry's Law. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.
5. Site Specific Target Groundwater Concentration calculated by multiplying the Target Groundwater Concentration by the ratio of the OSHA PEL to the Target Indoor Air Concentration.
6. See Calculations worksheet for derivation of these values.

n.v.: Target Concentration not available.
**: The groundwater concentration cannot exceed unity.

APPENDIX B

FATE AND TRANSPORT MODEL

APPENDIX B
FATE AND TRANSPORT MODEL
REVISED FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

A single component transport model was used to simulate fate and transport of chlorinated solvents in groundwater at two areas of the site: the former Wire Mill Area and the Waste Water Treatment Plant (WWTP) Area. The purpose of the model is to evaluate the relative time for remedial options to reduce contaminant concentrations to below the NYSDEC's groundwater standards. For each simulation, it was assumed that the selected remedial system would effectively reduce groundwater concentrations to below the NYSDEC's groundwater standards. Therefore, the model simulates the attenuation of contaminants downgradient of the treatment systems.

The computer program ATRANS (Zehng and Bennett, 1995) was used to simulate the effects of implementing proposed remedial options at GE's Main Plant. ATRANS uses an analytical solution of the advection-dispersion equation and incorporates one-dimensional groundwater advection, three-dimensional dispersion, sorption to organic material in the aquifer, and first-order decay of a single solute.

B.1 MODEL FRAMEWORK

The ATRANS model simulates solute transport along a groundwater flowpath. The model uses an analytical solution to the advection-dispersion equation:

$$R\frac{\partial C}{\partial t} = -v\frac{\partial C}{\partial x} + D_x\frac{\partial^2 C}{\partial x^2} + D_y\frac{\partial^2 C}{\partial y^2} + D_z\frac{\partial^2 C}{\partial z^2} - R\lambda C$$

where:

- R is the retardation factor (unitless),
- C is the concentration of the solute (mass/volume),
- t is time,
- v is the groundwater flow velocity (length/time),
- x, y, and z are spatial coordinates (length),
- D_x, D_y, and D_z are the combined diffusion/dispersion coefficients (length^2/time), and
- λ is the first-order decay constant (1/time).

The analytical solution to the model assumes homogeneous and isotropic flow conditions in one direction (the x-direction) and allows for time varying concentrations within a planar source area oriented perpendicular to the direction of groundwater migration. The model further assumes first-order decay of one solute.

B.2 MODEL INPUT

The model was used to simulate current conditions and to predict the relative effects of implementing remedial options in two areas of the site. The following discussion describes the input parameters derived from site data that were used in ATRANS. The input values used in the simulations are summarized on Tables B-1 and B-2.

Groundwater Velocity

Groundwater velocity, q (length/time), was calculated using the Darcy equation:

$$q = \frac{Ki}{n},$$

where:

- K is the hydraulic conductivity (length/time),
- i is the hydraulic gradient (unitless), and
- n is the porosity.

For the former Wire Mill Area, a hydraulic conductivity of 4.6 x 10^{-3} centimeters per second (cm/s), or 4.8 x 10^{3} feet per year (ft/yr) was used, based on the slug test results from monitoring well DM-432CF. A hydraulic gradient of 0.0045 feet per foot (ft/ft) was used based on the potentiometric surface drawn with groundwater elevations from February 2001. Porosity was assumed to be 0.25, which is consistent with published values for silty sands (Freeze and Cherry, 1979). Therefore, the groundwater velocity used for the model in the WWTP Area was 86 ft/yr.

In the WWTP Area, a hydraulic conductivity of 1.0 x 10^{-2} cm/s, or 1.0 x 10^{4} ft/yr was used, based on the geometric mean of slug test results from monitoring wells near the WWTP Area. A hydraulic gradient of 0.0024 ft/ft was used based on the potentiometric surface drawn with groundwater elevations from February 2001. Porosity was assumed to be 0.25, consistent with published values for silty sands (Freeze and Cherry, 1979). Therefore, the groundwater velocity used for the model in the former Wire Mill Area was 98 ft/yr.

Retardation

The retardation factor, R (unitless) describes how much slower a solute moves relative to the average groundwater velocity under advective transport. For organic compounds, it is a function of the amount of organic carbon in the soils and the compound's affinity to sorb to the organic carbon. The retardation factor is calculated as:

$$R = 1 + \frac{\rho_b}{n} K_{oc} f_{oc}$$

where:

- n is the effective porosity of the aquifer (unitless),
- ρ_b (mass/volume) is the bulk density of the soil,
- K_{oc} is the organic carbon partitioning coefficient of the solute (volume/mass), and
- f_{oc} (unitless) is the fraction of natural organic carbon in the soil.

For DCE, a K_{oc} of 125 liters per kilogram (L/kg) was used based on published values (Schwarzenbach et al., 1992). An n of 0.25 and a ρ_b of 1.65 kilograms per liter (kg/L) were assumed. The fraction of organic carbon was based on a geometric mean of site total organic carbon data collected from the channel fill deposits. A f_{oc} of 2.1 x 10^{-3} was used based on site soil analytical data. Thus, the retardation factor used was 2.8. In the WWTP Area, a slightly lower value of f_{oc} (1.3 x 10^{-3}) was used to account for the expected lower organic carbon content in the bedding material along the storm sewer outfall pipe. Thus, the R used in the WWTP Area was 2.1.

Aquifer Thickness

Aquifer thickness was based on boring log information in each of the modeled areas. For the purpose of the model, the aquifer thickness was chosen based on the average elevation of the top and bottom of the channel fill deposits. If the glaciolacustrine deposits were comprised of silty sand rather than clay, the glaciolacustrine deposits were included in the aquifer thickness. In the former Wire Mill Area, an aquifer thickness of 60 feet was used. In the WWTP Area, a thickness of 63 feet was used.

Source Area Dimensions

The source area in ATRANS is assumed to be a planar feature oriented perpendicular to the direction of groundwater flow. For the purpose of this simulation, the source areas were chosen at the down gradient side of the proposed remedial system for each area.

The source area in the former Wire Mill Area was assumed to be approximately 100 feet wide and extended to a depth of 25 feet below the top of the aquifer. The location of the "source" used in the model is shown on Figure B-1.

The source area in the WWTP Area was assumed to be approximately 80 feet wide and extended to a depth of 18 to 27 feet below the top of the aquifer. This depth was based on PID readings from soil boring GW-WWTP-2. The location of the "source" used in the model is shown as Treatment Area (Option 1) on Figure B-2.

B.3 MODEL CALIBRATION

Site analytical data were used to calibrate the model at steady state conditions. In the model for each area, three parameters were varied to achieve calibration (dispersivity, decay rate, and source area concentration). Each was varied within what is considered a reasonable range of values.

Source Area Concentration

Source area concentrations were varied to achieve observed concentrations. 1,2-dichloroethene (DCE) was chosen to be simulated. DCE was chosen because it is the most chlorinated ethene found within the modeled areas. Vinyl chloride, which is produce from the breakdown of DCE, is also found. Since vinyl chloride is more mobile (lower retardation factor) than DCE and vinyl chloride is only produced as a byproduct of DCE degradation, concentrations of vinyl chloride will reach NYSDEC's groundwater standards at a similar rate as DCE.

In the former Wire Mill Area the source concentration of DCE was assumed to be 4,500 micrograms per liter (μg/L). This is significantly greater than the 166 μg/L detected at groundwater sampling point CGW-109-1 but within the range of concentrations detected upgradient near monitoring well DM-421G.

Dispersivity

Initially, values of 70, 10, and 0.7 feet were assumed for longitudinal, transverse-horizontal, and transverse-vertical dispersivity, respectively, in the former Wire Mill Area. These values resulted in insufficient horizontal spreading and too much vertical spreading, relative to observed values. Final values of 80, 40, and 0.15 feet were used. This corresponds to documented anisotropy and heterogeneity within the channel fill and glaciolacustrine deposits.

In the WWTP Area, much lower values for transverse dispersion were used to simulate the preferential migration pathway along the bedding material of the storm sewer outfall pipe. Initially, values of 70, 1.0, and 0.1 feet were assumed for longitudinal, transverse-horizontal, and transverse-vertical dispersivity, respectively. These values resulted in too much horizontal spreading and insufficient vertical spreading, relative to observed values. Final values of 70, 0.8, and 0.3 feet were used to match observed conditions.

Decay Constant

Initial decay rates of 0.24 year^{-1} were used in both modeled areas. This decay rate results in a half-life of 2.9 years, which is typical of published values and was based on the results of GE GRC's microcosm study (unamended control). In both areas, a decay rate constant of 0.24 year^{-1} resulted in DCE being degraded too quickly. In the former Wire Mill Area, a decay rate constant of 0.1 year^{-1} (half-life of 6.9 years) was used. In the WWTP Area, a decay rate constant of 0.2 year^{-1} (half-life of 3.5 years) was used to match observed conditions.

B.4 MODEL PREDICTIONS

Once calibrated, the models were used to simulate the reduction of concentrations of DCE downgradient of the proposed remedial systems. This was accomplished by running the simulations until the models reached steady state (50 years) using the initial source area concentrations selected during model calibration. The source area concentration was then changed to zero and the model was allowed to simulate the attenuation of DCE downgradiant of the proposed remedial system.

Figure B-3 shows the predicted results of the simulation near the former Wire Mill Area. Figure B-4 shows the predicted results of concentrations along the centerline of the plume downgradient of the former Wire Mill Area. As shown in Figures B-3 and B-4, concentrations are expected to reach the NYSDEC's groundwater standard for DCE within 10 to 30 years of implementation of the proposed remedial system, depending on the distance down gradient from the remediation area.

Figure B-5 shows the predicted results of concentrations along the centerline of the plume downgradient of the WWTP Area. As shown in Figure B-5, concentrations of DCE in groundwater at the Mohawk River (1,000 feet downgradient) will begin to decrease in approximately 10 years. Concentrations of DCE are expected to reach the NYSDEC's groundwater standard for DCE at the Mohawk River in approximately 30 years of implementation of the proposed remedial system. Concentrations will begin to decrease in approximately 10 years.

One potential remedial option calls for a remedial system to be installed along the northern property boundary of the site near the WWTP Area in addition to the proposed system south of the WWTP Area. The purpose of the remedial system north of the WWTP Area would be to reduce concentrations of DCE and vinyl chloride to below the NYSDEC's groundwater standards north of the site in less time. Therefore, to estimate the effectiveness of the additional option, a second simulation was run north of the WWTP Area and is shown as Treatment Area (Option 2) in Figure B-2. In this simulation, the source area dimensions and concentrations were changed to 3,000 µg/L and located along the property boundary. Based on that simulation (Figure B-6), groundwater concentrations of DCE along at the Mohawk River would begin to decline in approximately 8 years and would reach groundwater standards in approximately 24 years.

B.5 REFERENCES

Freeze, R.A. and J.A. Cherry, 1979. *Groundwater*. Prentice Hall, Inc. Englewood Cliffs, New Jersey.

Schwarzenbach, R.P, P.M. Gschwend, and D.M. Imboden, 1992. *Environmental Organic Chemistry*. Wiley InterScience. New York.

Zehng, C. and G.D. Bennett, 1995. *Applied Contaminant Transport Modeling: Theory and Practice*. Van Nostrand Reinhold.

TABLE B-1
MODEL INPUT PARAMETERS FOR ATRANS
FORMER WIRE MILL AREA
APPENDIX B - FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Value	Units	Source
Groundwater Velocity (V)	86	ft/year	Site data
Longitudinal dispersion (ALX)	70	feet	assumed
Transverse Dispersion - horizontal (ALY)	10	feet	assumed
Transverse Dispersion - vertical (ALZ)	0.7	feet	assumed
Diffusion Coefficient (D*)	0	ft2/yr	assumed
Aquifer Thickness (THICK)	50	feet	Site data
Contaminant Decay Rate (CLAMDA)	0.24	1/yr	Site data
Retardation Factor (R)	2.8	--	Site data
Source Width (WIDTH)	100	feet	Site data
Bottom of Source (Z1)	25	feet	Site data
Top of Source (Z2)	50	feet	Site data
Number of Source Intervals (NINT)	2	--	
Starting Time (1st Interval)	0	years	
Ending Time (1st Interval)	50	years	
Concentration (1st Interval)	4500	ug/L	
Starting Time (2nd Interval)	50	years	
Ending Time (2nd Interval)	100	years	
Concentration (2nd Interval)	0	ug/L	
Output Information			
Number of Observation Points (NOBS)	20	--	
XYZ (Location 1)	120,-80,45	feet	DM-436S
XYZ (Location 2)	120,-80,25	feet	DM-436I
XYZ (Location 3)	120,-80,5	feet	DM-436D
XYZ (Location 4)	200,40,45	feet	DM-437S
XYZ (Location 5)	200,40,25	feet	DM-437I
XYZ (Location 6)	200,40,5	feet	DM-437D
XYZ (Location 7)	290,170,45	feet	DM-438S
XYZ (Location 8)	290,170,25	feet	DM-438I
XYZ (Location 9)	290,170,5	feet	DM-438D
XYZ (Location 10)	440,50,45	feet	DM-432CF
XYZ (Location 11)	440,50,25	feet	DM-432I
XYZ (Location 12)	440,50,5	feet	DM-432D
XYZ (Location 13)	1000,20,40	feet	GW-109-6
XYZ (Location 14)	50,70,45	feet	CGW-109-1
XYZ (Location 15)	0,0,45	feet	x=-20 (source)
XYZ (Location 16)	70,0,45	feet	x=50
XYZ (Location 17)	120,0,45	feet	x=100
XYZ (Location 18)	270,0,45	feet	x=250
XYZ (Location 19)	520,0,45	feet	x=500
XYZ (Location 20)	770,0,45	feet	x=750
XYZ (Location 21)	1020,0,45	feet	x=1000

TABLE B-2
MODEL INPUT PARAMETERS FOR ATRANS
WASTEWATER TREATMENT PLANT AREA
APPENDIX B - FEASIBILITY STUDY

GENERAL ELECTRIC - MAIN PLANT
SCHENECTADY, NEW YORK

Parameter	Value	Units	Source
Groundwater Velocity (V)	98	ft/year	Site data
Longitudinal dispersion (ALX)	20	feet	assumed
Transverse Dispersion - horizontal (ALY)	0.8	feet	assumed
Transverse Dispersion - vertical (ALZ)	0.2	feet	assumed
Diffusion Coefficient (D*)	0	ft2/yr	assumed
Aquifer Thickness (THICK)	60	feet	Site data
Contaminant Decay Rate (CLAMDA)	0.24	1/yr	Site data
Retardation Factor (R)	2.1	--	Site data
Source Width (WIDTH)	80	feet	Site data
Bottom of Source (Z1)	35	feet	Site data
Top of Source (Z2)	45	feet	Site data
Number of Source Intervals (NINT)	2	--	
Starting Time (1st Interval)	0	years	
Ending Time (1st Interval)	50	years	
Concentration (1st Interval)	369000	ug/L	
Starting Time (2nd Interval)	50	years	
Ending Time (2nd Interval)	100	years	
Concentration (2nd Interval)	0	ug/L	
Output Information			
Number of Observation Points (NOBS)	20	--	
XYZ (Location 1)	120,-80,45	feet	DM-436S
XYZ (Location 2)	120,-80,25	feet	DM-436I
XYZ (Location 3)	120,-80,5	feet	DM-436D
XYZ (Location 4)	200,40,45	feet	DM-437S
XYZ (Location 5)	200,40,25	feet	DM-437I
XYZ (Location 6)	200,40,5	feet	DM-437D
XYZ (Location 7)	290,170,45	feet	DM-438S
XYZ (Location 8)	290,170,25	feet	DM-438I
XYZ (Location 9)	290,170,5	feet	DM-438D
XYZ (Location 10)	440,50,45	feet	DM-432CF
XYZ (Location 11)	440,50,25	feet	DM-432I
XYZ (Location 12)	440,50,5	feet	DM-432D
XYZ (Location 13)	1000,20,40	feet	GW-109-6
XYZ (Location 14)	50,70,45	feet	CGW-109-1
XYZ (Location 15)	0,0,45	feet	x=-20 (source)
XYZ (Location 16)	70,0,45	feet	x=50
XYZ (Location 17)	120,0,45	feet	x=100
XYZ (Location 18)	270,0,45	feet	x=250
XYZ (Location 19)	520,0,45	feet	x=500
XYZ (Location 20)	770,0,45	feet	x=750
XYZ (Location 21)	1020,0,45	feet	x=1000

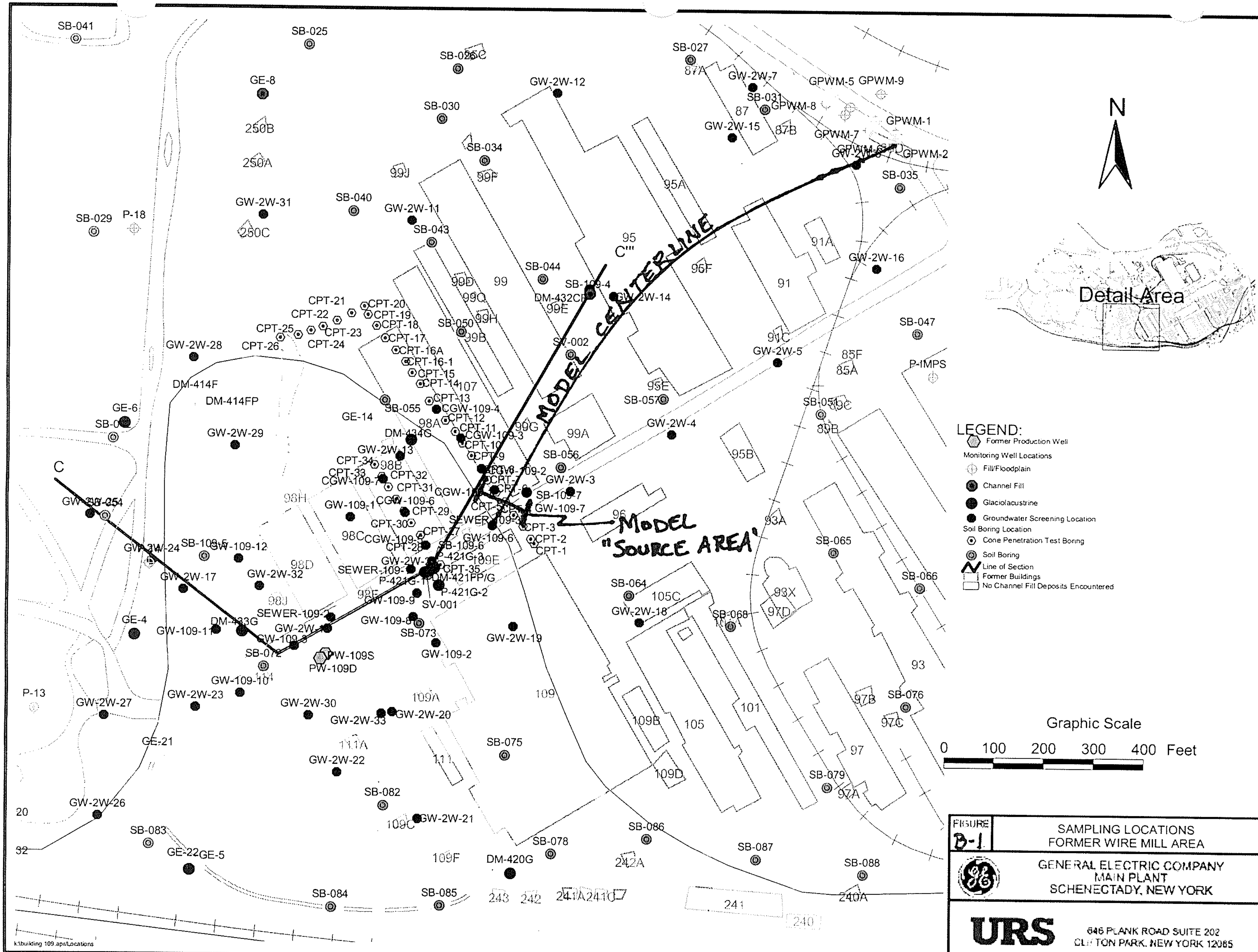
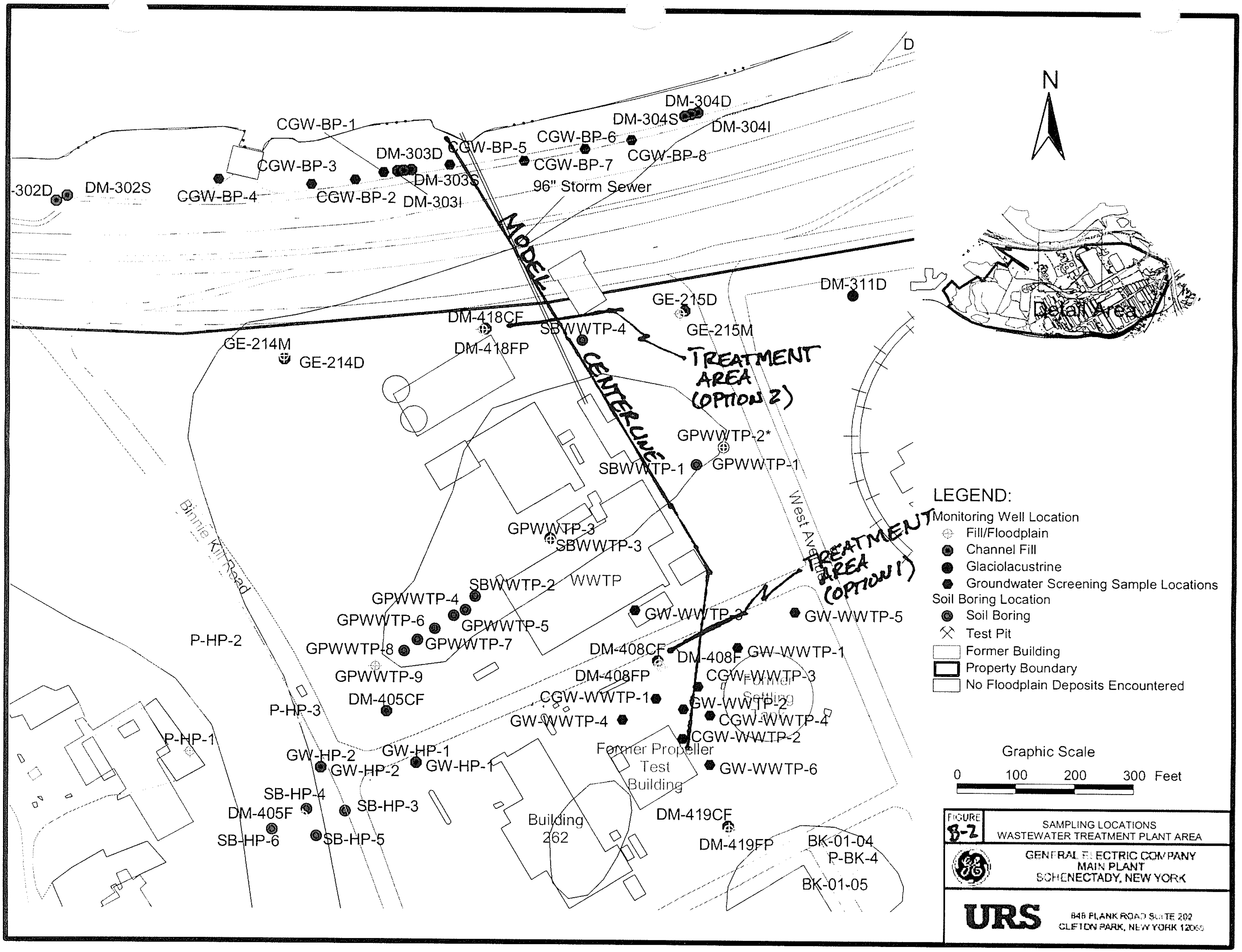


FIGURE B-1

SAMPLING LOCATIONS
FORMER WIRE MILL AREA

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS
646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065



N
DM-304D
DM-304S
DM-304I
CGW-BP-1
CGW-BP-6
CGW-BP-5
CGW-BP-8
DM-303D
CGW-BP-7
CGW-BP-3
DM-303S
96" Storm Sewer
-302D
DM-302S
CGW-BP-4
CGW-BP-2
DM-303I
MODEL CENTERLINE
DM-311D
GE-215D
DM-418CF
GE-215M
SBWWTP-4
GE-214M
DM-418FP
GE-214D
TREATMENT AREA (OPTION 2)
GPWWTP-2*
SBWWTP-1
GPWWTP-1
West Avenue
Binnie Kill Road
GPWWTP-3
SBWWTP-3
TREATMENT AREA (OPTION 1)
SBWWTP-2
WWTP
GPWWTP-4
GPWWTP-6
GW-WWTP-3
GW-WWTP-5
GPWWTP-5
P-HP-2
GPWWTP-8
GPWWTP-7
DM-408CF
GW-WWTP-1
DM-408F
GPWWTP-9
DM-408FP
CGW-WWTP-3
Former Settling
DM-405CF
CGW-WWTP-1
P-HP-3
GW-WWTP-2
GW-WWTP-4
CGW-WWTP-4
CGW-WWTP-2
P-HP-1
Former Propeller Test Building
GW-HP-2
GW-HP-1
GW-HP-2
GW-HP-1
GW-WWTP-6
SB-HP-4
SB-HP-3
DM-405F
Building 262
DM-419CF
SB-HP-6
SB-HP-5
DM-419FP
BK-01-04
P-BK-4
BK-01-05
Detail Area
LEGEND:
Monitoring Well Location
Fill/Floodplain
Channel Fill
Glaciolacustrine
Groundwater Screening Sample Locations
Soil Boring Location
Soil Boring
Test Pit
Former Building
Property Boundary
No Floodplain Deposits Encountered
Graphic Scale
0 100 200 300 Feet
FIGURE 8-2
SAMPLING LOCATIONS
WASTEWATER TREATMENT PLANT AREA
GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK
URS
848 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065

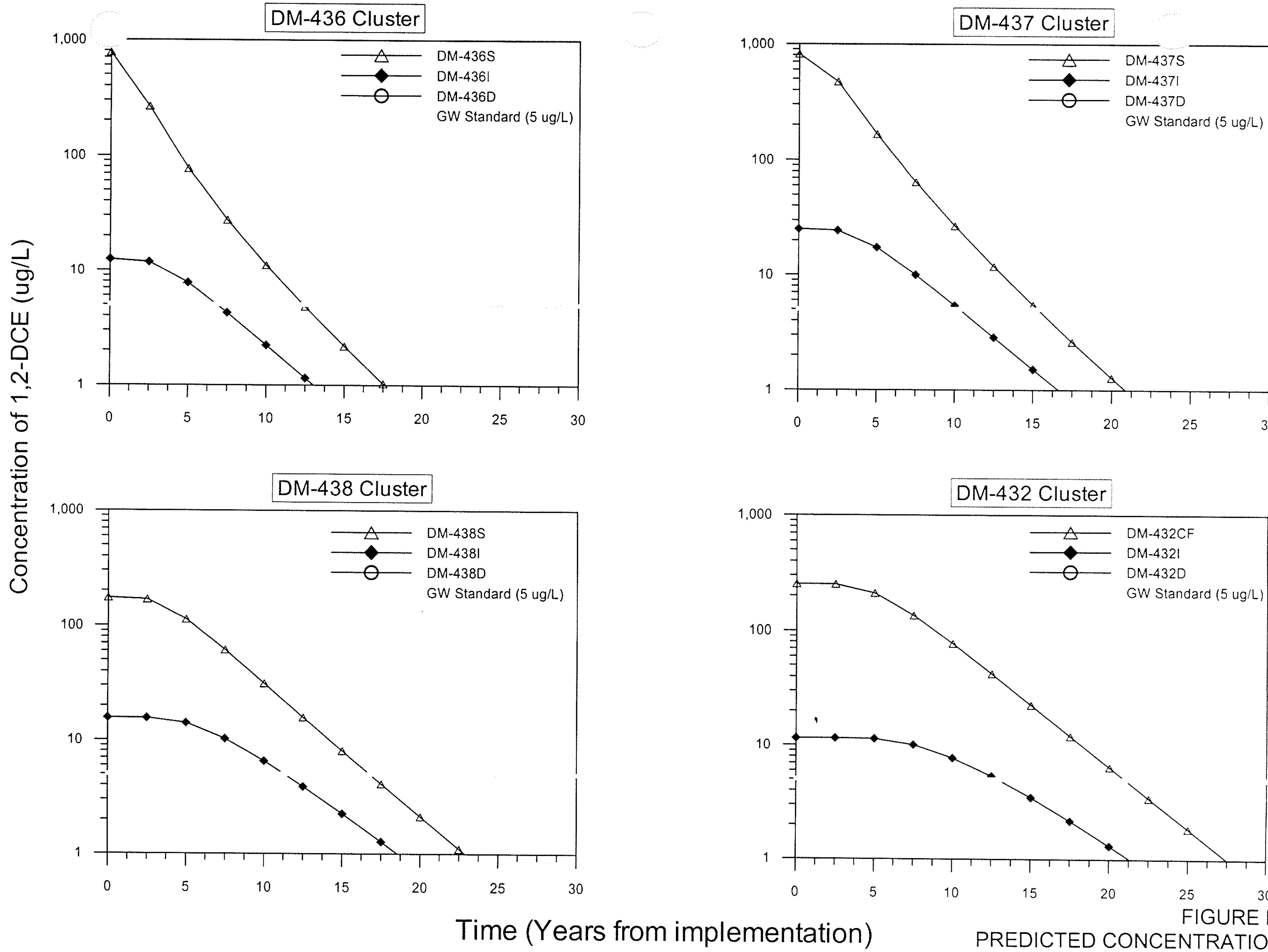


FIGURE B-3
PREDICTED CONCENTRATIONS
AT MONITORING WELLS
FORMER WIRE MILL AREA

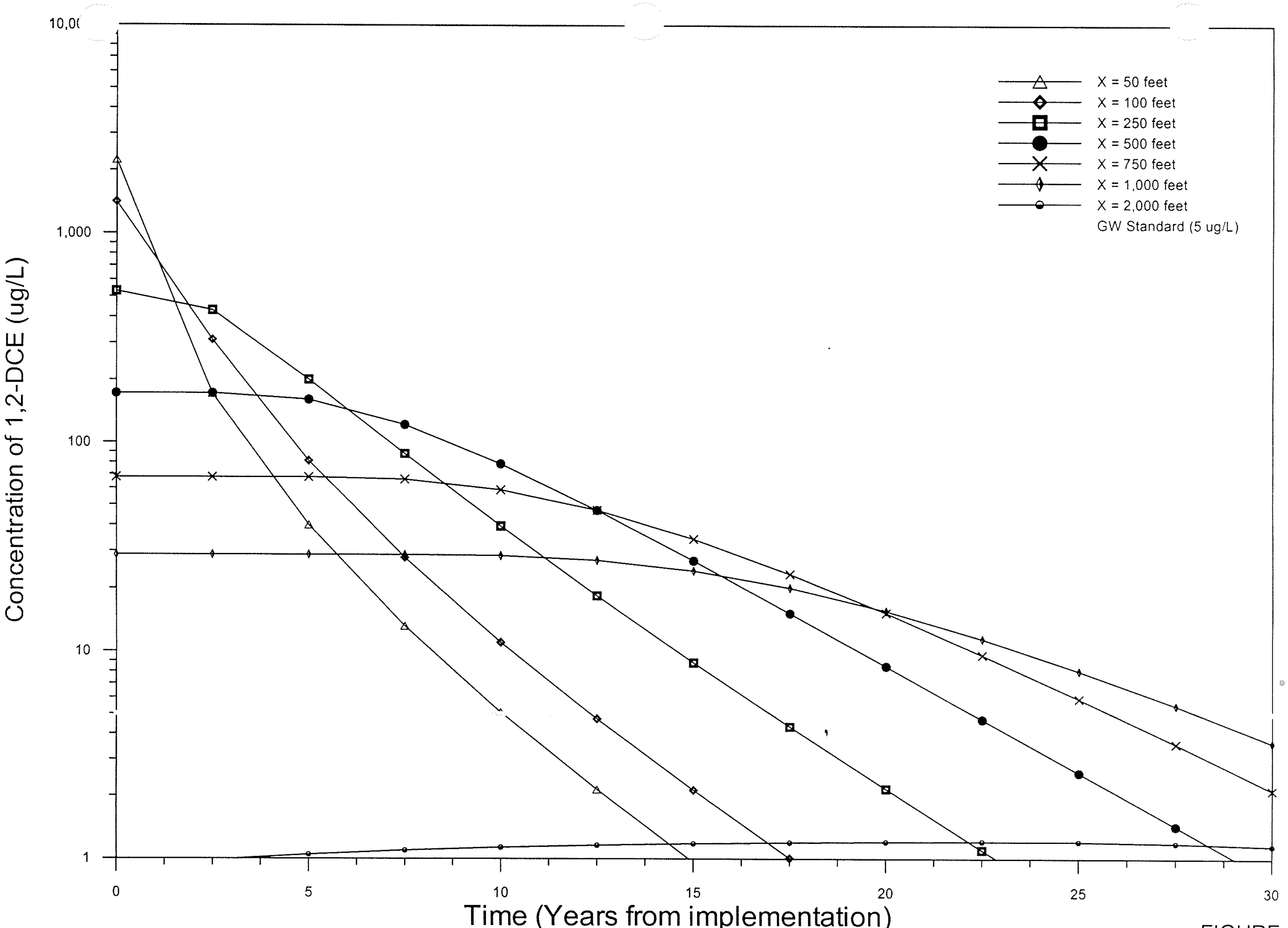


FIGURE B-4
PREDICTED CONCENTRATIONS
ALONG CENTERLINE
FORMER WIRE MILL AREA

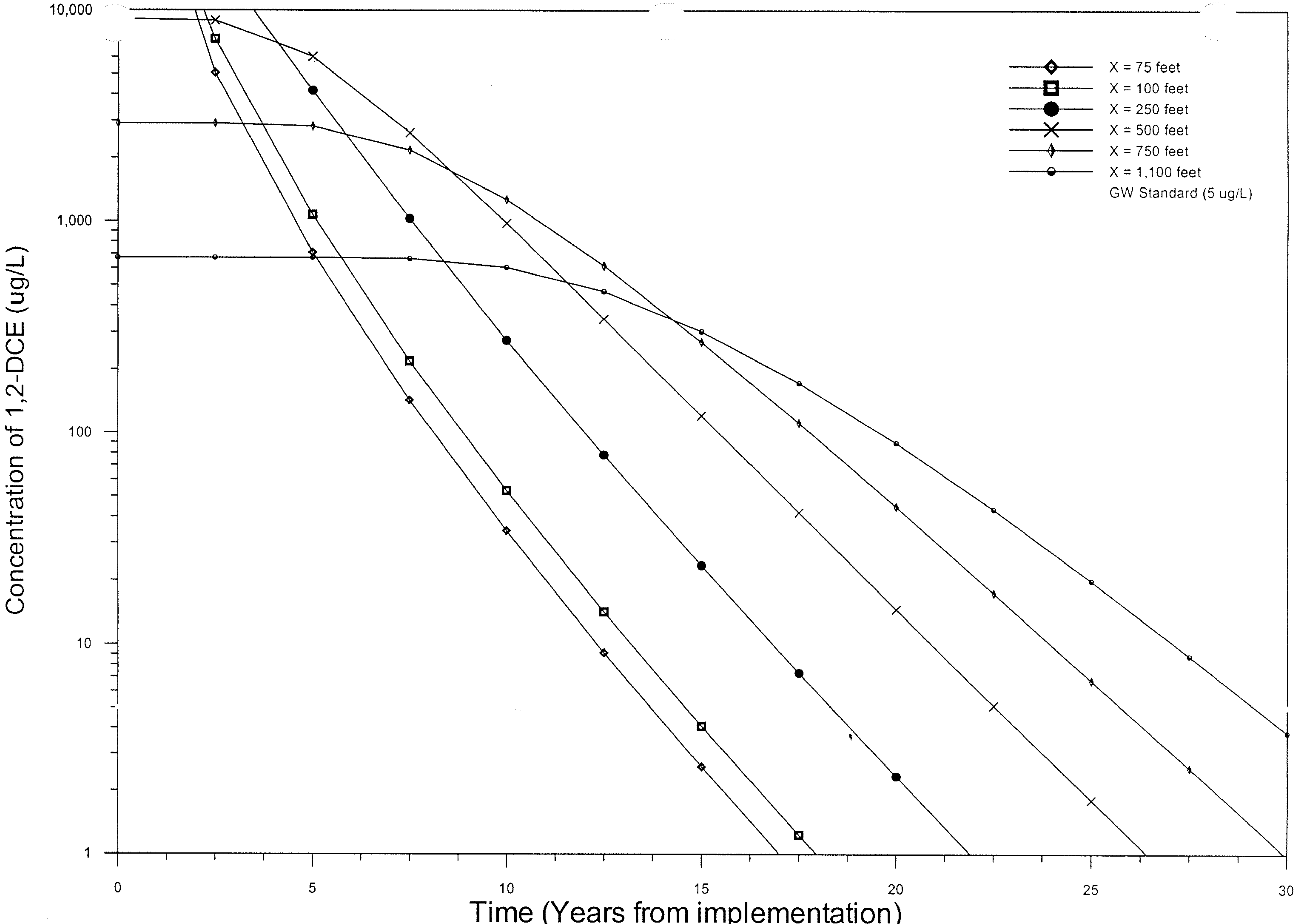


FIGURE B-5
PREDICTED CONCENTRATIONS
ALONG CENTERLINE
WASTER WATER TREATMENT PLANT AREA

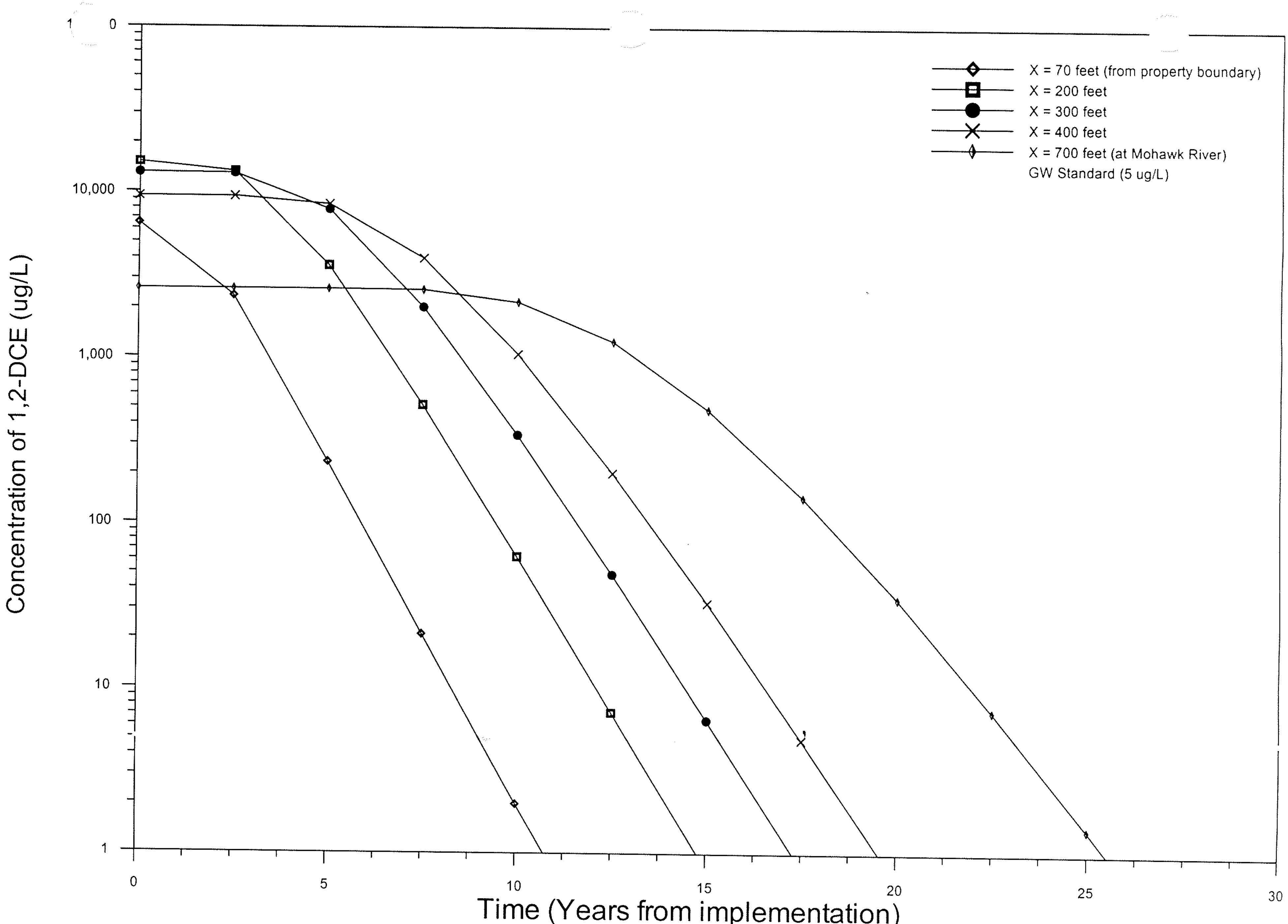


FIGURE B-6
PREDICTED CONCENTRATIONS ALONG CENTERLINE
PROPERTY LINE BARRIER WALL
WASTER WATER TREATMENT PLANT AREA