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GENERAL ELECTRIC, PITTSFIELD, MASSACHUSETTS

FINAL CORRECTIVE ACTION PERMIT

AND

RESPONSIVENESS SUMMARY

February 8, 1991

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

February 8, 1991

Ronald Desgroseilliers, Manager
Area Environmental & Facility Programs
General Electric Company
100 Woodlawn Avenue
Pittsfield, MA 01201

Dear Mr. Desgroseilliers:

The U.S. Environmental Protection Agency, Region I, is issuing a RCRA Corrective Action Permit to General Electric Company, Pittsfield, MA, in accordance with the provisions of the Hazardous and Solid Waste Amendments of 1984 (HSWA) which amend the Resource Conservation and Recovery Act (RCRA).

This Permit requires General Electric Company to conduct certain activities at its facility in accordance with sections 3004(u), 3004(v), 3005(c), and 3005(h) of RCRA as amended by HSWA as specified by the conditions set forth in this Permit.

EPA has identified areas of the General Electric Facility where releases of hazardous wastes or hazardous constituents have occurred or are suspected to have occurred. This Corrective Action Permit requires General Electric Company to investigate these releases and to propose remedies.

General Electric Company has thirty (30) days upon issuance of this Permit to petition for review of any permit condition commented upon during the Public Comment Period. You should refer to 40 Code of Federal Regulations Section 124.19 for procedures for the appeal of RCRA permits.

If you have any questions regarding the issuance of this Permit you may contact Mary Garren, of my staff, at (617) 573-9613.

Sincerely,

Merrill S. Hohman, Director
Waste Management Division

Enclosures

cc: Steven Joyce, MA DEP (w/ enclosures)
Charles Fredette, CT DEP (w/ enclosures)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

PRESS RELEASE/PUBLIC NOTICE

EPA ISSUES FINAL CORRECTIVE ACTION PERMIT TO GENERAL ELECTRIC FACILITY, PITTSFIELD, MA

Mary Garren, Waste Management Division, (617) 573-9613

For immediate release: February 8, 1991

BOSTON -- The U.S. Environmental Protection Agency (EPA) has issued the final corrective action permit to the General Electric Company of Pittsfield, Massachusetts requiring the company to assess hazardous waste contamination on and off its property.

The final permit is being issued along with EPA's responsiveness summary, a document summarizing and responding to all significant public comments received on the draft permit and detailing any changes made between the draft and final permits. The permit requires the company to conduct detailed investigations of areas that are known or suspected of being contaminated, including the adjacent Housatonic River and Silver Lake. The company is also being required to investigate and propose measures to clean up contaminated areas. All investigations are subject to EPA review and approval.

The final permit now specifies thirteen Interim Measures, requirements designed to address areas in need of immediate corrective action to protect human health or the environment. Three new Interim Measures, that were not previously included in the draft permit, have been added to the final permit in response to public comment. They are: 1) requiring GE to develop a proposal for preventing downstream transport of PCB-contaminated sediment past Rising Pond Dam; 2) requiring GE to perform an inventory of the stability and safety of the dams along the Housatonic River; and, 3) requiring GE to perform public outreach along the Housatonic River to publicize the fishing advisories to people who do not speak English or do not purchase a fishing license. All the Interim Measures previously included in the draft permit remain in the final permit.

The EPA permit is implemented under the 1984 Federal Hazardous and Solid Waste Amendments (HSWA) of the Resource Conservation and Recovery Act. HSWA authorizes EPA to require facilities that treat, store and/or dispose hazardous wastes to take comprehensive corrective action for releases into the environment.

General Electric has owned the Pittsfield site since 1903. The property slopes towards the Housatonic River and includes portions of the river's

- more -

floodplain. Unkamet Brook flows through the site and empties into the Housatonic River.

Hazardous wastes, including PCBs, were generated as a result of manufacturing processes and were disposed of in a variety of ways both on and off-site.

Within 30 days after the date of issuance of this final permit, any person who has filed comments on the draft permit or participated in the public hearing held on June 12, 1990 may petition the Administrator of EPA to review any condition of the permit decision. Any person who failed to file comments or failed to participate in the public hearing on the draft permit may petition for administrative review only to the extent of the changes from the draft to the final permit. Refer to 40 C.F.R. § 129.19(a)(1) for the information to be included in such a petition.

The final permit and related documents are available for public review at the following locations:

- Massachusetts Department of Environmental Protection
  Springfield, MA
  Contact: Richard Green, (413) 784-1100

- Connecticut Department of Environmental Protection
  Hartford, CT
  Contact: Charles Fredette, (203) 566-2588

- Berkshire Athenaeum
  Pittsfield, MA
  Contact: Phyllis Zack, (413) 499-9488

- Lenox Library
  Lenox, MA
  Contact: Denis Lesieur, (413) 637-0197

- Berkshire County Regional Planning Commission
  Pittsfield, MA
  Contact: Karl Heckler, (413) 442-1521

- Housatonic Valley Association
  Cornwall Bridge, CT
  Contact: Lynn Werner, (203) 672-6678

- end -

Appendix I: Location of SWMUs at General Electric

Appendix II: Scope of Investigation

APPENDIX II

SCOPE OF INVESTIGATION
GENERAL ELECTRIC PITTSFIELD, MA

AREA 1 SWMUs	Air	Soil	Subsurface Gas	Surface Runoff	Surface Water	Ground-Water	Integrity
G-11, G-12		X	X	X	X	X	
0-B, 0-8, 0-41, G-17							X
0-45, 0-2, 0-A, T-EEE, T-FFF, P-D thru P-L							X
P-4		X				X	
O-M		X				X	
Underground Pipes including Stormwater and Sewer Pipes, Tunnels and Other Preferential Pathways			Potentially All Media				
AREA 2 SWMUs							
G-5	X	X	X	X		X	
T-40		X				X	
Underground Pipes including Stormwater and Sewer Pipes, Tunnels and Other Preferential Pathways			Potentially All Media				
AREA 3 SWMUs							
T-19, T-26, T-W thru T-NN							X
T-9, T-61		X				X	
T-50		X				X	
Underground Pipes including Stormwater and Sewer Pipes, Tunnels and Other Preferential Pathways			Potentially All Media				
AREA 4 SWMUs							
G-20*		X			X	X	
G-13, G-14, G-15, G-16							X

APPENDIX II (continued)

AREA 4 (Cont'd) SWMUs	Air	Soil	Subsurface Gas	Surface Runoff	Surface Water	Ground-Water	Integrity
G-7	X	X	X			X	
G-8		X	X			X	
G-1, G-10		X				X	
T-D		X				X	
T-2, T-0 thru T-V, T-00 thru T-DDD, T-GGG thru T-QQQ							X
T-23		X				X	
T-5		X				X	
T-65**							X
G-2		X				X	X
T-42							X
T-63		X				X	
T-6		X				X	
Underground Pipes Including Stormwater and Sewer Pipes, Tunnels and Other Preferential Pathways				Potentially All Media			
AREA 5 SWMUs							
G-6, G-21		X	X			X	
AREA 6							
Housatonic River*		X			X		

* Sediment sampling is also required.
** Description of effluent management is also required.

PERMIT UNDER THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

In compliance with the provisions of the Hazardous and Solid Waste Amendments of 1984 (HSWA), which amend the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq.

General Electric Company
100 Woodlawn Avenue
Pittsfield, Massachusetts 01201-3698
EPA ID No. MAD002084093

The Permittee is required to conduct certain activities at the Facility located at Pittsfield, Massachusetts, in accordance with Sections 3004(u), 3004(v), 3005(c) and 3005(h) of the Resource Conservation and Recovery Act as amended by the Hazardous and Solid Waste Amendments of 1984, as specified in the conditions set forth herein.

Date, 2/8/91

Signed,

Merrill S. Hohman, Director
Waste Management Division
U.S. Environmental Protection Agency, Region I
Boston, MA 02203-2211

This Permit shall become effective on February 11, 1991.

This Permit shall expire on February 11, 2001.

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DEFINITIONS

All terms used in this Permit are as defined in 40 C.F.R. Part 260 and Section 264.141, unless defined below:

1. "Act" or "RCRA" means the Resource Conservation and Recovery Act as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §§ 6901 et seq.

2. "Appendix IX" means Appendix IX to 40 C.F.R. Part 264 as amended. See 52 Federal Register 25942 (July 9, 1987) (Final Rule).

3. "Background" for any particular media (i.e., groundwater, surface water and sediments, soil, air, and subsurface gas) shall mean a representative sample of that media that has not been affected by the Facility and is upgradient of any zone(s) of contamination.

4. "Director" means the Director of the Waste Management Division for the EPA Region I or his/her designee.

5. "Exposure Point Concentration" is the concentration of chemical or physical agent at the location of potential contact with an organism and/or environmental system.

6. "Facility" means all contiguous land, and structures, other appurtenances, and improvements on the land, under the control of the owner or operator on November 8, 1984, on which units subject to permitting are located.

7. "Groundwater" means water below the land surface.

8. "Hazardous Constituents" include those constituents listed in Appendix VIII to 40 C.F.R. Part 261 and Appendix IX to 40 C.F.R. Part 264.

9. "Hazardous Substance" means (A) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act, (B) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA, (C) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of RCRA (but not including any waste the regulation of which under RCRA has been suspended by Act of Congress), (D) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act, (E) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 7 of the Toxic Substances Control Act.

10. "Hazardous Waste" means a solid waste or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may:

    (A) cause, or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or

    (B) pose a substantial present or potential hazard to human health and/or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

11. "Health-Based Criteria" shall refer to those health-based standards that, in order of preference, have been either promulgated by EPA in regulation form, adopted by EPA in guidance form, or deemed acceptable by the Director.

12. "HSWA" means the Hazardous and Solid Waste Amendments of 1984.

13. "Justify" of "Justification" means to support the recommendation or conclusion which is being put forth with scientific principles and/or supporting data, as appropriate.

14. "Lithologic Unit" means a layer of unconsolidated sediment or consolidated rock.

15. "Log" means a record of data gathered while observing the installation of borings, piezometers, observation wells or monitoring wells.

16. "Monitoring Well" means a well capable of producing groundwater samples that, upon laboratory analysis, can provide a reliable indication of groundwater quality.

17. "Observation Well" means a well used to measure water table elevations.

18. "Piezometer" means a small diameter, non-pumping well with a screen length of less than or equal to five feet, which is used to measure hydraulic head at some depth below the water table.

19. "Piezometer Cluster" means a cluster of piezometers including at least one piezometer placed in each lithographic unit of hydrogeologic interest.

20. "Point of Exposure" means a location of potential contact between an organism and/or an environmental system and a chemical or physical agent.

21. "Pump Test" means a test made by pumping a well for a period of time and observing the change in hydraulic head in adjacent wells, to determine the hydraulic characteristics of a lithologic unit.

22. "Qualified Geologist" means a professional (i.e., by degree or certification) specializing in the study of earth material science (e.g., hydrogeologist or geotechnical engineer).

23. "Release" includes any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.

24. "Saturated Zone" or "Zone of Saturation" means that part of the earth's crust in which all voids are filled with water.

25. "Slug Test" means a test made by pouring a small instantaneous charge of water into a well or by withdrawing a small instantaneous charge of water from the well and monitoring the time the well requires to return to static water level condition. The test is used to determine the hydraulic conductivity of the lithologic unit.

26. "Solid Waste" means a solid waste as defined in 40 C.F.R. § 261.2.

27. "Surface Water" means water occurring immediately adjacent to land as overland flow, open channel flow, closed conduit flow and waters in lakes, ponds, reservoirs, estuaries and oceans.

28. "Solid Waste Management Unit (SWMU)" is defined as any unit at the Facility which contains or contained solid and/or hazardous waste, from which hazardous waste and/or hazardous constituents might migrate, irrespective of whether the unit was intended for the management of solid and/or hazardous wastes. Examples of SWMUs include: landfills, surface impoundments, waste piles, land treatment units, incinerators, injection wells, tanks (including 90-day accumulation tanks), container storage areas, transfer stations, and waste recycling operations. A solid waste management unit may include areas at the Facility which have become contaminated as a result of routine or systematic releases of hazardous waste and/or hazardous constituents.

29. "Unsaturated Zone" or "Zone of Aeration" means the zone between the land surface and the saturated zone.

30. "Uppermost Aquifer" means the geological formation nearest the natural ground surface that is an aquifer, as well as all lower water-bearing units that are hydraulically interconnected with it, and overlying or perched water-bearing zones.

31. "Well Development" means a process employed to restore the natural hydraulic conductivity to a geologic formation after the installation of a monitoring well, to ensure that any sample taken from that well provides a reliable indication of groundwater quality.

32. "Zone of Contamination" means the three-dimensional extent of contamination that was produced or is being produced from a release of hazardous waste and/or hazardous constituents from solid waste management units. This zone includes solid waste management units and their associated contamination.

PART I - GENERAL PERMIT CONDITIONS

The Permittee shall comply with the following general conditions pursuant to HSWA, and 40 C.F.R. Parts 124 and 270. These general conditions also apply to the requirements in the Special Permit Conditions of the Permit.

Duty to Comply

1. The Permittee shall comply with all conditions of this Permit, except that the Permittee need not comply with the conditions of this Permit to the extent and for the duration that such noncompliance is authorized by an emergency permit (See 40 C.F.R. § 270.61). For purposes of enforcement, compliance with this Permit during its term constitutes compliance with Sections 3004(u), 3004(v), 3005(c), and 3005(h) of the Act. The Permittee is also required to comply with 40 C.F.R. Parts 260, 261, 262, and 263, to the extent the requirements of those Parts are applicable. The Permittee must also comply with all applicable self-implementing provisions imposed by the RCRA Statute or regulations promulgated thereunder, including the Part 268 regulations. Any noncompliance with the Permit, except under the terms of an emergency permit, constitutes a violation of the Act and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a Permit renewal application.

Duty to Reapply

2. If the Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee shall apply for and obtain a new permit.

Duty to Mitigate

3. In the event of noncompliance with the Permit, the Permittee shall take all reasonable steps to minimize releases of hazardous waste and/or hazardous constituents to the environment, and shall carry out such measures as are reasonable to prevent its noncompliance from having significant adverse impacts on human health and/or the environment.

Need to Halt or Reduce Activity

4. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

Proper Operation and Maintenance

5. At all times the Permittee shall properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures.

Permit Actions

6. This Permit may be modified, revoked and reissued, or terminated for cause as specified in 40 C.F.R. §§ 270.41, 270.42, and 270.43. The filing of a request by the Permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

Property Rights

7. The issuance of this Permit does not convey any property rights of any sort, or any exclusive privilege to the Permittee.

8. The issuance of this Permit does not authorize any injury to persons or property or invasion of other private rights.

Duty to Provide Information

9. Within a reasonable time, the Permittee shall furnish to the Director any relevant information which the Director may request to determine whether cause exists for modifying, revoking and reissuing or terminating this Permit, or to determine compliance with this Permit. Upon request, the Permittee shall also furnish to the Director copies of records required to be kept or prepared by this Permit.

10. All information which the Permittee furnishes to the Director, either in the form of a request or a report pursuant to this Permit shall contain all sources from which the information was obtained.

Inspection and Entry

11. The Permittee shall allow the Director or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

    a. Enter at reasonable times upon the Permittee's premises where the regulated Facility or activity is located or conducted or where records must be kept under the conditions of this Permit;

    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

    d. Sample or monitor at reasonable times, for the purpose of assuring Permit compliance or as otherwise authorized by RCRA, any substance or parameters at any location.

Monitoring and Records

12. Samples and measurements taken for the purpose of waste analysis shall be representative of the waste to be analyzed. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from Appendix I of 40 C.F.R. Part 261. Laboratory methods must be those from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 (Third edition or any updated version).

13. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

14. The Permittee and the Permittee's contractors shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time. The Permittee shall maintain records from all groundwater monitoring activities for the active life of the Facility and for disposal facilities for the post-closure care period as well.

15. Records of data obtained through monitoring shall include:

    a. The date, exact place, and time of sampling or measurements;

    b. The individual(s) who performed the sampling or measurements;

    c. The raw data collected and data reduction;

    d. The date(s) analyses were performed;

    e. The individual(s) who performed the analyses;

    f. The analytical techniques or methods used;

    g. The result of analyses; and

    h. The quality assurance/quality control data.

Signatory Requirements

16. All applications, reports or other information required by this Permit or requested by the Director shall be signed and certified in accordance with 40 C.F.R. § 270.11.

Notice of Planned Changes

17. The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the Facility covered by this Permit.

Notice of Anticipated Noncompliance

18. The Permittee shall give advance notice to the Director of any planned changes in any activity which may result in noncompliance with the requirements of this Permit. The Permittee may not treat, store, or dispose of hazardous waste in a modified portion of the Facility, until:

    a. The Permittee has submitted to the Director a letter by certified mail or in-hand delivery, signed by the Permittee and a registered professional engineer, stating that the Facility has been modified in compliance with the Permit; and

    b. The Director has inspected the modified Facility and finds it is in compliance with the conditions of the Permit; or more than fifteen (15) days have elapsed since the date of submission of the letter in Permit

Condition I.18.a. and the Permittee has not received notice from the Director of his/her intent to inspect.

Transfer of Permit

19. This Permit shall not be transferred to a new owner or operator except after notice of the planned transfer is provided to the Director, who may require that the Permit be modified or revoked and reissued.

Twenty-Four-Hour Reporting and Follow-Up

20. The Permittee shall report to the Director any noncompliance which may endanger human health and/or the environment. Any information shall be provided orally within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. The Permittee shall supply the Director with the following data:

    a. Information concerning the release of any hazardous waste and/or hazardous constituent that may cause an endangerment to public drinking water supplies; and

    b. Any information of a release or discharge of hazardous waste and/or hazardous constituent, or of a fire or explosion from a hazardous waste management facility, which could threaten the environment and/or human health outside the Facility.

    The description of the occurrence and its cause shall include:

    (1) The name, address, and telephone number of the owner or operator;

    (2) The name, address, and telephone number of the Facility;

    (3) The date, time, and type of incident;

    (4) The name and quantity of material(s) involved;

    (5) The extent of injuries, if any;

    (6) An assessment of actual or potential hazards to human health and/or the environment outside the Facility, where applicable;

    (7) Any steps taken to minimize the impact of the release to the environment;

    (8) The estimated quantity and disposition of recovered material that resulted from the incident; and

    (9) The estimated time delay of any activity occurring under this permit as a result of the incident or any other effect the incident may have on an activity occurring under this permit.

21. A written submission shall also be provided within five (5) days of the time the Permittee becomes aware of the circumstances of the noncompliance. The written submission shall contain a description of the noncompliance, and its cause; the period of noncompliance including exact dates and times, and if the noncompliance has not be corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

22. The Permittee need not comply with the five (5)-day written notice requirement in condition 21 above if the Director waives that requirement and the Permittee submits a written report within fifteen (15) days of the time the Permittee becomes aware of the circumstances.

Other Notification and Reporting Requirements

23. The Permittee shall report all other instances of noncompliance not reported under the above paragraphs at the time monitoring reports are submitted. The reports shall contain the information listed in condition 20 above.

24. When the Permittee becomes aware that it failed to submit any relevant facts in a required report, or submitted incorrect information in a required report to the Director, it shall promptly submit the correct facts or information.

Computation of Time

25. For the purpose of compliance with this Permit, computation of time periods shall be made by the methodology specified in 40 C.F.R. § 124.20.

26. Where this Permit requires the submission of written reports or notification to the Director, the report or notification shall be deemed submitted on the post-marked date.

Severability

27. The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstances is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby.

State Laws

28. Nothing in this Permit shall be construed to prohibit any State or political subdivision thereof from imposing any requirements, including those for site selection, which are more stringent than those imposed by this Permit.

Confidentiality of Information

29. In accordance with 40 C.F.R. Part 2, any information submitted to the Director pursuant to this Permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "Confidential Business Information" on each page containing such information. If no claim is made at the time of submission, the Director may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 C.F.R. Part 2.

Waste Minimization

30. Within thirty (30) days of the effective date of this Permit and at least annually thereafter, the Permittee shall include a certification of the following in its written operating record kept at the Facility:

a. That, as a generator of hazardous waste, the Permittee is implementing a program to reduce the volume or quantity and toxicity of such hazardous waste to the degree which is economically practicable; and

b. That the method the Permittee uses to treat, store or dispose of its hazardous waste is that practicable method which minimizes the present and future threat to human health and/or the environment.

PART II - SPECIAL PERMIT CONDITIONS

The following Special Permit Conditions are imposed upon the Permittee pursuant to the provisions of HSWA and 40 C.F.R. § 264.90 and § 264.101.

The General Electric - Pittsfield Facility shall fully comply with all provisions of this Permit.

A. RCRA Facility Investigation (RFI) Proposal

Within 120 calendar days of the effective date of this Permit, the Permittee shall submit a RCRA Facility Investigation (RFI) Proposal for the review and approval of the Director. The RFI Proposal shall detail the methodology for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the solid waste management units (SWMUs) into the groundwater, soils, subsurface gas, surface waters and sediments, and air, including the surface waters, sediments and soils of the Housatonic River, Silver Lake and their 100-year floodplains. A map of the Facility indicating the locations of SWMUs is included as Appendix I. The specific media that shall be addressed for each SWMU are set out in Special Permit Conditions II.A.1. through II.A.6. A table indicating the scope of investigations for each SWMU and the specific SWMUs included in each area defined below is included as Appendix II. The methodology also shall be designed to gather the preliminary information necessary to select and design corrective measures for all releases from the SWMUs. At a minimum, this Proposal shall meet the requirements established in this Permit for the following areas of the Facility (See Map-Appendix I):

Area 1: Ordnance and Plastics Divisions, East and West of Plastics Avenue

This area includes all GE property east of Plastics Avenue and south of Dalton Avenue, and all surrounding properties to which releases of hazardous waste and/or hazardous constituents originating on GE property in this area are migrating and/or have migrated, including but not limited to Unkamet Brook and the property south of Merrill Road.

This area also includes all SWMUs associated with Buildings OP-1 and OP-2, and is bounded to the north by California Avenue, to the east by Plastics Avenue, and to the south by Merrill Road.

Area 2: SWMU G-5: Building 78 Landfill - Gas Plant Site

This is the area which includes Unit G-5 and surrounding areas to which releases of hazardous waste and/or hazardous constituents from the unit may be migrating and/or may have migrated.

Area 3: East Street - Area 1 and Transformer Division - East Area

East Street - Area 1: This is the area defined by GE as "East Street Area 1" in its ongoing oil recovery program. It is essentially the east section of the plant and extends south to the Housatonic River and to surrounding areas to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

Transformer Division - East Area: This area is bounded to the north by Tyler Street, to the east by New York Avenue, to the south by East Street, and to the west by Woodlawn Avenue and extends to surrounding areas to

which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

Area 4: Includes three areas described below:

East Street - Area 2: This is the area defined by GE as "East Street - Area 2" in its ongoing oil recovery program. It is bounded to the north by East Street, to the east by Area 3 (East Street - Area 1), and to the south by the Housatonic River and extends to surrounding areas to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

Transformer Division - West Area: This area includes all of the Facility west of Woodlawn Avenue and north of East Street, including the discharge points for and areas affected by all outfalls from the Facility into Silver Lake and extends to surrounding areas to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

Area West of "East Street - Area 2": This area encompasses all of the Facility property south of East Street and immediately west of GE's designated "East Street - Area 2" to the banks of Silver Lake. East Street - Area 2 extends to surrounding areas to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

Area 5: SWMU G-6 (Newell Street-GE Parking Lot Site) and SWMU G-21 (Lyman Street - GE Parking Lot Site)

This area includes SWMU G-6 and SWMU G-21 and surrounding areas to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated. Both SWMU G-6 and SWMU G-21 are former oxbow or marsh areas which have been filled with solid waste and debris. Investigations to date indicate wastes containing hazardous constituents have been disposed of in the area.

Area 6: Housatonic River and Silver Lake

This area includes all sediments, surface waters and soils of the Housatonic River and Silver Lake, including the 100-year floodplain, to which releases of hazardous waste and/or hazardous constituents originating on GE property are migrating and/or have migrated.

1. RFI Requirements for Area 1 (Ordnance and Plastics Divisions, East and West of Plastics Avenue)

   a. Preliminary Investigation of Corrective Measures

      The RFI Proposal shall identify the potential corrective measure technologies that may be used on-site and/or off-site to contain, treat, remedy, and/or dispose of the contamination resulting from the release of hazardous waste and/or hazardous constituents from the SWMUs and other sources in Area 1. This Preliminary Investigation shall summarize all prior investigations performed by or available to the Permittee and identify all existing data gaps and field data that needs to be collected during implementation of the RFI to facilitate the technical evaluation and selection of the corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

b. Identification of Additional SWMUs and/or Media of Concern in Area 1

The RFI Proposal shall include procedures to identify and describe any additional SWMUs and/or media of concern which are present in this area. The description of additional SWMUs shall include, at a minimum:

(1) Description of each SWMU and/or media, and location on a map;

(2) Period of operation of each SWMU;

(3) Description of wastes managed in each SWMU and/or media;

(4) Release controls for each SWMU;

(5) History of releases from each SWMU and/or media; and

(6) Any environmental data which has been collected for each SWMU and/or media.

The RFI Proposal shall include specific measures and schedules to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from additional SWMUs and/or to additional media, identified during the course of the RFI.

c. Environmental Setting

The RFI Proposal shall include a proposed study to characterize the environmental setting in Area 1 with respect to soils, ground water, surface waters and sediments, subsurface gas, and air. In the proposed study, the Permittee shall document the methodology to be used in obtaining the data necessary to provide the information required in the RFI Report, as detailed in Special Permit Condition II.G. The environmental setting section shall use procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and at a minimum shall include the following:

(1) Soil/Bedrock Characterization

The Permittee shall include a description and justification of the procedures to gather data sufficient to characterize the subsurface geology around each SWMU.

(2) Procedures for Determining Groundwater Hydraulics

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to characterize the groundwater hydraulics associated with each SWMU. The description shall identify the procedures for establishing the rate and direction of groundwater flow in the horizontal and vertical directions and for determining the areas of groundwater discharge and groundwater recharge. The description shall also identify the procedures for determining variations of groundwater flow rate and direction (i.e., seasonal, temporal, etc.), and the hydraulic properties of each stratum identified in the boring program.

(3) Procedures for Evaluating Surface Waters and Sediments

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to evaluate the surface waters and sediments in and surrounding Area 1. At a minimum, the evaluation shall include a description of the chemistries of the natural surface water and sediments as applicable. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations.

(4) Procedures for Evaluating Climatic Conditions

The Permittee shall include a description and justification of the procedures it intends to use in evaluating climatic conditions that may cause or influence air flow in the vicinity of the Facility.

d. Source Characterization

The RFI Proposal shall include a proposed study to characterize the SWMUs and other sources in Area 1 and the hazardous waste and/or hazardous constituents in these SWMUs and other sources. The proposed study shall document and justify the methodology for obtaining data and drawing conclusions in order to provide the information required in the RFI Report. At a minimum, the proposed study shall include a description of the procedures the Permittee intends to use to identify the hazardous waste and/or hazardous constituents, quantity, physical characteristics, migration/dispersal characteristics, toxicity and chemical composition.

e. Investigation of Individual SWMUs in Area 1

The RFI Proposal shall include specific measures and schedules to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from individual SWMUs in Area 1. Final determination of the extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The RFI Proposal shall characterize the contribution of releases from each source to area-wide groundwater contamination as determined under the investigations defined in Special Permit Condition II.A.1.f. The measures for each SWMU shall be consistent with the RFI Guidance, Interim Final (May, 1989), or any updated version, and shall include, at a minimum, the following:

(1) SWMU G-11 (Interior Landfill) and SWMU G-12 (Former Waste Stabilization Basin)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMUs. Procedures and schedules shall include the

procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal. The rationale shall include consideration of the documented soil contamination at the SWMUs;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Subsurface Gas Investigation Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMUs from the generation of or contamination from subsurface gas, including at a minimum:

i) A description of and justification for the procedures the Permittee proposes to use. This description shall include a provision for identifying any gas(es) found and for determining its (their) nature, the rate of migration, concentration and extent of contamination; and

ii) A description of and justification for the methodology to be used in obtaining data and drawing conclusions.

c) Surface Runoff Characterization Plan

For each SWMU, the RFI Proposal shall include a plan to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents which migrate from the SWMU in surface runoff. At a minimum, the plan shall include:

i) A proposed approach for identifying the most significant (in terms of relative volumetric flow) migration pathways of surface runoff from the SWMU; and

ii) A proposed approach utilizing the RFI Guidance, Interim Final (May, 1989), or any updated version, for sampling surface runoff during storm events along the most significant migration pathways. Runoff which migrates to surface water bodies must be included in the surface water sampling program.

d) Surface Water Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking surface water samples in Area 1 to determine the nature, rate of migration, concentration and extent of contamination from releases of hazardous wastes and/or hazardous constituents. Procedures shall include the following, at a minimum:

i) A map and grid indicating the proposed locations from which surface water samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version shall be included in the RFI Proposal; and

ii) At a minimum, the surface water samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

e) Groundwater Sampling Approach

A groundwater investigation is required for these units. The proposal shall provide for incorporation of these units into the investigation outlined in Special Permit Condition II.A.1.f.

(2) O-B (Building 51 Underground Drainage Pipe), SWMU O-8 (Building 51 Elementary Neutralization Unit), SWMU O-41 (Building OP-3 Metal Treat Area), and SWMU G-17 (Building 119W Oil/Water Separator)

a) Integrity Testing/Inspections

The RFI Proposal shall include specific procedures and schedules for determining the integrity of each SWMU. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. The integrity of SWMU O-B shall be determined by mechanical methods (i.e., tightness testing). For the remaining SWMUs, the integrity may be determined by visual methods (i.e., inspecting the SWMU when it is empty). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing integrity determinations for all SWMUs within ninety (90) days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(3) SWMU O-45 (Building OP-3 Abandoned Storage Tank), SWMU O-2 (Building OP-1 Abandoned Anodize Tank), O-A (Underground Fuel Storage Tanks), T-EEE and T-FFF (Transformer Division Inactive Underground Storage Tanks) and P-D through P-L (Plastics Division Inactive Underground Storage Tanks)

a) Integrity Testing

The RFI Proposal shall include specific procedures and schedules for determining the integrity of each SWMU. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity shall be determined by mechanical methods (i.e., tightness testing). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing integrity determinations for all SWMUs within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(4) SWMU P-4 (Building 109 Wastewater Tank Farm)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents, around the perimeter of the concrete dike and underlying the SWMU. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989) or any updated version, shall be included in the RFI Proposal. The rationale shall include consideration of the toluene soil contamination detected in the area of the SWMU;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/textural change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the hazardous waste and/or hazardous constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.1.f.

(5) O-M Ordinance Division Leaking Active Underground Storage Tank

a) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outline in Special Permit Condition II.A.1.f.

(6) Underground Pipes and Tunnels, Including Stormwater and Sewer Pipes and Other Preferential Pathways

The RFI Proposal shall include procedures for incorporating the contribution of preferential pathways, including but not limited to underground pipes, tunnels and storage tanks, to releases of hazardous waste and/or hazardous constituents to the subsurface environment. At a minimum, the Proposal shall include:

a) Facility maps showing the locations and routing of all underground pipes, tunnels, and storage tanks;

b) Description of the piping, tunnels, and storage tanks, including materials of construction, age, dimensions, structural integrity, and information regarding past or current leaks or breaks;

c) Description of the types of materials currently conveyed and/or stored by the pipes, tunnels and storage tanks, and the types of materials which have been conveyed and/or stored in the past, and approximate average and maximum flow rates;

d) A proposed approach for evaluating the locations and effects of underground pipes, tunnels and storage tanks on groundwater and contaminant movement, including infiltration/exfiltration of hazardous waste and/or hazardous constituents; and

e) A proposed approach for assessing the contributions of releases of hazardous waste and/or hazardous constituents in the area from underground pipes, tunnels and storage tanks (e.g., locating monitoring wells and taking soil samples in locations where releases and/or potential releases from underground pipes and tunnels are a concern, integrity testing, etc.) to all media.

f. Groundwater Contamination Investigation in Area 1

The RFI Proposal shall include specific measures to address any contaminant plume from the SWMUs and other sources in Area 1. The Area 1 groundwater investigation shall be designed to: 1) define the local and regional geology and hydrology, including such elements as surface water bodies; 2) define the nature and horizontal and vertical extent of contamination resulting from releases of hazardous waste and/or hazardous constituents in Area 1; 3) determine the direction of movement and rate of flow of contaminant plumes, taking into account seasonal variations in flow; 4) determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from Area 1 to surface water bodies; and 5) identify sources of contamination.

Requirements set forth in Attachment A for groundwater investigations shall be required for the investigation of this area. In addition, the following requirements shall be incorporated into the RFI proposal:

(1) Groundwater Investigation Approach

The RFI Proposal shall include justification of procedures and schedules for investigating each SWMU, which shall include provisions to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents to groundwater, and to all surface water bodies by surface and subsurface pathways. The Proposal shall provide for a characterization of the horizontal and vertical extent of releases from each SWMU and for all hazardous waste and/or hazardous constituents in the releases. The Proposal may incorporate existing data, protocols and groundwater monitoring wells, provided that the Proposal includes a demonstration that such data and/or monitoring wells fully meet the requirements established in this section. Schedules included in the RFI Proposal shall provide for submittal of all results to the Director within 360 calendar days of approval of the RFI Proposal by the Director. The Proposal shall include the following provisions:

a) Groundwater Monitoring Plan

The Permittee shall submit a Groundwater Monitoring Plan designed to collect enough information at each identified SWMU to determine the quality of background groundwater and to determine the rate of migration, concentration and extent of groundwater contamination due to releases of hazardous waste and/or hazardous constituents from each SWMU.

The plan shall include a justification of the location and number of monitoring wells at each identified SWMU based on

the rate and direction of groundwater flow, the size of the SWMU, the nature of the contaminants and the geologic conditions and complexity.

i) Background Groundwater Monitoring Plan

The Permittee shall submit a Background Groundwater Monitoring Plan that, at a minimum, shall specify the number and location of background monitoring wells that are proposed to be used in determining background groundwater quality at each identified SWMU. The plan shall also include justification showing how these wells will provide a reliable indication of background groundwater quality for the uppermost aquifer.

ii) Downgradient Groundwater Monitoring Plan

The Permittee shall submit a Downgradient Groundwater Monitoring Plan capable of monitoring all groundwater flow paths which are capable of transporting hazardous waste and/or hazardous constituents released from the identified SWMUs.

(a) The plan shall include a description of the number and location of downgradient monitoring wells that will be used to determine downgradient groundwater quality at each identified SWMU; and

(b) The Permittee shall submit a justification showing how these wells will provide a reliable indication of downgradient groundwater quality for the uppermost aquifer.

iii) Monitoring Well Design and Installation Plan

The Permittee shall submit a Monitoring Well Design and Installation Plan describing and justifying the monitoring well construction for all monitoring wells it proposes to be installed. At a minimum, the Monitoring Well Design and Installation Plan shall specify the following:

(a) Monitoring well design, installation procedures and well development techniques shall follow the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version. The use of oils, greases, or drilling muds during advancement of the borings is prohibited. The Permittee shall justify the proposed well screen material chosen. This justification shall include at least a discussion of alternative well screen materials and the reasons why these alternative materials were not chosen. The Permittee must propose to install enough monitoring wells and take sufficient samples to justify any conclusions resulting from its analysis; and

(b) A boring and well construction log shall be recorded by a qualified geologist during the installation of each monitoring well.

iv) Groundwater Sampling and Analysis Plan

The Permittee shall submit a Sampling and Analysis Plan designed to provide a reliable indication of water quality for the water samples taken. The proposed Sampling and Analysis Plan shall include at least the following:

(a) All the elements specified in the RFI Guidance, Interim Final (May, 1989), or any updated version;

(b) Justification of appropriate sampling techniques;

(c) Provision as to the appropriate sampling frequency, together with the justification therefor;

(d) At a minimum, the Sampling and Analysis Plan shall provide for an Appendix IX analysis for the first round of samples taken at each sampling location and for any other constituents which can be expected to be in or derived from the waste which was disposed;

(e) Proposed methodologies for ensuring that all data will be collected and managed in accordance with procedures specified in the RFI Guidance, Interim Final (May, 1989), or any updated version; and

(f) An explanation as to how the above Sampling and Analysis Plan will provide the necessary information to support the Preliminary Corrective Measures and/or any other corrective measures proposed and data quality objectives for risk assessment as described in Special Permit Condition II.A.7. and II.A.8.

(2) The Proposal shall include provisions for monitoring of the identified plume for the term of the Permit, to increase the existing database in light of the Area 1 investigation goals.

(3) The Proposal shall include a discussion of the nature of all contaminants which make up the contaminant plume (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.) and how sampling and analysis has and will account for these characteristics.

(4) The Proposal shall demonstrate that the regional and local hydrogeologic system has been or shall be defined as necessary to predict the rate and direction of plume migration. The following specific activities shall be required, at a minimum, in order to define the hydrogeologic system:

a) In-situ pump/slug testing to determine characteristics of the hydrogeologic system in order to facilitate rate of plume migration calculations;

b) Additional well installations to define flow to and beneath surface water bodies; and

c) Geophysical investigations, including seismic investigations and additional drilling and/or well installations to define the depth to bedrock and the geology and hydrology of the strata down to and including bedrock.

(5) The Proposal shall demonstrate that the rate and direction of plume movement will be defined as part of Area 1 contaminant plume investigation activities. Definition of the plume includes identification of contaminants including floating, sinking, and dissolved constituents, structure of all phases of the plume (i.e., extent of contamination in each hydrogeologic unit), rate and direction of plume movement, and possibility of migration beneath surface water bodies. The following specific activities shall be required, at a minimum, in order to define the rate and direction of plume movement:

a) Sampling on a quarterly basis for the term of the Permit in order to address seasonal changes in the plume and increase the database in this area; and

b) Installation and sampling of wells adequate to define the horizontal and vertical extent of the contaminant plume. Location, depth and design of wells shall include consideration of the definition of the regional and local hydrogeological system required in Special Permit Condition II.A.1.f.(4).

(6) The Proposal shall provide for the identification of the nature, rate of migration, concentration and extent of contaminated groundwater in this area recharging to surface water bodies.

(7) The Proposal shall demonstrate that all additional applicable requirements set forth in Attachment A regarding RFI activities and reporting shall be met.

(8) The Proposal shall include schedules providing for characterization of the nature, rate of migration, concentration and extent of area-wide groundwater contamination in Area 1 within 360 calendar days of approval of the RFI Proposal by the Director sufficient for the development of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

2. RFI Requirements for Area 2 Building 78 Hill (SWMU G-5: Building 78 Landfill-Gas Plant Site)

a. Preliminary Investigation of Corrective Measures

The RFI Proposal shall identify the potential corrective measure technologies that may be used on-site and/or off-site to contain, treat, remedy, and/or dispose of the contamination resulting from the release of hazardous waste and/or hazardous constituents from SWMUs and other sources in Area 2. This Preliminary Investigation shall summarize all prior investigations performed by or available to the Permittee and identify all existing data gaps and field data that needs to be collected during implementation of the RFI to facilitate the technical evaluation and selection of the corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

b. Identification of Additional SWMUs and/or Media of Concern in Area 2

The RFI Proposal shall include an identification and description of any additional SWMUs and/or media of concern which are present in this area. The description of additional SWMUs shall include, at a minimum:

(1) Description of each SWMU and/or media, and location on a map;

(2) Period of operation of each SWMU;

(3) Description of wastes managed in each SWMU and/or media;

(4) Release controls for each SWMU;

(5) History of releases from each SWMU and/or media; and

(6) Any environmental data which has been collected for each SWMU and/or media.

The RFI Proposal shall include specific measures and schedules to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from additional SWMUs and/or to additional media, identified during the course of the RFI.

c. Environmental Setting

The RFI Proposal shall include a proposed study to characterize the environmental setting in Area 2 with respect to soils, ground water, surface waters and sediments, subsurface gas, and air. In the proposed study, the Permittee shall document the methodology to be used in obtaining the data necessary to provide the information required in the RFI Report, as detailed in Special Permit Condition II.G. The environmental setting section shall use procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and at a minimum shall include the following:

(1) Soil/Bedrock Characterization

The Permittee shall include a description and justification of the procedures to gather data sufficient to characterize the subsurface geology around each SWMU.

(2) Procedures for Determining Groundwater Hydraulics

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to characterize the groundwater hydraulics associated with each SWMU. The description shall identify the procedures for establishing the rate and direction of groundwater flow in the horizontal and vertical directions and for determining the areas of groundwater discharge and groundwater recharge. The description shall also identify the procedures for determining variations of groundwater flow rate and direction (i.e., seasonal, temporal, etc.), and the hydraulic properties of each stratum identified in the boring program.

(3) Procedures for Evaluating Surface Waters and Sediments

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to evaluate the surface waters and sediments in and surrounding Area 2. At a minimum, the evaluation shall include a description of the chemistries of the natural surface water and sediments as applicable. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations.

(4) Procedures for Evaluating Climatic Conditions

The Permittee shall include a description and justification of the procedures it intends to use in evaluating climatic conditions that may cause or influence air flow in the vicinity of the Facility.

d. Source Characterization

The RFI Proposal shall include a proposed study to characterize the SWMUs and other sources in Area 2 and the hazardous waste and/or hazardous constituents in these SWMUs and other sources. The proposed study shall document and justify the methodology for obtaining data and drawing conclusions in order to provide the information required in the RFI Report. At a minimum, the proposed study shall include a description of the procedures the Permittee intends to use to identify the hazardous waste and/or hazardous constituents, quantity, physical characteristics, migration/dispersal characteristics, toxicity and chemical composition.

e. Investigation of Individual SWMUs in Area 2

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from individual SWMUs in Area 2. Final determination of the extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The RFI Proposal shall characterize the contribution of releases from each source to area-wide groundwater contamination as determined under the investigations defined in Special Permit Condition II.A.2.f. The measures for each SWMU shall be consistent with the RFI Guidance, Interim Final (May, 1989), or any updated version, and include at a minimum, the following:

(1) SWMU G-5 (Building 78 Landfill - Gas Plant Site)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Subsurface Gas Investigation Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMU from the generation of or contamination from subsurface gas, including at a minimum:

i) A description of and justification for the procedures the Permittee proposes to use. This description shall include a provision for identifying any gas(es) found and for determining its (their) nature, the rate of migration, concentration and extent of contamination; and

ii) A description of and justification for the methodology to be used in obtaining data and drawing conclusions.

c) Surface Runoff Characterization Plan

The RFI Proposal shall include a plan to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents which migrate from the SWMU in surface runoff. At a minimum, the plan shall include:

i) A proposed approach for identifying the most significant (in terms of relative volumetric flow) migration pathways of surface runoff from the SWMU; and

ii) A proposed approach utilizing the RFI Guidance, Interim Final (May, 1989), or any updated version, for sampling surface runoff during storm events along the most significant migration pathways. Runoff which migrates to surface water bodies must be included in the sampling program.

d) Air Contamination Characterization Plan

The RFI Proposal shall include a plan to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents which are released to the ambient air from the SWMU. The RFI Proposal shall provide procedures to assess maximum ambient concentrations of air contaminants volatilized or entrained on particulate at the Facility resulting from releases from the SWMU.

The Proposal shall include, at a minimum, the following information:

i) The Permittee shall submit an Air Monitoring Plan designed to collect sufficient information at the SWMU to determine the nature, rate of migration, concentration and extent of air contamination due to releases of entrained particulate or volatile constituents consisting of hazardous waste and/or hazardous constituents; and

ii) The Air Monitoring Plan shall include the following parameters, at a minimum:

(a) Chemical and physical composition of air contaminants including, at a minimum:

(i) water solubility
(ii) vapor pressure
(iii) octanol/water partition coefficient
(iv) partial pressure
(v) particle size distribution, porosity and organic matter content of the surficial soil that may act as entrained particulate;

(b) Nature, density, rate of migration, concentration and extent of air contaminants;

(c) Concentration of the emitted air contaminants; and

(d) Horizontal and vertical extent of air contamination.

e) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.2.f.

(2) SWMU T-40 (Building 71 Stormwater Drain Line)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents, around the perimeter of the concrete dike and underlying the

SWMU. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989) or any updated version, shall be included in the RFI Proposal. The rationale shall include consideration of the toluene soil contamination detected in the area of the SWMU;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/textural change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the hazardous waste and/or hazardous constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.2.f.

(3) Underground Pipes and Tunnels, including Stormwater and Sewer Pipes and Other Preferential Pathways

The RFI Proposal shall include procedures for incorporating the contribution of preferential pathways, including but not limited to underground pipes, tunnels and storage tanks, to releases of hazardous waste and/or hazardous constituents to the subsurface environment. At a minimum, the Proposal shall include:

a) Facility maps showing the locations and routing of all underground pipes, tunnels, and storage tanks;

b) Description of the piping, tunnels, and storage tanks, including materials of construction, age, dimensions, structural integrity, and information regarding past or current leaks or breaks;

c) Description of the types of materials currently conveyed and/or stored by the pipes, tunnels and storage tanks, and the types of materials which have been conveyed and/or stored in the past, and approximate average and maximum flow rates;

d) A proposed approach for evaluating the locations and effects of underground pipes, tunnels and storage tanks on groundwater

and contaminant movement, including infiltration/exfiltration of hazardous waste and/or hazardous constituents; and

e) A proposed approach for assessing the contributions of releases of hazardous waste and/or hazardous constituents in the area from underground pipes, tunnels and storage tanks (e.g., locating monitoring wells and taking soil samples in locations where releases and/or potential releases from underground pipes and tunnels are a concern, integrity testing, etc.) to all media.

f. Groundwater Contamination Investigation in Area 2

The RFI Proposal shall include specific measures to address any contaminant plume from the SWMUs and other sources in Area 2. The Area 2 groundwater investigation shall be designed to: 1) define the local and regional geology and hydrology, including such elements as surface water bodies; 2) define the nature and horizontal and vertical extent of contamination resulting from releases of hazardous waste and/or hazardous constituents in Area 2; 3) determine the direction of movement and rate of flow of contaminant plumes, taking into account seasonal variations in flow; 4) determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from Area 2 to surface water bodies; and 5) identify sources of contamination.

Requirements set forth in Attachment A for groundwater investigations shall be required for the investigation of this area. In addition, the following requirements shall be incorporated into the RFI proposal:

(1) Groundwater Investigation Approach

The RFI Proposal shall include justification of procedures and schedules for investigating each SWMU, which shall include provisions to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents to groundwater, and to all surface water bodies by surface and subsurface pathways. The Proposal shall provide for a characterization of the horizontal and vertical extent of releases from each SWMU and for all hazardous waste and/or hazardous constituents in the releases. The Proposal may incorporate existing data, protocols and groundwater monitoring wells, provided that the Proposal includes a demonstration that such data and/or monitoring wells fully meet the requirements established in this section. Schedules included in the RFI Proposal shall provide for submittal of all results to the Director within 360 calendar days of approval of the RFI Proposal by the Director. The Proposal shall include the following provisions:

a) Groundwater Monitoring Plan

The Permittee shall submit a Groundwater Monitoring Plan designed to collect enough information at each identified SWMU to determine the quality of background groundwater and to determine the rate of migration, concentration and extent of groundwater contamination due to releases of hazardous waste and/or hazardous constituents from each SWMU.

The plan shall include a justification of the location and number of monitoring wells at each identified SWMU based on the rate and direction of groundwater flow, the size of the SWMU, the nature of the contaminants and the geologic conditions and complexity.

i) Background Groundwater Monitoring Plan

The Permittee shall submit a Background Groundwater Monitoring Plan that, at a minimum, shall specify the number and location of background monitoring wells that are proposed to be used in determining background groundwater quality at each identified SWMU. The plan shall also include justification showing how these wells will provide a reliable indication of background groundwater quality for the uppermost aquifer.

ii) Downgradient Groundwater Monitoring Plan

The Permittee shall submit a Downgradient Groundwater Monitoring Plan capable of monitoring all groundwater flow paths which are capable of transporting hazardous waste and/or hazardous constituents released from the identified SWMUs.

(a) The plan shall include a description of the number and location of downgradient monitoring wells that will be used to determine downgradient groundwater quality at each identified SWMU; and

(b) The Permittee shall submit a justification showing how these wells will provide a reliable indication of downgradient groundwater quality for the uppermost aquifer.

iii) Monitoring Well Design and Installation Plan

The Permittee shall submit a Monitoring Well Design and Installation Plan describing and justifying the monitoring well construction for all monitoring wells it proposes to be installed. At a minimum, the Monitoring Well Design and Installation Plan shall specify the following:

(a) Monitoring well design, installation procedures and well development techniques shall follow the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version. The use of oils, greases, or drilling muds during advancement of the borings is prohibited. The Permittee shall justify the proposed well screen material chosen. This justification shall include at least a discussion of alternative well screen materials and the reasons why these alternative materials were not chosen. The Permittee must propose to install enough monitoring wells and take sufficient samples to justify any conclusions resulting from its analysis; and

(b) A boring and well construction log shall be recorded by a qualified geologist during the installation of each monitoring well.

iv) Groundwater Sampling and Analysis Plan

The Permittee shall submit a Sampling and Analysis Plan designed to provide a reliable indication of water quality for the water samples taken. The proposed Sampling and Analysis Plan shall include at least the following:

(a) All the elements specified in the RFI Guidance, Interim Final (May, 1989), or any updated version;

(b) Justification of appropriate sampling techniques;

(c) Provision as to the appropriate sampling frequency, together with the justification therefor;

(d) At a minimum, the Sampling and Analysis Plan shall provide for an Appendix IX analysis for the first round of samples taken at each sampling location and for any other constituents which can be expected to be in or derived from the waste which was disposed;

(e) Proposed methodologies for ensuring that all data will be collected and managed in accordance with procedures specified in the RFI Guidance, Interim Final (May, 1989), or any updated version; and

(f) An explanation as to how the above Sampling and Analysis Plan will provide the necessary information to support the Preliminary Corrective Measures and/or any other corrective measures proposed and data quality objectives for risk assessment as described in Special Permit Condition II.A.7. and II.A.8.

(2) The Proposal shall include provisions for monitoring of the identified plume for the term of the Permit, to increase the existing database in light of the Area 2 investigation goals.

(3) The Proposal shall include a discussion of the nature of all contaminants which make up the contaminant plume (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.) and how sampling and analysis has and will account for these characteristics.

(4) The Proposal shall demonstrate that the regional and local hydrogeologic system has been or shall be defined as necessary to predict the rate and direction of plume migration. The following specific activities shall be required, at a minimum, in order to define the hydrogeologic system:

a) In-situ pump/slug testing to determine characteristics of the hydrogeologic system in order to facilitate rate of plume migration calculations;

b) Additional well installations to define flow to and beneath surface water bodies; and

c) Geophysical investigations, including seismic investigations and additional drilling and/or well installations to define the depth to bedrock and the geology and hydrology of the strata down to and including bedrock.

(5) The Proposal shall demonstrate that the rate and direction of plume movement will be defined as part of Area 2 contaminant plume investigation activities. Definition of the plume includes identification of contaminants including floating, sinking, and dissolved constituents, structure of all phases of the plume (i.e., extent of contamination in each hydrogeologic unit), rate and direction of plume movement, and possibility of migration beneath surface water bodies. The following specific activities shall be required, at a minimum, in order to define the rate and direction of plume movement:

a) Sampling on a quarterly basis for the term of the Permit in order to address seasonal changes in the plume and increase the database in this area; and

b) Installation and sampling of wells adequate to define the horizontal and vertical extent of the contaminant plume. Location, depth and design of wells shall include consideration of the definition of the regional and local hydrogeological system required in Special Permit Condition II.A.2.f.(4).

(6) The Proposal shall provide for the identification of the nature, rate of migration, concentration and extent of contaminated groundwater in this area recharging to surface water bodies.

(7) The Proposal shall demonstrate that all additional applicable requirements set forth in Attachment A regarding RFI activities and reporting shall be met.

(8) The Proposal shall include schedules providing for characterization of the nature, rate of migration, concentration and extent of area-wide groundwater contamination in Area 2 within 360 calendar days of approval of the RFI Proposal by the Director sufficient for the development of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

3. RFI Requirements for Area 3 (East Street - Area 1 and Transformer Division - East Area)

a. Preliminary Investigation of Corrective Measures

The RFI Proposal shall identify the potential corrective measure technologies that may be used on-site and/or off-site to contain, treat, remedy, and/or dispose of the contamination resulting from the release of hazardous waste and/or hazardous constituents from SWMUs and other sources in Area 3. This preliminary Investigation shall summarize all prior investigations performed by or available to the Permittee and identify all existing data gaps and field data that needs to be collected during implementation of the RFI to facilitate the technical evaluation and selection of the corrective measure or

measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

b. Identification of Additional SWMUs and/or Media of Concern in Area 3

The RFI Proposal shall include procedures to identify and describe any additional SWMUs and/or media of concern which are present in this area. The identification and description of additional SWMUs shall include, at a minimum:

(1) Description of each SWMU and/or media, and location on a map;

(2) Period of operation of each SWMU;

(3) Description of wastes managed in each SWMU and/or media;

(4) Release controls for each SWMU;

(5) History of releases from each SWMU and/or media; and

(6) Any environmental data which has been collected for each SWMU and/or media.

The RFI Proposal shall include specific measures and schedules to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from additional SWMUs and/or to additional media, identified during the course of the RFI.

c. Environmental Setting

The RFI Proposal shall include a proposed study to characterize the environmental setting in Area 3 with respect to soils, ground water, surface waters and sediments, subsurface gas, and air. In the proposed study, the Permittee shall document the methodology to be used in obtaining the data necessary to provide the information required in the RFI Report, as detailed in Special Permit Condition II.G. The environmental setting section shall use procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and at a minimum shall include the following:

(1) Soil/Bedrock Characterization

The Permittee shall include a description and justification of the procedures to gather data sufficient to characterize the subsurface geology around each SWMU.

(2) Procedures for Determining Groundwater Hydraulics

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to characterize the groundwater hydraulics associated with each SWMU. The description shall identify the procedures for establishing the rate and direction of groundwater flow in the horizontal and vertical directions and for determining the areas of groundwater discharge and groundwater recharge. The description shall also identify the procedures for determining variations of groundwater flow rate and direction (i.e., seasonal,

temporal, etc.), and the hydraulic properties of each stratum identified in the boring program.

(3) Procedures for Evaluating Surface Waters and Sediments

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to evaluate the surface waters and sediments at and in the vicinity of Area 3. At a minimum, the evaluation shall include a description of the chemistries of the natural surface water and sediments as applicable. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations.

(4) Procedures for Evaluating Climatic Conditions

The Permittee shall include a description and justification of the procedures it intends to use in evaluating climatic conditions that may cause or influence air flow in the vicinity of the Facility.

d. Source Characterization

The RFI Proposal shall include a proposed study to characterize the SWMUs and other sources in Area 3 and the hazardous waste and/or hazardous constituents in these SWMUs and other sources. The proposed study shall document and justify the methodology for obtaining data and drawing conclusions in order to provide the information required in the RFI Report. At a minimum, the proposed study shall include a description of the procedures the Permittee intends to use to identify the hazardous waste and/or hazardous constituents, quantity, physical characteristics, migration/dispersal characteristics, toxicity and chemical composition.

e. Investigation of Individual SWMUs in Area 3

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from individual SWMUs in Area 3. Final determination of the extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The RFI Proposal shall characterize the contribution of releases from each source to area-wide groundwater contamination as determined under the investigations defined in Special Permit Condition II.A.3.f. The measures for each SWMU shall be consistent with the RFI Guidance, Interim Final (May, 1989), or any updated version, and include, at a minimum, the following:

(1) SWMU T-19 (Building 12T Oil Drainage Tank), T-26 (Building 14 Extension Drain Tank), and T-W through T-NN (Transformer Division Inactive Underground Storage Tanks)

a) Integrity Testing

The RFI Proposal shall include specific procedures and schedules for determining the integrity of each SWMU. Current

guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. The integrity of the tanks shall be determined by mechanical means (i.e., tightness testing). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for all SWMUs within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection.

(2) SWMU T-61 (Building 12F Former Oil Storage Tanks) and SWMU T-9 (Building 10 Sump Tank)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples, to determine the nature, rate of migration, concentration and extent of contamination from releases of hazardous waste and/or hazardous constituents, within and immediately adjacent to the SWMU. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for these units. The Proposal shall provide for incorporation of these units into the investigation outlined in Special Permit Condition II.A.3.f.

(3) SWMU T-50 (Building 12G Pyranol Unloading Station and Storage Area)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g. coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.3.f.

(4) Underground Pipes and Tunnels, Including Stormwater and Sewer Pipes and Other Preferential Pathways

The RFI Proposal shall include procedures for incorporating the contribution of preferential pathways, including but not limited to underground pipes, tunnels and storage tanks, to releases of hazardous waste and/or hazardous constituents to the subsurface environment. At a minimum, the Proposal shall include:

a) Facility maps showing the locations and routing of all underground pipes, tunnels, and storage tanks;

b) Description of the piping, tunnels, and storage tanks, including materials of construction, age, dimensions, structural integrity, and information regarding past or current leaks or breaks;

c) Description of the types of materials currently conveyed and/or stored by the pipes, tunnels and storage tanks, and the types of materials which have been conveyed and/or stored in the past, and approximate average and maximum flow rates;

d) A proposed approach for evaluating the locations and effects of underground pipes, tunnels and storage tanks on groundwater and contaminant movement, including infiltration/exfiltration of hazardous waste and/or hazardous constituents; and

e) A proposed approach for assessing the contributions of releases of hazardous waste and/or hazardous constituents in the area from underground pipes, tunnels and storage tanks (e.g., locating monitoring wells and taking soil samples in locations where releases and/or potential releases from underground pipes and tunnels are a concern, integrity testing, etc.) to all media.

f. Groundwater Contamination Investigation in Area 3

The RFI Proposal shall include specific measures to address any contaminant plume from the SWMUs and other sources in Area 3. The Area 3 groundwater investigation shall be designed to: 1) define the local and regional geology and hydrology, including such elements as other surface water bodies; 2) define the nature and horizontal and vertical extent of contamination resulting from releases of hazardous waste and/or hazardous constituents in Area 3; 3) determine the direction of movement and rate of flow of contaminant plumes, taking into account seasonal variations in flow; 4) determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from Area 3 to surface water bodies; and 5) identify sources of contamination.

Requirements set forth in Attachment A for groundwater investigations shall be required for the investigation of this area. In addition, the following requirements shall be incorporated into the RFI proposal:

(1) Groundwater Investigation Approach

The RFI Proposal shall include justification of procedures and schedules for investigating each SWMU, which shall include provisions to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents to groundwater, and to all surface water bodies by surface and subsurface pathways. The Proposal shall provide for a characterization of the horizontal and vertical extent of releases from each SWMU and for all hazardous waste and/or hazardous constituents in the releases. The Proposal may incorporate existing data, protocols and groundwater monitoring wells, provided that the Proposal includes a demonstration that such data and/or monitoring wells fully meet the requirements established in this section. Schedules included in the RFI Proposal shall provide for submittal of all results to the Director within 360 calendar days of approval of the RFI Proposal by the Director. The Proposal shall include the following provisions:

a) Groundwater Monitoring Plan

The Permittee shall submit a Groundwater Monitoring Plan designed to collect enough information at each identified SWMU to determine the quality of background groundwater and to determine the rate of migration, concentration and extent of groundwater contamination due to releases of hazardous waste and/or hazardous constituents from each SWMU.

The plan shall include a justification of the location and number of monitoring wells at each identified SWMU based on the rate and direction of groundwater flow, the size of the SWMU, the nature of the contaminants and the geologic conditions and complexity.

i) Background Groundwater Monitoring Plan

The Permittee shall submit a Background Groundwater Monitoring Plan that, at a minimum, shall specify the number and location of background monitoring wells that are proposed to be used in determining background groundwater quality at each identified SWMU. The plan shall also include justification showing how these wells will provide a reliable indication of background groundwater quality for the uppermost aquifer.

ii) Downgradient Groundwater Monitoring Plan

The Permittee shall submit a Downgradient Groundwater Monitoring Plan capable of monitoring all groundwater flow paths which are capable of transporting hazardous waste and/or hazardous constituents released from the identified SWMUs.

(a) The plan shall include a description of the number and location of downgradient monitoring wells that will be used to determine downgradient groundwater quality at each identified SWMU; and

(b) The Permittee shall submit a justification showing how these wells will provide a reliable indication of downgradient groundwater quality for the uppermost aquifer.

iii) Monitoring Well Design and Installation Plan

The Permittee shall submit a Monitoring Well Design and Installation Plan describing and justifying the monitoring well construction for all monitoring wells it proposes to be installed. At a minimum, the Monitoring Well Design and Installation Plan shall specify the following:

(a) Monitoring well design, installation procedures and well development techniques shall follow the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version. The use of oils, greases, or drilling muds during advancement of the borings is prohibited. The Permittee shall justify the proposed well screen

material chosen. This justification shall include at least a discussion of alternative well screen materials and the reasons why these alternative materials were not chosen. The Permittee must propose to install enough monitoring wells and take sufficient samples to justify any conclusions resulting from its analysis; and

(b) A boring and well construction log shall be recorded by a qualified geologist during the installation of each monitoring well.

iv) Groundwater Sampling and Analysis Plan

The Permittee shall submit a Sampling and Analysis Plan designed to provide a reliable indication of water quality for the water samples taken. The proposed Sampling and Analysis Plan shall include at least the following:

(a) All the elements specified in the RFI Guidance, Interim Final (May, 1989), or any updated version;

(b) Justification of appropriate sampling techniques;

(c) Provision as to the appropriate sampling frequency, together with the justification therefor;

(d) At a minimum, the Sampling and Analysis Plan shall provide for an Appendix IX analysis for the first round of samples taken at each sampling location and for any other constituents which can be expected to be in or derived from the waste which was disposed;

(e) Proposed methodologies for ensuring that all data will be collected and managed in accordance with procedures specified in the RFI Guidance, Interim Final (May, 1989), or any updated version; and

(f) An explanation as to how the above Sampling and Analysis Plan will provide the necessary information to support the Preliminary Corrective Measures and/or any other corrective measures proposed and data quality objectives for risk assessment as described in Special Permit Condition II.A.7. and II.A.8.

(2) The Proposal shall include provisions for monitoring of the identified plume for the term of the Permit, to increase the existing database in light of the Area 3 investigation goals.

(3) The Proposal shall include a discussion of the nature of all contaminants which make up the contaminant plume (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.) and how sampling and analysis has and will account for these characteristics.

(4) The Proposal shall demonstrate that the regional and local hydrogeologic system has been or shall be defined as necessary to predict the rate and direction of plume migration. The

following specific activities shall be required, at a minimum, in order to define the hydrogeologic system:

a) In-situ pump/slug testing to determine characteristics of the hydrogeologic system in order to facilitate rate of plume migration calculations;

b) Additional well installations to define flow to and beneath surface water bodies; and

c) Geophysical investigations, including seismic investigations and additional drilling and/or well installations to define the depth to bedrock and the geology and hydrology of the strata down to and including bedrock.

(5) The Proposal shall demonstrate that the rate and direction of plume movement will be defined as part of Area 3 contaminant plume investigation activities. Definition of the plume includes identification of contaminants including floating, sinking, and dissolved constituents, structure of all phases of the plume (i.e., extent of contamination in each hydrogeologic unit), rate and direction of plume movement, and possibility of migration beneath surface water bodies. The following specific activities shall be required, at a minimum, in order to define the rate and direction of plume movement:

a) Sampling on a quarterly basis for the term of the Permit in order to address seasonal changes in the plume and increase the database in this area; and

b) Installation and sampling of wells adequate to define the horizontal and vertical extent of the contaminant plume. Location, depth and design of wells shall include consideration of the definition of the regional and local hydrogeological system required in Special Permit Condition II.A.3.f.(4).

(6) The Proposal shall provide for the identification of the nature, rate of migration, concentration and extent of contaminated groundwater in this area recharging to surface water bodies.

(7) The Proposal shall demonstrate that all additional applicable requirements set forth in Attachment A regarding RFI activities and reporting shall be met.

(8) The Proposal shall include schedules providing for characterization of the nature, rate of migration, concentration and extent of area-wide groundwater contamination in Area 3 within 360 calendar days of approval of the RFI Proposal by the Director sufficient for the development of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

4. <u>RFI Requirements for Area 4 (East Street - Area 2, Transformer Division - West Area, and Area West of "East Street - Area 2")</u>

a. <u>Preliminary Investigation of Corrective Measures</u>

The RFI Proposal shall identify the potential corrective measure technologies that may be used on-site and/or off-site to contain,

treat, remedy, and/or dispose of the contamination resulting from the release of hazardous waste and/or hazardous constituents from SWMUs and other sources in Area 4. This Preliminary Investigation shall summarize all prior investigations performed by or available to the Permittee and identify all existing data gaps and field data that needs to be collected during implementation of the RFI to facilitate the technical evaluation and selection of the corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.)

b. Identification of Additional SWMUs and/or Media of Concern in Area 4

The RFI Proposal shall include procedures to identify and describe any additional SWMUs and/or media of concern which are present in this area. The identification and description of additional SWMUs shall include, at a minimum:

(1) Description of each SWMU and/or media, and location on a map;

(2) Period of operation of each SWMU;

(3) Description of wastes managed in each SWMU and/or media;

(4) Release controls for each SWMU;

(5) History of releases from each SWMU and/or media; and

(6) Any environmental data which has been collected for each SWMU and/or media.

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from additional SWMUs and/or to additional media, identified during the course of the RFI.

c. Environmental Setting

The RFI Proposal shall include a proposed study to characterize the environmental setting in Area 4 with respect to soils, ground water, surface waters and sediments, subsurface gas, and air. In the proposed study, the Permittee shall document the methodology to be used in obtaining the data necessary to provide the information required in the RFI Report, as detailed in Special Permit Condition II.G. The environmental setting section shall use procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and at a minimum shall include the following:

(1) Soil/Bedrock Characterization

The Permittee shall include a description and justification of the procedures to gather data sufficient to characterize the subsurface geology around each SWMU.

(2) Procedures for Determining Groundwater Hydraulics

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to characterize the groundwater hydraulics associated with each

SWMU. The description shall identify the procedures for establishing the rate and direction of groundwater flow in the horizontal and vertical directions and for determining the areas of groundwater discharge and groundwater recharge. The description shall also identify the procedures for determining variations of groundwater flow rate and direction (i.e., seasonal, temporal, etc.), and the hydraulic properties of each stratum identified in the boring program.

(3) Procedures for Evaluating Surface Waters and Sediments

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to evaluate the surface waters and sediments in and surrounding Area 4. At a minimum, the evaluation shall include a description of the chemistries of the natural surface water and sediments as applicable. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations.

(4) Procedures for Evaluating Climatic Conditions

The Permittee shall include a description and justification of the procedures it intends to use in evaluating climatic conditions that may cause or influence air flow in the vicinity of the Facility.

d. Source Characterization

The RFI Proposal shall include a proposed study to characterize the SWMUs and other sources in Area 4 and the hazardous waste and/or hazardous constituents in these SWMUs and other sources. The proposed study shall document and justify the methodology for obtaining data and drawing conclusions in order to provide the information required in the RFI Report. At a minimum, the proposed study shall include a description of the procedures the Permittee intends to use to identify the hazardous waste and/or hazardous constituents, quantity, physical characteristics, migration/dispersal characteristics, toxicity and chemical composition.

e. Investigation of Individual SWMUs in Area 4

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from individual SWMUs in Area 4. Final determination of the extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The RFI Proposal shall characterize the contribution of releases from each source to area-wide groundwater contamination as determined under the investigations defined in Special Permit Condition II.A.4.f. The measures for each SWMU shall be consistent with the RFI Guidance, Interim Final (May 1989), or any updated version, and shall include, at a minimum, the following:

(1) SWMU G-20 (Groundwater Recharge Pond)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe procedures and schedules proposed for taking soil samples to determine the nature, rate of migration, concentration and extent of contamination from releases of hazardous waste and/or hazardous constituents immediately adjacent to the SWMU. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Sediment Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking sediment samples in the surface water within SWMU G-20 to determine the nature, rate of migration, concentration and extent of contamination from releases of hazardous waste and/or hazardous constituents, including the following, at a minimum:

i) A map and grid showing the proposed locations from which sediment samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change);

iii) Procedures for ensuring that sediment samples are of a composition and texture allowing for comparison of results; and

iv) At a minimum, the sediment samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

c) Surface Water Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking surface water samples in the impounded water within SWMU G-20 to determine the nature, rate of migration, concentration and extent of contamination from releases of hazardous waste and/or hazardous constituents. Procedures shall include the following, at a minimum:

i) A map and grid indicating the proposed locations from which surface water samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal; and

ii) At a minimum, the surface water samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

d) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(2) SWMU G-13 (Building 64-W Oil/Water Separator), SWMU G-14 (Building 64-X Oil/Water Separator), SWMU G-15 (Building 64-Z Oil/Water Separator) and SWMU G-16 (Building 31-W Oil/Water Separator)

a) Integrity Testing/Inspections

The RFI Proposal shall include specific procedures and schedules for determining the integrity of each SWMU. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity shall be determined by mechanical methods (i.e., tightness testing), or by visual methods (i.e., inspecting the SWMU when it is empty). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for the SWMU within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(3) SWMU G-7 (Old Coal Gasification Plant Storage Tank Area)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples within and immediately adjacent to the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Subsurface Gas Investigation Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMU from the generation of or contamination from subsurface gas, including, at a minimum:

i) A description of and justification for the procedures the Permittee proposes to use. This description shall include a provision for identifying any gas(es) found and for determining its (their) nature, the rate of

migration, concentration and extent of contamination; and

ii) A description of and justification for the methodology to be used in obtaining data and drawing conclusions.

c) Air Contamination Characterization Plan

The RFI Proposal shall include a plan to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents which are released to the ambient air from the SWMU. The RFI Proposal shall provide procedures to assess maximum ambient concentrations of air contaminants volatilized at the Facility resulting from releases from the SWMU.

The Proposal shall include, at a minimum, the following information:

i) The Permittee shall submit an Air Monitoring Plan designed to collect sufficient information at the SWMU to determine the nature, rate of migration, concentration and extent of air contamination due to releases of hazardous waste and/or hazardous constituents; and

ii) The Air Monitoring Plan shall include the following parameters, at a minimum:

(a) Chemical and physical composition of air contaminants including, at a minimum:

(i) water solubility
(ii) vapor pressure
(iii) octanol/water partition coefficient
(iv) partial pressure

(b) Nature, density, rate of migration, concentration and extent of air contaminants;

(c) Concentration of the emitted air contaminants; and

(d) Horizontal and vertical extent of air contamination.

d) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(4) SWMU G-8 (Oxbow Fill Area)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples within and immediately adjacent to the SWMU to determine the nature, rate of migration, concentration and extent of releases of

hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Subsurface Gas Investigation Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMU from the generation of or contamination from subsurface gas, including, at a minimum:

i) A description of and justification for the procedures the Permittee proposes to use to gather sufficient data to determine whether the SWMU is generating or contaminating subsurface gas. This description shall include a provision for identifying any gas(es) found and for determining its (their) nature, the rate of migration, concentration and extent of contamination; and

ii) A description of and justification for the methodology to be used in obtaining data and drawing conclusions.

c) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outline in Special Permit Condition II.A.4.f.

(5) SWMU G-1 (Building 60 Former Drum Storage Area) and SWMU G-10 (Building 60 Tank Truck Area)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples around the perimeter of the concrete pad underlying the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(6) SWMU T-D (Building 29 Transformer Oil Transfer Area)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following for each SWMU, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(7) SWMU T-2 (Building 11 Interceptor Tank), and T-O through T-V, T-OO through T-DDD, and T-GGG through T-QQQ (Transformer Division Inactive Underground Storage Tanks)

a) Integrity Testing/Inspections

The RFI Proposal shall include specific procedures and schedules for determining the integrity of the SWMU. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity shall be determined by mechanical methods (i.e., tightness testing). For SWMU T-2, the integrity may be determined by visual methods (i.e., inspecting the tank when it is empty). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for the SWMU within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(8) SWMU T-23 (Building 12X Emergency Overflow Tanks)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g. coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(9) SWMU T-5 (Building 3C Yard Former Oil/Water Separator)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final

(May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have migrated to the subsurface. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g. coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(10) SWMU T-65 (Building 12Y Rainwater Sump)

a) Description of Effluent Management

The RFI Proposal shall provide a description of the composition and the route of effluent from the SWMU, including at a minimum:

i) A detailed drawing of the SWMU design including the discharge point or drain, if any. Engineering drawings shall be provided if available;

ii) A map showing the route of effluent from this unit to the Building 3C Yard Former Oil/Water Separator (SWMU T-5) and to its final point of disposition;

iii) A description of the piping, if any, providing the route of effluent from this unit to its final point of disposition, including the diameters of the inner and outer walls and materials of construction; and

iv) At a minimum, the effluent samples shall be analyzed for Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Integrity Testing/Inspections

The RFI Proposal shall include specific procedures and schedules for determining the integrity of the SWMU, including all associated piping. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity of the sump shall be determined by mechanical methods (i.e.,

tightness testing), or by visual means (i.e., inspecting the SWMU when it is empty). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for the SWMU within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results of the integrity testing/inspections to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(11) SWMU G-2 (Scrap Yard)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the perimeter of the pad underlying this SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outline in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed surface and subsurface samples, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have been released from the SWMU. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for all Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Integrity Testing/Inspections of SWMU Sump

The RFI Proposal shall include specific procedures and schedules for determining the integrity of the SWMU sump. Current guidance on recommended methods and procedures shall

be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity shall be determined by mechanical methods (i.e., tightness testing), or by visual methods (i.e., inspecting the SWMU when it is empty). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for the SWMU within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

c) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(12) SWMU T-42 (Building 68 Drainage Pits)

a) Integrity Testing/Inspections

The RFI Proposal shall include specific procedures and schedules for determining the integrity of the SWMU. Current guidance on recommended methods and procedures shall be obtained and referenced from EPA's Office of Underground Storage Tanks. Integrity shall be determined by mechanical methods (i.e., tightness testing). The proposal shall provide procedures for the following:

i) Notifying the Director at least fourteen (14) calendar days in advance of any test or inspection to be performed;

ii) Completing the integrity determinations for the SWMU within ninety (90) calendar days of approval of the RFI Proposal by the Director; and

iii) Providing all results to the Director within thirty (30) calendar days of performance of the test or inspection, including, at a minimum, all calculations, measurements, results, copies of inspection notebooks, raw data, and photographs taken during the test or inspection. Results of all integrity determinations made from visual inspection must be documented with photographs.

(13) SWMU T-63 (Building 61 Phenolic Dust Baghouse)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the perimeter of the pad underlying this SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have been released from the SWMU. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for all Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(14) SWMU T-6 (Building 3C Vault)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples at the perimeter of the pad underlying this SWMU to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. Procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale for determining the number of borings and samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI Proposal;

ii) Proposed depths of each sample, with a demonstration that the proposed depths are sufficient to provide representative samples of hazardous waste and/or hazardous constituents which have been released from the SWMU. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for all Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outlined in Special Permit Condition II.A.4.f.

(15) Underground Pipes, and Tunnels, Including Stormwater and Sewer Pipes and Other Preferential Pathways

The RFI Proposal shall include procedures for incorporating the contribution of preferential pathways, including but not limited to underground pipes, tunnels and storage tanks, to releases of hazardous waste and/or hazardous constituents to the subsurface environment. At a minimum, the Proposal shall include:

a) Facility maps showing the locations and routing of all underground pipes, tunnels, and storage tanks;

b) Description of the piping, tunnels, and storage tanks, including materials of construction, age, dimensions, structural integrity, and information regarding past or current leaks or breaks;

c) Description of the types of materials currently conveyed and/or stored by the pipes, tunnels and storage tanks, and the types of materials which have been conveyed and/or stored in the past, and approximate average and maximum flow rates;

d) A proposed approach for evaluating the locations and effects of underground pipes, tunnels and storage tanks on groundwater and contaminant movement, including infiltration/exfiltration of hazardous waste and/or hazardous constituents; and

e) A proposed approach for assessing the contributions of releases of hazardous waste and/or hazardous constituents in the area from underground pipes, tunnels and storage tanks (e.g., locating monitoring wells and taking soil samples in locations where releases and/or potential releases from underground pipes and tunnels are a concern, integrity testing, etc.) to all media.

f. Groundwater Contamination Investigation in Area 4

The RFI Proposal shall include specific measures to address any contaminant plume from the SWMUs and other sources in Area 4. The Area 4 groundwater investigation shall be designed to: 1) define the local and regional geology and hydrology, including such elements as surface water bodies; 2) define the nature and horizontal and vertical extent of contamination resulting from releases of hazardous waste and/or hazardous constituents in Area 4; 3) determine the direction of movement and rate of flow of contaminant plumes, taking into account seasonal variations in flow; 4) determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from Area 4 to surface water bodies; and 5) identify sources of contamination.

Requirements set forth in Attachment A for groundwater investigations shall be required for the investigation of this area. In addition, the following requirements shall be incorporated into the RFI proposal:

(1) Groundwater Investigation Approach

The RFI Proposal shall include justification of procedures and schedules for investigating each SWMU, which shall include provisions to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents to groundwater, and to all surface water bodies by surface and subsurface pathways. The Proposal shall provide for a characterization of the horizontal and vertical extent of releases from each SWMU and for all hazardous waste and/or hazardous constituents in the releases. The Proposal may incorporate existing data, protocols and groundwater monitoring wells, provided that the Proposal includes a demonstration that such data and/or monitoring wells fully meet the requirements established in this section. Schedules included in the RFI Proposal shall provide for submittal of all results to the Director within 360 calendar days of approval of the RFI Proposal by the Director. The Proposal shall include the following provisions:

a) Groundwater Monitoring Plan

The Permittee shall submit a Groundwater Monitoring Plan designed to collect enough information at each identified SWMU to determine the quality of background groundwater and to determine the rate of migration, concentration and extent of groundwater contamination due to releases of hazardous waste and/or hazardous constituents from each SWMU.

The plan shall include a justification of the location and number of monitoring wells at each identified SWMU based on the rate and direction of groundwater flow, the size of the SWMU, the nature of the contaminants and the geologic conditions and complexity.

i) Background Groundwater Monitoring Plan

The Permittee shall submit a Background Groundwater Monitoring Plan that, at a minimum, shall specify the

number and location of background monitoring wells that are proposed to be used in determining background groundwater quality at each identified SWMU. The plan shall also include justification showing how these wells will provide a reliable indication of background groundwater quality for the uppermost aquifer.

ii) Downgradient Groundwater Monitoring Plan

The Permittee shall submit a Downgradient Groundwater Monitoring Plan capable of monitoring all groundwater flow paths which are capable of transporting hazardous waste and/or hazardous constituents released from the identified SWMUs.

(a) The plan shall include a description of the number and location of downgradient monitoring wells that will be used to determine downgradient groundwater quality at each identified SWMU; and

(b) The Permittee shall submit a justification showing how these wells will provide a reliable indication of downgradient groundwater quality for the uppermost aquifer.

iii) Monitoring Well Design and Installation Plan

The Permittee shall submit a Monitoring Well Design and Installation Plan describing and justifying the monitoring well construction for all monitoring wells it proposes to be installed. At a minimum, the Monitoring Well Design and Installation Plan shall specify the following:

(a) Monitoring well design, installation procedures and well development techniques shall follow the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version. The use of oils, greases, or drilling muds during advancement of the borings is prohibited. The Permittee shall justify the proposed well screen material chosen. This justification shall include at least a discussion of alternative well screen materials and the reasons why these alternative materials were not chosen. The Permittee must propose to install enough monitoring wells and take sufficient samples to justify any conclusions resulting from its analysis; and

(b) A boring and well construction log shall be recorded by a qualified geologist during the installation of each monitoring well.

iv) Groundwater Sampling and Analysis Plan

The Permittee shall submit a Sampling and Analysis Plan designed to provide a reliable indication of water quality for the water samples taken. The proposed Sampling and Analysis Plan shall include at least the following:

(a) All the elements specified in the RFI Guidance, Interim Final (May, 1989), or any updated version;

(b) Justification of appropriate sampling techniques;

(c) Provision as to the appropriate sampling frequency, together with the justification therefor;

(d) At a minimum, the Sampling and Analysis Plan shall provide for an Appendix IX analysis for the first round of samples taken at each sampling location and for any other constituents which can be expected to be in or derived from the waste which was disposed;

(e) Proposed methodologies for ensuring that all data will be collected and managed in accordance with procedures specified in the RFI Guidance, Interim Final (May, 1989), or any updated version; and

(f) An explanation as to how the above Sampling and Analysis Plan will provide the necessary information to support the Preliminary Corrective Measures and/or any other corrective measures proposed and data quality objectives for risk assessment as described in Special Permit Condition II.A.7. and II.A.8.

(2) The Proposal shall include provisions for monitoring of the identified plume for the term of the Permit, to increase the existing database in light of the Area 4 investigation goals.

(3) The Proposal shall include a discussion of the nature of all contaminants which make up the contaminant plume (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.) and how sampling and analysis has and will account for these characteristics.

(4) The Proposal shall demonstrate that the regional and local hydrogeologic system has been or shall be defined as necessary to predict the rate and direction of plume migration. The following specific activities shall be required, at a minimum, in order to define the hydrogeologic system:

a) In-situ pump/slug testing to determine characteristics of the hydrogeologic system in order to facilitate rate of plume migration calculations;

b) Additional well installations to define flow to and beneath surface water bodies; and

c) Geophysical investigations, including seismic investigations and additional drilling and/or well installations to define the depth to bedrock and the geology and hydrology of the strata down to and including bedrock.

(5) The Proposal shall demonstrate that the rate and direction of plume movement will be defined as part of Area 4 contaminant plume investigation activities. Definition of the plume includes identification of contaminants including floating, sinking, and

dissolved constituents, structure of all phases of the plume (i.e., extent of contamination in each hydrogeologic unit), rate and direction of plume movement, and possibility of migration beneath surface water bodies. The following specific activities shall be required, at a minimum, in order to define the rate and direction of plume movement:

a) Sampling on a quarterly basis for the term of the Permit in order to address seasonal changes in the plume and increase the database in this area; and

b) Installation and sampling of wells adequate to define the horizontal and vertical extent of the contaminant plume. Location, depth and design of wells shall include consideration of the definition of the regional and local hydrogeological system required in Special Permit Condition II.A.4.f.(4).

(6) The Proposal shall provide for the identification of the nature, rate of migration, concentration and extent of contaminated groundwater in this area recharging to surface water bodies.

(7) The Proposal shall demonstrate that all additional applicable requirements set forth in Attachment A regarding RFI activities and reporting shall be met.

(8) The Proposal shall include schedules providing for characterization of the nature, rate of migration, concentration and extent of area-wide groundwater contamination in Area 4 within 360 calendar days of approval of the RFI Proposal by the Director sufficient for the development of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

5. RFI Requirements for Area 5 (SWMU G-6: Newell Street-GE Parking Lot Site and SWMU G-21: Lyman Street-GE Parking Lot Site)

a. Preliminary Investigation of Corrective Measures

The RFI Proposal shall identify the potential corrective measure technologies that may be used on-site and/or off-site to contain, treat, remedy, and/or dispose of the contamination resulting from the release of hazardous waste and/or hazardous constituents from SWMUs and other sources in Area 5. This Preliminary Investigation shall summarize all prior investigations performed by or available to the Permittee and identify all existing data gaps and field data that need to be collected during implementation of the RFI to facilitate the technical evaluation and selection of the corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

b. Identification of Additional SWMUs and/or Media of Concern in Area 5

The RFI Proposal shall include procedures to identify and describe any additional SWMUs and/or media of concern which are present in this area. The identification and description of additional SWMUs shall include, at a minimum:

(1) Description of each SWMU and/or media, and location on a map;

(2) Period of operation of each SWMU;

(3) Description of wastes managed in each SWMU and/or media;

(4) Release controls for each SWMU;

(5) History of releases from each SWMU and/or media; and

(6) Any environmental data which has been collected for each SWMU and/or media.

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from additional SWMUs and/or to additional media, identified during the course of the RFI.

c. Environmental Setting

The RFI Proposal shall include a proposed study to characterize the environmental setting in Area 5 with respect to soils, ground water, surface waters and sediments, subsurface gas, and air. In the proposed study, the Permittee shall document the methodology to be used in obtaining the data necessary to provide the information required in the RFI Report, as detailed in Special Permit Condition II.G. The environmental setting section shall use procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and at a minimum shall include the following:

(1) Soil/Bedrock Characterization

The Permittee shall include a description and justification of the procedures to gather data sufficient to characterize the subsurface geology around each SWMU.

(2) Procedures for Determining Groundwater Hydraulics

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to characterize the groundwater hydraulics associated with each SWMU. The description shall identify the procedures for establishing the rate and direction of groundwater flow in the horizontal and vertical directions and for determining the areas of groundwater discharge and groundwater recharge. The description shall also identify the procedures for determining variations of groundwater flow rate and direction (i.e., seasonal, temporal, etc.), and the hydraulic properties of each stratum identified in the boring program.

(3) Procedures for Evaluating Surface Waters and Sediments

The Permittee shall include a description and justification of the procedures it intends to use to gather data sufficient to evaluate the surface waters and sediments in and surrounding Area 5. At a minimum, the evaluation shall include a description of the chemistries of the natural surface water and sediments as applicable. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen

profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations.

(4) Procedures for Evaluating Climatic Conditions

The Permittee shall include a description and justification of the procedures it intends to use in evaluating climatic conditions that may cause or influence air flow in the vicinity of the Facility.

d. Source Characterization

The RFI Proposal shall include a proposed study to characterize the SWMUs and other sources in Area 5 and the hazardous waste and/or hazardous constituents in these SWMUs and other sources. The proposed study shall document and justify the methodology for obtaining data and drawing conclusions in order to provide the information required in the RFI Report. At a minimum, the proposed study shall include a description of the procedures the Permittee intends to use to identify the hazardous waste and/or hazardous constituents, quantity, physical characteristics, migration/dispersal characteristics, toxicity and chemical composition.

e. Investigation of Individual SWMUs in Area 5

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from individual SWMUs in Area 5. Final determination of the extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The RFI Proposal shall characterize the contribution of releases from each source to area-wide groundwater contamination as determined under the investigations defined in Special Permit Condition II.A.5.f. The measures for each SWMU shall be consistent with the RFI Guidance, Interim Final (May, 1989), or any updated version, and shall include, at a minimum, the following:

(1) SWMU G-6 (Newell Street-GE Parking Lot Site) and SWMU G-21 (Lyman Street-GE Parking Lot Site)

a) Soil Sampling Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for taking soil samples in the SWMUs to determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents. The procedures and schedules shall include the procedures outlined in Attachment B and the following, at a minimum:

i) A map and grid indicating the proposed locations from which samples are to be taken. A rationale for determining the number of samples based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, shall be included in the RFI proposal;

ii) Proposed surface and subsurface samples, with a demonstration that the proposed depths are sufficient to

provide representative samples of hazardous waste and/or hazardous constituents disposed of in and/or released from the SWMUs. Samples shall be taken at each interval where there are chemical or physical indications of potential wastes or waste residues (e.g., coloration change, material/texture change); and

iii) At a minimum, the soil samples will be analyzed for all Appendix IX constituents during the initial sampling event and any other constituents which can be expected to be in or derived from the waste or constituents released.

b) Subsurface Gas Investigation Approach

The RFI Proposal shall justify and describe the procedures and schedules proposed for determining the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMU from the generation of or contamination from subsurface gas, including, at a minimum:

i) A description of and justification for the procedures the Permittee proposes to use. This description shall include a provision for identifying any gas(es) found and for determining its (their) nature, the rate of migration, concentration and extent of contamination; and

ii) A description of and justification for the methodology to be used in obtaining data and drawing conclusions.

c) Groundwater Sampling Approach

A groundwater investigation is required for this unit. The Proposal shall provide for incorporation of this unit into the investigation outline in Special Permit Condition II.A.5.f

f. Groundwater Contamination Investigation in Area 5

The RFI Proposal shall include specific measures to address any contaminant plume from the SWMUs and other sources in Area 5. The Area 5 groundwater investigation shall be designed to: 1) define the local and regional geology and hydrology, including such elements as surface water bodies; 2) define the nature and horizontal and vertical extent of contamination resulting from releases of hazardous waste and/or hazardous constituents in Area 5; 3) determine the direction of movement and rate of flow of contaminant plumes, taking into account seasonal variations in flow; 4) determine the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from Area 5 to surface water bodies; and 5) identify sources of contamination.

Requirements set forth in Attachment A for groundwater investigations shall be required for the investigation of this area. In addition, the following requirements shall be incorporated into the RFI proposal:

(1) Groundwater Investigation Approach

The RFI Proposal shall include justification of procedures and schedules for investigating each SWMU, which shall include provisions to characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents to groundwater, and to all surface water bodies by surface and subsurface pathways. The Proposal shall provide for a characterization of the horizontal and vertical extent of releases from each SWMU and for all hazardous waste and/or hazardous constituents in the releases. The Proposal may incorporate existing data, protocols and groundwater monitoring wells, provided that the Proposal includes a demonstration that such data and/or monitoring wells fully meet the requirements established in this section. Schedules included in the RFI Proposal shall provide for submittal of all results to the Director within 360 calendar days of approval of the RFI Proposal by the Director. The Proposal shall include the following provisions:

a) Groundwater Monitoring Plan

The Permittee shall submit a Groundwater Monitoring Plan designed to collect enough information at each identified SWMU to determine the quality of background groundwater and to determine the rate of migration, concentration and extent of groundwater contamination due to releases of hazardous waste and/or hazardous constituents from each SWMU.

The plan shall include a justification of the location and number of monitoring wells at each identified SWMU based on the rate and direction of groundwater flow, the size of the SWMU, the nature of the contaminants and the geologic conditions and complexity.

i) Background Groundwater Monitoring Plan

The Permittee shall submit a Background Groundwater Monitoring Plan that, at a minimum, shall specify the number and location of background monitoring wells that are proposed to be used in determining background groundwater quality at each identified SWMU. The plan shall also include justification showing how these wells will provide a reliable indication of background groundwater quality for the uppermost aquifer.

ii) Downgradient Groundwater Monitoring Plan

The Permittee shall submit a Downgradient Groundwater Monitoring Plan capable of monitoring all groundwater flow paths which are capable of transporting hazardous waste and/or hazardous constituents released from the identified SWMUs.

(a) The plan shall include a description of the number and location of downgradient monitoring wells that will be used to determine downgradient groundwater quality at each identified SWMU; and

(b) The Permittee shall submit a justification showing how these wells will provide a reliable indication of downgradient groundwater quality for the uppermost aquifer.

iii) Monitoring Well Design and Installation Plan

The Permittee shall submit a Monitoring Well Design and Installation Plan describing and justifying the monitoring well construction for all monitoring wells it proposes to be installed. At a minimum, the Monitoring Well Design and Installation Plan shall specify the following:

(a) Monitoring well design, installation procedures and well development techniques shall follow the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version. The use of oils, greases, or drilling muds during advancement of the borings is prohibited. The Permittee shall justify the proposed well screen material chosen. This justification shall include at least a discussion of alternative well screen materials and the reasons why these alternative materials were not chosen. The Permittee must propose to install enough monitoring wells and take sufficient samples to justify any conclusions resulting from its analysis; and

(b) A boring and well construction log shall be recorded by a qualified geologist during the installation of each monitoring well.

iv) Groundwater Sampling and Analysis Plan

The Permittee shall submit a Sampling and Analysis Plan designed to provide a reliable indication of water quality for the water samples taken. The proposed Sampling and Analysis Plan shall include at least the following:

(a) All the elements specified in the RFI Guidance, Interim Final (May, 1989), or any updated version;

(b) Justification of appropriate sampling techniques;

(c) Provision as to the appropriate sampling frequency, together with the justification therefor;

(d) At a minimum, the Sampling and Analysis Plan shall provide for an Appendix IX analysis for the first round of samples taken at each sampling location and for any other constituents which can be expected to be in or derived from the waste which was disposed;

(e) Proposed methodologies for ensuring that all data will be collected and managed in accordance with procedures specified in the RFI Guidance, Interim Final (May, 1989), or any updated version; and

(f) An explanation as to how the above Sampling and Analysis Plan will provide the necessary information to support the Preliminary Corrective Measures and/or any other corrective measures proposed and data quality objectives for risk assessment as described in Special Permit Condition II.A.7. and II.A.8.

(2) The Proposal shall include provisions for monitoring of the identified plume for the term of the Permit, to increase the existing database in light of the Area 5 investigation goals.

(3) The Proposal shall include a discussion of the nature of all contaminants which make up the contaminant plume (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.) and how sampling and analysis has and will account for these characteristics.

(4) The Proposal shall demonstrate that the regional and local hydrogeologic system has been or shall be defined as necessary to predict the rate and direction of plume migration. The following specific activities shall be required, at a minimum, in order to define the hydrogeologic system:

a) In-situ pump/slug testing to determine characteristics of the hydrogeologic system in order to facilitate rate of plume migration calculations;

b) Additional well installations to define flow to and beneath surface water bodies; and

c) Geophysical investigations, including seismic investigations and additional drilling and/or well installations to define the depth to bedrock and the geology and hydrology of the strata down to and including bedrock.

(5) The Proposal shall demonstrate that the rate and direction of plume movement will be defined as part of Area 5 contaminant plume investigation activities. Definition of the plume includes identification of contaminants including floating, sinking, and dissolved constituents, structure of all phases of the plume (i.e., extent of contamination in each hydrogeologic unit), rate and direction of plume movement, and possibility of migration beneath surface water bodies. The following specific activities shall be required, at a minimum, in order to define the rate and direction of plume movement:

a) Sampling on a quarterly basis for the term of the Permit in order to address seasonal changes in the plume and increase the database in this area; and

b) Installation and sampling of wells adequate to define the horizontal and vertical extent of the contaminant plume. Location, depth and design of wells shall include consideration of the definition of the regional and local hydrogeological system required in Special Permit Condition II.A.5.f.(4).

(6) The Proposal shall provide for the identification of the nature, rate of migration, concentration and extent of contaminated groundwater in this area recharging to surface water bodies.

(7) The Proposal shall demonstrate that all additional applicable requirements set forth in Attachment A regarding RFI activities and reporting shall be met.

(8) The Proposal shall include schedules providing for characterization of the nature, rate of migration, concentration and extent of area-wide groundwater contamination in Area 5 within 360 calendar days of approval of the RFI Proposal by the Director sufficient for the development of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

6. RFI Requirements for Area 6 (Housatonic River and Silver Lake)

a. Preliminary Investigation of Corrective Measures

The RFI Proposal shall include a proposal for the Preliminary Investigation of Corrective Measures for the Housatonic River and Silver Lake. The proposal shall provide detailed plans and specifications for conducting studies and research of dredging and treatment techniques for sediments in the Housatonic River and Silver Lake containing hazardous waste and/or hazardous constituents originating from the Facility. The Preliminary Investigation of Corrective Measures shall be completed within 180 days of approval of the RFI Proposal and shall include the following at a minimum:

(1) Research on Alternative Treatment/Disposal Technologies

The RFI Proposal shall provide specific procedures (including literature reviews) for evaluating the potential corrective measure technologies that may be used on-site and off-site to contain, treat, remedy, and/or dispose of contaminated sediments in the Housatonic River and Silver Lake. The technologies to be evaluated shall include, but are not limited to, those identified in Attachment C. The proposal will include the following, at a minimum:

a) A research plan, providing a detailed description of the following:

i) Specific treatment technologies to be evaluated, and the basis for selection of each technology. At a minimum, the treatment technologies identified in Attachment C shall be evaluated and a minimum of three technologies shall be identified for in-depth evaluation;

ii) If appropriate, justification of the scale of the bench-scale, laboratory or pilot study (including the volumes of sediments to be treated in each phase of the study) for each technology;

iii) Basis for selection of each technology, including a summary of relevant research conducted to date and the relationship of completed and/or ongoing research to the proposed study;

iv) A summary of all treatment technologies considered by the Permittee in selecting the technologies to be included in the study. This shall include, at a minimum, consideration of all technologies in Attachment C and the specific reasons why any of these technologies were not selected for inclusion in the study;

v) If a pilot, bench-scale, or laboratory study is proposed, a sampling and analysis plan meeting the requirements of Special Permit Conditions II.A.8. and II.A.9. Specification of all parameters to be analyzed shall be included; and

vi) Criteria to be used in evaluating each technology, and specific data to be collected to measure each criterion with each technology, including but not limited to: effectiveness in reducing the volume, toxicity and mobility of hazardous waste and/or hazardous constituents; short- and long-term practicality of implementation; and environmental impacts.

b) A detailed schedule of all construction and research activities, providing for completion of the study no later than 180 days of approval of the RFI Proposal by the Director;

c) A description of environmental impacts likely to result from pilot study activities, during construction and research phases, and proposed measures to mitigate the environmental impacts, if applicable;

d) An evaluation of the need for and availability of river and lake access for each alternative; and

e) A description of all federal, state, and local approvals, including permits, required for construction and operation of any pilot study facilities, and estimates of the time required for each approval.

(2) Dredging Technologies

The RFI Proposal shall provide a detailed plan to evaluate the effectiveness of techniques for dredging sediments contaminated with hazardous waste and/or hazardous constituents originating at the Facility. The Plan shall include the following, at a minimum:

a) A research plan, providing a detailed description of the following:

i) Specific dredging technologies to be evaluated, and the basis for selection of each technology. At a minimum, the technologies shall include at least one hydraulic, one mechanical, and one pneumatic dredging technology, as well as drawdown and dry excavation technologies;

ii) If appropriate, justification of scale of the bench-scale, laboratory or pilot study (including the volumes of sediment to be handled in each phase of the study) for each technology;

iii) Basis for selection of each technology, including a summary of relevant research conducted to date and the relationship of completed and/or ongoing research to the proposed study;

iv) A summary of all dredging technologies considered by the Permittee in selecting the technologies to be included in the study, and the specific reasons why these technologies were not selected for inclusion in the study;

v) If a pilot, bench-scale, or laboratory study is proposed, a sampling and analysis plan meeting the requirements of Special Permit Conditions II.A.8. and II.A.9. Specification of all parameters which are to be analyzed shall be included;

vi) A summary of alternatives to transport treated or untreated dredge spoils. At a minimum, the modes of transportation investigated shall include pumping and railroad; and

vii) Criteria to be used in evaluating each technology, and specific data to be collected to measure each criterion with each technology, including but not limited to: effectiveness (in terms of removal efficiency and of time required to achieve removal); short- and long-term practicality of implementation; and environmental impacts (including quantification of the relative amounts of sediments and hazardous waste and/or hazardous constituents which are mobilized during dredging with respect to the total amount of sediments and hazardous waste and/or hazardous constituents which are removed).

b) A detailed schedule of all construction and research activities, providing for completion of the study no later than 180 days of approval of the RFI Proposal by the Director;

c) A description of environmental impacts likely to result from any pilot study activities, during construction and operation of the pilot study facilities, and proposed measures to mitigate the environmental impacts;

d) An evaluation of the need for and availability of river and lake access for each alternative; and

e) A description of all federal, state and local approvals, including permits, required for construction and operation of any pilot study facilities, and estimates of the time required for each approval.

b. Investigation of Contamination in the Housatonic River and Silver Lake.

The RFI Proposal shall include specific measures to evaluate the nature, rate of migration, concentration and extent of hazardous waste and/or hazardous constituents, released from the Facility, into the surface waters and sediments of Silver Lake and the Housatonic River and soils of their 100-year floodplains. Final determination of the

extent of contamination shall be based on analyses of all previously detected hazardous waste and/or hazardous constituents. The investigation shall be designed to: 1) define the locations and volumes of sediments and soils which must be addressed with corrective measures; 2) determine the extent to which concentrations and volumes of hazardous waste and/or hazardous constituents may be changing over time, including changes since the Housatonic River Study was conducted in 1982 and since data collection began in Silver Lake; 3) determine the extent to which hazardous waste and/or hazardous constituents are migrating downstream in the river; 4) characterize the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the Facility to the Housatonic River and Silver Lake; 5) develop sufficient information to meet the requirements for the Health and Environment Assessment Proposal set out in Special Permit Condition II.A.7.; and 6) develop sufficient information for a Corrective Measures Study. The following requirements shall be incorporated in the RFI Proposal:

(1) The RFI Proposal shall provide a program for sampling and analyzing sediments and surface waters of the lake and river under a range of flow and seasonal conditions. Samples shall be taken during periods of average flow and during all peak and low flow events. Sampling and analysis shall be performed on soil samples from the floodplains of the lake and river. For the first round of sampling, samples shall be analyzed for all Appendix IX constituents and any associated transformation and degradation products. The sampling program shall include the following, at a minimum:

a) Sediment and surface water samples shall be taken in the river and soil samples on the banks of the river within the 100-year floodplain at a minimum in proximity of samples collected in the river in the 1982 Housatonic River Study. The sampling program shall include taking core samples at selected locations in the river, at depths sufficient to determine the vertical extent of downward movement of hazardous waste and/or hazardous constituents. The sampling program shall provide for and justify that adequate definition of the extent of contamination throughout the floodplain will be provided. The proposal shall provide specific procedures for comparing the results of this sampling and analysis program with any past data collected by or available to the Permittee;

b) Sediment and surface water samples shall be taken in the river and soil samples on the banks of the river within the 100-year floodplain along the portion of the river which adjoins the Facility. The sampling program shall include taking core samples at selected locations in the river, at depths sufficient to determine the vertical extent of downward movement of hazardous waste and/or hazardous constituents. The locations and number of samples shall be sufficient to characterize the nature, rate of migration, concentration and extent of releases from the Facility to the river by subsurface and surface pathways. Locations of samples shall include, but not be limited to, portions of the river likely to be direct reception areas of subsurface and surface releases from Areas 1, 2, 3, 4, and 5 of the Facility;

c) Sediment and surface water samples in the river and soil samples on the banks of the river within the 100-year floodplain shall be taken in the portion of the river downstream of the Woods Pond dam. Sediment and surface water samples shall be taken at the discharge point of the raceway channel to the river. Samples shall also be taken at selected locations within the raceway channel. The sampling program shall include taking core samples at selected locations in the river, at depths sufficient to determine the vertical extent of downward movement of hazardous waste and/or hazardous constituents;

d) Surface water and sediment samples shall be taken at the intake and discharge points of the pipe which discharges surface water from Silver Lake to the Housatonic River. Measurements of flow rates at the intake and discharge points shall be taken with each sample. Sampling and analysis procedures shall include procedures for determining the volumes of hazardous waste and/or hazardous constituents which may be leaking from the pipe between Silver Lake and the Housatonic River; and

e) Sediment and surface water samples shall be taken in the lake and sediment samples on the banks of the lake within the 100-year floodplain. The sampling program shall include taking core samples at selected locations in the lake, at depths sufficient to determine the vertical extent of downward movement of hazardous waste and/or hazardous constituents. The locations and number of samples shall be sufficient to characterize the nature, rate of migration, concentration and extent of releases from the Facility to the lake by subsurface and surface pathways. Locations of samples shall include, but not be limited to portions of the lake likely to be direct reception areas of subsurface and surface releases from Area 4 of the Facility.

(2) The RFI Proposal shall include specific procedures for obtaining the following:

a) Locations, volumes and concentrations of hazardous waste and/or hazardous constituents released from the Facility into Silver Lake, the Housatonic River and their 100-year floodplains;

b) Migration of hazardous waste and/or hazardous constituents, including deposition rates, mobilization and remobilization of sediments containing hazardous waste and/or hazardous constituents under the range of flow conditions. The proposal shall include laboratory protocols, quality assurance procedures and procedures for maintaining original data sheets;

c) Nature, rate of migration, concentration and extent of migration of hazardous waste and/or hazardous constituents which pass the Woods Pond dam; and

d) Nature, rate of migration, concentration and extent of continuing releases of hazardous waste and/or hazardous constituents from the Facility to the river and lake by

surface and subsurface pathways, including specific consideration of releases from Areas 1, 2, 3, 4, and 5 of the Facility.

(3) The RFI Proposal shall include a sampling and analysis plan meeting the requirements of Special Permit Conditions II.A.8. and II.A.9.; and

(4) The RFI Proposal shall include specific milestones and schedules for the characterization of the fate, transport, nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents in Area 6 from the Facility. Information and analyses developed during the RFI shall be sufficient for the development, if necessary, of a Media Protection Standards Proposal and a Corrective Measures Study Proposal.

7. Health and Environmental Assessment Proposal

The RFI Proposal shall include a Health and Environmental Assessment (HEA) Proposal designed to identify the human populations and/or environmental systems that may be exposed to hazardous waste and/or hazardous constituents released from all of the areas and SWMUs identified in Special Permit Conditions II.A.1 through II.A.6. At a minimum, the Permittee shall apply the Risk Assessment Guidance for Superfund, Interim Final, Volume 1 (December, 1989) and Volume 2 (March, 1989), the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final (June, 1989), the Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (March, 1989) and Data Quality Objectives For Remedial Response Activities (March, 1987), or any updated versions, to the structure and methodology of the Health and Environmental Assessment. The Health and Environmental Assessment Proposal shall document the methodology that will be used in obtaining data and drawing conclusions to provide the types of information required in subsections (a) through (g) below.

At a minimum, the Health and Environmental Assessment Proposal shall include the following:

a. A proposal for identifying exposure pathways, which shall include consideration of the following:

(1) sources of chemical releases and media subject to releases;

(2) current local uses and possible future uses of groundwater, including:

a) type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/nonpotable, and industrial (including use by cogeneration plants));

b) location of groundwater users, including wells and discharge areas; and

c) aquifer classification(s) of groundwater within 2,000 feet of the Facility boundary.

(3) current local and potential future uses of surface waters draining from or in proximity to the Facility (Unkamet Brook, Housatonic River and Silver Lake), including:

a) domestic and municipal uses (e.g., potable and lawn/garden watering);

b) recreational uses (e.g., swimming, fishing);

c) agricultural uses (e.g., crops, farm animals);

d) industrial uses (e.g., cogeneration plants); and

e) environmental uses (e.g., fish and wildlife propagation).

(4) current and potential future human use of and/or access to the Facility and lands adjacent to and including contaminated surface water bodies, including but not limited to:

a) recreational uses (including hunting, fishing, swimming, etc.);

b) residential uses; and

c) commercial uses.

(5) the relationship between population locations and the prevailing wind direction;

(6) a description of the biota in surface water bodies, including Unkamet Brook, Housatonic River, Silver Lake and adjacent wetlands on, adjacent to, and/or affected by the Facility;

(7) the presence of sensitive human and/or environmental populations, including without limitation the following:

a) workers and residents at and adjacent to the Facility;

b) students at the local schools; and

c) a description of any endangered or threatened environmental systems and/or species in the vicinity of the Facility and residing along lands adjacent to surface water or in surface water bodies; and

(8) the integration of release sources, environment transport media, exposure points, and exposure routes into exposure pathways and exposure scenarios.

b. A proposal for identifying indicator chemicals to be used in evaluating public health and environmental risk at exposure points. The proposal shall provide that these chemicals shall be selected in accordance with the Risk Assessment Guidance for Superfund, Interim Final, Volume 1 (December, 1989) and Volume 2 (March, 1989), the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final (June, 1989), the Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (March, 1989), and Data Quality Objectives for Remedial Response Activities (March, 1987), or any updated versions.

c. A proposal for estimating exposure point concentrations of hazardous constituents releasing to soils, groundwater, surface water and sediments, and air, including but not limited to PCBs, which shall include consideration of at least the following:

(1) quantity of chemical releases; and

(2) predictions as to environmental fate and transport of all releases.

d. A proposal for comparing the exposure point concentrations referenced in Special Permit Condition II.A.7.c above to the following requirements, standards, and criteria:

(1) Maximum Contaminant Levels;

(2) National and State Ambient Air Quality Standards;

(3) Federal and State Water Quality Standards;

(4) Water Quality Criteria;

(5) Drinking Water Health Advisories; and

(6) Any other relevant criteria (e.g., Reference Doses, Carcinogenic Potency Factors, criteria based on research literature).

e. For those indicator chemicals for which there are no requirements, standards, or criteria applicable under Special Permit Condition II.A.7.d above, or where existing requirements, standards, or criteria are insufficient to characterize the risks, the HEA Proposal shall include a proposal which includes the following:

(1) a technique for determining the chemical intake or uptake of the contaminant(s) in groundwater, soil, surface water and sediments, air, and subsurface gas, as well as a technique for integrating total oral and inhalation intakes from all media;

(2) a methodology for assessing the toxicity of the contaminant(s) with regard to non-carcinogenic (chronic, subchronic and acute) and carcinogenic effects;

(3) a methodology of characterizing non-carcinogenic (chronic, subchronic and acute) and carcinogenic effects, as well as for identifying the uncertainties inherent in the proposed methodology; and

(4) a methodology for risk integration (e.g., comparing intake levels to health-based criteria).

f. The HEA Proposal shall include a proposal for determining the relative risks to human health and/or the environment from releases of hazardous waste and/or hazardous constituents among each of the five areas of the Facility and to the Housatonic River and Silver Lake as addressed in Special Permit Conditions II.A.1 through II.A.6.

g. The HEA Proposal shall include a schedule providing for submittal of the HEA Report for the review and approval of the Director within 450 calendar days of approval of the RFI Proposal by the Director.

8. Data Collection and Analysis Quality Assurance Plan

The RFI Proposal shall include a proposed plan to document all monitoring procedures (sampling, field measurements and sample analysis) performed during the investigations to characterize the environmental setting, the source, and the contamination, to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented. The RFI Proposal shall be consistent with the RFI Guidance, Interim Final (May, 1989), or any updated version. At a minimum, the Data Collection and Analysis Quality Assurance Plan shall include the following:

a. Data Collection Strategy

(1) Description of the intended uses for the data, and the necessary level of precision and accuracy for such uses;

(2) description of methods and procedures proposed to assess the precision, accuracy and completeness of the measurement data; and

(3) description of proposed measures to assure that the following data sets can be compared to each other:

a) data generated by the Permittee over the same time period;

b) data generated by an outside consultant or laboratory versus data generated by the Permittee; and

c) data generated by independent consultants or laboratories versus data generated by the Permittee.

b. Sampling

(1) A proposal for collecting, interpreting, and assessing all necessary ancillary data;

(2) proposed conditions under which sampling shall be conducted;

(3) proposed media to be sampled (e.g., groundwater, air, soil, sediment, surface water, subsurface gas, biota, etc.);

(4) a proposal for determining which parameters are to be sampled and where;

(5) proposed types of samples (e.g., composites vs. grabs) and number of samples to be collected;

(6) proposed sample containers;

(7) proposed measures to assure sample preservation;

(8) proposed frequency of sampling and length of sampling period; and

(9) proposed chain-of-custody procedures including provisions to standardize field tracking reporting forms, to establish sample custody in the field prior to shipment, and to provide pre-prepared sample labels containing all information necessary for effective sample tracking.

c. Field Measurements

(1) Proposed field measurement locations, depths, etc.;

(2) proposed number of field measurements necessary to satisfy the data quality objectives specified in Special Permit Condition II.A.7.;

(3) a proposal for measuring and collecting all necessary ancillary data;

(4) proposed conditions under which field measurement shall be conducted;

(5) proposed parameters to be measured and where;

(6) proposed frequency of field measurements and length of field measurements period;

(7) proposed procedures and forms for recording raw data and the exact location, time, and Facility-specific considerations associated with the data acquisition;

(8) proposed procedures for calibrating field devices;

(9) proposed procedures for collecting replicate measurements; and

(10) proposed decontamination procedures.

d. Sample Analysis

(1) Proposed chain-of-custody procedures, including:

a) identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

b) provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

c) laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.

(2) Proposed procedures for sample storage;

(3) Proposed sample preparation methods;

(4) Proposed analytical procedures, including:

a) scope and application of the procedure;

b) sample matrix;

c) potential interferences;

d) precision and accuracy of the methodology; and

e) all method detection limits.

(5) Proposed calibration procedures and frequency;

(6) Data reduction, validation and reporting;

(7) Proposed internal quality control checks, laboratory performance and systems audits and frequency; and

(8) Proposed preventive maintenance procedures and schedules.

9. Data Management Plan

The RFI Proposal shall include a proposed Data Management Plan designed to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements and project-related progress reporting procedures and documents. The Plan shall also propose a format to be used to present the raw data and conclusions of the RFI. At a minimum, the Data Management Plan shall provide that certain data be documented as follows:

a. Data Record

The following data shall be presented in a data record:

(1) unique code for the field measurement sample;

(2) sampling or field measurement location and sample or measurement type;

(3) sampling or field measurement raw data;

(4) laboratory analysis ID number;

(5) property or component measured;

(6) result of analysis (e.g., concentration); and

(7) appropriate cross referencing of sample, analyses, and reference to specific investigation of individual units or areas.

b. Tabular Displays

The following data shall be presented in tabular displays:

(1) unsorted (raw) data;

(2) results for each medium, or for each constituent monitored;

(3) data reduction for statistical analysis;

(4) sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

(5) summary data.

c. Graphical Displays

The following data shall be presented in graphical format as applicable (e.g., bar graphs, line graphs, area or plan maps, isotropic plots, cross-sectional plots or transectional three-dimensional graphs):

(1) Sampling location and sampling grid;

(2) Boundaries of sampling areas and areas where more data are required;

(3) Range of concentration for each constituent at each sampling location;

(4) Geographical extent of contamination;

(5) Constituent concentrations, averages, and maxima;

(6) Changes in concentration in relation to distance from the source, time, depth or other parameters; and

(7) Features which affect intramedia transport and which show potential receptors.

10. Health and Safety Plans

a. The RFI Proposal shall include a proposed General Facility Health and Safety Plan which, at a minimum, includes the following:

(1) Facility description including availability of resources such as roads, water supply, electricity and telephone service;

(2) description of known hazards and evaluation of the risks associated with each activity proposed as part of the various investigations;

(3) list of key personnel and alternates responsible for site safety, response operations, and for protection of public health;

(4) description of levels of protection to be worn by personnel;

(5) delineation of work area;

(6) proposed procedures to control site access;

(7) proposed decontamination procedures for personnel and equipment;

(8) proposed site emergency procedures;

(9) provisions for emergency medical care for injuries and toxicological problems;

(10) description of requirements for an environmental surveillance program;

(11) proposed procedures for protecting workers from weather-related problems; and

(12) proposed site emergency procedures.

b. The General Facility Health and Safety Plan shall be consistent with:

(1) NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

(2) EPA Order 1440.2 - Health and Safety Requirements for Employees engaged in Field Activities;

(3) EPA Order 1440.3 - Respiratory Protection;

(4) Facility Contingency Plan;

(5) EPA Standard Operating Safety Guide (1984);

(6) OSHA regulations (particularly those in 29 C.F.R. §§ 1910 and 1926);

(7) state and local regulations; and

(8) other EPA guidance as provided.

11. Project Management Plan

The RCRA Facility Investigation (RFI) Proposal shall include a Project Management Plan establishing a proposed schedule within which specified elements of the work required under this Permit must be completed. The Plan shall include a breakdown of specific tasks to be performed and milestones associated with each task shall be provided for each activity required in this Permit. Schedules shall be provided for each milestone. The Permittee shall provide a spreadsheet or other similar tracking system(s) detailing tasks and milestones for all tasks in this Permit. Interim milestones shall be completed as expeditiously as practicable to meet the schedules specified below. The Permittee shall submit a justification for the proposed schedule, and shall have the burden of demonstrating that the proposed schedule is as expeditious as possible.

At a minimum, the Project Management Plan shall specify the following:

a. Monthly Progress Reports

Beginning with the month following the effective date of this Permit, the Permittee shall provide the Director with written progress reports for each month, by the tenth day of the following month. At a minimum, these progress reports shall include:

(1) a description of all tasks completed during the previous month;

(2) a description of all required tasks not completed during the previous month and an explanation as to why the tasks were not completed;

(3) a description and schedule of the tasks to be completed in the next month;

(4) all results of sampling, tests and other data generated during the previous month; and

(5) a description of any problem areas and anticipated problem areas in complying with the Permit.

b. Interim Measures

The Permittee shall submit an Interim Measures Proposal to the Director for review and approval within thirty (30) calendar days of the effective date of this Permit. The Proposal shall meet the requirements of Special Permit Condition II.O.

Within ninety (90) calendar days of approval of the Interim Measures Proposal by the Director, the Permittee shall submit the Interim Measures Report. The Interim Measures Report shall meet the requirements of Special Permit Conditions II.O. and II.Q.

c. RFI Proposal, which includes the Health and Environmental Assessment (HEA) Proposal and Current Assessment Summary (CAS) Report

The Permittee shall submit an RFI Proposal, which includes the HEA Proposal and CAS Report, to the Director for review and approval within 120 calendar days of the effective date of this Permit. The Proposals and Report shall meet the requirements of Special Permit Conditions II.A. and II.B.

d. RFI Report, which includes the HEA Report, and Media Protection Standards (MPS) Proposal

The Permittee shall submit an RFI Report, HEA Report, and MPS Proposal to the Director for review and approval within 450 days from approval of the RFI Proposal and HEA Proposal, and shall meet the requirements of Special Permit Conditions II.A., II.E., II.G. and II.I.

e. Corrective Measures Study (CMS) Proposal

The Permittee shall submit a CMS Proposal to the Director for review and approval within ninety (90) days from the approval of Media Protection Standards by the Director, and shall meet the requirements of Special Permit Conditions II.K.

f. Corrective Measures Study (CMS) Report

The Permittee shall submit a CMS Report to the Director for review and approval within 120 days from the approval of the CMS Proposal by the Director and shall meet the requirements of Special Permit Conditions II.K. and II.M.

B. Current Assessment Summary Report

The RFI Proposal shall include a Current Assessment Summary Report submitted within 120 calendar days of the effective date of this Permit based on all existing past or current data or other information that is available to Permittee. The Current Assessment Summary Report shall provide all information available to define the nature, rate of migration, concentration and extent of contamination. At a minimum, the Report shall include:

1. A history and description of the generation, treatment, storage and/or disposal activities of hazardous waste and/or hazardous constituents associated with the SWMUs set out in Special Permit Conditions II.A.1. through II.A.6. This history shall be based on all available records and include without limitation:

   a. A listing of identified hazardous waste and/or hazardous constituents;

   b. Estimated volumes and quantities of each hazardous waste and/or hazardous constituent, any associated degradation and transformation products, and other by-products;

   c. A description of all processes associated with the production of the identified hazardous waste and/or hazardous constituents;

   d. The active dates of the SWMUs; and

   e. An evaluation of the quality and completeness of information in available records regarding hazardous waste and/or hazardous constituents present in and/or migrating from the SWMU.

2. An analysis of the climatological and topographic features of the site;

3. Results of all localized geologic and geophysical studies, borings, test pits and/or other exploratory activities to characterize the vertical and horizontal extent and chemical composition of wastes and/or waste residues which remain in and/or have migrated from the SWMU;

4. A description of the zone of contamination of hazardous waste and/or hazardous constituents released from SWMUs at the Facility. The description shall be based on available monitoring data and qualitative information on locations and contaminant levels. The Permittee shall include a description of the sampling methodologies, including quality assurance and quality control (QA/QC) procedures used to generate all quantitative data. The Permittee also shall include a conclusion as to whether the releases potentially could have entered the groundwater, soils, surface water and sediments, air, and subsurface gas;

5. Historic topographic maps and historic photography of the Facility in the Permittee's possession. If the historic maps are not of a scale which clearly depicts the information required, the Permittee shall use these maps to generate new ones that are of such a scale. The scale shall be clearly stated for all maps, and shall be consistent and appropriate for all newly generated maps. All newly generated maps shall be of sufficient detail and accuracy to locate and report all current and future work performed at the site. Maps shall be included which identify the following:

   a. General geographic location of the Facility;

   b. Property lines, with the owners of all adjacent property clearly indicated;

   c. Topography, waterways, wetlands, flood plains, water features, drainage patterns, storm drainage systems;

   d. Tanks, buildings, utilities, pipelines, tunnels, paved areas, easements, right-of-ways, and wells;

e. All solid or hazardous waste treatment, storage or disposal areas active after November 19, 1980;

f. All known past solid waste treatment, storage or disposal areas regardless of whether they were active after November 19, 1980;

g. Surrounding land use (residential, commercial, agricultural, recreational); and

h. Existing piezometers, caissons, groundwater recovery wells, observation wells and monitoring wells.

Historic high quality photographs of the Facility shall be included to the extent that they may bear on the investigations required under this Permit;

6. A description of data omissions and/or inadequacies that must be addressed to satisfy the objectives of the RFI Proposal. This shall include all other areas of the property that have not been addressed at this time. (Sampling methodologies that have been dismissed from consideration because of inadequate QA/QC must be included, with an explanation as to why they were inadequate.);

7. A concise summary of all environmental studies conducted by or available to the Permittee in regard to investigations of soils, sediments, groundwater, air, and surface water quality at the Facility or in or along the Housatonic River since the last Consent Order between the Environmental Protection Agency and the Permittee was signed, including at a minimum:

   a. Title of study or, if no title has been designated, a brief description of the subject matter addressed;

   b. Date of study;

   c. Author; and

   d. If study was performed under a requirement imposed by a state or federal agency, identification of the agency and nature of the requirement and study results.

8. The Current Assessment Summary Report shall include a Hydrogeologic Investigations Summary Report for each area set out in Special Permit Conditions II.A.1. through II.A.5. This report shall summarize all hydrogeological investigations in the areas to date, present in an organized manner all data gathered to date, identify data gaps and provide a basis for proposal of additional activities necessary to meet the objectives and requirements of the groundwater contamination investigations set out in Special Permit Conditions II.A.1 through II.A.6. The report shall include the following:

   a. A discussion of time variations in site water levels. Water level contour maps shall be presented for every past sampling event for each distinct hydrogeologic unit. The discussion shall include vertical gradient trends at each well addressing consistency and variations as applicable. The relationship of surface water bodies to the groundwater flow regime shall be addressed;

b. A discussion of water quality trends. Data shall be presented in a manner facilitating historical comparisons, and illustrations of changes in the shape of plumes over time shall be provided;

c. Presentation of all data regarding well/screen placement and construction details. All information required of wells for the RFI shall be required of all existing wells (see Attachment A, Section 2);

d. Information pertaining to the amounts of groundwater recharge and discharge (e.g., infiltration from precipitation, seepage to and/or from surface water, groundwater flow to and/or from the vicinity of the site, nearest artificial recharge/discharge activity, etc.);

e. Information pertaining to ambient groundwater quality (i.e., groundwater chemistry);

f. Information pertaining to geologic and hydrologic properties of the units beneath the site, based on regional information and site-specific determinations;

g. All data regarding the locations, volumes and concentrations of hazardous waste and/or hazardous constituents in sediments and surface waters shall be concisely summarized, including maps showing locations and dates when the data was collected and a separate map showing all locations and the date when the most recent data was collected;

h. A discussion of gaps in the database for the areas;

i. An analysis of the direction and rate of groundwater flow through the site including a recent groundwater table map;

j. A description and evaluation of all actions taken to date to define and mitigate the effects on human health and/or the environment of any releases from SWMUs at the Facility. This includes, but is not limited to groundwater pumping stations, flood-control measures, oil/water separators, caissons, and current integrity status of all units;

k. A description and evaluation of the current performance of existing piezometers, observation wells, and monitoring wells (i.e., design, screen length, well logs, well development, etc.) in use;

l. A description of all caissons, production wells and recovery wells at the Facility, including location, design, depth, diameter, materials of construction, current operational status and usage, and peak pumping rates; and

m. A discussion of the nature of all contaminants which are currently known to make up the contaminant plumes (presence of Dense Non-Aqueous Phase Liquids [DNAPLs], attenuation characteristics, characteristics of indicator chemicals, etc.)

9. The Current Assessment Summary Report shall include a Housatonic River and Silver Lake Investigation Summary Report for Area 6, set out in Special Permit Condition II.A.6. This report shall summarize all geologic, hydrologic and environmental investigations performed by or available to the Permittee to date, present in an organized manner all data gathered to date, identify data gaps in terms of RFI Investigation objectives, and provide a basis for proposal of additional activities

necessary to meet the objectives and requirements of the RFI Investigation set out in Special Permit Condition II.A.6. This report shall include the following:

a. A complete and detailed discussion of the flow characteristics of the river and lake to include at a minimum the historical records of the rates and volume of flow of the river and from the lake to the river, the variability of flow rate and volume in time and area affected by flows, and flood and low flow frequencies and duration. It will include historical trends in river flow regime;

b. A complete and detailed discussion of the chemical quality of the river both upstream and downstream of the Facility and of the lake. This will include at a minimum a description of chemical quality changes that occur as a result of discharge of hazardous waste and/or hazardous constituents from the Facility, both in terms of wastes that move into the lake and river system at a relatively constant rate over time and wastes carried to the lake and river by short-duration extreme events such as floods or extreme precipitation events. It will include historical trends in river and lake water quality;

c. A complete and detailed discussion of the sediment transport regime of the lake and the river. It will include, at a minimum, sediment physical properties, composition, rates and volume of flow and how these are distributed in time throughout the lake and among river reaches. Historical trends are to be included;

d. All effects resulting from the Permittee's modifications of the Woods Pond dam which have been characterized to date shall be discussed from the standpoint of river flow regime, river chemical quality, and river sediment transport regime;

e. All data regarding the locations, volumes and concentrations of hazardous waste and/or hazardous constituents in sediments, surface waters, and soils in the 100-year floodplain of the lake and along the entire length of the river adjoining and downstream of the Facility, shall be concisely summarized, including a map showing all locations and dates when the most recent data was collected;

f. All data regarding the mobilization, transport and deposition of sediments containing hazardous waste and/or hazardous constituents shall be concisely summarized;

g. All data regarding the mobilization, transport and disposition of hazardous waste and/or hazardous constituents downstream of the Woods Pond dam, including transport through the raceway channel, shall be concisely summarized;

h. All data regarding the current structural integrity of the Woods Pond dam shall be concisely summarized;

i. All data regarding changes over time of concentrations of hazardous waste and/or hazardous constituents in the sediment and surface water of Silver Lake and the Housatonic River shall be concisely summarized;

j. All data regarding the impacts of hazardous waste and/or hazardous constituents released from the Facility to the lake and river on human health and/or the environment, including bioassays of aquatic life, shall be concisely summarized; and

k. A concise summary of all analyses conducted on the nature, rate of migration, concentration and extent of hazardous waste and/or hazardous constituents in Silver Lake and the Housatonic River, including but not limited to:

(1) A detailed map or maps of the river and lake showing most recent estimates of volumes of contaminated sediments and concentrations of PCBs and any other hazardous waste and/or hazardous constituents in the sediments and surface waters for which data is available;

(2) Flow rates of the river including peak, low and median flow rates;

(3) Most recent estimates of sediment mobilization, deposition, and transport rates along the river and lake, at locations for which such estimates are available;

(4) Most recent estimates of influx of hazardous waste and/or hazardous constituents to the river and lake from the Facility by discharge of groundwater and surface runoff from the Facility to the river and lake; and

(5) Areas of recharge and discharge of groundwater underlying the Facility.

C. Identification of Additional Media of Concern and/or SWMUs

1. Additional Media of Concern

If, pursuant to Special Permit Condition II., the Permittee identifies any additional media of concern not set out in Special Permit Conditions II.A.1. through II.A.6., the RFI Proposal shall incorporate new or additional media of concern into the proposed investigations for the specified SWMUs.

2. Additional Solid Waste Management Units

If, pursuant to Special Permit Condition II., the Permittee identifies any additional solid waste management units not set out in Special Permit Condition II.A.1. through II.A.6., the RFI Proposal shall incorporate the newly identified solid waste management units into the proposed investigations for each medium of concern.

D. Review and Approval of the RFI Proposal

After the Permittee submits the RFI Proposal in accordance with Special Permit Condition II.A. above, the Director will either approve or disapprove the Proposal. If the Director approves either the entire Proposal or any subset thereof, the Permittee shall implement the Proposal to the extent approved in accordance with the implementation schedules contained therein.

If the Director disapproves the Proposal, the Director shall specify the deficiencies and establish a time frame within which the Permittee shall submit a modified Proposal. If this Proposal is not approved, the Director may, within his/her discretion, either require further modification or make such modifications as he/she deems necessary to satisfy the requirements of Special Permit Condition II.A. above. In the event that the Director makes

such modifications, the modified Proposal becomes the approved RFI Proposal and the Permittee shall implement such Proposal in accordance with the implementation schedules contained therein.

E. Health and Environmental Assessment Report

Within 450 calendar days of approval of the RFI Proposal by the Director, the Permittee shall submit to the Director, a Health and Environmental Assessment (HEA) Report identifying the human populations and/or environmental systems that may be exposed to hazardous waste and/or hazardous constituents released from all SWMUs and areas of the Facility identified in Special Permit Conditions II.A.1 through II.A.6. The HEA Report shall be submitted separate from yet concurrent with the RFI Report. The HEA Report shall also address potential impacts on receptors from contamination, or potential contamination, originating from the SWMUs and areas identified above. At a minimum, the Permittee shall provide the information specified in Special Permit Conditions II.A.7., in addition to the following:

1. An evaluation of exposure pathways, which shall include consideration of the following:

   a. chemical release sources and release media;

   b. local current uses and possible future uses of groundwater, including:

      (1) type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/nonpotable, and industrial);

      (2) location of groundwater users including wells and groundwater discharge areas; and

      (3) aquifer classification within 2000 feet of the Facility boundary and along the length of the Housatonic River below the Facility.

   c. local current and potential future uses of surface waters, including connecting surface waters and surface waters affected by overland flow draining the Facility, including:

      (1) domestic and municipal uses (e.g., potable and lawn/garden watering);

      (2) recreational uses (e.g., swimming, fishing);

      (3) agricultural uses (e.g., crops, farm animals);

      (4) industrial uses;

      (5) environmental uses (e.g., fish and wildlife propagation); and

      (6) Massachusetts stream classification.

   d. human use of and/or access to the Facility and adjacent lands, including but not limited to:

      (1) recreational uses (including hunting, fishing, swimming, etc.);

      (2) residential uses; and

      (3) commercial uses.

e. the relationship between population locations and the prevailing wind direction;

f. a description of the biota in surface water bodies on, adjacent to, and/or affected by the Facility;

g. the presence of sensitive human and/or environmental populations, including without limitation the following:

(1) schools, nursing homes, hospitals, parks, and neighborhood areas within a 5 mile radius of the Facility; and

(2) a description of any endangered or threatened species within a 5 mile radius of the Facility.

h. the integration of release sources, environment transport media, exposure points and exposure routes into exposure pathways.

2. Estimations of exposure point concentrations of those indicator chemicals included in the approved RFI Proposal, which shall include consideration of at least the following:

a. quantity of chemical releases; and

b. predictions as to environmental fate and transport of all releases and including information in Special Permit Condition II.E.1. above.

3. Comparisons of estimated exposure point concentrations of the indicator chemicals included in the approved RFI Proposal to the following requirements, standards, and criteria, as specified in the approved RFI Proposal:

a. Maximum Contaminant Levels;

b. National and State Ambient Air Quality Standards;

c. Federal and State Water Quality Standards;

d. Water Quality Criteria;

e. Drinking Water Health Advisories; and

f. Any other relevant criteria (e.g., Reference Doses, Carcinogenic Potency Factors, criteria based on research literature).

4. For the indicator chemicals included in the approved RFI Proposal for which no requirements, standards, or criteria exist, the HEA shall include the following:

a. determinations as to the chemical intake of the contaminant(s) in groundwater, soil, surface waters and sediments, and air, and an integration of the oral, dermal, and inhalation intakes from all media;

b. assessments of the toxicity of the contaminant(s) with regard to chronic, subchronic, acute, and carcinogenic effects;

c. characterizations of the chronic, subchronic, acute, and carcinogenic effects of the contaminants, identifying the uncertainties inherent in the proposed methodology; and

d. a risk integration in accordance with the approved RFI Proposal.

F. Review and Approval of Health and Environmental Assessment Report

After the Permittee submits the HEA Report, the Director will either approve or disapprove the Report.

If the Director disapproves the Report, the Director shall specify the deficiencies and establish a time frame within which the Permittee shall submit a modified Report. If this Report is not approved, the Director may, within his/her discretion, either require further modification or make such modifications as he/she deems necessary to satisfy the requirements of Special Permit Condition II.E. above. In the event that the Director makes such modification, the modified Report becomes the approved HEA Report.

G. RCRA Facility Investigation (RFI) Report

The Permittee shall submit to the Director an RFI Report summarizing all work done at each area and SWMU pursuant to Special Permit Conditions II.A.1 through II.A.11. The Report shall meet the requirements provided in this Permit for each area and SWMU, and the following, at a minimum:

1. Format of the RFI Report

The RFI Report shall, at a minimum, contain the following information:

a. Environmental Setting

(1) Hydrogeology

The RFI Report shall evaluate the hydrogeologic conditions at the Facility. At a minimum, the RFI Report shall include:

a) A description of the regional and Facility-specific geologic and hydrogeologic characteristics affecting groundwater flow beneath the Facility, including without limitation:

i) regional and Facility-specific stratigraphy (soil and unconsolidated sediment cover, bedrock, strike and dip, and formation origins), illustrated by geologic maps and cross sections with supporting geophysical data and boring logs;

ii) a description of regional and local structural features (e.g., folding, faulting, tilting, jointing, etc.), including all supporting data;

iii) depositional history of unconsolidated and consolidated units;

iv) regional and Facility-specific hydrogeologic flow patterns, including an analysis of the interrelationship between the bedrock and surficial aquifers;

v) an analysis of the potential influence(s) of geologic, topographic, and geomorphic features on the groundwater flow system; and

vi) identification and characterization of areas and amounts of groundwater recharge and discharge.

b) A classification and description of the hydrogeologic properties of the Facility-specific geologic units including units in Special Permit Condition II.G.1.a.(1), above and including:

i) hydraulic conductivity and porosity (total and effective), collected at ten foot intervals or as changes in stratigraphy occur;

ii) lithology, grain size distribution, texture, and uniformity; and

iii) an interpretation of hydraulic interconnections between saturated zones and consolidated and unconsolidated geologic units.

c) A description of groundwater quality and flow beneath the Facility, based upon a review of existing data and the results of soil borings, geophysical investigations, and groundwater monitoring. At a minimum, this description shall include the following:

i) Water levels during high and low flow season;

ii) Vertical and horizontal flow components during high and low flow seasons, noting any changes in the hydraulic gradients; and

iii) Water level contour maps, vertical gradient sections, and well or piezometer hydrographs shall be submitted as documentation of the above.

d) A description of manmade influences that may affect the hydrogeology of the site, identifying:

i) local water supply and production wells, with approximate schedules of pumping;

ii) hydraulic structures (pipelines, french drains, ditches); and

iii) groundwater mounding resulting from the SWMUs.

(2) Soils

The RFI Report shall include an evaluation of all surface and subsurface soils in the vicinity of the SWMUs. Those features and properties of the soils that may cause or influence the migration, transformation, or attenuation of contaminants shall be characterized. The RFI Report also shall include an areal distribution and a cross-sectional profile of the soils. At a

minimum, the Report shall include the following for each stratigraphic unit identified:

a) Soil Conservation Service soil classification;

b) Surface soil distribution;

c) Soil profile;

d) Hydraulic conductivity (saturated and unsaturated);

e) Bulk density;

f) Particle size distribution;

g) Depth of water table;

h) Soil pH;

i) Infiltration;

j) Storage capacity; and

k) Vertical flow rate.

(3) Surface Water and Sediments

The RFI Report shall include an evaluation of the surface waters and sediments in the vicinity of the Facility. At a minimum, the Permittee shall provide the following information:

a) A description of the temporal and permanent surface-water bodies including:

i) for impoundments: location, elevation, surface area, depth, volume, freeboard and purpose of the impoundment;

ii) for streams, ditches and channels: location, elevation, flow rates, depth, width, seasonal fluctuation, flood potential (i.e., 100 year storm event), and state stream classification (for streams only); and

iii) drainage patterns.

b) A description of the chemistries of the surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, and specific contaminant concentrations, as applicable; and

c) A description of sediment characteristics, including without limitation:

i) deposition area(s);

ii) physical and chemical parameters (e.g., grain size distribution, density, total organic carbon content, ion exchange capacity, pH); and

iii) seasonal variations in sediment transport.

(4) Air

The RFI Report shall include an evaluation of the climatic conditions in the vicinity of the Facility that may cause or influence the transport of hazardous waste and/or hazardous constituents released from SWMUs into the atmosphere. At a minimum, the Permittee shall provide the following information:

a) A description of the following parameters:

i) annual and monthly rainfall averages for the preceding thirty years;

ii) monthly temperature averages and extremes for the preceding thirty years;

iii) a wind rose for monthly and annual wind direction; and

iv) Other meteorological data including, at a minimum, relative humidity and atmospheric pressure.

b) A description of any topographic and/or manmade features that may affect airflow and emission patterns.

b. Source Characterization

The RFI Report shall include a description and map(s) of the SWMUs and the waste placed into these SWMUs. At a minimum, the Permittee shall provide the following information:

(1) SWMU Characteristics:

a) location of SWMU;

b) type of SWMU area;

c) design features;

d) operating practices (past and present as applicable);

e) period of operation;

f) age of SWMU;

g) general physical conditions;

h) method used to close the SWMU;

i) information source(s) for the above SWMU characteristics; and

j) chemical composition.

(2) Waste Characteristics:

a) Type of waste placed in the SWMU, including:

i) hazardous classification (i.e., whether it is a non-hazardous or a listed or characteristic hazardous waste and, if it is a characteristic hazardous waste, what the characteristic is that renders it hazardous);

ii) quantity;

iii) chemical composition; and

iv) toxicity.

b) Physical and chemical characteristics of identified non-hazardous wastes, hazardous wastes, and hazardous constituents (pure component values) including:

i) physical form (solid, liquid, gas);

ii) physical description (e.g., powder, oily sludge);

iii) pH;

iv) general chemical class (e.g., acid, base, solvent);

v) molecular weight;

vi) density;

vii) boiling point;

viii) viscosity;

ix) solubility in water;

x) cohesiveness of the waste; and

xi) vapor pressure.

c) Migration and dispersal characteristics of the waste and waste constituents, including:

i) sorption;

ii) biodegradability, bioaccumulation, biotransformation;

iii) photodegradation rates;

iv) hydrolysis rates;

v) volatilization rates; and

vi) chemical transformations.

c. Contamination Characterization

The RFI Report shall include documentation of the nature, rate of migration, concentration and extent of releases of hazardous waste and/or hazardous constituents from the SWMUs into the groundwater, soils, surface water and sediments, air, and subsurface gas. The RFI Report shall characterize contamination individually for each SWMU. At a minimum, the Permittee shall provide the following information:

(1) Groundwater Contamination

In the RFI Report, the Permittee shall characterize all groundwater contamination resulting from releases from the SWMUs. At a minimum, the Permittee shall provide the following information:

a) a description of the horizontal and vertical extent of any immiscible or dissolved contaminants in the groundwater and originating from the Facility;

b) the horizontal and vertical directions of contaminant movement;

c) the velocity of contaminant movement;

d) the horizontal and vertical concentration profiles of Appendix IX constituents in the groundwater;

e) an evaluation of factors influencing the contaminant movement, including the combined effect of all constituents detected; and

f) an extrapolation of future contaminant movement, including a discussion of degradation, attenuation, and diffusion.

(2) Soil Contamination

In the RFI Report, the Permittee shall characterize the contamination of the surface and subsurface soils in the vicinity of any contaminant releases from the SWMUs. At a minimum, the Permittee shall provide the following information:

a) A description of the vertical and horizontal extent of contamination;

b) A description of contaminant and soil chemical properties within the saturated and unsaturated contaminated area(s). At a minimum, the described properties shall include contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation, and any other factors that might affect contaminant migration and transformation;

c) Specific contaminant concentrations;

d) The velocity and direction of contaminant movement; and

e) An extrapolation of future contaminant movement.

(3) Surface Water and Sediment Contamination

In the RFI Report, the Permittee shall characterize the contamination in surface water bodies and sediments resulting from releases from the SWMUs. At a minimum, the Permittee shall provide the following information:

a) A description of the horizontal and vertical extent of any immiscible and/or dissolved contaminants in surface water and sediments originating from the Facility, and the extent of contamination in underlying sediments;

b) A description of the horizontal and vertical direction of contaminant movement;

c) The velocity of the contaminant plume (if any);

d) An evaluation of the physical, biological and chemical factors influencing contaminant movement;

e) An extrapolation of future contaminant movement; and

f) A description of the chemistries of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, chemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon and specific contaminant concentrations, as applicable.

(4) Air Contamination

In the RFI Report, the Permittee shall assess maximum ambient concentrations of air contaminants at the Facility resulting from releases from the SWMUs. At a minimum, the Permittee shall provide the following information:

a) A discussion of any deviation(s) from the approved sampling and analysis plan; and

b) Results of air monitoring at each of the SWMUs including:

i) chemical composition of air contaminants;

ii) rate and density of air contaminants; and

iii) distribution and concentration of the emitted air contaminants.

(5) Subsurface Gas

In the RFI Report, the Permittee shall report the findings of the subsurface gas investigations. At a minimum, the Report shall include the following information:

a) All raw data collected during the investigations, all calculations performed, and an interpretation of the data;

b) A description of the methods used by the Permittee to gather and interpret data;

c) A description of the subsurface gas contamination from the SWMUs;

d) Specific contaminant concentrations; and

e) A description of the rate of migration and extent of contaminant movement away from the SWMUs.

2. Evaluation of the Need for Further Investigations

The RFI Report shall include a recommendation as to whether further investigation is necessary in order to fully evaluate the effects of hazardous waste and/or hazardous constituents released from the SWMUs in each area. If the RFI Report concludes that further investigation is necessary, the Report shall include a proposed scope of investigation, together with appropriate protocols and schedules. If further investigation is to be conducted, the Report shall also propose the submission of a supplemental RFI Report within thirty (30) calendar days after the completion of the final field task of the supplemental investigation. If the RFI Report concludes that no further investigation is necessary, the report shall include all information the Permittee used in arriving at that decision. The Director has the authority to approve or disapprove the decision based on the information presented.

3. Compendium of Final Reports

The RFI Report shall contain a compendium of all reports that have been compiled pursuant to this Permit.

4. Applicable Supplemental and Additional Reports (if any)

If any supplemental or additional reports become due under the terms of this Permit at the time of the RFI Report, these reports shall be included therein.

5. Integration of Work Done to Date

The RFI Report shall include an integration of the results of all human health and/or environmental investigations conducted at the Facility to date and an evaluation of the data. This integration shall evaluate each SWMU in terms of the types and severity of the release(s).

6. Identification of Additional Tasks (if any)

a. Identification of Additional Media of Concern

The RFI Report shall include a statement as to whether any additional releases have been identified during the RFI. If so, the Report shall also include a proposed supplement to the RFI Proposal indicating that these releases shall be investigated for each media of concern and a proposed scope of investigation, together with appropriate protocol and schedules.

The report shall propose the submission of a supplemental RFI Report within thirty (30) days after the completion of the final field task of the supplemental investigation. In such event, the proposal shall

also provide for review and possible modification of the supplemental Report by the Director as provided under analogous sections of this Permit.

b. Identification of Additional SWMUs

The RFI Report shall include a statement as to whether any additional SWMUs have been identified during the RFI. The following information shall be provided:

(1) type of unit;

(2) topographic map identifying location of unit;

(3) dimensions of the unit;

(4) descriptions of wastes that were released from the unit including known waste constituents;

(5) estimated quantity of each waste released and a description of how the quantity was calculated; and

(6) potential receptors and their distance from release.

H. Review and Approval of the RFI Report

After the Permittee submits an RFI Report, the Director will either approve or disapprove the Report. If the Director approves the Report, and if the Report concludes that further investigation and/or remediation is required under the terms of Special Permit Conditions II.G, the Permittee shall implement the investigation and/or remediation in accordance with the implementation schedules contained therein.

If the Director disapproves the Report, the Director shall specify the deficiencies and establish a time frame within which the Permittee shall submit a modified Report. If this Report is not approved, the Director may, within his/her discretion, either require further modification or make such modifications as he/she deems necessary to satisfy the requirements of Special Permit Condition II.G., above. In the event that the Director makes such modifications, the modified Report becomes the approved RFI Report. If such Report concludes that further investigation and/or remediation pursuant to Special Permit Conditions II.G., the Permittee shall implement the investigation and/or remediation in accordance with the implementation schedules contained therein.

I. Media Protection Standards Proposal

At the time the Permittee submits the RFI Report, the Permittee shall submit a Media Protection Standards Proposal containing, at a minimum, proposed Media Protection Standards for all releases of hazardous waste and/or hazardous constituents identified during the RFI. For each proposed standard, the Permittee shall include data justifying and supporting the limits specified, the locations at which the limits shall be met, and the schedule proposed for achieving these limits. The Permittee shall have the obligation of showing that the proposed schedule for achieving these limits is as expeditious as possible. In addition, the proposed limits shall comply with the following media-specific parameters:

1. Groundwater Protection Standards

a. The Permittee shall propose Groundwater Protection Standards for each hazardous waste and/or hazardous constituent released into the groundwater, as identified in the approved RFI Report. The Permittee shall use the following methods to set the standards:

(1) The proposed groundwater concentration limits for any hazardous waste and/or hazardous constituent shall not exceed the background concentration for such hazardous waste and/or hazardous constituent in the groundwater at the time the Permittee submits its proposal; or

(2) For any hazardous constituent listed below, proposed groundwater concentration limits may be submitted in the proposal, but the limits may not exceed those limits specified in this subparagraph, or any updated or amended version of the Federal or State Drinking Water Standards:

Constituent	Maximum Concentration (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a, 5,6,7,8,8a -octahydro-1, 4-endo, endo-5,8 -dimethanonaphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachloro-cyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2, 2-bis p-methyoxyphenylethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$, Technical chlorinated camphene, 67-69% chlorine)	0.005
2,4-D,(2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichloro-phenoxypropionic acid)	0.01
Benzene	0.005
Carbon Tetrachloride	0.005
1,2 Dichloroethane	0.005
Trichloroethylene	0.005
Para-dichlorobenzene	0.075
1,1 Dichloroethylene	0.007
1,1,1 Trichloroethane	0.20
Vinyl Chloride; or	0.002

(3) The Permittee may propose an Alternate Concentration Limit for each hazardous waste and/or hazardous constituent released or being released from SWMUs at the Facility. If the Permittee chooses to propose an Alternate Concentration Limit (ACL), the Permittee shall have the burden of proving that the proposed groundwater concentration limits will not pose a current or future

hazard to human health and/or the environment provided that concentration limits are not exceeded. The ACL proposed must be consistent with the Alternate Concentration Limit Guidance, Interim Final, (July 1987) or any updated version; or

(4) The proposed Groundwater Protection Standard may be a combination of any of the methods described above; and

(5) The proposed Groundwater Protection Standards for any hazardous waste and/or hazardous constituent shall be protective of human health and the environment as determined in the Health and Environmental Assessment Report, Special Permit Condition II.E.

b. If the Permittee chooses to propose background groundwater concentration limits pursuant to Special Permit Condition II.I.1.a.(1) above, the Permittee shall determine such background concentration limits as follows:

(1) The groundwater monitoring system must consist of a sufficient number of wells installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of background groundwater; and

(2) Each groundwater monitoring well must be cased in a manner that maintains the integrity of the monitoring well borehole. The casing must be screened and packed with gravel or sand, where necessary, to enable the Permittee to collect groundwater samples and minimize siltation. The space between the borehole and the well casing which projects above the sampling depth must be sealed to prevent contamination of samples and the groundwater. The well stick-up must be protected from damage by traffic or other potential harm. Well construction must meet the requirements of Attachment A.

c. If the Permittee chooses to propose Alternate Concentration Limits pursuant to Special Permit Condition II.I.1.a.(3) above, at a minimum, support and justification for the proposed limits shall include a detailed analysis of the following issues:

(1) Potential adverse effects on groundwater quality, considering:

a) The physical and chemical characteristics of the hazardous waste and/or hazardous constituents released from any SWMU, including their potential for migration;

b) The hydrogeological characteristics of the Facility and surrounding land;

c) The quantity of groundwater and the direction of groundwater flow;

d) The proximity and withdrawal rates of groundwater users;

e) The current and future uses of groundwater in the area;

f) The existing quality of groundwater, including other sources of contamination and their cumulative impact on groundwater quality;

g) The potential for health risks caused by human exposure to hazardous waste and/or hazardous constituents;

h) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to hazardous waste and/or hazardous constituents; and

i) The persistence and permanence of the potential adverse effects.

(2) Potential adverse effects on the quality of hydraulically connected surface water, considering:

a) The volume and physical and chemical characteristics of the hazardous waste and/or hazardous constituents released from any SWMU;

b) The hydrogeological characteristics of the Facility and surrounding land;

c) The quantity and quality of groundwater and the direction of groundwater flow;

d) The patterns and quantity of rainfall in the region;

e) The proximity of the SWMUs to surface waters;

f) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;

g) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface water quality;

h) The potential for health risks caused by human exposure to hazardous waste and/or hazardous constituents;

i) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to hazardous waste and/or hazardous constituents; and

j) The persistence and permanence of the potential adverse effects.

(3) In the absence of specific criteria, the Permittee shall apply results from relevant and accepted human epidemiological studies or animal studies.

2. Soil Protection Standards

a. The Permittee shall propose Soil Protection Standards for each hazardous waste and/or hazardous constituent released into the soil as identified in the approved RFI Report. The Permittee shall use the following methods to set the standards:

(1) The proposed Soil Protection Standard for any hazardous waste and/or hazardous constituent shall not exceed the background

concentration for that hazardous waste and/or hazardous constituent at the time the Permittee submits its proposal; or

(2) The Permittee may propose a soil Alternate Concentration Limit (ACL) for each hazardous waste and/or hazardous constituent associated with a release to soil. If the Permittee chooses to propose a soil ACL, the Permittee shall have the burden of proving that the proposed soil ACL will not pose a current or future hazard to human health and/or the environment provided the soil ACL is not exceeded; or

(3) The proposed Soil Protection Standards may be a combination of any of the methods described above. In the absence of specific criteria, the Permittee shall apply results from relevant and accepted human epidemiological studies or animal studies; and

(4) The proposed Soil Protection Standards for any hazardous waste and/or hazardous constituent shall be protective of human health and the environment as determined in the Health and Environmental Assessment Proposal, Special Permit Condition II.A.7. above.

b. If the Permittee chooses to propose a background Soil Protection Standard pursuant to Special Permit Condition II.I.2.a.(1) above, the Permittee shall determine background for the standard as follows:

(1) A soil sampling program shall consist of a statistically significant number of soil borings located at the appropriate locations and depths to represent background soil quality at or near the Facility. Soil sampling must meet the requirements of Attachment B; and

(2) The locations selected must be unaffected by waste management activities at either the unit in question or other, nearby SWMUs.

c. If the Permittee chooses to propose a soil ACL pursuant to Special Permit Condition II.I.2.a.(2) above, at a minimum, its support and justification for the ACL shall be based on risk assessment, exposure assessment, and presently existing health standards. In any case, the approach chosen shall be consistent with the current EPA policies and guidance, including the Risk Assessment Guidance for Superfund, Interim Final, Volume 1 (December, 1989) and Volume 2 (March 1989), the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final (June, 1989) and Data Quality Objectives For Remedial Response Activities (March, 1987), or any updated versions. This support and justification shall include, at a minimum, the following:

(1) Intake assumptions for soil intake at all points of exposure, together with the bases therefor; and

(2) Calculation of any contaminant exposures based on assumptions noted in Special Permit Condition II.I.2.c.(1) above. The total exposure to soil (ingestion, direct contact, etc.) shall be used in calculating the soil contaminant levels at the point(s) of exposure that will not result in exceeding health-based criteria for systematic toxicants or carcinogens for the most sensitive human population or critical environmental receptor, whichever is more sensitive.

3. Surface Water and/or Sediment Protection Standards

a. The Permittee shall propose Surface Water and Sediment Protection Standards for each hazardous waste and/or hazardous constituent released into the surface water or sediments as identified in the approved RFI Report. The Permittee shall use the following methods to set the standards:

(1) The proposed Surface Water and Sediment Protection Standards for any hazardous waste and/or hazardous constituent shall not exceed the background concentration for that hazardous waste and/or hazardous constituent at the time the Permittee submits its proposal; or

(2) The Permittee may propose a surface water and/or sediment ACL for each hazardous waste and/or hazardous constituent associated with a release to surface water. If the Permittee chooses to propose such an ACL, the Permittee shall have the burden of proving that the proposed ACL will not pose a current or future hazard to human health and/or the environment provided the ACL is not exceeded; or

(3) The proposed Surface Water and/or Sediment Protection Standards may be a combination of any of the methods described above; and

(4) The proposed Surface Water and/or Sediment Protection Standards for any hazardous waste and/or hazardous constituent shall be protective of human health and the environment as determined in the Health and Environmental Assessment Proposal, Special Permit Condition II.A.7. above.

b. If the Permittee chooses to propose background surface water and/or sediment concentration limits pursuant to Special Permit Condition II.I.3.a.(1) above, the Permittee shall locate a surface water transect upgradient of all potential release sources to surface waters. A statistically significant number of surface water and sediment samples shall be collected at appropriate depths to represent the quality of background surface water and sediment;

c. If the Permittee chooses to propose surface water and/or sediment ACL pursuant to Special Permit Condition II.I.3.a.(2) above, at a minimum, its support and justification for the ACL shall be based on risk assessment, exposure assessment, and presently existing health standards. In any case, the approach chosen shall be consistent with current EPA policies and guidance, including the Risk Assessment Guidance for Superfund, Interim Final, Volume 1 (December, 1989) and Volume 2 (March, 1989), the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final (June, 1989) and Data Quality Objectives For Remedial Response Activities (March, 1987), or any updated versions. The support and justification for a surface water and/or sediment ACL shall include at least the following:

(1) Intake assumptions for surface water and/or sediment intake at all points of exposure, together with the bases therefor;

(2) Validation of the assumptions by both direct measurements and/or modeling calculations. This validation shall indicate the surface water and/or sediment contaminant levels at the point of compliance that will result in surface water and/or sediment

contaminant levels at all points of exposure that do not exceed health-based criteria for systemic toxicants or carcinogens for the most sensitive human population or critical environmental receptor, whichever is more sensitive; and

(3) In the absence of specific criteria, the Permittee shall apply results from relevant and accepted human epidemiological studies or animal studies.

4. Air Protection Standards

a. The Permittee shall propose Air Protection Standards for each hazardous waste and/or hazardous constituent released into the air as identified in the approved RFI Report. The Permittee shall use the following methods to set the standards:

(1) The proposed Air Protection Standard for any hazardous waste and/or hazardous constituent shall not exceed the background concentration for such hazardous waste and/or hazardous constituent at the time the Permittee submits its proposal; or

(2) The Permittee may propose an air Alternate Concentration Limit (ACL) for each hazardous waste and/or hazardous constituent associated with a release to air. If the Permittee chooses to propose an air ACL, the Permittee shall have the burden of proving that the proposed air ACL will not pose a current or future hazard to human health and/or the environment provided the air ACL is not exceeded; or

(3) The proposed Air Protection Standards may be a combination of any of the methods described above; and

(4) The proposed Air Protection Standards for any hazardous waste and/or hazardous constituent shall be protective of human health and the environment as determined in the Health and Environmental Assessment Proposal, Special Permit Condition II.A.7. above.

b. If the Permittee chooses to propose a background Air Protection Standard pursuant to Special Permit Condition II.I.4.a.(1) above, background shall be determined as follows:

(1) The Permittee shall conduct initial air monitoring, consisting of the collection of ambient air samples for four target zones: the first zone located upwind of the SWMU to define background concentration levels, the second zone located downwind at the unit boundary, the third zone located downwind at the property boundary to collect data for input into the Health and Environmental Assessment, and the fourth zone located off-site at a point where no effects or influences from topographic features and/or manmade structures would affect the contaminant dispersion characteristics; and

(2) Background air quality shall take into consideration primary daytime air flow path(s), primary nighttime air flow path(s), prevailing seasonal air flow path(s), and emissions from the Thermal Oxidizer (SWMU T-10) and neighboring facilities and sites.

c. If the Permittee chooses to propose an air ACL pursuant to Special Permit Condition II.I.4.a.(2) above, its support and justification

for the ACL shall, at a minimum, be based on risk assessment, exposure assessment, and presently existing health standards. In any case, the approach chosen shall be consistent with the current EPA policies and guidance, including the Risk Assessment Guidance for Superfund, Interim Final, Volume 1 (December, 1989) and Volume 2 (March, 1989), the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final (June, 1989) and Data Quality Objectives For Remedial Response Activities (March, 1987), or any updated versions. This support and justification shall include, at a minimum, the following:

(1) Intake assumptions for air intake at all identified potential points of exposure, together with the bases therefor;

(2) Calculation of any contaminant exposures based on assumptions noted in Special Permit Condition II.I.4.c.(1) above. The total exposure to air (inhalation, direct contact, etc.) shall be used in calculating the air contaminant levels at all identified potential point(s) of exposure that will not result in exceeding the health-based criteria for systemic toxicants or carcinogens for the most sensitive human receptors or critical environmental receptors, whichever is more sensitive;

(3) Validation of the above assumptions by direct measurements in combination with modeling calculations. This validation shall indicate the air contaminant levels at the point of compliance that will result in air contaminant levels at all identified potential point(s) of exposure that do not exceed health-based criteria for systemic toxicants or carcinogens for the most sensitive human receptors or critical environmental receptors, whichever is more sensitive; and

(4) In the absence of specific criteria, the Permittee shall apply results from relevant and accepted human epidemiological studies or animal studies.

J. Review of the Media Protection Standards Proposal and Establishment of the Media Protection Standards

After the Permittee submits the Media Protection Standards (MPS) Proposal, the Director will either approve or disapprove the Proposal. If the Director approves the Proposal, the Director shall review the information presented in the Proposal and, based on that information but not limited to that information, shall establish MPS so that the Permittee can develop corrective measures as required under Special Permit Condition II.K. below.

If the Director disapproves the Proposal, the Director shall, within the Director's discretion, either establish MPS or specify the deficiencies in the Proposal and establish a timeframe within which the Permittee shall submit a modified Proposal. If this modified Proposal is not approved, the Director shall establish MPS so that the Permittee can develop corrective measures as required under Special Permit Condition II.K. below.

K. Corrective Measures Study Proposal

Within ninety (90) days after the Permittee receives written notice from the Director establishing the Media Protection Standards (MPS) as specified in Special Permit Condition II.J. above, the Permittee shall submit to the Director a Corrective Measure Study (CMS) Proposal. In the CMS Proposal, the

Permittee shall identify the corrective measures it proposes to study to achieve the MPS. This Proposal shall also justify the selection of the corrective measures that are proposed for study. With regard to groundwater, soil, surface water and sediments, subsurface gas, and air, this justification shall demonstrate the ability of the proposed corrective measures to achieve the MPS.

L. Corrective Measures Study Proposal Approval

After the Permittee submits the CMS Proposal, the Director will either approve or disapprove the proposal. If the Director approves the proposal, the Permittee shall develop the CMS Report (see Special Permit Condition II.M, below) in accordance with the approved list of corrective measures, as developed in Special Permit Condition II.K, above.

If the Director disapproves the proposal, the Director shall specify the deficiencies and establish a timeframe within which the Permittee shall submit a modified Proposal. If this modified proposal is not approved, the Director shall make further modifications as he/she deems necessary to assure that the MPS will be met. If the Director modifies the proposal, the Permittee shall develop the CMS Report (see Special Permit Condition II.M, below) in accordance with the modified proposal.

M. Corrective Measures Study Report

Within 120 days after the Permittee receives approval from the Director of corrective measures to be studied as identified in Special Permit Condition II.L, above, the Permittee shall submit to the Director a Corrective Measures Study (CMS) Report. At a minimum, the Permittee shall provide the following information for each corrective measure approved in the CMS Proposal:

1. Technical

The Permittee shall submit an evaluation of each corrective measure based on its performance, reliability, ease of implementation, timeliness, and safety. At a minimum, this evaluation shall include the following:

a. The Permittee shall evaluate performance based on the effectiveness of the corrective measure and the projected service lives of its component technologies:

(1) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, and/or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be identified. The evaluation shall also include discussion of the effectiveness of combinations of technologies; and

(2) For purposes of compliance with this Special Permit Condition, the projected service lives of the component technologies shall be compared against the length of time before compliance with the Media Protection Standards can be achieved.

b. The Permittee shall evaluate the reliability of each corrective measure including its operation and maintenance requirements and its demonstrated reliability:

(1) Operation and maintenance requirements shall be evaluated in terms of the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities shall be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

(2) Demonstrated and expected reliability shall be evaluated based on whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. The Permittee shall evaluate the relative ease of implementation and the time required for the corrective measure to comply with the Media Protection Standards:

(1) Ease of implementation shall be evaluated through a discussion of conditions both internal and external to the Facility such as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the Facility (e.g., remote location versus a congested urban area). The Permittee shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

(2) The time required for the corrective measure to comply with the Media Protection Standards shall be evaluated in terms of the time it takes to install the corrective measure and the time it takes for the corrective measure to achieve compliance with the Media Protection Standards.

d. The Permittee shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include a discussion of threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors that shall be considered include the probability of fire, explosion, and exposure to hazardous substances.

2. Environmental

The Permittee shall assess the environmental impacts of each corrective measure. The assessment shall focus on Facility conditions and pathways of contamination actually addressed by each corrective measure. For each corrective measure, the short- and long-term beneficial and adverse effects shall be assessed, including impacts caused by the corrective measure. Analyses of any potentially adverse effects on environmentally sensitive areas, and of any measures that may be employed to mitigate such adverse efforts, shall also be included. The assessment shall address potential cross-media impacts (e.g., whether the alternative removes groundwater contamination, but creates air problems, or requires off-site disposal, etc.).

If any proposed corrective measures may result in the release of hazardous waste and/or hazardous constituents into the atmosphere, and Media Protection Standards have not already been proposed for those releases, then the Permittee shall propose Media Protection Standards for those releases.

3. Human Health

The Permittee shall assess each corrective measure in terms of the extent to which it mitigates short-and long-term potential exposure to any residual contamination and protects human health both during and after implementation of the corrective measure. The assessment shall describe the levels and characterizations of contaminants off-site and on-site, potential exposure routes, and potentially affected populations during remedial activities and during transport of hazardous waste and/or hazardous constituents both on-site and off-site. Each corrective measure shall be evaluated to determine the level of exposure to contaminants and the reduction of that exposure over time.

4. Institutional

The Permittee shall assess relevant institutional requirements for each corrective measure. This assessment shall include a discussion of the effects of any relevant federal, state or local environment or public health standards, regulations, permit requirements, and/or ordinances on the design, construction, operation, and timing of each corrective measure alternative.

5. Cost Estimate

The Permittee shall include an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and annual operation and maintenance costs.

6. Corrective Measure Assessment

The CMS Report shall include an assessment as to which corrective measure alternatives could be pursued to meet the Media Protection Standards. This assessment shall include an evaluation of how well these alternatives achieve the following objectives, considering limitations imposed by the character of the site, the wastes released, technological limitations, or other factors identified in Special Permit Conditions II.M.1 through II.M.4 above, including:

a. Compliance with the Media Protection Standards at the locations specified in Special Permit Condition II.K, above, set by the Director under Special Permit Condition II.J, above;

b. Reliability of operation and maintenance;

c. The time period for achieving compliance with the Media Protection Standards;

d. Minimizing any health and safety threats to the public during corrective measures implementation; and

e. Minimizing any adverse impacts to the environment during corrective measures implementation.

7. Recommendation

The Permittee shall conclude the CMS Report with a recommendation as to which corrective measure, in the Permittee's opinion, is best suited to meet the Media Protection Standards in light of the criteria outlined in Special Permit Condition II.M.6 above.

N. Corrective Measures Study Report Approval

After the Permittee submits the CMS Report, the Director will either approve or disapprove the Report. If the Director approves the Report, the Director shall review the information presented in the Report and, based on, but not limited to, that information, will select the corrective measures that, in his/her opinion, are best suited to meet the MPS.

If the Director disapproves the Report, the Director shall specify the deficiencies and establish a timeframe within which the Permittee shall submit a modified Report. If this modified Report is not approved, the Director shall select the corrective measures that, in his/her opinion, are best suited to meet the MPS. This decision shall be based on all information available to the Director, including, but not limited to, that information contained in the modified CMS Report.

O. Interim Measures Proposal

Within thirty (30) days of the effective date of this Permit, the Permittee shall submit an Interim Measures (IM) Proposal for review and approval by the Director. The IM Proposal shall detail the methodology and procedures to be followed in order to complete the interim measures specified below and shall include the information detailed in Special Permit Condition II.U. A schedule for completing specific tasks shall also be included in the submission. The interim measures, which must be performed at specified areas to mitigate or remove the exposure threat to human health and/or the environment presented by releases, are the following:

1. East Street - Area 1 and Transformer Division - East Area (Study Area 3)

Maintain Effective Operation of the Existing Oil Recovery Program

The Permittee shall maintain effective operation of the existing oil recovery program in this area to mitigate or remove the exposure threat to human health and the environment presented by the groundwater contaminant plume until implementation of corrective measures has been completed.

2. East Street - Area 2 (Part of Study Area 4)

Maintain Effective Operation of the Existing Oil Recovery Program

The Permittee shall maintain effective operation of the existing oil recovery program in this area to mitigate or remove the exposure threat to human health and the environment presented by the groundwater contaminant plume, until implementation of corrective measures has been completed. This shall include demonstrating the adequacy of the existing slurry wall to prevent migration of the groundwater contaminant plume toward the Housatonic River. The demonstration of the adequacy of the slurry wall may be achieved through sampling of soil and groundwater, integrity testing, or other methods approved by the Director.

3. Groundwater Recharge Pond: SWMU G-20 (Part of Study Area 4)

Cease Discharge to the Groundwater Recharge Pond: SWMU G-20

The Permittee shall cease use of the Groundwater Recharge Pond. This measure is necessary to mitigate or remove the exposure threat to human health and the environment presented by releases. The Permittee shall develop an alternative system for managing recovered groundwater at the Facility. In addition, the Permittee shall account for the impact of abandonment of the Groundwater Recharge Pond on the existing groundwater oil recovery system and modify the system as necessary to ensure its effective operation.

4. Groundwater Contaminant Plume in Study Area 1

Implement Measures to Prevent Infiltration of the Plume into Unkamet Brook and the Housatonic River

The Permittee shall develop a plan to prevent infiltration of the groundwater contaminant plume into Unkamet Brook and into the Housatonic River in order to mitigate or remove the exposure threat to human health and the environment presented by releases. The measures to contain the plume must control the hydraulic gradient through either active (e.g. by using pumping wells) or passive (e.g. by using a slurry wall) methods, a combination of active and passive methods, or through other measures approved by the Director.

5. Allendale School - Adjacent to Building 78 Landfill - Gas Plant Site: SWMU G-5 (Part of Study Area 2)

In order to mitigate or remove the exposure threat to human health and the environment presented by releases, the Permittee shall:

a. Conduct Soil Sampling

Propose a plan for taking soil samples on the grounds of Allendale School, adjacent to the Building 78 Landfill - Gas Plant Site. The plan shall include procedures and schedules for taking soil samples to assess the potential of transport of contaminated sediment from the Building 78 Landfill - Gas Plant Site to the grounds of Allendale School. The procedures and schedules shall include the following, at a minimum:

(1) A map and grid indicating the proposed locations from which soil samples are to be taken. A rationale shall be presented for determining the number of samples, based on procedures detailed in the RFI Guidance, Interim Final (May, 1989), or any updated version, and must include collection of samples representative of background soils in the area;

(2) Proposed depths of each soil sample, with a demonstration that the proposed depths are sufficient to assess potential contamination;

(3) At a minimum, the soil samples shall be analyzed for Appendix IX constituents during the initial sampling event. Analyses of subsequent samples shall include, at a minimum, those constituents detected in the initial Appendix IX analysis and any other

constituents which can be expected to be in or derived from the waste or constituents released; and

(4) The IM Proposal shall include procedures and schedules including procedures outlined in Attachment B.

b. Restrict Access to the Contaminated Area

Propose a plan for erecting a continuous chain-link security fence to restrict access to soil with PCB concentrations greater than 1 ppm. The proposal shall include posting the fence every 50 feet with a two foot by 3 foot (2x3) metal sign reading as follows:

WARNING
HAZARDOUS MATERIALS
KEEP OUT
by order of the U.S. EPA

The letters shall be proportional to the size of the sign and printed in red on a white background.

c. Remediate Surficial Soil Contamination

Propose a plan for remediation of surficial soil contamination at the schoolyard. The plan shall address remediation of surficial soil PCB contamination subject to direct exposure to a soil protection standard of 1 ppm or less. A soil protection standard shall be proposed for each additional Appendix IX constituent detected. For each proposed soil protection standard, the Permittee shall include data justifying and supporting the limit specified, the locations at which the limits shall be met, and the proposed corrective measures and schedules for achieving these limits.

6. Leaking Underground Storage Tank - O-M, Ordnance Division Active Underground Storage Tank (Part of Study Area 1);

Remove Contaminated Soil

In order to mitigate or remove the exposure threat to human health and the environment presented by releases, the Permittee shall propose a plan for removal of the contaminated soil. Procedures shall include specific steps to be taken to assure no loss of contents to the environment during removal. The IM Proposal shall include procedures and schedules including, but not limited to, procedures outlined in Attachment B.

7. Oil Seepage on River Bank of Housatonic River (Part of Study Area 6)

Implement Measures to Prevent Uncontrolled Releases into the Housatonic River

In order to mitigate or remove the exposure threat to human health and the environment presented by releases, the Permittee shall propose measures to prevent uncontrolled releases of oil into the Housatonic River from existing oil seepage on the river banks of the Housatonic River within the area designated by GE as East Street Area 2 and at the Lyman Street Bridge. The measures shall include, at a minimum, the effective operation of the existing oil boom at Area 2 and installation of a new oil boom system at the Lyman Steet Bridge. A plan and schedule for maintenance, to include lengthening as appropriate, of the boom and

skimming of oil on a regular basis shall be proposed, and the rationale for the frequency of skimming shall be provided.

8. Newell Street - GE Parking Lot Site: SWMU G-6 (Part of Study Area 5)

Remove all High Concentrations ("Hot Spots") of PCB-Contaminated Soil

In order to mitigate or remove the exposure threat to human health and the environment presented by releases, the Permittee shall propose a plan to remove all high concentrations ("hot spots") of PCB-contaminated surficial soil from SWMU G-6 (Newell Street-GE Parking Lot Site). The plan shall provide the criteria for defining "hot spots" and include the method used to delineate "hot spots." Procedures shall include specific steps to be taken to assure no loss of contaminated soil or release of hazardous waste and/or hazardous constituents to the environment during removal. The IM Proposal shall include procedures and schedules including, but not limited to, procedures outlined in Attachment B.

9. Housatonic River (Study Area 6)

Initiate Monitoring of Fish and Other Aquatic Biota in the Housatonic River

In order to expedite mitigation or removal of the exposure threat to human health and the environment presented by releases, the Permittee shall propose procedures and schedules for monitoring levels of total polychlorinated biphenyls, polychlorinated dibenzodioxins, and polychlorinated dibenzofurans, in fish and other aquatic biota in the Housatonic River to supplement existing data prior to approval of the RFI Proposal. The program shall monitor fish and other aquatic biota at all river levels, from the lower trophic levels to the surface of the river. The program shall include selective sampling of specific organisms, and evaluation of standard "condition factors" (e.g., length, width, girth), as well as analyzing tissue samples for total polychlorinated biphenyls, polychlorinated dibenzodioxins, and polychlorinated dibenzofurans. The Permittee shall correlate tissue sampling results with the historical record of the fish population, whenever such historical data is available.

10. Housatonic River (Study Area 6)

Initiate Water Quality Monitoring in the Housatonic River

In order to expedite mitigation or removal of the exposure threat to human health and the environment presented by releases, the Permittee shall propose a program of water quality monitoring in the Housatonic River to supplement existing data prior to approval of the RFI proposal. Chemical and physical parameters to be analyzed include, at a minimum, flow rate, sedimentation rate, stream velocity, organic matter content, TOC, suspended sediment, total polychlorinated biphenyls, polychlorinated dibenzodioxins, and polychlorinated dibenzofurans. Sampling locations shall include, at a minimum, waters adjacent to the Facility, in Woods Pond, below Woods Pond, and at Great Barrington, Massachusetts. The methodology for determining the specific sampling locations, analytical techniques, and sampling frequency, shall be detailed in the IM Proposal.

11. Housatonic River (Study Area 6)

Implement Measures to Prevent Downstream Transport of Sediment

In order to expedite mitigation or removal of the exposure threat to human health and the environment presented by releases, the Permittee shall propose a plan to prevent downstream transport of contaminated sediment past Rising Pond Dam during high and low flow events and through one-hundred year storm events. The IM Proposal shall include procedures and schedules as well as means by which to assess the efficacy of the proposed measures.

12. Housatonic River (Study Area 6)

Inventory of Stability and Safety of Dams along the River

In order to expedite mitigation or removal of the exposure threat to human health and the environment presented by releases, the Permittee shall propose a plan for evaluating the stability and safety of dams along the Housatonic River in Massachusetts, as those issues relate to the potential transport of hazardous constituents in the river. The IM Proposal shall include procedures and schedules for performing the proposed inventory.

13. Housatonic River and Silver Lake (Study Area 6)

Perform Public Outreach Regarding Fishing Advisories along the Housatonic River.

In order to mitigate or remove the exposure threat to human health and the environment presented by releases, the Permittee shall propose a plan for notifying the public of the advisories against consumption of fish from the Housatonic River. The plan shall account for outreach to people who do not purchase a fishing license and people whose native language is not English. The IM Proposal shall include procedures and schedules for performing the outreach activities.

P. Interim Measures Proposal Approval

After the Permittee submits the IM Proposal, the Director will either approve or disapprove the proposal. If the Director approves the proposal, the Permittee shall implement the interim measures and develop the IM Report (see Special Permit Condition II.Q, below).

If the Director disapproves the proposal, the Director shall specify the deficiencies and establish a timeframe within which the Permittee shall submit a modified proposal. If this modified proposal is not approved, the Director shall make further modifications as he/she deems necessary to assure that the Interim Measures will be adequately conducted.

Q. Interim Measures Report

Within ninety (90) days of the approval of the Interim Measures Proposal, the Permittee shall submit an IM Report for review and approval of the Director. The IM Report shall summarize all work performed to meet the requirements specified in this Permit and described in the Permittee's approved IM Proposal. The IM Report shall include an evaluation of the effectiveness of the IM to meet the requirements specified in this Permit and provide conclusions regarding the need for further work. If the IM Report concludes that further work is necessary, the Report shall include a

proposed scope of further work, appropriate protocols and schedules. The Report shall also propose the submission of a supplemental IM Report within thirty (30) days after the completion of the final task of the supplemental work.

R. Interim Measures Report Approval

After the Permittee submits the IM Report, the Director will either approve or disapprove the Report. If the Director approves the Report, and if the Report concludes that supplemental work is required under the terms of Special Permit Conditions II.Q., the Permittee shall implement the Report in accordance with the implementation schedules contained therein.

If the Director disapproves the Report, the Director shall specify the deficiencies and establish a timeframe within which the Permittee shall submit a modified Report. If this modified Report is not approved, the Director may, within his/her discretion, either require further modification or make such modifications as he/she deems necessary to satisfy the requirements of Special Permit Condition II.Q, above. In the event that the Director makes such modifications, the modified Report becomes the approved IM Report. If such Report requires supplemental work pursuant to Special Permit Conditions II.Q, the Permittee shall implement the Report in accordance with the implementation schedules contained therein.

S. Project Coordinators

1. On the effective date of the Permit, the Director and the Permittee shall each designate a Project Coordinator. Each Project Coordinator shall be responsible for overseeing the implementation of the Permit. The Director's Project Coordinator will be the Director's designated representative. To the maximum extent possible, all communications between the Permittee and the Director, and all documents, reports, approvals and other correspondence concerning the activities performed pursuant to the terms and conditions of the Permit, shall be directed through the Project Coordinators.

2. The Director and the Permittee shall provide at least fifteen (15) days' written notice prior to changing Project Coordinators.

3. The absence of the Director's Project Coordinator shall not be cause for stoppage of work by the Permittee.

4. Unless otherwise specified, reports, notices or other submissions required under the Permit shall be in writing and shall be sent to:

Director's Project Coordinator:	Permittee's Project Coordinator:
Ms. Mary E. Garren	Mr. Grant Bowman
U.S. Environmental Protection	General Electric Company
Agency, Region I	Area Environmental and Facility
(HRR-CAN3)	Programs
JFK Federal Building	100 Woodlawn Avenue
Boston, MA 02203-2211	Pittsfield, MA 01201

T. Major Permit Modification

Based on the information the Permittee submits pursuant to Special Permit Conditions A. through R., the Director will propose Media Protection Standards for all hazardous waste and/or hazardous constituents released

from SWMUs in need of corrective action. The Director also will propose which corrective measures the Permittee shall design and implement to meet the proposed Media Protection Standards as well as the conditions for submitting such designs. The Director will propose these modifications as a major modification to this Permit, pursuant to 40 C.F.R. Parts 124 and 270.

U. Reporting Requirements

If at any time after the effective date of this Permit, the Permittee becomes aware of any information concerning a new release of hazardous waste and/or hazardous constituents from any SWMU at the Facility, including past releases not previously reported to the Director, the Permittee shall report such information within fourteen (14) days to the Director. The following information shall be provided:

1. Type of unit from which hazardous waste and/or hazardous constituents have been and/or are being released;

2. A topographic map identifying the location of the unit from which hazardous waste and/or hazardous constituents have been and/or are being released;

3. Dimensions of the unit from which hazardous waste and/or hazardous constituents have been and/or are being released;

4. Description of hazardous waste and/or hazardous constituents that have been and/or are being released from the unit;

5. Estimated quantity of each hazardous waste and/or hazardous constituent released and a description of how the quantity was calculated;

6. For spills, the physical dimensions of the area containing the released hazardous waste and/or hazardous constituents;

7. Proposed actions to clean up or mitigate the effects of the release; and

8. Potential receptors and their distance from the release.

On the basis of this information, the Director shall assess the need for the Permittee to submit an interim measures proposal.

V. Sampling Requirements

The Permittee shall provide the results of all sampling and/or tests or other data generated by the Permittee, or on the Permittee's behalf with respect to the implementation of the Permit, to the Director and shall submit these results in monthly progress reports as required in Special Permit Condition II.A.11.a.

At the request of the Director, the Permittee shall allow split or duplicate samples to be taken by the Director and/or his/her authorized representative, of any samples collected by the Permittee or on the Permittee's behalf, pursuant to the implementation of this Permit. The Permittee shall notify the Director not less than fourteen (14) working days in advance of any sampling collection activity.

W. Permittee Requirements

The Permittee shall conduct such monitoring, testing, analysis and reporting as determined by the Director to be necessary to protect human health and/or the environment after reviewing the information submitted under Part II.

X. Other Permit Modifications

On the basis of the data submitted under Part II., the Director may modify this Permit as provided under 40 C.F.R. Parts 124 and 270.

Y. Financial Assurance

1. Within thirty (30) days after the Permittee receives written notice from the Director of approval of the RFI Proposal in accordance with Special Permit Condition II.D., the Permittee shall provide financial assurance for the performance of the work required under this Permit using one or more of the mechanisms allowable under 40 C.F.R. § 264.143. If the Permittee fails to perform any of the terms or conditions of this Permit, the financial assurance shall be available to the Director to perform such terms or conditions of this Permit provided that, prior to drawing upon any financial assurance instrument, the Director shall notify the Permittee in writing of the alleged failure to perform and provide the Permittee with a reasonable period of not less than fifteen (15) days in which to remedy the alleged non-performance.

2. Each year, on the anniversary of the provision of financial assurance, the Permittee shall adjust the amount of financial assurance to reflect the approved completion of construction items and/or any other factors that may bear on the cost of the yet-to-be-completed work that is required under this Permit.

Z. Reservation of Rights

The Director expressly reserves all rights and defenses that he/she may have, including the right both to disapprove of work performed by the Permittee and to request that the Permittee perform tasks in addition to those stated in the Permit as necessary to comply with the permit conditions.

Compliance by the Permittee with the terms of this Permit shall not relieve the Permittee of its obligations to comply with RCRA or any other federal law.

The Director reserves the right to take any enforcement action pursuant to CERCLA, RCRA, or any other available legal authority, including without limitation, the right to seek injunctive relief, including actions to ensure implementation of corrective measures to compel compliance with this Permit, for cost recovery, for monetary penalties, and for punitive damages.

The Director reserves the right to perform any portion of the work in the Permit or any additional work as he/she deems necessary to protect human health and/or the environment. Absent an imminent hazard, the Director will not perform work if the Permittee is performing said work in a timely and satisfactory manner. In any event, the Director reserves the right to seek reimbursement from the Permittee for any such additional costs incurred by the United States. Notwithstanding compliance with the terms of this Permit, the Permittee is not released from liability, if any, for the costs of any response actions taken by the Director.

AA. Access to or Use of Property

1. To the extent that the work required under this Permit requires access to or use of property presently owned or under the control of persons other than the Permittee, the Permittee shall use its best efforts to obtain whatever access agreements, easements, rights-of-way, or other rights of entry that are necessary to carry out the term of this Permit. Such access agreements shall provide for reasonable access by the Director and/or any authorized EPA representative to the property for the purpose of observing the Permittee's activities undertaken pursuant to this Permit.

2. For the purposes of Special Permit Condition II.AA.1. above, "best efforts" shall include the offering of a reasonable amount for the requisite access agreements, easements, rights-of-way, or other rights of entry.

3. In the event that any access agreement required in Special Permit Condition II.AA.1. cannot be expeditiously obtained, the Permittee shall immediately notify the Director of its failure to obtain such agreements.

4. Nothing in this Permit shall be construed to limit EPA's authority to exercise its rights pursuant to Section 3007 of RCRA, 42 U.S.C. §6927, or to affect any rights of entry possessed by EPA pursuant to any applicable laws, regulations, or permits.

Appendix I: Location of SWMUs at General Electric

Appendix II: Scope of Investigation

Attachment A: RFI Groundwater Investigation Requirements

The following minimum requirements apply to any investigation conducted as part of the RCRA Facility Investigation which requires meeting Attachment A requirements. In the event any or all activities required have already taken place in any areas, the proposal or plan for that area must include justification that the resulting information was obtained pursuant to the requirements of this attachment and applicable specific requirements set forth in the body of the Permit.

1. Hydrogeologic Investigation Requirements

   For each investigation requiring hydrogeologic characterization of groundwater and contaminant movement, the investigation plan or proposal shall include provisions for obtaining the following:

   a. Local geologic characteristics of the area adequate to describe the local subsurface geologic conditions, including stratigraphy (soil and unconsolidated sediment cover, bedrock, formation origins) and structure (fractures and other structural features which may affect groundwater flow);

   b. A description of the regional hydrogeological characteristics in the vicinity, including but not limited to:

      (1) regional hydrogeologic flow patterns; and

      (2) areas of recharge and discharge (artificial and natural).

   c. An analysis of geographic/topographic features and their effect on the groundwater flow system;

   d. Classification and description of the hydrogeologic properties of all distinct hydrogeologic units found in the area, including:

      (1) hydraulic conductivity (determined at a minimum by in-situ aquifer testing);

      (2) porosity;

      (3) texture, uniformity, lithology; and

      (4) an interpretation of hydraulic interconnections between saturated zones and any surface water features.

   e. Using a topographic map as a base, and at least two perpendicular geologic cross sections for each area-wide investigation, an identification of the following, in order to describe the extent (depth, thickness, lateral extent) of all hydrogeologic units, including:

      (1) sand and gravel deposits in unconsolidated deposits;

      (2) zones of significant fracturing or channelling;

(3) zones of higher permeability that might direct or restrict the flow of contaminants;

(4) perched aquifers;

(5) water table; and

(6) the uppermost aquifer.

f. A description of water level and fluid pressure monitoring including:

(1) water level contour maps for each distinct hydrogeologic unit and vertical gradient sections for the area-wide investigation. In areas of questionable direction of vertical flow, piezometer clusters shall be required with screens of no longer than 1 foot;

(2) water level contour map using data from all groundwater monitoring wells at the Facility that have been designed in accordance with the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version;

(3) well or piezometer hydrographs;

(4) an interpretation of the flow system, including the vertical and horizontal components of flow; and

(5) an interpretation of all changes in hydraulic gradients and the effect these changes may have on contaminant movement.

g. A description of manmade influences that may affect the hydrogeology of the area, identifying:

(1) the nearest water supply or injection wells, with applicable schedule of pumping or injection;

(2) recharging and discharging wells; and

(3) manmade hydraulic structures (pipelines, caissons, tunnels, french drains, ditches, ponds, slurry walls, etc.).

h. A summary of all surface water hydrology (water quality data, classification, commercial and/or recreational use).

2. Groundwater Contamination Detection and Monitoring Requirements

These requirements apply to any investigation at any area involving groundwater contamination detection and/or monitoring as part of RFI activities, including both area-wide hydrogeologic investigations and individual SWMU investigations. Each applicable investigation plan or proposal shall include provisions for the following:

a. Each plan shall include the locations, design and installation procedures for any additional groundwater monitoring wells required at each SWMU or in each area as necessary to meet the investigation

objectives. These wells may be used in conjunction with existing wells in the area. Each monitoring well network shall meet the following requirements:

(1) Upgradient wells must be capable of yielding samples that are representative of background water quality in the uppermost aquifer and must not be affected by any SWMU. The number and location of the wells must be demonstrated to be sufficient to characterize the spatial variability of background water quality;

(2) Downgradient wells must include wells capable of immediately detecting any hazardous waste and/or hazardous constituents that migrate from the SWMU under investigation, or changes in previously identified contaminant plume extent, as appropriate. Screens shall be located to enable representative sampling depending on the nature of the contaminants (floaters, sinkers, dissolved constituents); and

(3) The monitoring system shall be designed to operate for the term of the permit.

b. Each plan and final report shall provide a description of the SWMUs' or areas' monitoring wells, including the following information:

(1) A description and map of well locations, including a survey of each well's surface reference point and the elevation of the top of its casing;

(2) Size (diameter, length of casing, etc.) and depth of each well;

(3) Description of well intake design, including screen slot size and length, filter pack materials and method of filter pack emplacement;

(4) Type of well casing and screen materials. The choice of well materials shall be made in light of the parameters to be monitored and the nature of the leachate potentially migrating to groundwater. The well materials shall: 1) minimize the potential of absorption or adsorption of constituents from groundwater; and 2) maintain their integrity for the expected life of the system;

(5) Description of methods used to seal each well from the surface and prevent downward migration of contaminants through the well annulus;

(6) Description of the methods and procedures used to develop the well; and

(7) Boring logs for each well, including all of the following information requirements:

a) Drilling activities/well construction data:

i) date and time of construction;
ii) name of geologist on-site and drillers present;
iii) drilling method;

iv) boring/well location;
v) ground elevation;
vi) bore hole diameter and well casing diameter; and
vii) boring/well depth;

b) Detailed continuous drilling and lithologic logs sufficient to show presence of fractures, joints, hairline cracks, voids, etc., in bedrock;

c) detailed drawings of the boring/well;

d) volatile screening readings on all samples (e.g., HNu or OVA);

e) description and depth of stratigraphy (sample description shall include type of sample, depth, casing blows per foot, percent recovery, sampler blows per six inches, sample number, equipment installed, field testing performed);

f) description of casing and screen materials;

g) filter pack material and volume; and

h) sealant volume and placement method.

c. Justification that the monitoring well network (composed of existing and/or new wells) is or will be adequate to accomplish the investigation objectives shall be included in every proposal or plan and final report; and

d. Each plan shall include a description of the groundwater sampling and analysis program to be conducted as part of the investigation. The description shall include a discussion of the nature of expected and/or known contaminants and applicability of proposed sampling methods in light of certain characteristics of these contaminants (e.g., floaters, sinkers, dissolved constituents).

Final determinations of the extent of contamination shall be based on analyses of all previously detected constituents. When addressing the above requirements, the Permittee shall refer to the RCRA Ground Water Monitoring Technical Enforcement Guidance Document (September, 1986), or any updated version, to determine methods and materials acceptable to the Director.

Attachment B: RFI Soil Investigation Requirements

The following minimum requirements apply to any investigation conducted as part of the RCRA Facility Investigation which requires meeting Attachment B requirements. In the event any or all activities required have already taken place in any areas, the proposal or plan for that area must include justification that the resulting information was obtained pursuant to the requirements of this attachment and applicable specific requirements set forth in the body of the Permit.

1. Soil Contamination Detection Requirements

   For each investigation requiring determination of the presence of contamination in soils, the investigation plan or proposal shall include the following:

   a. A description of all sampling and analysis procedures. The procedures for sampling soil will follow protocols outlined in the RFI Guidance, Interim Final (May, 1989), or any updated version, for collecting discreet grab samples;

   b. The plan or proposal shall demonstrate that the investigation shall be sufficient to determine the presence of hazardous waste and/or hazardous constituents at the unit and enable the Permittee to recommend appropriate further actions; and

   c. Each plan shall identify the criteria to be used by the Permittee to determine if further investigation is warranted.

2. Soil Contamination Extent and Migration Investigation Requirements

   These requirements apply to any investigation at any location, unit or as part of an area-wide investigation involving determination of soil contamination extent and migration. Each applicable investigation plan or proposal shall include provisions for obtaining the following:

   a. A description of the vertical and horizontal extent of contamination;

   b. A description of contamination and soil chemical properties within the contaminant source area and area surrounding any associated groundwater plume. This includes contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation and other factors that might affect contaminant migration and transformation;

   c. Specific contaminant concentrations;

   d. The velocity and direction of contaminant movement;

   e. An extrapolation of future contaminant movement;

   f. Determination of the need for groundwater monitoring in the area to evaluate the migration of contamination to groundwater; and

g. Justification that the soil sampling locations shall be adequate to accomplish the investigation objectives shall be included in every proposal or plan and final report.

Final determination of the extent of contamination shall be based on analyses of all previously detected constituents.

ATTACHMENT C

REMEDIAL TECHNOLOGIES TO BE CONSIDERED IN HOUSATONIC RIVER AND SILVER LAKE REMEDIATION*

CHEMICAL TREATMENT

Low-temperature oxidation
- --Wet air oxidation
- --Supercritical water oxidation
- --Chemical oxidation
- --UV Ozonation Process

Chlorine removal
- --Dehydrochlorination
- --Glycolate dechlorination
- --Chemical reduction
- --Nucleophilic substitution
- --Radiant energy
- --Electromechanical reduction
- --Chemical Extraction
- --Chlorinolysis

THERMAL TREATMENT (On-site and/or Off-site)

- --Fluidized bed incineration
- --Rotary kiln incineration
- --Infrared thermal treatment

PHYSICAL TREATMENT

- --Heated Air Stripping
- --Physical Extraction
- --Absorption/Adsorption
- --In-situ Vitrification
- --Stabilization/Solidification

BIOLOGICAL

- --Biodegradation
- --In-situ biodegradation

ON-SITE DISPOSAL

- --In-situ impoundment
- --River Channelization

OFF-SITE DISPOSAL

*Note: Specific trade names were deleted for the purposes of this Permit. The Permittee may request specific vendors from the Director.