
*Baseline Monitoring
Program Proposal for Plant
Site 1 Groundwater
Management Area*

General Electric Company
Pittsfield, Massachusetts

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1. Introduction

1.1 General

On October 7, 1999, a Consent Decree (CD) executed by the General Electric Company (GE), the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and several other government agencies was lodged in the United States District Court for the District of Massachusetts (Court). The CD governs (among other things) the performance of response actions and natural resource restoration work to address polychlorinated biphenyls (PCBs) and other hazardous constituents in soils, sediment, and groundwater in several areas at and near Pittsfield, Massachusetts that collectively comprise the GE-Pittsfield/Housatonic River Site (the Site). Following lodging, the CD underwent a period of public comment, which ended on February 23, 2000. On July 20, 2000, the United States filed responses to the public comments and a motion to enter the CD. The CD will become effective if and when it is formally entered by the Court.

The CD provides for the performance of numerous Removal Actions at the Site in areas located outside the Housatonic River. Some of those Removal Actions relate to the soils in various Removal Action Areas (RAAs) designated in the CD and an accompanying *Statement of Work for Removal Actions Outside the River* (SOW) (which is Appendix E to the CD). Other Removal Actions relate to the groundwater, as well as non-aqueous-phase liquid (NAPL) (if any), in a number of these areas. For purposes of the latter, the areas at and near the GE Pittsfield facility have been divided into five Groundwater Management Areas (GMAs), some of which include multiple RAAs, based on the geographical proximity of such RAAs and similarities in hydrogeologic conditions. These GMAs are described, together with the Performance Standards established for the Removal Actions at and related to them, in Section 2.7 of the SOW, with further details presented in Attachment H to the SOW (Groundwater/NAPL Monitoring, Assessment, and Response Programs).

In the CD, GE agreed to conduct certain activities at the Site prior to entry of the CD by the Court. One of these activities involves the development and submission (but not implementation) of a Baseline Monitoring Program Proposal for the Plant Site 1 GMA. As shown on Figure 1, the Plant Site 1 GMA (referred to herein as GMA 1) occupies an area of approximately 215 acres encompassing a large part of the GE facility as well as certain adjacent areas, and includes 11 RAAs (also identified on Figure 1).

GE submitted a prior version of this Baseline Monitoring Program Proposal for GMA 1 to EPA in April 2000, in accordance with the schedule set forth in Attachment H to the SOW. Thereafter, EPA provided comments on the April 2000 Proposal in a letter to GE dated August 24, 2000. In response to EPA's comments and the related

discussions, GE has revised its proposal for GMA 1. A copy of EPA's August 24, 2000 comment letter is included as Appendix A.

In accordance with GE's agreement in the CD, this *Baseline Monitoring Program Proposal for Plant Site 1 Groundwater Management Area* (GMA 1 Baseline Monitoring Proposal, or Proposal) has been prepared to summarize the hydrogeologic information that is currently available for GMA 1 and, based on that information, to propose baseline groundwater monitoring activities that will be used to support further response actions as part of the Plant Site 1 GMA Removal Action. This Proposal has been developed to meet the requirements for baseline monitoring program proposals for GMAs, as set forth in Attachment H to the SOW. As specified in Attachment H, each such proposal must include (where applicable) the following items:

- C Summary of historical groundwater data;
- C Results of updated monitoring well inventory;
- C A proposal to conduct baseline monitoring at the wells identified in Attachment H to the SOW, with any additions or modifications proposed by GE;
- C A proposal regarding the groundwater constituents to be subject to baseline monitoring, considering initially all compounds listed in Appendix IX of 40 CFR Part 264 plus 2-chloroethylvinyl ether, benzidine, and 1,2-diphenylhydrazine (Appendix IX+3), as applicable to the monitoring objective, with any proposed well-specific limitations based on prior data from such well(s);
- C Identification of existing and proposed wells to be monitored for the presence and thickness of NAPL;
- C An assessment of existing NAPL recovery systems and/or programs, including proposals to optimize NAPL recovery, if appropriate;
- Proposals regarding other groundwater quality parameters to evaluate intrinsic/natural processes that may mitigate groundwater impacts (if applicable), and regarding wells (if any) to be subject to hydraulic conductivity testing;

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- Identification of other potential sources, as well as an evaluation of the need for additional monitoring for potential preferential pathways near occupied buildings;
 - Proposed frequency and duration of baseline monitoring activities (including quarterly water level monitoring and semi-annual groundwater quality monitoring for at least two years); and
- C A schedule for baseline field activities, assessments, and reporting.

The activities proposed to address the above requirements in this GMA 1 Baseline Monitoring Proposal have been based on information obtained from prior hydrogeologic investigations and prior/ongoing remedial actions. Groundwater conditions within GMA 1 have been studied for approximately 20 years, during which time over 500 monitoring wells have been installed and over 350 groundwater samples have been collected and analyzed. In addition, within this GMA, GE has installed and continues to operate twelve recovery wells which have automated groundwater/NAPL collection pumps and nine other wells which have automated NAPL recovery pumps, and also conducts NAPL monitoring and manual recovery on a routine basis at numerous other wells in this GMA. Further, GE has previously performed several assessments of overall hydrogeologic conditions and potential source areas to satisfy its prior obligations under various state and federal environmental programs. The results of these efforts have also been considered in the preparation of this GMA 1 Baseline Monitoring Proposal.

Since lodging of the CD, and as part of the preparation of this GMA 1 Baseline Monitoring Proposal, GE has further reviewed the available hydrogeologic data and groundwater/NAPL conditions within GMA 1. The results of this review (summarized herein) generally confirm that the baseline monitoring activities identified in the SOW are sufficient to assess current conditions and support future groundwater-related response actions within GMA 1. However, based on this further review as well as comments from EPA, some modifications to the baseline monitoring program described in Attachment H to the SOW have been identified and are proposed herein.

1.2 Format of Document

The remainder of this GMA 1 Baseline Monitoring Proposal is presented in four sections. Section 2 provides a summary of background information concerning GMA 1, including a brief description of the RAAs that comprise GMA 1, and a summary of the historical groundwater analytical data. Section 3 discusses the applicable

Performance Standards identified in the CD related to groundwater and NAPL within GMA 1. Section 4 identifies additional baseline data needs and describes the baseline monitoring program proposed by GE to satisfy those data needs. Finally, Section 5 presents the proposed schedule for the baseline field and reporting activities.

2. Background Information

2.1 General

As discussed above, the CD and the SOW provide for the performance of groundwater-related Removal Actions at a number of GMAs. Some of these GMAs include multiple RAAs to reflect the fact that groundwater may flow across several RAAs. The GMAs within the Site and the associated RAAs are detailed in the following table and shown on Figure 1:

Groundwater Management Area (GMA)	GMA Name	Removal Action Area (RAA)
1	Plant Site 1	40s Complex 30s Complex 20s Complex East Street Area 2 - South East Street Area 2 - North East Street Area 1 - South East Street Area 1 - North Lyman Street Area Newell Street Area II Newell Street Area I Silver Lake Area
2	Former Oxbows J and K	Former Oxbow Areas J and K
3	Plant Site 2	Unkamet Brook Area (east of Plastics Ave.)
4	Plant Site 3	Hill 78 Consolidation Area Building 71 Consolidation Area Hill 78 Area - Remainder Unkamet Brook Area (west of Plastics Ave.)
5	Former Oxbows A and C	Former Oxbow Areas A and C

The remainder of this section discusses pertinent background information concerning GMA 1, including general descriptions of the RAAs which comprise the GMA, the general hydrogeologic setting, the principal sources of groundwater contamination in the area, ongoing groundwater and NAPL-related monitoring programs, prior groundwater analytical results, and the most recent inventories regarding the condition of monitoring wells in the GMA.

2.2 Description of Plant Site 1 Groundwater Management Area

GMA 1 encompasses several RAAs, as summarized in Section 2.1 and shown on Figure 1. These areas are briefly described below.

40s Complex (RAA 1)

This approximately 10-acre area is located within the western portion of GE's Pittsfield facility and is generally bounded by Kellogg Street to the north, other areas of the GE facility to the south and east, and non-GE owned commercial/industrial areas to the west. Currently, Buildings 42, 43, 43-A, and 44 comprise nearly one-half of this area (eastern portion) while the remainder is mostly paved (asphalt/concrete). Previously, Buildings 40-B, 41, and 41-A comprised much of the western portion of this area; these buildings were demolished in the early 1990s, although the subgrade portions of these buildings remain within this area.

30s Complex (RAA 2)

This approximately 20-acre area is located south of the 40s Complex, and is generally bounded by Silver Lake Boulevard to the west, East Street to the south, and other areas of the GE facility to the south and east. The surface of this area generally consists of asphalt/concrete, some unpaved areas, and several existing buildings.

20s Complex (RAA 3)

This approximately 15-acre area is located immediately east of the 30s Complex within the western portion of the GE facility, and is generally bounded by East Street to the south and other areas of the GE facility to the north and east. Current conditions within this area are predominantly characterized by the existing asphalt parking areas. The main parking lot located in this area covers the existing 20s Complex vault, which was used in the late 1980s to consolidate building debris generated during the demolition of the above-grade portions of several former buildings in this area, as well as some equipment housed within the former buildings. At this time, only two buildings remain in this area.

East Street Area 2 - South (RAA 4)

This area comprises approximately 50 acres of the western portion of the GE facility. It is generally bounded by East Street to the north, Newell Street to the east, the Housatonic River to the south, and the Lyman Street Area to the west. The central portion of East Street Area 2 - South contains one of the former Housatonic River oxbows (Oxbow Area H). This area is mostly open, with a relatively small wooded area located south of the former oxbow. The western portion of this area is composed mostly of the 60s Complex, and is otherwise mostly paved. An area southeast of the 60s Complex contains a scrap yard, which has been used as a scrap metal crushing, sorting, and storage area.

East Street Area 2 - North (RAA 5)

This approximately 50-acre area is also located within the western portion of the GE facility. It is currently covered mostly with buildings and pavement. However, several relatively small grassy areas are present within the eastern portion of this area. This area is generally bounded by Tyler Street to the north; New York Avenue to the east; Woodlawn Avenue and the 40s Complex to the west; and Merrill Road, the 20s Complex, and East Street to the south.

East Street Area 1 - South (RAA 18)

This area consists primarily of residential properties and a few commercial businesses located between East Street Area 1 - North, Newell Street, Fasse Street, and the Housatonic River. Groundwater in this area will be addressed in accordance with the CD and SOW. However, soil-related issues in the East Street Area 1-South RAA will not be addressed pursuant to the CD and SOW, but rather pursuant to a revised Administrative Consent Order to be executed by GE and MDEP.

East Street Area 1 - North (RAA 6)

This approximately 5-acre area is mostly unpaved and is generally bounded by Merrill Road to the north and west, East Street to the south, and a non-GE owned commercial area to the east. This area also includes the area currently occupied by a commercial-use building (of which GE owns a portion) and a relatively small unpaved GE-owned property south of East Street.

Lyman Street Area (RAA 12)

This approximately 9-acre area is located immediately west of East Street Area 2 - South and is generally bounded by the Housatonic River to the south, East Street and several commercial/residential properties to the north, and Cove Street to the west. Approximately 3 acres of this area are composed of the GE-owned Lyman Street parking lot, which is paved. The remaining GE-owned portions of this area are partially paved and undeveloped. The non-GE-owned portions of this area consist of an undeveloped right-of-way for high tension electricity transmission lines (containing Former Oxbow Area E) and Former Oxbow Area B. Former Oxbow Area B is approximately 3 acres in size and located north of and across the Housatonic River from Former Oxbow Area C, west of Lyman Street, and immediately east of Cove Street. Nearly all of this former oxbow area is used for parking in support of local commercial businesses, although a commercial use building occupies a small portion of this area. The remaining portions are undeveloped.

Newell Street Area II (RAA 13)

This approximately 8-acre area is located immediately west of the Newell Street Area I RAA and is generally bounded by the Housatonic River to the north, Newell Street and residential property to the south, and Sackett Street to the west. Approximately 3 acres of this area is composed of the GE-owned Newell Street Parking Lot, which is paved. The remaining GE-owned portions of this area are wooded. The non-GE-owned portions of this area consist of an undeveloped right-of-way for high tension electricity transmission lines and undeveloped private, non-residential property. Former Oxbow Area G is located within this RAA.

Newell Street Area I (RAA 14)

This approximately 11-acre area includes Former Oxbow Area I, and is generally composed of 10 commercial/industrial properties and three recreational properties located along Newell Street. This area is bounded by the Housatonic River to the north, Newell Street to the south, the Hibbard School playground to the east (including the northwest corner of that playground within this RAA), and Ontario Street Extension and the GE-owned Newell Street Parking Lot to the west.

Silver Lake Area (RAA 17)

The Silver Lake Area is located immediately to the west of and across Silver Lake Boulevard from the 30s Complex and includes the lake and its banks. Silver Lake has a surface area of approximately 26 acres and a maximum water depth of about 30 feet. It receives stormwater contributions from several municipal outfalls, a portion of the GE Plant Area (via NPDES-permitted outfalls), and a number of non-GE-owned properties (both commercial and residential). Silver Lake is hydraulically connected to the Housatonic River by a 48-inch diameter concrete conduit located near the intersection of Fenn Street and East Street. This conduit conveys intermittent flow from Silver Lake and stormwater runoff from Fenn Street and East Street to the Housatonic River.

2.3 Hydrogeologic Setting

2.3.1 General

Over 500 monitoring wells and associated soil borings have been installed across GMA 1. Data collected at the time of soil boring/monitoring well installation (e.g., lithologic descriptions of the subsurface materials) and subsequent groundwater monitoring at many of these locations have produced an extensive database of hydrogeologic information from which this GMA 1 Baseline Monitoring Proposal has been prepared. Although variations to the hydrogeologic setting within GMA 1 exist depending on the specific location and RAA, the available data support a general assessment of subsurface conditions and groundwater hydraulics within GMA 1 and are sufficient for the purposes of this GMA 1 Baseline Monitoring Proposal. In general, three hydrogeologic, water-bearing units are present within GMA 1. These units are briefly described below:

Surficial Deposits

This unit generally consists of heterogenous fill materials overlying alluvial sands and gravels. These well-sorted sands and sandy gravels were deposited as glacial outwash and/or in association with recent depositional processes within the Housatonic River. Isolated peat deposits are also present, typically at depths corresponding to the bottom elevations of the river and the former oxbows. At certain locations within GMA 1, non-native fill materials are present above the alluvial deposits. The fill materials, where present, consist of sand, gravel, cinders, brick, glass, and other similar material.

The alluvial unit extends from ground surface to depths ranging from less than 5 feet in the northern portion of GMA 1 to over 40 feet in the southeastern corner of the GMA. The majority of the existing monitoring wells within GMA 1 are screened within this unit, as it is the upper and primary water-bearing unit within the GMA. Groundwater is encountered under unconfined conditions within this unit at depths between less than 3 feet to over 25 feet below ground surface.

Glacial Till

The till unit underlies the alluvial deposits and consists of approximately 20 to 40 feet of dense silt containing varying amounts of clay, sand, and gravel. Discontinuous sandy lenses also have been identified in the till at the Lyman Street Area RAA in the southwestern portion of GMA 1. Till is encountered relatively close to the ground surface at the higher elevation areas in the East Street Area 2 - North RAA, but otherwise generally encountered at depths beginning at approximately 20 feet beneath the remainder of GMA 1.

The glacial till unit is generally much less permeable than the alluvial deposits and serves as a hydraulic barrier to downward groundwater flow and potential constituent migration. Wells installed within the till are generally located in the East Street Area 2 - North RAA, where the till serves as the uppermost water-bearing unit. Additionally, numerous monitoring wells throughout GMA 1 have also been installed to intercept the alluvial deposit/till interface to monitor for the potential presence of dense non-aqueous liquid (DNAPL) along this hydrogeologic interface.

Bedrock

Bedrock beneath GMA 1 consists of white coarse-grained marble associated with the Stockbridge Formation. Bedrock occurs within this GMA at depths up to approximately 50 to 60 feet. Generally, bedrock occurs at shallower depths in the upland portions of the plant site and dips downward to greater depths near the Housatonic River. An industrial water supply well in bedrock was formerly utilized in the 30s Complex and a series of currently active production wells are present at the U.S. Generating Company located east of GMA 1 within GMA 4. With respect to the former industrial water supply well in the 30s Complex, GE has reviewed available information concerning its construction, prior use(s), and current status. A summary is provided below, and certain information is provided in Appendix B.

Between 1930 and 1931, the industrial water supply well was installed to a depth of 2,000 feet below ground surface to provide a supplemental source of water for manufacturing activities at the GE facility. However, following construction, the well yield was less than anticipated and it was determined to be impractical to design an extraction system for the well at that time. GE later installed a pumping system in this well to address potential water shortages during a drought period in the summer of 1965. The extracted water was routed to a holding tank near Building 31 and used for certain plant processes. Due to the hardness of the groundwater, it was of limited usefulness in many processes at the facility. Use of the groundwater well was discontinued by the fall of 1965, although groundwater from this well was utilized on a limited basis until at least July 1974. In August 1987, sampling of the water from the well was performed for certain inorganics; the results are included in Appendix B.

GE does not have records concerning the dismantling/abandonment of this well, and a recently conducted limited site reconnaissance did not identify the former/current location of the well. Therefore, as discussed in Section 4.2.1, GE proposes to perform additional assessment activities related to this well.

2.3.2 Groundwater Flow

Groundwater at GMA 1 generally flows toward the Housatonic River and is primarily influenced by the existing topography. However, several ongoing groundwater extraction systems related to NAPL recovery operations and a groundwater recharge pond produce relatively localized variations in the flow direction. Figures 2 and 3 illustrate generalized high and low water table conditions, respectively. These figures were prepared, to the extent possible, using groundwater elevation data from a representative period of high water table conditions (Spring 1994) and low (Fall 1998) groundwater elevations. At locations where groundwater elevation data were not available for these specific time periods, groundwater elevations were calculated based on area-specific average changes in groundwater elevations during similar timeframes.

As can be seen on Figures 2 and 3, in general, the hydraulic gradients are variable within GMA 1. The horizontal component of the hydraulic gradient generally decreases toward the Housatonic River, corresponding to a flattening in the ground surface topography. Monitoring of well pairs or closely-spaced shallow and deep well clusters at GMA 1 indicates that the vertical component of the hydraulic gradient is primarily upward, particularly near the river.

2.4 Principal Sources of Groundwater Contamination

There are several identified sources of constituents potentially affecting groundwater quality within GMA 1. Based on current information, the principal sources appear to include the following:

- Ⓒ Light non-aqueous phase liquid (LNAPL) and DNAPL in 20s Complex, and East Street Area 2 - North and South;
- Ⓒ LNAPL in East Street Area 1 - North and South;
- Ⓒ Scrap Yard and former drum storage area in East Street Area 2 - South; and
- Ⓒ Former Oxbows.

Each of these sources of potential groundwater contamination is described below.

LNAPL and DNAPL in 20s Complex and East Street Area 2 - North and South - In the past, GE used these areas of the facility in various manufacturing operations, primarily the manufacture of electrical transformers and associated components. These areas contained GE's primary transformer oil storage and distribution facilities (e.g., Building 12G Pyranol Unloading Station and Storage Area and Building 3C Oil Storage Area), and spills and leaks periodically occurred during those operations. As a result, various oils, some containing PCBs, and other materials were released to the environment.

In addition, the Berkshire Gas Company (Berkshire Gas) operated a coal gas manufacturing and storage facility in portions of these areas. Following a decommissioning process performed by Berkshire Gas (which reportedly included the hauling of waste sludges and tars off site, deposition of materials in the former oxbow in East Street Area 2 - South, and in-place abandonment of waste tars, sludges, and related equipment), the property was sold to GE in 1973.

The LNAPL in these areas is present as a plume occupying portions of the 20s Complex, East Street Area 2 - North, and East Street Area 2 - South. This LNAPL plume measures several acres in size and is currently subject to various monitoring and recovery operations being conducted by GE. Section 2.5.2 further describes these programs.

Two types of DNAPL are present within this area: (1) A coal-tar DNAPL associated with the former Berkshire Gas coal gas manufacturing and storage facility has been observed along the eastern limb of Former Oxbow H near the Housatonic River; and (2) DNAPL containing PCBs has been observed north of East Street near Building 12G, at scattered locations along Former Oxbow H and along the Housatonic River near Building 68. The presence of DNAPL within these areas is limited to several pockets located mainly in East Street Area 2 - South. These DNAPL occurrences are also subject to current monitoring and/or recovery programs being conducted by GE (see Section 2.5.2).

LNAPL in East Street Area 1 - North and South (RAAs 6 and 18) - Prior to 1964, a portion of the GE facility, referred to as the Building 12F Tank Farm, located within East Street Area 1 - North, was used for the storage of mineral oil dielectric fluid. A total of 14 underground storage tanks, ranging in size from 20,000 gallons to 25,000 gallons, and one 100,000-gallon capacity aboveground storage tank were located in this area. The LNAPL currently present in the subsurface of this area is believed to have originated from this former tank farm area. However, while these tanks were not used for storage of pyranol, some residual PCBs have been detected during prior sampling of the LNAPL. The presence of PCBs in LNAPL in this area may have resulted from limited interconnections between PCB and mineral oil distribution systems. Section 2.5.1 further describes the current LNAPL monitoring and recovery operations being conducted by GE in this area.

Scrap Yard and Drum Storage Area in East Street Area 2 - South - The former Scrap Yard area was situated south of Building 64 in East Street Area 2 - South. This area has also been referred to as the Materials Reclamation Area, and was used as a scrap metal crushing and storage area. Scrap metals generated throughout the GE facility were delivered to this area, compacted using a pressure crusher located within Building 61-R, and shipped off site for disposal/salvage. The former Drum Storage area was located east of the former Scrap Yard area and north of the former Thermal Oxidizer. The area was used as a “less than 90-day” drum storage area and transfer facility for hazardous wastes generated throughout the plant. Waste materials managed at this location were subsequently transferred to the Building 68 Drum Storage area, incinerated in the former Thermal Oxidizer, or shipped off site.

Former Oxbows - In an effort to reduce flooding potential of the Housatonic River, the City of Pittsfield, in a joint program with the United States Army Corps of Engineers in the late 1930s and early 1940s, altered the natural course of the river through the urban areas of Pittsfield to form a relatively straight channel. A total of 11 oxbows or low-lying areas, which had previously conveyed river flows, were isolated from the newly formed channel of the river. These oxbows were subsequently filled with materials originating from the GE facility as well as other

sources. Seven of these former oxbows areas are located within GMA 1; these include Former Oxbows B, D, and E within the Lyman Street Area, Former Oxbows F and G within Newell Street Area II, Former Oxbow H within East Street Area 2 - South, and Former Oxbow Area I within Newell Street Area I. NAPL has been detected in the subsurface at portions of the Lyman Street and Newell Street Area II RAAs.

2.5 Current NAPL Monitoring Programs

GE has conducted, and continues to conduct, various monitoring, assessment, and response action activities related to NAPL in GMA 1. Under the CD and SOW, GE is required to continue monitoring, assessment, and response action activities related to NAPL, including the submission of periodic summary reports, until applicable Performance Standards (described in Section 3 of this report) are achieved. Currently, GE conducts monitoring and recovery operations for LNAPL and/or DNAPL (along with aqueous phase recovery and treatment as a byproduct of NAPL recovery) -- and related reporting activities -- at the following RAAs within GMA 1:

- Ⓒ East Street Area 1 - South;
- Ⓒ East Street Area 1 - North;
- Ⓒ East Street Area 2 - South;
- Ⓒ 20s, 30s, and 40s Complexes;
- Ⓒ East Street Area 2 - North;
- Ⓒ Lyman Street Area; and
- Ⓒ Newell Street Area II.

The current NAPL monitoring and recovery programs within GMA 1 are described below. These programs will continue to be performed until such time as the CD is entered or this Baseline Monitoring Program Proposal is approved by EPA (whichever is later). At that time, the modifications proposed in this document and approved by the EPA (as well as any other separate proposals approved by EPA prior to that time), will be implemented. In addition, beginning at that time, the various NAPL reporting activities for the RAAs within GMA 1 will be consolidated into a single report covering all NAPL activities within GMA 1. That report will be prepared and submitted by GE on a semi-annual basis. Additional discussion regarding future NAPL reporting is presented in Section 4.6.3.

The remainder of this section provides general information regarding the current NAPL monitoring programs within GMA 1. To facilitate this summary, Figure 4 identifies the locations of the existing recovery systems and the current extent of NAPL, while Table 1 identifies the wells that are monitored as part of the ongoing programs. In addition, the historical data on recovery of NAPL in these areas, as well as the existing analytical data for the NAPL, are summarized in Appendix C.

2.5.1 East Street Area 1 - North and South (RAAs 6 and 18)

As illustrated on Figure 5, approximately 70 wells in this area are currently monitored on a semi-annual basis for the presence of LNAPL. Additionally, six wells (34, 52, 72, 105, 106, 131) are monitored monthly, with any LNAPL accumulations (if present) removed manually. These monitoring and manual recovery activities are conducted to supplement active groundwater pumping/LNAPL recovery operations which are provided by two systems in this area (northside and southside collection systems) which are composed of caissons equipped with automated groundwater extraction pumps and oil skimmers. The northside collection system, installed in 1979, consists of a perforated steel caisson and perforated collection laterals. The laterals start at a depth of 7.5 feet below grade and extend to a depth of 18.5 feet. The southside collection system, installed in 1987, consists of a perforated precast concrete caisson that extends to a depth of approximately 16 feet below grade. Both NAPL recovery systems include mechanisms to recover and remove LNAPL that enters into the collection caissons. Since 1980, the systems have collected over 1,300 gallons of LNAPL from this area. The results of the semi-annual and monthly monitoring, and the active NAPL removal activities associated with the two recovery systems, are summarized in reports that are submitted to EPA and MDEP on a semi-annual basis. A more detailed summary of NAPL recovery data related to these systems is included in Appendix C to this document.

As shown on Figure 6, active pumping and manual oil recovery efforts for this area have reduced the extent of LNAPL to a few relatively small pockets located along East Street. To further evaluate and possibly enhance NAPL recovery in this area, GE conducted a groundwater pumping test in March 2000 at two monitoring wells (34 and 72; see Figure 6). These wells, located between the active recovery caissons, were tested to assess the feasibility of providing additional hydraulic control in this area. For each well, the removal rate at which a constant drawdown could be maintained in the wells was determined. However, each of these wells was de-watered at minimal pumping rates, suggesting that the hydraulic conductivity of the subsurface soils and/or actual well construction may be limiting factors in the observed rate of groundwater extraction. GE submitted the results of this testing to EPA and MDEP in a letter dated May 3, 2000. To further assess the possibility that well construction

is limiting groundwater recovery, GE is proposing herein the installation of a new replacement monitoring well. Section 4.3.1 provides additional information regarding this proposal.

2.5.2 20s, 30s, and 40s Complexes and East Street Area 2 - South and North (RAAs 1, 2, 3, 4, and 5)

As illustrated on Figure 7, approximately 145 wells in this combined area (formerly known as East Street Area 2) are currently monitored for the presence of LNAPL on a semi-annual basis, while numerous additional wells are monitored for LNAPL and/or DNAPL on a weekly and monthly basis. Table 1 presents a summary of these wells and associated monitoring frequencies. Manual NAPL recovery is also conducted, as appropriate, when various program-specific NAPL thicknesses are detected. Historical NAPL recovery data are presented in Appendix C.

In addition to the monitoring/manual recovery activities described above, several active groundwater/NAPL recovery operations are also conducted by GE in this area. These active operations include the following pumping systems: RW-1(S), RW-1(X), RW-2(X), 64R/40R, 64S, 64V, and 64X (W). Three of these recovery systems (64R, 64S, and 64X) are composed of 7- to 8-foot diameter caissons from which a series of collection laterals extend. The remaining systems consist of recovery wells with diameters ranging from 8 inches to 2 feet. These systems actively pump groundwater and recover NAPL which enters the caisson/well. An automated oil skimming system is also installed in well 40R.

In addition to these active recovery systems, a 380 feet long by 30 feet deep slurry wall and a groundwater recharge pond provide further physical and hydraulic containment of LNAPL (see Figures 2 and 3). A sheetpile containment barrier has also been constructed along the riverbank near the 64X(W), RW-1(X), and RW-2(X) recovery systems to minimize the potential for NAPL to migrate toward the Housatonic River. Currently, the results of the weekly, monthly, and semi-annual monitoring activities, as well as the manual/active LNAPL recovery operations described above, are summarized in reports that are submitted to EPA and MDEP on a semi-annual basis.

The historic ongoing LNAPL removal programs are effectively reducing the LNAPL thickness across this area and preventing lateral expansion/migration of LNAPL. Since 1975, over 847,000 gallons of LNAPL have been removed by the recovery systems. Figure 8 presents a comparison of past and recent configurations of LNAPL extent within this area. As shown on this figure, the lateral extent and thickness of the LNAPL plume has decreased over time.

Particularly notable is the reduction of the area within the plume containing an LNAPL thickness greater than 0.8 feet.

In addition to the recovery efforts summarized above for the primary LNAPL plume in this area, GE is also performing LNAPL recovery activities within a former elevator shaft located in Building 42. In March 1997, GE provided oral notification to the MDEP that a release of approximately 220 gallons of hydraulic oil had occurred from a hydraulic component of the freight elevator located in Building 42. Since reporting the release, GE implemented an Immediate Response Action (IRA) to recover the hydraulic oils not immediately collected following the initial release and assessed the potential for further migration of the released oils within the environment. Collectively, these activities include the decommissioning of the freight elevator, initiation and performance of oil recovery operations from the Building 42 elevator shaft, and investigations (utilizing both existing and new monitoring wells in the area) to assess the potential for the subsurface migration of oils released from the elevator shaft.

As part of the decommissioning, dismantling, and cleaning of the freight elevator and its related components, GE removed an additional 135 gallons of oil. Once the freight elevator was removed, GE converted the abandoned hydraulic cylinder into an oil recovery well by drilling several holes through the cylinder wall and installing an automatic LNAPL skimming device. To date, a total of approximately 190 gallons of the hydraulic oil have been recovered from the abandoned hydraulic cylinder associated with the former Building 42 freight elevator. GE continues to operate the automated oil recovery system and collects weekly data concerning the depth to the water table and thickness of oil (if present). All data associated with these efforts are provided in monthly status reports prepared by GE. In addition, GE monitors two downgradient wells (wells 95-16 and ES2-19) as part of the semi-annual monitoring program previously described. No oil has been observed in these wells since their addition to the semi-annual program.

In addition to the occurrences of LNAPL within this combined area, prior investigations in this area have defined several occurrences of DNAPL. These occurrences are illustrated on Figure 4, and generally involve the presence of DNAPL at the till confining layer at these locations. In addition to the periodic monitoring and manual recovery related to these occurrences (refer to Table 1), GE has implemented other measures designed to recover/control the migration of DNAPL in this area. These activities include the installation of a sheetpile containment barrier along the riverbank near Building 68 and the installation (in July 1999) of a DNAPL recovery well (RW-3X) along the riverbank near the 64X(W), RW-1(X), and RW-2(X) LNAPL recovery systems. Following installation, DNAPL

recovery testing was performed in this well. The results of this testing (submitted to EPA in October 1999) were utilized in the design of an automated recovery system for this well. The RW-3(X) automated DNAPL recovery system was constructed in spring 2000 and active operation was initiated on June 15, 2000. Over 800 gallons of DNAPL have been removed from East Street Area 2 - South since 1997. Additional DNAPL has been removed from beneath the Housatonic River as part of ongoing remediation activities adjacent to this area.

2.5.3 Lyman Street Area (RAA 12)

As shown on Figure 9, GE currently monitors 43 wells and well points for LNAPL and DNAPL on a regular basis (see Table 1). Generally, LNAPL accumulations greater than 0.25 feet in thickness and DNAPL accumulations greater than 1 foot are manually removed from any well. Exceptions to this are that: (a) LNAPL is not manually removed from monitoring wells located immediately adjacent to active recovery wells; and (b) DNAPL is manually removed from wells LSSC-7 and LSSC-16I regardless of thickness. In addition to manual recovery activities, three automated NAPL/groundwater recovery systems are in operation: RW-1 and RW-2 were installed in 1992, and RW-3 first became operational in August 1996. Well RW-1 was replaced, because of apparent fouling, by a new recovery well [RW-1(R)], which became operational in September 1998. Since 1992, over 2,000 gallons of LNAPL and approximately 700 gallons of DNAPL have been removed from this area. Results of the ongoing monitoring and NAPL recovery activities are summarized in annual reports submitted to EPA and MDEP.

The extent of LNAPL and DNAPL in this area has been defined during several past investigations. Figure 9 shows locations where LNAPL and DNAPL are currently observed within the Lyman Street Area RAA. Given the relatively new NAPL recovery operations (relative to those related to the East Street Area 1 and 2 RAAs), the extent of NAPL within this area has not historically varied to a degree to produce a meaningful comparison between past and present configurations.

With respect to recent and future NAPL-related activities within this area, in July 1999 GE submitted to the EPA a technical plan for the installation of a 400 linear foot sheetpile containment barrier. Figure 9 identifies the approximate location of the proposed barrier along the southern edge of the Lyman Street parking lot. Similar to the barrier installed along the riverbank area within the East Street Area 2 - South RAA in 1999, the proposed barrier is intended to provide supplemental NAPL containment beyond what is already provided by the three pumping systems. The design of the Lyman Street sheetpile containment barrier was conditionally approved by EPA in August 1999 and construction is scheduled to be completed in Spring 2001. In addition, the feasibility of

operating additional DNAPL recovery systems in this area was evaluated in 1999 at three wells (LS-34, LSSC-07, and LSSC-16I). The results of this assessment (provided to the EPA in September 1999) concluded that installation of automated DNAPL recovery systems was not warranted, but an enhanced manual removal effort was proposed. This proposal was subsequently approved by EPA and GE is currently implementing that program.

2.5.4 Newell Street Area II (RAA 13)

The extent of LNAPL and DNAPL in this area has been defined during several past investigations, which have involved the installation of numerous monitoring wells to the till confining layer interface. Figure 5 shows locations where LNAPL and DNAPL are currently observed at Newell Street Area II. Since 1996, approximately 8 gallons of LNAPL and over 22,000 gallons of DNAPL have been removed from this area. Detailed NAPL recovery data is presented in Appendix C.

LNAPL and DNAPL monitoring and recovery activities were initiated in 1995 at Newell Street Area II. Currently, GE monitors NS-10 and NS-33 for LNAPL on a weekly basis, and approximately 25 wells for DNAPL on a weekly, monthly, or quarterly basis. LNAPL accumulations greater than 0.25 feet in thickness and DNAPL accumulations greater than 0.5 feet in thickness are manually removed from the wells. Since March 1, 1999, GE has operated an automated DNAPL recovery system within wells NS-15, NS-30, and NS-32. On July 15, 1999, GE began operation of a second automated DNAPL recovery system at well N2SC-1I. On June 30, 2000, GE expanded this second DNAPL recovery system to include wells N2SC-2 and N2SC-3I, and added well N2SC-14 on July 10, 2000. Most recently, in August 2000, GE installed two additional deep monitoring wells to further assess the presence of DNAPL at the confining till layer beneath the Site. These two wells (N2SC-16 and N2SC-17, Figure 9) have been incorporated into the weekly monitoring performed at this RAA. Similar to the Lyman Street Area, the relatively new and recent NAPL assessments/recovery activities in this area do not support a meaningful comparison between past and present configurations. Currently, the NAPL-related activities associated with Newell Street Area II are summarized in semi-annual reports that are submitted to EPA and MDEP.

2.6 Current Groundwater Monitoring Programs

The ongoing NAPL monitoring programs described in Section 2.4 also contain a significant groundwater elevation monitoring component, which involves the recording of groundwater elevation each time a particular well is monitored for NAPL presence/thickness. As a result, water level measurements are routinely recorded (e.g.,

weekly, monthly, semi-annually, etc.) at approximately 320 wells within GMA 1. The monitoring results are summarized in the appropriate RAA-specific monthly, semi-annual, or annual reports that are submitted to EPA and MDEP.

In addition, groundwater samples are collected on a semi-annual basis from four wells (22, 43, 44, and P-6) in the vicinity of the groundwater recharge pond located within East Street Area 2 - South. Once collected, the samples are analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, total organic carbon, pH, and specific conductance. Each of the wells is sampled and analyzed on a weekly basis during each of the two months included in the semi-annual program. The data generated to date are summarized in Appendix D. This groundwater monitoring program will be discontinued upon implementation of the baseline monitoring program proposed in Section 4.2.

2.7 Summary of Groundwater Analytical Data

Groundwater analytical data concerning the individual RAAs which comprise GMA 1 have been previously summarized in numerous reports prepared under the MCP and RCRA Corrective Action Programs that have been ongoing at the GE facility (and related areas) since the late 1980s. The primary documents (excluding routine monitoring reports) which provide discussions concerning the results of past groundwater investigations for areas within or related to GMA 1 are listed below. These documents have all been submitted to EPA and/or MDEP.

- C Response to Massachusetts DEQE Review of the Ground-Water Monitoring Program in the East Street-Area 2 Project Site, Geraghty & Miller, August 1986;*
- C Investigation of Soil and Groundwater Conditions of the Newell Street Site, General Electric Company, Pittsfield, Massachusetts, Geraghty & Miller, July 1988;*
- C Supplemental Investigation of Soil and Groundwater Conditions of the Newell Street Site, General Electric Company, Pittsfield, Massachusetts, Geraghty & Miller, April 1989;*
- C Results of the Well Installation and Water Sampling Program in the Vicinity of Building 100, GE Company, Pittsfield, Massachusetts, Geraghty & Miller, May 1990;*
- C Results of the Well Installation and Water Sampling Program in the Vicinity of Building 17, GE Company, Pittsfield, Massachusetts, Geraghty & Miller, May 1990;*
- C Newell Street MCP Phase II Supplemental Data Summary, Blasland & Bouck, June 1990;*

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- C *Additional Hydrogeologic Assessment and Short-Term Measure Evaluation and Proposal, Lyman Street Parking Lot (Oxbow Area D)*, Golder Associates, January 1992;
 - C *MCP Interim Phase II Report for the Newell Street Site*, Blasland & Bouck, February 1992;
 - C *MCP Interim Phase II Report and Current Assessment Summary for East Street Area 2/USEPA Area 4*, BBL, August 1994;
 - C *MCP Interim Phase II Report and Current Assessment Summary for East Street Area 1/USEPA Area 3*, BBL, October 1994;
 - C *Sub-Surface Investigation at the Newell Street Site (#1-0151) Moldmaster Engineering Property, 187 Newell Street, Pittsfield, Massachusetts, S-K*, November 1994;
 - C *Supplemental Phase II/RCRA Facility Investigation Report for Housatonic River and Silver Lake*, BBL, January 1996;
 - C *MCP Phase I and Interim Phase II Report for Former Housatonic River Oxbow Areas A, B, C, J, and K*, BBL, February 1996;
 - C *Addendum to Phase II/RFI Proposal - East Street Area 2/ USEPA Area 4*, Golder Associates, May 1996;
 - C *Addendum to Supplemental Phase II SOW / RFI Proposal - East Street Area 1/ USEPA Area 3*, Golder Associates, November 1996;
 - C *Revisions to Addendum to Phase II/RFI Proposal - East Street Area 2/USEPA Area 4*, Golder Associates, April 1997;
 - C *MCP Phase II/RCRA Facility Investigation Report for Lyman Street Parking Lot/USEPA Area 5A*, BBL, June 1997;
 - C *MCP Supplemental Phase II Report for the Newell Street I Site*, BBL, September 1997;
 - C *Addendum to MCP Supplemental Phase II/RCRA Facility Investigation Proposal for Lyman Street / USEPA Area 5A*, BBL, October 1997;
 - C *Pittsfield 1-1057, USEPA Area 5B GE/Newell Street Area II - Phase II/RFI Data and Boring Logs*, BBL, May 1996 (data verified July 1998);
 - C *Source Control Investigations and Preliminary Containment Barrier Design for East Street Area 2, GE Company, Pittsfield, Massachusetts*, GE, November 1998;
 - C *Proposal for Supplemental Source Control Containment/Recovery Measures*, BBL, January 1999;
 - C *DNAPL Assessment, East Street Area 2 Site, Pittsfield, Massachusetts*, HSI GeoTrans, Inc., April 1999 ;

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- C *Source Control Investigation Addendum Report, Upper Reach Housatonic River (First ½ Mile), Pittsfield, Massachusetts, HSI GeoTrans, Inc., June 1999;*
 - C *GE-Pittsfield/Housatonic River Site; Upper ½-Mile Reach Removal Action: DNAPL Investigation Work Plan, GE, letter to USEPA dated February 7, 2000;*
 - C *DNAPL Investigation at Newell Street Area II - Plant Site 1 Groundwater Management Area, GE, letter to USEPA dated March 15, 2000;*
 - C *Newell Street Area II (DEP #1-1057; USEPA Area 5B); Proposal for Additional DNAPL Recovery Operations, GE, letter to USEPA dated March 30, 2000;*
 - C *Additional DNAPL Investigation at Newell Street Area II - Plant Site 1 Groundwater Management Area, GE, letter to USEPA dated May 19, 2000;*
 - C *Upper ½-Mile Reach of Housatonic River Removal Action; Preliminary Analytical Results - DNAPL in Cell F-1, GE, letter to USEPA dated May 19, 2000;*
 - C *GE-Pittsfield/Housatonic River Site; Plant Site 1 Groundwater Management Area (GECD310); Additional DNAPL Investigation at Newell Street Area II, GE, letter to USEPA dated June 5, 2000;*
 - C *Upper ½-Mile Reach of Housatonic River Removal Action; Analytical Results - DNAPL in Cell G-1, GE, letter to USEPA dated June 9, 2000;*
 - C *GE-Pittsfield/Housatonic River Site; Upper ½-Mile Reach Removal Action (GECD800); Results of Cell G1 DNAPL Investigation and Proposal to Address Presence of DNAPL in Cell G1, GE, July 11, 2000;*
 - C *GE-Pittsfield/Housatonic River Site; Results of DNAPL Investigation: East Street Area 2-South Portion of Plant Site 1 Groundwater Management Area (GECD310), GE, letter to USEPA dated July 20, 2000;*
 - C *GE-Pittsfield/Housatonic River Site; Upper ½-Mile Reach Removal Action (GECD800); Proposal to Install Monitoring Wells Adjacent to Cells G1/G2, GE, letter to USEPA dated September 20, 2000; and*
 - C *GE-Pittsfield/Housatonic River Site; Plant Site 1 Groundwater Management Area (GECD310); Results of Groundwater Investigation - 10 Lyman Street Property, GE, letter to USEPA dated September 27, 2000.*

The investigations described in the above reports have produced a substantial amount of groundwater analytical data for GMA 1, involving analytical data from over 350 groundwater samples. The groundwater analyses conducted during these investigations are summarized in Table 2, and pertinent groundwater analytical data are summarized in Appendix E. A broader review of the groundwater analytical data indicates that:

- C approximately 90% of the samples were analyzed for PCBs (total and/or dissolved);
- C approximately 80% of the samples were analyzed for VOCs and/or SVOCs;

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- C approximately 30% of the samples were analyzed for inorganics (total and/or dissolved);
 - C approximately 20% of the samples were analyzed for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (dioxins/furans);
 - C approximately 7% of the samples were analyzed for pesticides/herbicides; and
 - C between approximately 10% and 30% of these samples were analyzed for various other constituents (e.g., TOC, phenols, sulfide, etc.).

These existing groundwater data were generally collected and analyzed by procedures appropriate for the intended use of the data at the time of the previous investigations. These data were considered in the development of the proposed baseline monitoring activities discussed in Section 4 below. However, the existing database is not being considered at this time for use in assessing achievement of the groundwater Performance Standards or as the basis for proposing to limit the analyte list for the baseline monitoring program. Hence, a complete assessment of the quality of these data for quality assurance/quality control (QA/QC) parameters has not been completed at this time. GE may conduct such an assessment of particular historical data at selected locations in support of proposals for future modifications to the baseline or long-term monitoring programs, and will present the results of any such assessments in the pertinent proposals.

2.8 Prior Monitoring Well Inventories

Attachment H to the SOW requires that the baseline monitoring program proposal for a GMA include the results of monitoring well inventories performed since 1995. A well inventory involves an inspection of a monitoring well to assess its condition. Items verified include:

- C presence of well identification marker;
- C condition of well head and surface seal;
- C comparison of measured stickup and total depths to previously reported values, and
- C depth to water.

Any discrepancies between actual and reported measurements, repairs made, or items needing repair are noted. Several such inventories have been performed since 1995 within GMA 1 either as part of the routine monitoring programs conducted by GE or as separate tasks. A summary of the results of these activities is provided in Table 3.

3. Summary of Applicable Performance Standards

3.1 General

This section describes the Performance Standards that are applicable to response actions to address groundwater and NAPL for GMA 1. Those Performance Standards are set forth in Section 2.7 and Attachment H (Section 4.0) of the SOW. They relate primarily to the groundwater quality and NAPL-related conditions that must ultimately be achieved for GMA 1 and the long-term monitoring program that will be performed at this GMA, after completion of the baseline monitoring, to assess achievement of those conditions. However, it is important to understand these Performance Standards in the context of the baseline monitoring program, since they provide the criteria for evaluating the results from that program and for conducting further response actions.

The following sections provide a summary of the applicable Performance Standards for groundwater quality and NAPL, respectively. As noted above, the Performance Standards are set forth in full in Section 2.7 and Attachment H of the SOW.

3.2 Groundwater Quality Performance Standards

In general, the Performance Standards for groundwater quality are based on the groundwater classification categories designated in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0932). The MCP identifies three potential groundwater categories that may be applicable to a given site. One of these, GW-1 groundwater, applies to groundwater that is a current or potential source of potable drinking water. None of the groundwater at any of the GMAs at the Site are classified as GW-1 groundwater. However, the remaining MCP groundwater categories are applicable to GMA 1 and are described below:

Ⓒ GW-2 Groundwater - Groundwater that is a potential source of vapors to the indoor air of buildings; groundwater is classified as GW-2 if it is located within 30 feet of an existing occupied building and with an average annual depth to groundwater of 15 feet or less. Under the MCP, VOCs present within GW-2 groundwater represent a potential source of organic vapors to the indoor air of the overlying occupied structures.

Ⓒ GW-3 Groundwater - Groundwater that discharges to surface water; by MCP definition, all groundwater at a site is classified as GW-3 since it is considered to be ultimately discharged to surface water. It should be noted that within GMA 1 some groundwater does not in fact discharge directly to surface water because of the operation of numerous groundwater pumping systems. Water extracted from these systems is transferred to an on-site

treatment plant for processing prior to discharge. Nevertheless, in accordance with the CD, all groundwater at GMA 1 will be considered as GW-3.

The CD and the SOW allow for the establishment of standards for GW-2 and GW-3 groundwater at the GMAs through use of one of three methods, as generally described in the MCP. The first, known as Method 1, consists of the application of pre-established numerical "Method 1" standards set forth in the MCP for both GW-2 and GW-3 groundwater (310 CMR 40.0974). These "default" standards have been developed to be conservative and will serve as the initial basis for evaluating groundwater at GMA 1. The MCP Method 1 standards for GW-2 and GW-3 groundwater are listed in Appendix F. (In the event of any discrepancy between the standards listed in this appendix and those published in the MCP, the latter shall be controlling.) For constituents for which Method 1 standards do not exist, the MCP provides procedures, known as Method 2, for developing such standards ("Method 2 standards") for both GW-2 (310 CMR 40.0983(2)) and GW-3 (310 CMR 40.0983(4)) groundwater. For such constituents, Attachment H to the SOW states that GE must use these MCP procedures or alternate procedures approved by EPA to develop Method 2 standards, or provide a rationale for why such standards need not be developed. For constituents whose concentrations exceed the applicable Method 1 or Method 2 standards, GE may develop and propose to EPA alternative GW-2 and/or GW-3 standards based on a site-specific risk assessment. This procedure is known as Method 3 in the MCP. Upon EPA approval, these alternative risk-based GW-2 and/or GW-3 standards may be used in lieu of the Method 1 (or Method 2) standards. Of course, whichever method is used to establish such groundwater standards, GW-2 standards will be applied to GW-2 groundwater and GW-3 standards will be applied to GW-3 groundwater.

Based on consideration of the above points, the specific groundwater quality Performance Standards for GMA 1 consist of the following:

1. At monitoring wells designated as compliance points to assess GW-2 groundwater (i.e., groundwater located at an average depth of 15 feet or less from the ground surface and within 30 feet of an existing occupied building), groundwater quality shall achieve any of the following: (a) the Method 1 GW-2 groundwater standards set forth in the MCP or, for constituents for which no such standards exist, Method 2 GW-2 standards developed using procedures in the MCP or approved by EPA (unless GE provides and EPA approves a rationale for not developing such Method 2 standards); or (b) alternative risk-based GW-2 standards developed by GE and approved by EPA as protective against unacceptable risks due to volatilization and transport of volatile chemicals from groundwater to the indoor air of nearby occupied buildings; or (c)

a condition, based upon a demonstration approved by EPA, in which constituents in the groundwater do not pose an unacceptable risk to occupants of nearby occupied buildings via volatilization and transport to the indoor air of such buildings.

2. Groundwater quality shall achieve the following standards at the perimeter monitoring wells designated as compliance points for GW-3 standards: (a) the Method 1 GW-3 groundwater standards set forth in the MCP or, for constituents for which no such standards exist, Method 2 GW-3 standards developed using procedures in the MCP or approved by EPA (unless GE provides and EPA approves a rationale for not developing such Method 2 standards); or (b) alternative risk-based GW-3 standards proposed by GE and approved by EPA as protective against unacceptable risks in surface water due to potential migration of constituents in groundwater.

These Performance Standards are to be applied to the results of the individual monitoring wells included in the monitoring program. As discussed in Section 4 of this GMA 1 Baseline Monitoring Proposal, several existing and proposed wells have been selected as the compliance points for attainment of the Performance Standards identified above.

3.3 NAPL Performance Standards

The NAPL Performance Standards applicable to GMA 1 consist of the following:

1. Containment, defined as no discharge of NAPL to surface waters and/or sediments, which shall include no sheens on surface water and no bank seeps of NAPL.
2. For areas near surface waters in which there is no physical containment barrier between the wells and the surface water, elimination of measurable NAPL (i.e., detectable with an oil/water interface probe) in wells near the surface water bank that could potentially discharge NAPL into the surface water, in order to prevent such discharge and assist in achieving groundwater quality Performance Standards.
3. For areas adjacent to physical containment barriers, prevention of any measurable LNAPL migration around the ends of the physical containment barriers.

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4. For NAPL areas not located adjacent to surface waters, reduction in the amount of measurable NAPL to levels which eliminate the potential for NAPL migration toward surface water discharge areas or beyond GMA boundaries, and which assist in achieving groundwater quality Performance Standards.

 5. For NAPL detected in wells designed to assess GW-2 groundwater (i.e., located at average depths of 15 feet or less from the ground surface and within a horizontal distance of 30 feet from an existing occupied building), a demonstration that constituents in the NAPL do not pose an unacceptable risk to occupants of such building via volatilization and transport to the indoor air of such building. Such demonstration may include assessment activities such as: NAPL sampling; soil gas sampling; desk-top modeling of potential volatilization of chemicals from the NAPL (or associated groundwater) to the indoor air of the nearby occupied buildings; or sampling of the indoor air of such buildings. If necessary, GE shall propose corrective actions including, but not limited to, containment, recovery, or treatment of NAPL and impacted groundwater.

4. Proposed Baseline Monitoring Program

4.1 General

This section describes the baseline monitoring activities proposed by GE for groundwater and NAPL within GMA 1. This section has been developed based on a review of the available hydrogeologic information associated with GMA 1 (Section 2), as well as the applicable Performance Standards summarized in Section 3 of this document. As previously indicated, the anticipated baseline monitoring activities for GMA 1 were previously identified in Attachment H to the SOW, and were collectively developed between GE and the Agencies prior to lodging of the CD. Since lodging of the CD, GE has: (1) conducted a further review of the available data related to the hydrogeologic setting and groundwater / NAPL conditions within GMA 1; (2) submitted the initial GMA 1 Baseline Monitoring Proposal in April 2000; (3) received Agency comments regarding that submittal in a letter dated August 24, 2000; and (4) met with the Agencies (in August 2000) to discuss those comments. These collective activities have resulted in certain modifications to the baseline monitoring program identified in Attachment H to the SOW.

This section describes GE's proposed baseline monitoring program for groundwater and NAPL at GMA 1, including the modifications to the baseline program identified in Attachment H to the SOW. Specifically, Section 4.2 presents GE's proposed baseline monitoring activities for groundwater at GMA 1, including the evaluations conducted to support those proposed activities, while Section 4.3 describes the NAPL monitoring and recovery activities proposed to be conducted during the baseline monitoring period. Section 4.4 outlines GE's proposed data assessment activities, and Section 4.5 describes the required notification activities associated with the baseline monitoring activities, as well as the requirements relating to interim response actions, if needed, in accordance with Attachment H to the SOW. Finally, Section 4.6 describes the various reporting requirements that are applicable to the baseline monitoring program.

The Data Quality Objectives (DQOs) for this proposed baseline monitoring program are: (a) to obtain the necessary data on groundwater conditions and NAPL in GMA 1 to meet the baseline monitoring requirements specified in Attachment H to the SOW; (b) to provide a baseline database for the subsequent development and implementation of a long-term monitoring program for this GMA and ultimately for evaluating the impact of soil-related response actions on groundwater quality and assessing achievement of the groundwater quality and NAPL Performance Standards described in Section 3; and (c) to determine the need for interim response actions to the extent required by Attachment H to the SOW.

The baseline monitoring activities and modifications to existing/previously proposed programs discussed in this section are intended to replace any such ongoing or previously proposed activities. Specifically, the baseline groundwater monitoring program outlined in Section 4.2 supersedes the preliminary program presented in Attachment H to the SOW, and the routine NAPL monitoring and recovery modifications proposed in Section 4.3 will, when approved by the Agencies and once the CD is entered, supersede current activities and/or schedules, where applicable. Also, GE proposes to discontinue semi-annual groundwater sampling and analysis activities at the groundwater recharge pond area wells 22, 43, 44, and P-6 (discussed in Section 2.6), as the proposed baseline monitoring program will provide adequate groundwater analytical data for this area. Finally, regarding the replacement of monitoring wells which have been or will be removed in conjunction with Merrill Road reconstruction activities, GE proposes that only selected wells be replaced as described in Sections 4.3.1 and 4.3.2 below. GE further proposes that no laboratory analyses be conducted on soil samples collected during well installation. Although such soil sampling and analyses were previously specified in conditional approval letters from EPA and MDEP dated July 3, 1997 and August 21, 1997, these specifications were made prior to negotiation and execution of the CD and are considered to be superseded by the protocols for additional soil investigations described in Attachment D to the SOW (i.e., grid-based soil sampling).

4.2 Baseline Groundwater Monitoring

4.2.1 Evaluations and Overview

To develop the baseline groundwater monitoring program for GMA 1, GE reviewed and evaluated a number of factors. It began by reviewing the baseline monitoring program described in Attachment H to the SOW and considering the need for additions or modifications to that program. In this connection, GE considered appropriate locations for both sentinel wells and perimeter wells, as described in Attachment H to the SOW. According to Attachment H, sentinel wells for GMA 1 fall into two categories:

- GW-2 Sentinel Wells -- wells located within or close to areas where the GW-2 groundwater classification applies (i.e., shallow groundwater near occupied buildings); these wells are to be considered compliance points for the GW-2 standards; and

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- General and Source Area Sentinel Wells -- wells located near known contaminant sources and spatially distributed across the GMA to monitor groundwater downgradient of known sources and to provide additional areal coverage to monitor for previously undetected source areas.

Sentinel wells will not be considered compliance points for the GW-3 standards. However, general/source area sentinel wells will be used to provide an early indication of groundwater conditions that could exceed GW-3 standards in the downgradient perimeter wells.

Perimeter wells are those intended to monitor groundwater quality along the outer boundary of the GMA. All downgradient perimeter wells are to be used as compliance points for the GW-3 standards. Upgradient perimeter wells are generally intended to assess the quality of groundwater entering the GMA. However, in some cases, perimeter wells may be located near or upgradient of existing occupancies buildings where GW-2 classification criteria apply, and will be monitored for compliance with the GW-2 standards. The criteria for selecting locations for sentinel and perimeter monitoring wells are described in Section 5.1 of Attachment H to the SOW. (Attachment H also provides for the establishment, where applicable, of natural attenuation monitoring wells to assess intrinsic and natural processes that may mitigate groundwater impacts. However, as recognized in Attachment H, these types of wells are not currently applicable to GMA 1.)

In this context, GE evaluated the usability of existing monitoring wells to serve as sentinel wells (either GW-2 sentinel wells or general/source area sentinel wells) or perimeter wells for the baseline monitoring program. In doing so, GE considered the locations of these wells relative to occupied buildings, to known/suspected source areas, and to the GMA boundary; and for those wells that were appropriately located, GE considered the depth and length of their well screens to ensure that they would monitor the appropriate groundwater. Based on this evaluation, and taking into account the wells preliminarily identified in Attachment H to the SOW for the baseline monitoring program, GE selected the existing wells that could serve as sentinel or perimeter wells in this program and identified locations for the installation of additional wells to fill in any gaps.

In addition, GE evaluated the distribution of monitoring well pair clusters and the need for establishing additional such clusters to assess achievement of the GW-2 and GW-3 standards. While a few such paired clusters were selected, there is no need for widespread use of such clusters at GMA 1, because both the GW-2 and the GW-3 standards at this GMA apply to relatively shallow groundwater (i.e., groundwater with an average annual depth

less than 15 feet below the ground surface and near occupied buildings or groundwater that could discharge to surface water).

Based on the above-described evaluations, a baseline groundwater monitoring program consisting of 52 existing monitoring wells and 13 new or replacement monitoring wells was selected for GMA 1. The locations of these wells, along with their designation as GW-2 sentinel wells, general/source area sentinel wells, or perimeter wells, are depicted on Figure 10 and presented in Table 4.

Prior to commencement of this baseline monitoring program, an additional well inventory/inspection will be conducted for each well included in the program to provide an update on the condition of the wells, including structural integrity and possible sediment accumulations. Following completion of this inventory, GE will complete any repairs, redevelopment, or resurveying that may be required. If an existing well proposed for inclusion in the baseline monitoring program cannot be suitably repaired or redeveloped, GE will propose a replacement well at that location. In addition, based on observations made during this additional well inventory, GE may propose to abandon and replace certain other wells or to substitute other wells into the program. Any such proposal will be submitted to EPA for approval in an addendum to this Baseline Monitoring Proposal. Finally, as part of this well inventory/assessment, GE will perform a more comprehensive site reconnaissance to see if it can identify the location of the former industrial water supply well within the 30s Complex. If this well can be located and is accessible, GE will discuss with EPA and MDEP obtaining a groundwater sample from this well for analysis of Appendix IX+3 constituents.

In accordance with Attachment H to the SOW, the baseline monitoring program will be conducted over a period of at least two years and will include water level monitoring on a quarterly basis and groundwater sampling and analysis on a semi-annual basis. A further and more specific discussion of the proposed baseline monitoring activities for GW-2 and GW-3 groundwater is presented below. All well installation activities for the new wells and all groundwater measurement, sampling, and analysis activities will be conducted in accordance with the procedures set out in GE's Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP), as such plan is approved by EPA. (This plan was submitted by GE in September 2000 and is currently awaiting EPA approval.)

4.2.2 GW-2 Monitoring

To establish the GW-2 sentinel/compliance wells, GE first identified, using data available from prior monitoring activities, those areas within GMA 1 where the average annual depth to groundwater is 15 feet or less below ground surface. These shallow groundwater areas were determined by an initial examination of seasonal high and low groundwater elevation data available from over 400 wells within GMA 1. At locations where both the maximum and minimum depths to groundwater were less than 15 feet, the average annual depth to groundwater was assumed to be less than 15 feet and no further analysis was conducted. Likewise, at locations where both the maximum and minimum depths to groundwater were greater than 15 feet, the average annual depth to groundwater was assumed to be greater than 15 feet. For locations where the minimum depth to groundwater was less than 15 feet, but the maximum depth to groundwater was greater than 15 feet, a more detailed analysis was conducted. To incorporate a varying number of depth to water measurements recorded at the wells, one spring water level measurement (representative of high water table conditions) and one fall water level measurement (representative of low water table conditions) were selected for each year of available monitoring data (generally between 1994 and 2000, although earlier dates were utilized at certain wells where limited data was available). The average annual depth to water was determined by the arithmetic average of the low and high water table depths for each well. This process was utilized in order to minimize bias due to a potentially uneven number of measurements taken during high and low water table periods. Figure 11 identifies these potential shallow groundwater areas.

Once the areas of shallow groundwater were determined, specific GW-2 sentinel/compliance monitoring locations were selected considering the proximity to occupied structures located above the shallow groundwater areas, and to provide spatial coverage throughout the remainder of the shallow groundwater areas. (Figure 11 denotes those existing buildings within GMA 1 that are currently occupied.) From this effort, a total of 24 new (proposed) or existing wells have been selected for GW-2 monitoring, as identified in Table 4 and on Figure 10. It should be noted that some of these wells are located more than 30 feet from an existing occupied building. Such wells will initially be used as compliance points for the GW-2 standards. However, if exceedances of GW-2 standards are observed in these wells, GE will consider installing new wells closer (i.e., within 30 feet of) the target building(s) in question and, if appropriate, will propose such new wells to EPA for approval. Upon EPA approval, any such newly installed wells will be utilized as GW-2 sentinel wells, in place of the former wells, for the remainder of the baseline monitoring program.

For the initial baseline monitoring, all GW-2 sentinel/compliance wells will be subject to sampling and analysis for the VOCs listed in Appendix IX of 40 CFR Part 264 plus 2-chloroethylvinyl ether. As the baseline monitoring program proceeds, GE may propose to reduce this analyte list at certain well locations if appropriate.

As previously mentioned, the baseline monitoring activities proposed herein have been modified and expanded relative to the scope of activities identified in Attachment H to the SOW. Specific to GW-2 groundwater monitoring, the following modifications have been incorporated into this GMA 1 Baseline Monitoring Proposal:

- C Well ES1-11 will be substituted for well ES1-27. This change is appropriate because the average depth to water at well ES1-27 was determined to be greater than 15 feet below grade. (As discussed in Section 4.2.3, well ES1-27 has been abandoned due to Merrill Road reconstruction activities, but will be replaced with a new monitoring well, which will be monitored as a general/source area sentinel well.)
- C Well MW-3 will be substituted for well MW-2. During a recent field inspection, well MW-2 was found to be unusable. Well MW-3 is located in the vicinity of MW-2 and will adequately monitor groundwater conditions near the building located at 10 Lyman Street.
- C Well RF-4 will be eliminated as a GW-2 sentinel/compliance well, at least at the outset of the baseline monitoring program. This change is appropriate because the average annual depth to water at well RF-4 was determined to be greater than 15 feet below grade. There are no suitable substitutes for this well, due to the general relatively deep (i.e., greater than 15 feet) depth to groundwater in this area (see Figure 10). As discussed in Section 4.2.3, well RF-4 will be monitored as a GW-3 perimeter well. However, this well will be used as a GW-2 sentinel/compliance well if future groundwater level measurements indicate that the average annual depth to water is within 15 feet of the ground surface.
- C Based on an evaluation of potential preferential pathways at the GE facility near occupied buildings, some additional wells are proposed for GW-2 compliance monitoring. Specifically, as discussed further in Section 4.2.5, three wells (ES1-23, RF-3, and PROP-18) previously designated as GW-3 sentinel or perimeter wells have also been designated for GW-2 compliance, as shown on Figure 10 and in Table 4.
- C To provide further assessment of GW-2 groundwater conditions in the general vicinity of Buildings 3, 7, 12, and 100, existing well A7 has been added as a GW-2 sentinel/compliance well.

In addition, as discussed in Section 4.3.1 of this Proposal, GE will install a new monitoring well (PROP-22) to assess the possible presence of LNAPL downgradient of the existing southside LNAPL recovery system. Following installation of this well, GE will evaluate whether this well can also serve as a GW-2 monitoring well for the Lakewood residential area between East Street and the Housatonic River. If so, this well will be included in the baseline monitoring program as a GW-2 sentinel/compliance well. If this well is not suitable for GW-2 compliance monitoring (e.g., due to interferences from LNAPL), GE will evaluate the need for an additional GW-2 monitoring well in this area and, if appropriate, will select an existing well in this area (i.e., well 77 or 89) or propose another new well in the area to serve as a GW-2 sentinel/compliance well. The results of GE's evaluation and any proposal for the addition of another GW-2 sentinel/compliance well in this area will be submitted to EPA for approval.

In addition to the wells identified as GW-2 sentinel/compliance wells on Table 4 and Figure 10, additional GW-2 sentinel/compliance wells or changes to the existing monitoring program may be proposed if, prior to or during the baseline monitoring program, additional buildings are constructed or now-vacant buildings are occupied at GMA 1. Figure 11 identifies the existing buildings within the GE facility that are currently occupied. In addition, included as Appendix G is a figure from the Definitive Economic Development Agreement between GE and the Pittsfield Economic Development Authority that presents the most current and available information regarding the possible future status of certain buildings within the GE facility. If new buildings are constructed or currently unoccupied buildings become occupied at GMA 1, GE will propose additional GW-2 sentinel/compliance wells near such buildings, if necessary, to the extent that the average depth to groundwater in such areas is 15 feet or less.

Finally, if during the installation of the proposed GW-2 monitoring wells, a field assessment determines that the average annual depth to groundwater at the well location will likely be greater than 15 feet (taking into account the time of the year and seasonal water table fluctuations), GE will discontinue well installation activities and propose for EPA review and approval a replacement well location within the same general area but where the annual average depth to groundwater is 15 feet or less.

4.2.3 GW-3 Monitoring

The existing and proposed wells established to monitor GW-3 groundwater fall into two categories:

- Perimeter Wells -- wells located near the boundary of the GMA. All downgradient perimeter wells will be considered compliance points for the GW-3 standards, while upgradient perimeter wells designated for GW-3

monitoring will be used to assess the quality of groundwater entering the GMA. (In addition, as noted above and shown in Table 4 and on Figure 10, a couple of upgradient perimeter wells located near existing buildings have been established for GW-2 compliance rather than GW-3 monitoring, and some downgradient perimeter wells will be used for both GW-2 and GW-3 compliance.)

- General/Source Area Sentinel Wells -- wells that are spatially distributed across the GMA to monitor groundwater downgradient of known/suspected sources and to provide areal coverage to monitor for potential unknown sources.

The baseline monitoring program for GW-3 monitoring will include 40 perimeter wells and 13 general/source area sentinel wells. The locations of these wells are identified in Table 4 and on Figure 10.

Initially, these wells will be monitored for all Appendix IX+3 constituents. However, as the baseline monitoring program proceeds, GE may propose to reduce the analyte list at certain well locations if appropriate. For example, depending on the results of the initial round of sampling, GE may propose to eliminate analysis for pesticides and herbicides from future sampling rounds at most of the monitoring wells in this GMA. The existing groundwater monitoring database indicates that such compounds have been detected only in relatively few wells at this GMA and, even when found, are generally present at low concentrations (see Tables E-4a and E-4b in Appendix E).

As previously mentioned, the baseline monitoring activities proposed herein have been modified relative to the scope of activities identified in Attachment H to the SOW. Specific to monitoring related to GW-3 groundwater, the following modifications have been incorporated into this GMA 1 Baseline Monitoring Proposal:

- C Well ES1-27 cannot be used for GW-3 monitoring because it has been abandoned in conjunction with the Merrill Road reconstruction activities. (As previously discussed, that well will be replaced by well ES1-11 for GW-2 compliance monitoring.) As discussed with EPA and MDEP on March 22, 2000, GE will install a replacement well, designated as ES1-27R on Figure 10, which will be added to the baseline monitoring program as a general/source area sentinel well.
- C Well ES2-2A will be substituted for well ES2-2 as a perimeter well to be monitored for compliance with GW-3 standards. This change is appropriate because the well screen at well ES2-2 was determined to be significantly below the water table, while well ES2-2A is screened at the water table in the same well cluster.

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- C Two additional GW-3 perimeter monitoring wells (PROP-19 and PROP-20) will be installed between the Former Oxbow F Area and the Housatonic River (see Figure 10) to monitor groundwater quality associated with the former oxbow area.

 - C Existing well U (located near Building 29B within the East Street Area 2 - North RAA) will not be utilized as a GW-3 sentinel monitoring well, based on the historical presence of LNAPL detected in that well (most recently in Spring 2000). That well will continue to be monitored as part of the NAPL monitoring activities conducted within this RAA.

 - C Attachment H to the SOW previously identified well 92 (located north of the Housatonic River and east of Newell Street) as a GW-3 perimeter monitoring well and GW-2 compliance well. However, based on access issues related to that particular well, GE will, instead, install a new GW-3 perimeter well (PROP-23) at the location shown on Figure 10 to monitor downgradient groundwater quality in that area.

 - C As proposed by GE in a letter dated September 20, 2000, three new monitoring wells (PROP-24, PROP-25, and PROP-26) will be installed by GE north of the Housatonic River in the general area of the Building 64W oil/water separator to monitor for the potential presence of NAPL in this area. One of these wells will be selected, based on field observations during installation, for inclusion in the baseline monitoring program as a GW-3 perimeter well to address groundwater quality downgradient of the former Thermal Oxidizer. (For purposes of illustration, Figure 10 shows PROP-25 as this GW-3 perimeter well, as stated in GE's September 20, 2000 proposal. However, the actual well to be included in the baseline monitoring program will be selected during well installation activities for these three wells.)

4.2.4 Monitoring for Potential Future Vault Areas

The criteria for placement of sentinel wells, set forth in Attachment H to the SOW, include monitoring of areas downgradient of buildings where demolition debris may be placed in the building foundations. Under the CD and the SOW, GE may place demolition debris in the foundations of Building 31 (in the 30s Complex) and/or Buildings 2, 3C, 12, 12X, and 12Y (in East Street Area 2-North) within this GMA. Review of the proposed baseline network of monitoring wells (Figure 10) indicates that network provides general coverage of areas downgradient of these buildings. However, if and when GE submits a specific work plan for use of one or more of these buildings for placement of demolition debris in the foundations, it will evaluate the need for more site-specific downgradient

monitoring wells for such building(s) and, if appropriate, will include a proposal for such additional wells in that work plan.

4.2.5 Evaluation of Potential Preferential Pathways Near Buildings

GE has also evaluated whether additional GW-2 monitoring is necessary to address potential preferential pathways at the GE facility near occupied or potentially occupied buildings. This evaluation was conducted for potential preferential pathways (e.g., subsurface utilities) which are situated below the high groundwater elevation water table and are located near buildings. These potential preferential pathways are depicted on Figure 10. Based on this evaluation, three wells (ES1-23, RF-3, and PROP-18) that were previously proposed for GW-3 monitoring have also been proposed for GW-2 compliance monitoring. In addition, a number of the wells proposed for GW-2 compliance monitoring due to their proximity to occupied or potentially occupied buildings (e.g., wells 17A, 52, A7, ES1-8, and ES1-14) are also well positioned to provide monitoring data relative to potential preferential pathways. As shown on Figure 10, the monitoring wells proposed for inclusion in this baseline monitoring program will provide adequate coverage of the identified potential preferential pathways.

4.2.6 Hydraulic Monitoring

In accordance with Attachment H to the SOW, during the baseline monitoring period, GE will perform comprehensive quarterly measurements of groundwater elevations at the wells proposed for groundwater quality monitoring in GMA 1 (listed in Table 4). In addition, GE will perform surface water elevation monitoring at a number of locations within the Housatonic River between the Newell Street and Lyman Street bridges, as well as at Silver Lake. This surface water elevation monitoring will be performed at staff gauges located at:

- East Street Area 2 - South, near the 64X recovery system;
- Lyman Street Area, south of the parking lot; and
- Silver Lake, west of the 30s Complex.

These groundwater and surface water elevation measurements will be made in accordance with the procedures in the FSP/QAPP, as approved by EPA.

Furthermore, groundwater elevation data from other ongoing monitoring programs -- i.e., the monitoring programs designed to address NAPL (discussed in Section 4.3 below) -- will be reviewed as appropriate to complement the groundwater elevation data from the baseline quarterly monitoring events. In particular, groundwater elevation data from piezometers located near the Housatonic River, active pumping wells, and shallow/deep well pairs will be examined.

Monitoring well pairs and clusters will be utilized to establish vertical hydraulic gradients. Although not all wells will be sampled and analyzed at every well cluster as part of the baseline monitoring program, many will be monitored for groundwater elevations to provide additional information on vertical gradients. These clusters include RF-3/PROP-17, ES2-2/ES2-2A, LSSC-16S/LSSC-16I, LSSC-34S/LSSC-34I, MW-1S/MW-1D, N2SC-9S/N2SC-9I, and ES2-1/ES2-6, among others. At locations where the applicable GW-2 or GW-3 standards are exceeded, vertical gradient data will be assessed as part of the process of determining whether to install and/or sample wells screened at other depths in a cluster.

An extensive amount of hydraulic conductivity data has already been collected at GMA 1, as shown on Figure 12. To provide more comprehensive coverage across GMA 1, GE proposes to conduct 13 additional hydraulic conductivity tests at the monitoring wells shown on Figure 12. Following initiation of the baseline monitoring program, additional hydraulic conductivity testing may be warranted at selected wells and/or well clusters if exceedances of the applicable GW-2 or GW-3 standards are detected and such hydraulic conductivity data have not already been collected. GE will propose additional hydraulic conductivity testing in future baseline monitoring program interim reports, if needed.

4.2.7 Proposed Assessment of Passive Diffusion Sampling Technique

Passive-diffusion sampling of groundwater using a semi-permeable membrane is a patented technology [U.S. Patent Number 5,804,743 held by Don A. Vroblesky (U.S. Geological Survey) and William T. Hyde (General Electric Company)]. The method is based on the principle that VOCs in groundwater will migrate via molecular diffusion through a semi-permeable membrane such as polyethylene until the concentrations on either side of the membrane reach equilibrium. Analyte-free water sealed within a semi-permeable passive-diffusion bag serves as the sample medium, which is placed in the open interval of a monitoring well and removed after an equilibration period. Passive-diffusion bags have been successfully benchmarked for many common VOCs, including aromatics and chlorinated ethenes and ethanes.

GE does not propose to conduct groundwater sampling using this method at this time. However, GE will examine the data obtained during the initial rounds of baseline monitoring to identify suitable candidate wells for an assessment of the passive-diffusion bag sampling method. If such a candidate well is identified (i.e., where only VOC sampling and analysis is required), GE may propose to conduct an assessment of the passive-diffusion bag sampling method at certain locations. Prior to conducting such an assessment, GE will submit a detailed protocol for the passive-diffusion bag sampling method for VOCs in groundwater to EPA for review and approval and, upon approval, will incorporate that protocol into the FSP/QAPP. In the assessment of this method (if conducted), to evaluate comparability between sampling methods, GE will collect an initial round of samples by standard sampling methods and by the passive-diffusion bag sampling method. If the analytical results are comparable, GE may propose to utilize the passive-diffusion bag sampling method for locations at GMA 1.

4.3 Baseline NAPL Monitoring

As previously described in Section 2.5 of this Baseline Monitoring Proposal, GE has conducted, and continues to conduct, various monitoring, assessment, and response action activities related to the presence of NAPL within GMA 1. As discussed below in this section, GE proposes to continue the majority of the current NAPL-related activities during the baseline monitoring program proposal for GMA 1. However, as also discussed below, certain modifications to the current programs are proposed. These modifications include the installation of 25 new or replacement monitoring wells to further assess the possible presence of NAPL, a reduction in the number of monitoring wells subject to routine monitoring, and a consolidation of the NAPL-related reports that are prepared for various RAAs within GMA 1 into a single semi-annual NAPL report for this GMA. Additional proposals for NAPL characterization and optimization of NAPL recovery will be presented, as appropriate, in those semi-annual NAPL reports, as discussed further in Section 4.6.3.

The proposals presented in this section have been developed in consideration of the applicable requirements of Attachment H to the SOW, an assessment of the existing NAPL monitoring/recovery systems and programs within GMA 1, and comments received from the Agencies (August 24, 2000 letter to GE) regarding the April 2000 GMA 1 Groundwater Monitoring Proposal. In addition, certain of the modifications proposed in this section take into account the reconstruction of Merrill Road, which has resulted in the destruction or abandonment of a number of the existing monitoring wells in the 20s Complex, East Street Area 1 - North, and East Street Area 2 - North. Where appropriate for the purpose of this NAPL monitoring program, GE proposes to replace such wells with replacement

wells, as described below. The proposals described herein supersede any prior proposals regarding replacement of the wells affected by the Merrill Road reconstruction, as discussed in Section 4.1.

In addition, GE has evaluated the presence of NAPL in relatively shallow groundwater (located at an annual average depth of 15 feet or less below the ground surface) in the vicinity (within 30 feet) of occupied buildings to determine the need for additional NAPL sampling for GW-2 constituents in those areas. Based on this evaluation, including consideration of current NAPL extent and depth, it is concluded that there is no need for additional NAPL sampling to evaluate GW-2 constituents in such areas at this time, since adequate analytical data exist from each such NAPL area. In the future semi-annual NAPL reports, GE will continue to assess this issue as necessary, and will evaluate the available NAPL data in consideration of the applicable Performance Standards contained in Attachment H to the SOW.

4.3.1 LNAPL at East Street Area 1 - North and South

With a few exceptions (described below), the current NAPL monitoring and recovery programs being conducted within East Street Area 1 - North and South will continue during the baseline monitoring period for GMA 1. In general, the extent of LNAPL in this area has been defined as a result of the ongoing monitoring programs, and the two operating LNAPL recovery systems (northside and southside collection systems) are positioned in this area to recover the majority of the LNAPL associated with this area (see Figure 2). Therefore, GE proposes that these recovery operations be continued as part of the GMA 1 Baseline Monitoring Program.

However, two activities have been identified to further assess the presence of LNAPL and to evaluate certain ongoing LNAPL recovery operations. First, to evaluate the possible presence of LNAPL in the area south of the southside collection system, GE proposes to install a new LNAPL monitoring well (PROP-22) at the approximate location shown on Figure 10. Upon installation, the new well will be monitored for the presence of LNAPL and will be included in future semi-annual monitoring events associated with East Street Area 1 - North and South. Second, as described in Section 2.5.1 of this Proposal, GE conducted a limited groundwater pump test for two wells within East Street Area 1 (wells 34 and 72) to evaluate the feasibility of providing additional hydraulic control in this area and thus facilitating LNAPL collection activities. GE submitted a report on the results of the groundwater pump tests on May 3, 2000. In EPA's comment letter dated August 24, 2000, EPA recommended that additional wells in this area be evaluated in order to determine whether the poor groundwater recovery results obtained from wells 34 and 72 were representative of groundwater conditions in the area or attributable to the

formation-packed construction of the wells. However, no existing wells have been identified in this area for supplemental evaluation. All wells in the vicinity have either been constructed in similar fashion to wells 34 and 72, or are small diameter wells which may not produce representative results during pump testing. Therefore, GE proposes that well 72 be overdrilled and a 4-inch diameter replacement well (72R) be installed at this location. Following its installation, this new well will be subject to a groundwater pump test similar to that which was performed previously for wells 34 and 72. The results of this test, and any recommendations regarding further activities, will be presented in the next semi-annual NAPL report to be prepared for GMA 1.

In addition to maintaining the current recovery operations in this area and performing the additional assessment activities described above, GE proposes that the number of monitoring wells currently included in the semi-annual monitoring program be reduced from 67 to 37 wells, with slight modifications being made to the list of wells subject to future monitoring. The wells proposed to be added or removed from current semi-annual monitoring are listed in Table 5, along with the supporting rationale. Most of the wells proposed to be removed from the program were utilized primarily to generate groundwater elevation contour maps. However, the quarterly monitoring included in this proposed baseline monitoring program (which includes monitoring at nine wells in this area, three of which are not currently involved in the semi-annual program) will adequately support the preparation of groundwater elevation contour maps for the entirety of GMA 1 (including the former East Street Area 1). Additionally, wells in this area have been monitored regularly since the early 1980s and an extensive groundwater database exists for this area. Wells which are proposed to be retained in this program are generally located in the vicinity of the known extent of LNAPL, which is confined to small pockets located along the north and south sides of East Street.

Other modifications to the list of wells subject to future monitoring are based on elimination of duplicative monitoring (i.e., two or more proximate wells being monitored when less would suffice) and/or loss of wells due to the reconstruction of Merrill Road. These modifications are also summarized in Table 5. In particular, well 31R (Figure 10) is proposed as a replacement well for wells 31 and 32, which have been or will be abandoned as part of the reconstruction of Merrill Road. GE will coordinate well installation activities in this area with the Massachusetts Highway Department to avoid interferences from and to the road construction activities in the vicinity of this area, while at the same time attempting to avoid unnecessary delays in commencement of the baseline monitoring program activities in this area (see Section 5.2 below). Specifically, GE anticipates, subject to discussions with the Massachusetts Highway Department, that replacement well 31R will be installed within 60 days after either EPA's approval of this Proposal or entry of the CD by the Court, whichever is later.

In addition to the activities described above GE proposes to continue the ongoing monthly LNAPL monitoring and removal (if present) at six wells (34, 52, 72/72R, 105, 106, 131). Results of this monitoring will continue to be presented in monthly reports and semi-annual NAPL reports. Modifications to the monitoring conducted in the vicinity of wells 34 and 72 may be proposed following the evaluation of the results of the proposed hydrogeologic assessment at this location.

4.3.2 NAPL at East Street Area 2 - South and North, and 20s, 30s, and 40s Complexes

As described previously in Section 2.5.2, this combined area (formerly known as East Street Area 2) has been subject to regular monitoring for many years, and that monitoring is ongoing. The extent of NAPL in this area has been generally well defined as a result of these monitoring programs. The various recovery systems operating in this area are effectively containing and recovering the NAPL in this area. Therefore, GE proposes that these activities be continued without significant modification. However, GE proposes to conduct NAPL removal/recovery testing at a small LNAPL area located to the south of Buildings 64 and 66, specifically at wells 13, 14, and 15R. Following an integrity assessment of these wells (and redevelopment if necessary), NAPL accumulations within the wells will be manually removed on a regular basis (initially hourly, with adjustments to be made as the test progresses), with subsequent monitoring of LNAPL recovery. The data obtained during this test will be used to assess the need for additional monitoring wells in this area, to evaluate the feasibility of installing an automated pumping system in this area, and to determine the specifications for recovery equipment and approximate pumping rates (if appropriate). After completion of the field testing, GE will present the results and provide recommendations for any future activities in the next semi-annual NAPL report for GMA 1.

In addition to maintaining the above-described recovery operations in this area, GE proposes that the total number of monitoring wells included in the semi-annual monitoring program be reduced, with slight modifications being made to the list of wells subject to future monitoring. The wells proposed to be added or removed from the current semi-annual oil monitoring are listed in Table 5, along with the supporting rationale. Most of the wells proposed to be removed from the program were utilized primarily in the generation of groundwater elevation contour maps. However, the quarterly monitoring included in this proposed baseline monitoring program will produce groundwater elevation contour maps for the entirety of GMA 1 (including the areas discussed in this section). Additionally, an extensive database exists since regular groundwater monitoring has been performed for this area since the early 1980s. This will adequately replace the site-specific water table maps previously prepared under

the semi-annual program. Wells proposed to be retained in this program are generally located near the edges of the known NAPL areas or at areas where NAPL thicknesses have historically been the greatest.

Additionally, as at East Street Area 1, multiple wells are currently being monitored at areas where a single well would provide adequate coverage for the purposes of the semi-annual monitoring program. In these cases, well screen placement data and recent well inventories were examined to select the most suitable well to retain in the program. In other cases, multiple adjacent wells screened at variable depths will be monitored on a quarterly basis to provide vertical gradient data in conjunction with the quarterly groundwater elevation monitoring in the baseline program. These wells are also identified in Table 5.

GE also proposes several changes to the ongoing weekly and monthly monitoring programs at this combined area. As indicated in Table 5, a number of wells are proposed to be removed from monitoring programs due to a historical lack of observed NAPL presence or a screen placement that is inconsistent with the intended monitoring goal. The monitoring frequency is proposed to be modified at certain locations which are within known NAPL areas, but near existing NAPL recovery locations or otherwise actively contained (e.g., within sheetpile containment barrier areas, hydraulically controlled by recharge pond activities, etc.), and also at locations where NAPL has rarely been detected. Monitoring is not proposed to be discontinued at most of these locations, but merely reduced (generally shifting from weekly to monthly monitoring, or from monthly to quarterly monitoring) based on the existing monitoring data and recent source control measures.

Several monitoring wells were removed from this area during the reconstruction of Merrill Road. Many of the wells were located near the edges of the known NAPL, but some of them were well outside the historic NAPL limits or located in areas which can be monitored by other wells. GE proposes the replacement of these wells only at locations which will provide significant information regarding the presence and extent of NAPL which cannot be obtained from other existing monitoring wells. These wells are identified in Table 5.

4.3.3 Lyman Street Area

Currently, the effectiveness of the NAPL recovery measures at the Lyman Street Area is evaluated on an annual basis. Based on the results of the most recent evaluation completed for the period between August 1998 and July 1999, as well as additional NAPL removal assessments conducted in this area as part of the source control activities

being performed for the Upper ½-Mile Reach of the Housatonic River, no additions or modifications are recommended to the active NAPL recovery operations in this area.

Several changes are proposed to the ongoing weekly and monthly monitoring programs at the Lyman Street Area. However, only four wells are proposed to be removed from monitoring programs, while reduced monitoring frequencies are proposed at several other locations (as indicated in Table 5). These modifications are proposed at various locations which generally fall into the following categories:

- C Wells which are within known NAPL areas but near existing active NAPL recovery wells, and within the area which will be actively contained by the installation of a future sheetpile containment barrier;
- C Wells where limited NAPL quantities are typically observed or recovered during the current periodic monitoring events; and/or
- C Wells located outside of the known extent of NAPL, where other wells exist between the subject well and the edge of NAPL.

In addition, monitoring at several well points located along the riverbank in this area (P-1 through P-7) will continue until the installation of the future sheetpile containment barrier. This installation, and possibly other response actions to be conducted along the riverbank in this area, will likely require the removal of some or all of these well points. Following the completion of these activities, GE will re-evaluate the riverbank monitoring program and propose new or replacement monitoring locations in this area, as appropriate.

4.3.4 Newell Street Area II

As discussed in this section, GE proposes to continue the current NAPL assessment, monitoring, and removal activities at Newell Street Area II with certain modifications and additional NAPL assessment activities.

Over the last several months, GE has continued to perform NAPL-related activities within Newell Street Area II, including additional assessment activities and the expansion, as appropriate, of the wells that are included in the automated NAPL recovery programs. These activities, which have been performed in accordance with separate proposals submitted by GE and approved by EPA, have primarily focused on the paved, GE-owned parking lot

within Newell Street Area II and the adjacent area located to the west of the parking lot. Section 2.3.4 of this Proposal summarizes the recent NAPL-related activities that have been conducted in this area.

Automated NAPL recovery at Newell Street Area II has only been in operation for a relatively short time. In addition, GE has recently added three additional wells into the active recovery wells program (N2SC-2, N2SC-31, and N2SC-14) and has installed two deep monitoring wells (N2SC-16 and N2SC-17) to further assess the possible presence of DNAPL. Therefore, as part of the present Proposal, no further additions or modifications are recommended to the active NAPL recovery operations in this area at this time. Future activities related to NAPL assessment and recovery, as well as any proposals related to these efforts, will be presented within the semi-annual NAPL reports that are discussed in Section 4.6.3 of this Proposal.

With respect to the ongoing monitoring activities within Newell Street Area II, minor changes are proposed to the ongoing weekly monitoring programs at this area, as indicated in Table 5. Two wells (NS-18 and NS-19) are proposed to be removed from the quarterly monitoring program. Reduced monitoring frequencies are also proposed at wells N2SC-8, NS-33, NS-34, NS-35, NS-36, and NS-37, based on recent monitoring results which indicate that weekly monitoring is not necessary at these locations. These wells are located outside the known extent of NAPL, which is adequately monitored by other wells.

Finally, to supplement the NAPL assessment activities that have been performed to date within Newell Street Area II, and as a precursor to future pre-design soil investigations that will be conducted once the CD is entered, GE will investigate the potential presence of NAPL in the Former Oxbow F area located west of the GE parking lot area and east of Sackett Street (Figure 10). This area has been subject to several soil investigation activities in the past, from which elevated levels of PCBs have been identified in soils. As discussed in Section 4.2.3 of this Proposal, GE will install two new monitoring wells (PROP-19 and PROP-20) between the Former Oxbow F area and the Housatonic River, as shown on Figure 10. These wells will be installed as GW-3 perimeter monitoring wells. In addition, to assess the potential presence of NAPL further upgradient of these two new wells and within the Former Oxbow F area, GE proposes to install a soil boring and monitoring well (PROP-21) at the location shown on Figure 10. The location selected for this proposed monitoring well is based on the results of certain soil investigations conducted in September/October 1995 (i.e., samples SS-9 through SS-13), as well as the approximate location of the former oxbow and related drainage swale. (Specifically, the prior soil sampling conducted in this area ranged from depths of one to four feet below the ground surface and PCBs were detected at concentrations as high as 34,000 ppm.) In this area, GE proposes to advance a soil boring until a confining till layer is encountered. Samples

will be collected continuously for visual classification of soil type and potential evidence of NAPL, and will be screened for organic vapors. Once the soil boring is completed, GE will install a 4-inch diameter monitoring well for subsequent development and gauging for the presence of NAPL. Other installation details will be consistent with the recent well installations within Newell Street Area II, as well as the procedures in the FSP/QAPP. The results of these activities, as well as any follow-up proposals, will be presented in the next semi-annual NAPL report to be submitted for GMA 1.

4.4 Data Quality Assessment

As discussed in Section 2.7 above, the existing groundwater data from GMA 1 have not been fully reviewed for data quality because those data are not being considered at the present time for the purpose of achieving the groundwater quality Performance Standards or for proposals to limit the constituents to be analyzed for in the baseline groundwater monitoring program. In the future, GE may conduct a more thorough assessment of the quality of historical groundwater data at selected locations in support of modifications which may be proposed to the baseline or long-term monitoring programs. GE will present the results of any such data quality assessments in conjunction with the applicable proposals for modification.

All future groundwater analytical data collected during the baseline monitoring program will undergo data validation in accordance with the applicable procedures set forth in the FSP/QAPP, as that document is approved by EPA. The results will be presented in the pertinent reports submitted on the baseline monitoring program, as described in the next section.

4.5 Notification and Interim Response Actions

Section 6.2 of Attachment H to the SOW establishes requirements relating to GE's notification to EPA and MDEP (the Agencies) of certain findings during the course of the baseline monitoring program. In some circumstances, these notifications are to include proposals for interim response actions to address certain groundwater or NAPL-related issues. This section describes the requirements of Attachment H to the SOW for such notifications and proposals (if required) for interim response actions. It should be noted that, although some notification requirements are consistent with the MCP's reporting requirements for releases to surface water or groundwater, the notification and reporting requirements described below are limited to those set forth in Attachment H to the

SOW; they do not supersede or negate the MCP's reporting requirements or any other applicable reporting requirements under federal or state law.

4.5.1 Groundwater Quality-Related Notifications

Upon obtaining knowledge of sampling data from a well containing category GW-2 groundwater within 30 feet of a school or occupied residential structure and having a total VOC concentration equal to or greater than 5 ppm, GE will notify EPA and MDEP within 72 hours unless such exceedance was previously observed and reported to EPA. GE will provide the data from each such event in the next monthly progress report for overall work at the Site. Subsequent exceedances for a given well will also be indicated in the next monthly progress report for the Site.

If an exceedance of a groundwater Upper Concentration Limit (UCL), as set forth in the MCP (310 CMR 40.0996(5)), is indicated in a groundwater sample from any monitoring well, and such an exceedance was not previously observed and reported to EPA, GE will notify EPA and MDEP within 14 days of obtaining knowledge of such results. (For convenience, the UCLs are listed, along with the Method 1 GW-2 and GW-3 standards, in Appendix F.) GE will also provide the data and identify specifically each such exceedance in the next monthly progress report for overall work at the Site. Subsequent exceedances of a UCL for a given well will be identified in the next monthly report. The monthly progress report for overall work at the Site will also identify any wells which were sampled and provide the sampling results for all constituents which exceeded the applicable GW-2 or GW-3 standards.

4.5.2 NAPL-Related Notifications

During the baseline monitoring program, if NAPL is observed to be discharging to surface water and creating a sheen on the water in a location in which such NAPL discharge was not previously observed or measures are not in place to effectively contain the discharge, GE will notify EPA and MDEP within two hours of obtaining knowledge of such observation. This will be followed by written notice to EPA within seven days. The written notification will include a proposal to EPA for interim response actions to contain such discharge. Upon EPA approval, GE will conduct the approved interim response actions to contain the NAPL discharge.

If NAPL is observed to be discharging to surface water or creating a sheen on the water in a location in which such NAPL discharge was previously observed and reported to EPA and measures are in place to effectively contain the sheen, GE will notify EPA of the continued presence of such NAPL in the next monthly progress report for overall work at the Site.

If a NAPL thickness of greater than or equal to 1/2-inch is observed in any monitoring well, GE will notify EPA and MDEP within 72 hours of obtaining knowledge of such a condition, unless such conditions are consistent with the types, nature, and quantities of NAPL which were previously observed and reported to the Agencies. This notification will be followed by written notice to the EPA within 60 days. The written notification will include a proposal to EPA for interim response actions to be conducted, which may include NAPL sampling, additional assessment/monitoring, or NAPL removal activities. Upon EPA approval, GE will conduct the approved interim response actions. If a NAPL thickness of greater than or equal to 1/8-inch, but less than 1/2-inch is observed in a monitoring well, GE will notify EPA and MDEP in the next monthly progress report, unless the results are consistent with the types, nature, and quantities of NAPL which have previously been observed and reported to the Agencies.

4.6 Reporting Requirements

Separate from the notification requirements discussed above, Section 6.3 of Attachment H to the SOW establishes requirements relating to GE's reporting of baseline activities to the Agencies. That section requires GE to submit interim reports on the baseline monitoring program after each round of groundwater quality monitoring, as well as a final report on the overall baseline monitoring program at the conclusion of the program. These reports are described in Sections 4.6.1 and 4.6.2 below.

In addition, in its August 24, 2000 letter providing comments on the prior version of this GMA 1 Baseline Monitoring Proposal, EPA recommended that GE consolidate the various NAPL reports that are currently prepared for the RAAs within GMA 1 into a single NAPL report for this GMA, to be submitted on a semi-annual basis. GE has modified this Proposal to incorporate that approach and, in light of this change, has also slightly modified the specified contents of the above-mentioned baseline monitoring program summary reports (insofar as they relate to NAPL-related reporting) to reflect the fact that separate NAPL reports will be submitted. The proposed semi-annual NAPL reports are discussed further in Section 4.6.3.

4.6.1 Baseline Groundwater Quality Interim Reports

Following the receipt of data from each semi-annual round of groundwater quality monitoring at GMA 1, in accordance with the schedule described in Section 5.4.2, GE will prepare and submit a summary report describing the field activities and presenting the monitoring results from that round and the subsequent water level monitoring round. GE will also provide an electronic submittal of the analytical and locational (e.g., X-Y-Z coordinates) data for the round being reported in a format compatible for entry into an ArcInfo GIS System.

Each such summary report will compare the results from that event to the prior data from the GMA and also to the Method 1 (or 2) GW-2 or GW-3 standards at applicable well locations. If the sampling results for GW-2 compliance wells indicate: (1) an exceedance of the Method 1 (or 2) GW-2 standards in a well in which such exceedance had not previously been found; or (2) the GW-2 standard has previously been exceeded and groundwater concentration is greater than or equal to 5 ppm total VOCs (if such an exceedance was not previously addressed), GE will propose appropriate interim response actions. These response actions may include: resampling of the groundwater; increasing the sampling frequency to quarterly intervals; additional well installation and sampling (taking into account the proximity of any known or any newly defined potential soil-related contaminant sources and/or potential preferential pathways); soil gas sampling; modeling of potential volatilization of chemicals from the groundwater to the indoor air of the nearby occupied buildings; sampling of the indoor air of such buildings; an evaluation of the potential risks related to volatilization to such indoor air; the development of a risk-based alternative GW-2 standard; and/or active response actions, including, but not limited to, containment, recovery, or treatment of impacted groundwater and/or NAPL.

For sampling results that indicate an exceedance of Method 1 (or 2) GW-3 standards at downgradient perimeter monitoring wells in a well in which: (1) such exceedance had not previously been found; or (2) the GW-3 standard (Method 1 or 2) has previously been exceeded and the groundwater concentration is greater than or equal to 100 times the GW-3 standard (if such exceedance was not previously addressed), GE will propose interim response actions, which may include: (a) further assessment activities such as resampling, increasing the sampling frequency to quarterly intervals, additional well installation and sampling (taking into account the proximity of any known or any newly defined potential soil-related contaminant sources and/or potential preferential pathways), and/or continuation of the baseline monitoring program; (b) active response actions, including, but not limited to, containment, recovery, or treatment of impacted groundwater; and/or (c) the conduct of a site-specific risk evaluation (taking into account the impacts on adjacent surface water, sediments, or biota) and the proposal of

alternative risk-based GW-3 Performance Standards. Upon EPA approval, GE will implement the approved interim response actions.

In any interim summary report, GE may propose, consistent with the requirements of Attachment H to the SOW, modifications to the monitoring frequency and specific wells to be monitored and/or the constituents to be analyzed for during the remaining sampling rounds in the baseline program. In addition, GE will evaluate the results of future pre-design soil investigations performed within the RAAs that comprise GMA 1 to identify potential soil-related impacts to groundwater. If any new potential soil sources are identified, GE will evaluate the scope of the ongoing baseline monitoring program relative to the area of interest and propose, if appropriate, modifications to the baseline program (e.g., installation of new monitoring wells, sampling of existing wells, etc.). Upon EPA approval, GE will implement such modifications for the remaining rounds.

If the two-year “baseline” period ends prior to the completion of soil-related response actions at all the RAAs in GMA 1, GE may submit a proposal to EPA for approval to modify and/or extend the baseline monitoring program based on the results of the initial assessment and the estimated timing of future response actions at the RAAs in the GMA.

4.6.2 Baseline Assessment Final Report and Long-Term Monitoring Program Proposal

At the conclusion of the GMA 1 baseline field investigation program, in accordance with the schedule described in Section 5.4.3, GE will submit a Baseline Assessment Final Report for this GMA to EPA for review and approval. This report will also include a proposal to EPA for a long-term monitoring program for GMA 1.

The final report on the GMA 1 baseline monitoring program will include:

- C An update of the current understanding of hydrogeologic conditions and the extent of groundwater contamination, including a statistical assessment of the “baseline” data and other historical data, if appropriate, and a comparison to the Performance Standards;
- C An evaluation of the spatial distribution of constituents within the GMA and the actual migration or potential for migration of such constituents outside the GMA, including an evaluation of groundwater travel time to any receptor (e.g. surface water body/building);
- C Identification of the presence or potential presence of previously unidentified sources of groundwater contamination;

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- C An assessment of the adequacy of the selected monitoring locations;
 - C A re-assessment of the constituents, locations, and frequencies to be subject to future monitoring;
 - C Identification of areas where the GW-2 Performance Standards apply in addition to the GW-3 Performance Standards;
 - C Identification of the specific wells to be used to measure compliance with the NAPL, GW-2 and GW-3 Performance Standards;
 - C An evaluation of variations in groundwater quality from event to event to identify and assess sampling data variability and potential causes for the variability, including seasonal influences;
 - C A summary of NAPL-related monitoring results and recovery activities, with appropriate cross references to the NAPL-related reporting described in Section 4.6.3; and
 - C A statement of the basis for GE's proposal to EPA for approval of a long-term monitoring program and/or additional response actions.

The Long-Term Monitoring Program Proposal for GMA 1 will include:

- C The specific soil RAAs to be subject to the monitoring (if different from these currently included in GMA 1), along with the supporting rationale;
- C The monitoring locations, along with the supporting rationale;
- C A schedule for plan implementation, including reporting;
- C The frequency of future monitoring events;
- C The constituents to be subject to analysis;
- C Descriptions of statistical techniques to be employed to evaluate data trends;
- C Proposal for any additional investigations or assessments, interim response actions, or NAPL recovery modifications/additions;
- C Any proposal for risk-based alternative GW-2 or GW-3 Performance Standards; and
- C An outline of the Monitoring Event Evaluation Reports to be submitted under the long-term monitoring program.

4.6.3 NAPL-Related Reporting

As previously described in Section 2.5 of this Proposal, GE currently prepares several NAPL summary reports. The current scope, frequency, and timing of these reports vary depending on the specific NAPL circumstances and affected RAA. In addition to the routine monthly reporting that is provided to the Agencies, GE currently

prepares and submits four periodic NAPL monitoring and recovery summary reports involving portions of GMA 1, including:

- ☐ East Street Area 1 (semi-annual report);
- ☐ East Street Area 2 (semi-annual report);
- ☐ Lyman Street Area (annual report); and
- ☐ Newell Street Area II (semi-annual report).

Once the CD has been entered and the GMA 1 Baseline Monitoring Proposal has been approved by EPA, GE will consolidate the various annual and semi-annual NAPL reports into a single document that is submitted on a semi-annual basis. At a minimum, each report will describe the NAPL-related field activities that have been performed since the last report, and provide a summary of monitoring and recovery operations. Within GMA 1, the following known LNAPL/DNAPL areas will be addressed within these semi-annual reports:

- ☐ East Street Area 1 LNAPL;

- ☐ East Street Area 2 LNAPL;
 - Building 12 and 3C Area
 - Building 64/66 Area

- ☐ East Street Area 2 DNAPL;
 - Deep Coal-Tar DNAPL at Glacial Till
 - Intermediate Coal-Tar DNAPL in former Cell C of the removal action in the upper 1/2-mile reach of the Housatonic River
 - DNAPL in Outfall 005 Area
 - DNAPL in Building 68 Area

- ☐ Lyman Street Area LNAPL;

- ☐ Lyman Street Area DNAPL;

- ☐ Newell Street Area LNAPL; and

C Newell Street Area DNAPL.

Each semi-annual report will include the same general type of information that has been previously presented in the various RAA-specific reports, such as written, tabular, and illustrative summaries of field activities, monitoring results, and NAPL recovery volumes, as well as proposals for any program modifications. In addition, the semi-annual reports will also serve as the forum for proposing future characterization activities for known/suspected NAPL areas, assessments of ongoing recovery systems and/or programs, and proposals to optimize NAPL recovery operations, as appropriate.

Historically, GE has performed semi-annual NAPL monitoring in approximately April and October of each year, corresponding to typical seasonal high and low groundwater elevations, respectively. Following these events, for the duration of the baseline monitoring program for GMA 1, GE proposes to submit semi-annual NAPL summary reports by the end of the following August and February, respectively, as described in Section 5.4.1 below. Both of the semi-annual reports will present monitoring and NAPL recovery data and, as appropriate, proposals for changes to the monitoring program and/or additional characterization activities. In addition, to the extent practicable, one of the reports (probably the February semi-annual report) will also provide assessments of overall NAPL recovery operations and include proposals to optimize NAPL recovery, if appropriate, based on the results of such assessments.

5. Schedule

5.1 General

Schedule requirements related to the baseline monitoring programs were generally identified in Attachment H to the SOW. This section provides a schedule specifically for conducting the GMA 1 baseline monitoring program.

5.2 Field Activities Schedule

The baseline monitoring program for GMA 1 will begin following EPA's approval of this Baseline Monitoring Proposal or entry of the CD by the Court, whichever is later. During the baseline monitoring period, GE proposes to continue to conduct all ongoing NAPL-related monitoring programs within this GMA according to their previously approved schedules (as described in Section 2.5), with the modifications proposed herein. Any approved modifications to these monitoring programs will be initiated during the next scheduled monitoring event(s) following the later of EPA's approval of this Baseline Monitoring Proposal or the entry of the CD.

GE proposes to complete the inventory of wells proposed for sampling and installation of the additional new monitoring wells described in this Baseline Monitoring Proposal within the later of (a) 60 days after EPA's approval of this Proposal or (b) 60 days after entry of the CD by the U.S. District Court, subject to obtaining the necessary Access Agreements with the property owners in a timely manner. If GE is unable to obtain Access Agreements from particular property owners after using "best efforts" (as defined in the CD) to do so, it will so advise EPA and MDEP and seek their assistance in obtaining such agreements pursuant to Paragraph 60.f(i) of the CD. If delays in obtaining Access Agreements will cause a delay in the schedule proposed above, GE will notify the Agencies and propose for EPA approval a revised schedule for completing the additional monitoring well installations and initiating the baseline monitoring program. Further, for replacement wells located within the Merrill Road reconstruction area, GE will coordinate well installation activities with the Massachusetts Highway Department. Optimally, such wells should not be installed until all road construction activities in the area have been completed. If that would cause an undue delay in the commencement of the baseline monitoring program activities, GE will evaluate and discuss with the Massachusetts Highway Department whether some or all of these wells can be installed in the meantime without interferences from or to the road construction activities. GE will keep EPA advised of its evaluation and discussions of these timing issues. Finally, following installation and development of the proposed new baseline monitoring program wells, GE will conduct hydraulic conductivity testing at the selected new and existing wells illustrated on Figure 12.

GE proposes to conduct quarterly groundwater level monitoring at the baseline program wells described herein during periods representing winter, spring, summer, and fall conditions for a two-year period beginning with the first of these time periods following the installation of all approved additional baseline monitoring wells, as discussed above. GE will attempt to obtain the quarterly groundwater elevation data during the months of January, April, July, and October, but may, on occasion, collect these measurements at the end of the prior month or the beginning of the next month from the target date if scheduling issues or other unforeseen factors necessitate alterations to the schedule.

GE proposes to conduct semi-annual groundwater quality monitoring at the baseline program wells described herein during periods representing Spring and Fall conditions for a two-year period, coinciding with the Spring and Fall groundwater elevation monitoring and NAPL monitoring events discussed in the previous paragraph. The time periods for semi-annual water quality sampling were chosen to adequately assess seasonal variation which may occur during the baseline sampling period. This schedule was selected to obtain data during presumed annual high and low water table conditions. GE will attempt to collect groundwater analytical samples during the months of April and October, but may, on occasion, conduct these sampling events at the end of the prior month or the beginning of the next month from the target date if scheduling issues or other unforeseen factors necessitate alterations to the schedule. GE will make best efforts to avoid scheduling groundwater monitoring at times and locations at which the baseline data could be impacted by ongoing soil/sediment response actions within GMA 1.

In addition, GE may propose a modified sampling schedule for selected wells following evaluation of the analytical data as the baseline monitoring program progresses.

5.3 Monthly CD Reporting

In the monthly progress reports for overall work at the Site, GE will continue to provide the results from ongoing NAPL and groundwater monitoring and recovery programs for GMA 1. In addition, observations and results of the GMA 1 baseline monitoring program will be incorporated into the monthly progress reports as follows:

Following a quarterly groundwater elevation monitoring event, the following information will be added to the next monthly progress report for the Site:

- C A listing of the wells which were monitored, and the depths from the well measuring point to groundwater and groundwater/NAPL interfaces (if present);

C A listing of the wells where a NAPL thickness of greater than or equal to 1/8-inch, but less than 1/2-inch was observed, unless the results are consistent with the types, nature, and quantities of NAPL which have previously been observed and reported to the Agencies; and

C A listing of locations where NAPL was observed to be discharging to any surface water and creating a sheen on the water in a location in which such NAPL discharge was previously observed and reported to EPA and measures are in place to effectively contain the sheen.

Following a semi-annual groundwater sampling event, the following information will be added to the next monthly progress report for the Site:

C Each of the items listed above for the associated quarterly groundwater elevation monitoring event; and

C A listing of the wells which were sampled during the event and the analyses to be conducted.

Following receipt of preliminary analytical results from a semi-annual groundwater sampling event, the following information will be added to the next monthly progress report for the Site:

- The analytical results from that monitoring event;
- An identification of any wells containing GW-2 groundwater in which the analytical results indicate an exceedance of an applicable GW-2 standard;
- An identification of any wells where the analytical data indicate an exceedance of a groundwater UCL; and
- An identification of any wells monitored for GW-3 groundwater in which the analytical data indicate an exceedance of an applicable GW-3 standard. These include not only the perimeter wells, but also, as an early warning mechanism, any of the general/source area sentinel wells.

5.4 Reporting Schedule

In addition to the monthly status reports and any time-critical notifications, GE will prepare several reports during the course of the baseline monitoring program for GMA 1. In general, three types of reports will be prepared: NAPL monitoring reports, Baseline Groundwater Quality Interim Reports, and the Baseline Assessment Final Report and Long-Term Monitoring Program Proposal. The anticipated content of these various reports has been previously discussed in Section 4.6, The proposed schedule for submittal of these reports is presented below.

Certain of the scheduling presented below has been developed in consideration of the overall work efforts associated with the GMA 1 baseline program, as well as future fieldwork and reporting related to other investigations and monitoring to be performed elsewhere within the GE-Pittsfield/Housatonic River Site in accordance with the CD. As such, in an effort to balance the timing and resources associated with baseline report preparation (and other future submittals), GE has proposed a schedule that distributes the report submittals over a several-month period.

5.4.1 NAPL Monitoring Reports

As previously discussed, NAPL monitoring reports for GMA 1 will be prepared and submitted on a semi-annual basis and will contain the information described in Section 4.6.3 of this Proposal. From a scheduling perspective, GE proposes to submit the semi-annual reports by August 31 and February 28 of each year after initiation of the baseline monitoring period. The proposed submittal dates are generally consistent with GE's reporting of NAPL-related activities associated with the East Street Area 1 and 2 RAAs and Newell Street Area II and have been selected based on the following considerations:

- C In past NAPL reports related to the East Street Area 1 and 2 RAAs and Newell Street Area II, active NAPL recovery operations were generally summarized for two time periods: January to June and July to December (although recent reports for East Street Area 1 have been offset by one month). Semi-annual NAPL reports submitted on August 31 and February 28 will provide approximately 60 days to incorporate the NAPL recovery data for these time periods into the appropriate report.
- C In addition to routine weekly and monthly monitoring, a significant percentage of the NAPL-related field activities will be performed in the Spring (e.g., April) and Fall (e.g., October) timeframes. Any sampling data

that may be collected as part of these field activities will require laboratory analysis and subsequent data validation. It is anticipated that, following sample collection, a 60-day timeframe will be needed to receive and then validate the analytical data. Following these activities, an additional 60 days was assumed for final report preparation (to avoid overlap and interference with the preparation of the Baseline Groundwater Quality Interim Reports, as discussed in Section 5.4.2). Thus, the April and October field activities and results will be discussed in the reports submitted in the following August and February, respectively.

5.4.2 Baseline Groundwater Quality Interim Reports

As described in Section 4.2 of this Proposal, baseline groundwater sampling activities will be performed on a semi-annual basis, in approximately April and October of each year. GE proposes to submit the Baseline Groundwater Quality Interim Reports on these events by the following July 31 and January 31, respectively. This timeframe is based on an anticipated 60-day period for the field samples to be analyzed and reported and the analytical data to be validated, plus an additional 30 days for report preparation. GE anticipates that, if feasible, these reports will also include the water level measurement data (and associated groundwater elevation contour maps) from the two immediately preceding quarterly groundwater elevation monitoring events (i.e., the April and July water level data in the July 31 interim report and the October and January water level data in the January 31 interim report).

5.4.3 Baseline Assessment Final Report and Long-Term Monitoring Program Proposal

Following the two-year baseline monitoring program for GMA 1, GE will prepare a Baseline Assessment Final Report and Long-Term Monitoring Program Proposal, which will contain the information described in Section 4.6.2 above. GE proposes to submit this final report and long-term monitoring proposal to EPA within 90 days following submittal of the last Baseline NAPL Monitoring Report.