

2/24/09

Malden 3-0362

100 Commercial St

SCANNED

POST-RAO RELEASE ABATEMENT MEASURE PLAN
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS
RTN 3-0362

100 Commercial St. SL-V/A

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DEP
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by

Haley & Aldrich, Inc.
Boston, Massachusetts

On behalf of

Massachusetts Electric Company d/b/a National Grid
Westborough, Massachusetts

for

Massachusetts Department of Environmental Protection
Wilmington, Massachusetts

File No. 06558-753
August 2007

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Massachusetts Department of Environmental Protection
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Attention: Bureau of Waste Site Cleanup

Subject: RAM Plan for 51 Commercial Street and 100 Commercial Street
Former Malden MGP Site
Malden, Massachusetts
Release Tracking Number 3-0362

Ladies and Gentlemen:

On behalf of Massachusetts Electric Company d/b/a National Grid (National Grid), Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this Release Abatement Measure (RAM) Plan for response actions to be conducted at the 51 Commercial Street and 100 Commercial Street portions of the former Malden Manufactured Gas Plant (MGP) Site located near the intersection of Commercial and Charles Streets in Malden, Massachusetts (hereinafter referred to as the RAM Areas). The Massachusetts Department of Environmental Protection (MassDEP) assigned Release Tracking Number (RTN) 3-0362 to the Malden MGP Site.

The objectives of this RAM are to accomplish the following actions:

1. Install, start up, and conduct operation, maintenance, and monitoring (OMM) activities for a non-aqueous phase liquid (NAPL) recovery system at 51 Commercial Street.
2. Manage remediation waste generated during floor and foundation removal from the prior structure at 51 Commercial Street, construction of the new building foundation and Engineered Barrier under the foundation at 51 Commercial Street, and waste from construction and operation of the NAPL recovery systems.
3. Install an Engineered Barrier beneath the proposed building at 51 Commercial Street.
4. Restore, restart, and conduct OMM activities on an existing NAPL recovery system at 100 Commercial Street composed of existing NAPL recovery well RW-1; equipment shed; and related piping, equipment, and appurtenances installed during prior IRAs.

The purpose of the NAPL recovery system is to reduce the quantity of NAPL in the subsurface in the RAM Areas. NAPL recovery is consistent with the recommended remedial alternative in the Phase III Remedial Action Plan, which was submitted to the MassDEP in July 2003. While the Engineered Barrier installation was not selected as the preferred remedial action due to site features existing at that time, recent demolition and property

redevelopment plans have created an opportunity to install an Engineered Barrier below the proposed new structure. These three actions are considered "definitive and enterprising steps" toward a Permanent Solution, as outlined in the partial Class C¹ Response Action Outcome (p-RAO) submitted for the Site in February 2004.

The RAM Plan is being submitted in accordance with the requirements specified in the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). More specifically, this RAM Plan conforms to the MCP requirements found at 310 CMR 40.0440 (Release Abatement Measures), as well as 310 CMR 40.1067(6)(a) (describing requirements for conducting Remedial Actions after a Class C-1 RAO has been attained).

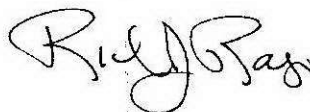
The original RAM Transmittal Form (BWSC 106) is enclosed with this RAM Plan; a copy is provided in Appendix A. In addition, public notice of proposed RAM activities will be provided to both the City of Malden Board of Health and Mayor's offices within the 20 days prior to implementing this RAM Plan as required under 310 CMR 40.1403(3)(d)(2). Copies of these notices are included in Appendix B.

If you have any questions or require additional information, please do not hesitate to contact the undersigned or Michele Leone at National Grid at (508) 389-4296.


Sincerely yours,
HALEY & ALDRICH, INC.



Thomas J. Holden, P.E.
Senior Engineer



Richard J. Rago
Senior Scientist



Richard P. Standish, LSP-of-Record
Senior Vice President

Enclosures

cc: National Grid; Michele V. Leone
KeySpan Energy Delivery; Richard Schmitz

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¹ Class C RAO status defaulted to Class C-1 RAO upon changes to MCP in April 2006.

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1. INTRODUCTION

1.1 General

On behalf of Massachusetts Electric Company d/b/a National Grid (National Grid), Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this Release Abatement Measure (RAM) Plan for response actions to be conducted at the 51 Commercial Street and 100 Commercial Street portions of the former Malden Manufactured Gas Plant (MGP) Site located near the intersection of Commercial and Charles Streets in Malden, Massachusetts (hereinafter referred to as the RAM Areas). Figure 1 is a locus map. The Massachusetts Department of Environmental Protection (MassDEP) assigned Release Tracking Number (RTN) 3-0362 to the Malden MGP Site.

This RAM Plan is being submitted in accordance with the requirements specified in the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). More specifically, this RAM Plan conforms to the MCP requirements found at 310 CMR 40.0440 (Release Abatement Measures), as well as 310 CMR 40.1067(6)(a) (describing requirements for conducting Remedial Actions after a Class C-1 RAO has been attained).

1.2 Persons Conducting the RAM

Responsive to MCP requirement found at 310 CMR 40.0444(1)(a).

The Site is a former MGP for which a Class C-1 partial Response Action Outcome (p-RAO) has been obtained. RAM activities will be conducted in two portions of the Site: 51 Commercial Street and 100 Commercial Street. The contact person, address, and telephone number for this project is:

Name:	Michele V. Leone
Title:	Lead Senior Environmental Engineer
Address:	National Grid 25 Research Drive Westborough, MA 01582
Telephone Number:	(508) 389-4296

The Licensed Site Professional (LSP) assisting in the completion of the RAM is:

Name:	Richard P. Standish, LSP-of-Record (LSP Reg. No. 2242)
Title:	Senior Vice President
Address:	Haley & Aldrich, Inc. 800 Connecticut Blvd. East Hartford, CT 06108-7303
Telephone Number:	(860) 290-3131

This information is also provided on the attached RAM Transmittal Form (Form BWSC-106). A copy of this form is included in Appendix A to this RAM Plan.

Innovative Engineering Solutions, Inc. (IESI) has prepared technical specifications for the work to be completed on the 51 Commercial Street property and will team with Haley & Aldrich as the Consultant-of-Record for this RAM.

1.3 Site Conditions

Responsive to MCP requirement found at 310 CMR 40.0444(1)(b).

The former manufactured gas plant (MGP) was located near the intersections of Commercial Street with Centre Street and Charles Street in Malden, Massachusetts. Figure 1 is a site locus. The ground surface elevations at the Site are relatively flat, varying between approximately El. 10 to 15 feet (ft)². However, the ground surface rises steeply on the west portion of the Site, where active railroad tracks for the Massachusetts Bay Transit Authority (MBTA) are located. Groundwater elevations vary across the Site, but generally range from approximately El. 2 to 5. The Disposal Site boundary is composed of three parcels of land, including land currently referred to as Parcels A, B, and E (see Figure 2). The Site area relevant to this Release Abatement Measure (RAM) Plan includes the properties at 51 Commercial Street and a portion of the 100 Commercial Street property (hereinafter referred to as the RAM Areas), which are located on Parcel A and E, respectively, as shown on Figure 2.

1.4 Historical Site Usage

Responsive to MCP requirement found at 310 CMR 40.0444(1)(b).

The former Malden and Melrose Gas Light Company (MMGLC) and its successor, the Mystic Valley Gas Company (MVGCC), operated an MGP on approximately 16.4 acres of land in the vicinity of the intersection of Commercial and Charles Streets in Malden, Massachusetts from approximately the mid to late 1800s to the late 1960s/early 1970s. The former MGP features are shown on Figure 3.

These parcels were re-developed following the decommissioning of the former MGP facilities in the 1970s, and are now owned and controlled by various parties. The proposed dense non-aqueous phase liquid (NAPL) recovery systems are proposed for these two properties at the Former Malden MGP Site, as described below:

- **51 Commercial Street:** National Grid owns the approximate 0.3-acre 51 Commercial Street property. The property is bounded by Commercial Street to the east, the Midas business located at 65 Commercial Street to the south, a Massachusetts Bay Transit Authority (MBTA) Orange Line railroad right-of-way to the west, and Centre Street to the north. National Grid is leasing the 51 Commercial Street property to Danvers Savings Bank (DSB). DSB has demolished the former building and plans to construct a new building for commercial use.
- **100 Commercial Street:** Boston Gas Company d/b/a KeySpan Energy Delivery New England (KeySpan) owns the 6.6-acre 100 Commercial Street property. The property is bounded by Commercial Street to the west, Charles Street to the south, Centre Street to the north, and the culvert-section of the Malden River to the east. KeySpan

² Elevations in feet (ft) referenced to the National Geodetic Vertical Datum (NGVD).

currently owns and occupies this property, using it as an Operations and Vehicle Maintenance Center.

According to available historical information, 100 Commercial Street was the location of MGP facilities including the gas production building, condenser house, tar filters, tar spray pond, and other facilities that likely generated or handled tars and oils. The 51 Commercial Street property was occupied by American Tar Company, a separate entity from MMGLC and MVGC. Approximate locations of historical MGP features are shown on Figure 3.

1.5 Description of Release

Responsive to MCP requirement found at 310 CMR 40.0444(1)(b).

NAPL has been identified in observation wells on Parcels A and E in the central and northern portion of the 100 Commercial Street property (Parcel E) and on the northern portion of 51 Commercial Street property (Parcel A) in the location of proposed RAM activities. NAPL thickness monitoring has been conducted in selected wells in conjunction with monitoring of prior response actions at the Site. In the area of proposed RAM activities, DNAPL is the NAPL density generally encountered (unless otherwise indicated, NAPL in this document refers to DNAPL). Table I presents the results of NAPL gauging in selected Site observation wells proximate to existing recovery well RW-1 on the 100 Commercial Street property. Table II presents the results of NAPL gauging in the vicinity of 51 Commercial Street. NAPL thickness gauging results are summarized below.

The results of Site subsurface investigations to date indicate that the northern portions of Parcel A and Parcel E are underlain by an organic deposit, the top of which is generally located between 4 and 17.5 ft below ground surface (bgs). NAPL migration generally occurs along this organic deposit, and accumulates in depressions in the organic deposit.

1.6 Select Existing and New Site Information

Following is a brief summary of existing and new data obtained at the 51 Commercial Street and 100 Commercial Street properties most relevant to proposed RAM activities.

1.6.1 51 Commercial Street

Additional assessment activities were conducted by IESI on the 51 Commercial Street property in November 2006. The following summary highlights prior existing and new environmental investigation work completed at 51 Commercial Street, where the bulk of RAM activities are proposed.

- **NAPL in the Subsurface:** The Phase II Report indicates that subsurface investigations conducted at this property between 1997 and 2000 consisted of drilling three soil borings (00A-B901-OW, 00A-B902, and 00A-B903-OW), installing observation wells in two of the borings (00A-B901-OW and 00A-B903-OW), and collecting three surface soil samples (SS-101, SS-102, and SS-103). Additional soil borings and observation wells are located on the adjacent property to the south (00A-B913-OW, 00A-B914-OW, and 00A-B915); in Commercial Street (97A-GP5, 98A-GP6, and 98A-GP7) to the east, and in Centre Street (99A-B812-OW and 98A-B811-OW) to the north.

The locations of the soil borings and observation wells where NAPL has been observed are shown on Figure 4; soil boring logs are included in Appendix C.

In November 2006, IESI completed fifteen direct-push soil borings (identified as GP400 through GP414) at the property. The locations of these borings are shown on Figure 4 and the soil boring logs are included in Appendix C. Based upon the results of these investigations, it appears the property is underlain by approximately 5 ft to 15 ft of urban fill that contains primarily slag, cinders, coal ash, sand, and gravel. An organic silt/peat layer (2.5 ft to 7 ft thick) is located below this fill layer followed by a silt unit then a sand unit.

The soil borings also indicate that the western half of the property is underlain by 2 to 7 ft of tar (i.e., NAPL) saturated soil (except boring GP410 where only coal tar staining was observed), the southeastern quadrant of the site is underlain by less than 1 ft to 2 ft of tar saturated soil (except boring 98A-GP6 where 4 ft of tar saturated soil were observed), and the northeastern quadrant of the site is underlain by soil exhibiting a slight tar sheen or tar staining. Appendix C contains a figure depicting the estimated extent of tar saturated and stained soil observed during investigations conducted on the property. In general, the tar saturated soils were observed in the fill on top of the organic silt/peat layer. Tar saturated soils were mostly observed at depths of 13 ft to 15 ft below grade; however, they were observed at depths as shallow as 10 ft and as deep as 18 ft below grade.

The groundwater depth at the property ranges from approximately 6 ft to 11 ft below grade. Shallow groundwater flow is generally south toward the culvert portion of the Malden River.

During well gauging conducted by Haley & Aldrich, NAPL was observed in observation well 00A-B903-OW [the greatest thickness was 4.75 ft (57 inch (in.)) on 4 December 2000] on the property and in 00A-B913-OW [the greatest thickness was 2.63 ft (31.5 in.)) and 00A-B914-OW [the greatest thickness was 0.79 ft (9.5 in.)) on the adjacent property to the south, and 98A-B811-OW [the greatest thickness was 1.66 ft (20 in.)) located in Centre Street. During well gauging conducted by IESI in November 2006, only 00A-B903-OW was located; NAPL was not observed in the observation well. Table II summarizes NAPL gauging results in the vicinity of 51 Commercial Street.

- **Analytical Results:** During the Phase II investigations, soil samples collected from the shallow soils (0 ft to 3 ft in borings 00A-B903-OW and 00A-B915), soils at 6 ft to 8 ft (00A-B914-OW) and 6 ft to 9.5 ft (00A-B915-OW), and deeper soils ranging from 10 ft to 12 ft in 00A-B901-OW to 14 ft to 16 ft in 00A-B903-OW were submitted for analysis of the following parameters: extractable petroleum hydrocarbons (EPH) with target polycyclic aromatic hydrocarbons (PAHs) compounds, volatile petroleum hydrocarbons (VPH) with target volatile organic hydrocarbon (VOCs) compounds, metals, and cyanide. As expected, the majority of the compounds detected were present

at concentrations greater than the MCP Method 1 standards for soil category S-1/GW-2, S-1/GW-3, S-3/GW-2, and S-3/GW-3.

No groundwater samples have been submitted for laboratory analysis from this property.

As reported in the Phase II Report, five air samples were collected in 2000 inside the 51 Commercial Street building while it was in use as a dentist's office. Indoor air concentrations were reported to be below MassDEP background concentrations.

1.6.2 100 Commercial Street

An IRA was initiated in May 1996 due to the appearance of a sheen on surface water in the West End Brook (WEB) and Malden River (MR) culverts on the Site. During inspection of the culverts, coal tar was observed migrating into the culverts through joints and openings in the culvert walls. IRA response actions included sealing culvert expansion joints and weep holes, re-lining storm drains and catch basins that drain into the culvert, removing coal tar impacted sediments from the culverts, installing a Tar Relief Port and a Tar Monitoring Port in the culvert bedding, installing a grout barrier and performing regular inspections of the culvert. One NAPL recovery well, designated RW-1, was installed in April 2000 adjacent to the WEB Culvert and was operated as part of IRA response actions. The location of RW-1 is shown on Figure 5.

A field trial of a pneumatic submersible NAPL recovery pump was conducted in October 2000, and a permanent NAPL recovery system was installed in July and August 2001. Recovery Well RW-1 was operated from August 2001 until July 2003; in June 2003, an inspection of the WEB and MR Culverts indicated that the migration of NAPL into the culverts had ceased. NAPL extraction using RW-1 was discontinued in July 2003, and an IRA Completion Statement was submitted for this IRA in September 2003. Between August 2001 and July 2003, approximately 702 gallons of NAPL were recovered using RW-1. Although the rate of NAPL recharge appeared to be slowing in June and July 2003, monitoring conducted on 26 January 2006 at RW-1 following system shut down indicated that the NAPL thickness had recovered to approximately 7.17 ft (86 in.). NAPL thickness monitoring from RW-1 and select observation wells in the vicinity of RW-1 collected prior to, during, and following the IRA are summarized graphically on Figure 6 and in tabular form in Table I. Recovery well RW-1 will be re-activated as part of this RAM Plan.

The existing NAPL recovery system installed during the IRA in 2001 is illustrated schematically on Figure 7. It is anticipated that the same general components and configuration will be used when the system is re-activated. The components are described below:

- **Air Compressor:** A compressed air source including a 5-Hp air compressor, air dryer, and 20-gallon air storage tank.
- **Pneumatic Pump:** A pneumatic NAPL recovery pump (Xitech ADJ 1100 - 4"), with pump control;

- **Product Recovery Tubing:** ½-in. outer diameter UV-resistant black polyethylene product discharge tubing to NAPL storage drums (housed in a shed);
- **Conduit:** Compressed air and NAPL recovery tubing in a secondary containment pipe consisting of 4-in. diameter Sch 80 PVC pipe within a shallow trench between the wellhead and the storage shed;
- **Secondary Containment:** NAPL storage drums in a secondary containment structure within the storage shed.
- **NAPL Storage Drum and Safety Interlock (High-High Alarm):** Product recovery tubing is attached to the manifold system for collection of NAPL in up to four (4) drums at once, with each drum continuously monitored with a high level tank shut off sensor (i.e., high-high alarm) to safeguard against overfilling of the drum(s). In addition, the NAPL recovery pump is set to shut off when the first tank alarm/switch sensor is triggered.

Additional information describing site conditions is presented in the December 2001 report entitled *Report on Phase II Comprehensive Site Assessment* (Phase II CSA), the June 2003 Phase III Remedial Action Plan (Phase III RAP), and the February 2004 Class C p-RAO, which were prepared by Haley & Aldrich.

1.7 Regulatory Compliance History

Contamination present at the Site is the result of over 100 years of historic MGP operations, and has impacted soil, groundwater, indoor air, sediments and surface water to varying degrees. Assessment activities began in 1988 under several MassDEP RTNs. Response actions have included several Release Abatement Measures (RAMs) and Immediate Response Actions (IRAs). The Phase II CSA was submitted to MassDEP on 28 December 2001. At that time, a condition of No Significant Risk to certain human health exposure scenarios (e.g., landscaper on 51 Commercial Street, a current scenario) and to Public Welfare could not be satisfied due to elevated contaminant concentrations [in some cases exceeding the MCP Upper Concentration Limit (UCLs)] and the presence of NAPL in Site observation wells at thicknesses greater than ½-in. Section 1.10 provides additional risk characterization background information relevant to the RAM Areas.

The Phase III RAP evaluating remedial alternatives to address the risks identified in the Phase II CSA for the terrestrial portion of the Site was submitted to MassDEP on 2 July 2003. As detailed in the Phase III RAP, the Malden River portion of the Site is being addressed separately from the terrestrial portion of the Site. A Class A-2 RAO for the River portion of the Site was submitted to the MassDEP on 1 July 2007.

A partial Class C Response Action Outcome (p-RAO) for the entire Disposal Site, prepared by Haley and Aldrich, was submitted to the MassDEP in February 2004; the Class C p-RAO included the subject properties. The Class C p-RAO is considered a Class C-1³ RAO in accordance with April 2006 modifications to the MCP as the Phase III RAP concluded that response actions to achieve a Permanent Solution are not feasible. As indicated in the

³ The MCP at 310 CMR 40.1051(1) defines a Class C-1 RAO as a site where "a condition of No Substantial Hazard exists, and it is concluded that response actions to achieve a Permanent Solution are not currently feasible." The former Malden MGP Site meets these criteria.

Class C p-RAO, a Permanent Solution is not feasible because of the presence of NAPL and soil containing contaminant concentrations that exceed MCP Upper Concentration Limits (UCLs) beneath existing, active commercial buildings across the Disposal Site. The Phase III RAP, submitted to the MassDEP in July 2003, recommended a remedial approach to reduce the quantity of NAPL in the subsurface at the Site, and to reduce VOC concentrations in soil, groundwater, and indoor air that may contribute to future potential exposure pathways for which a condition of No Significant Risk could not be satisfied. The Temporary Solution for the Site is to be re-evaluated within five years and reconsidered in the event that a change in Site conditions or advances in technology enable access to currently inaccessible portions of the Site.

As required by the MCP, the Class C p-RAO also included a plan for definitive and enterprising steps to be taken towards achieving a Permanent Solution. The remedial approach for the portion of the Disposal Site that includes the subject properties (51 Commercial Street on Parcel A and 100 Commercial Street on Parcel E) includes reduction of the quantity of NAPL in the subsurface to the extent practicable prior to addressing the remaining tar saturated materials and impacted soil. This RAM Plan is considered an element of the plan for definitive and enterprising steps as it includes the installation of a NAPL recovery system on the northern portion of Parcel A (51 Commercial Street) and re-activation of the NAPL recovery system on Parcel E (100 Commercial Street). The operation of the NAPL systems at these locations will provide valuable data regarding the practicability of NAPL recovery and, if successful, would also reduce the quantity of mobile NAPL at the property.

As described in the Class C p-RAO, NAPL recovery was conducted on the 100 Commercial Street property between August 2001 and July 2003. During this period, approximately 702 gallons of NAPL was extracted from the extraction well designated RW-1. An IRA completion report was submitted to MassDEP in September 2003, closing out this program (refer to the IRA completion report or the Class C p-RAO statement for additional information summarizing IRA activities and additional response actions conducted at the Site).

National Grid purchased the 51 Commercial Street property in December 2004. DSB recently entered into a lease from National Grid for the 51 Commercial Street property. The above-grade portion of the former building that occupied the property has been razed. The concrete floor and foundations remain. Prior to building demolition, utilities connected to the building were cut and capped on 21 June 2007; these activities were conducted under the provisions of a Utility Release Abatement Measure (URAM) and RTN 3-27001. A URAM Notification Letter and Completion Report were submitted to MassDEP on 25 June 2007.

1.8 Proposed Construction at 51 Commercial Street

Responsive to MCP requirement found at 310 CMR 40.0444(1)(c).

DSB intends to construct a new single story commercial building in 2007 on the property. The new building will occupy a footprint of about 2,140 ft², and will be placed in the approximate center of the property. This proposed redevelopment has created an opportunity to conduct additional remedial actions in the vicinity of the proposed new building; the scope of additional RAM activities is described in Section 2.2.1. Since the planned DSB improvements also include small landscaped areas, this RAM may also manage limited quantities of shallow soils generated from these activities. Such RAM soil management, if

any, will be handled as remediation waste (described later herein) and documented in future RAM Status Reports and Remedial Monitoring Reports accordingly. The DSB parking lot will be repaved following the installation of RAM components and construction of the new building. Appendix C, Figure 3 shows the approximate building location and property layout (including surface types) proposed for 51 Commercial Street. Section 3 responds to the MCP requirements at 310 CMR 40.0442(3), which presents the requirements for constructing structures on Disposal Sites.

1.9 Surrounding Receptors

Responsive to MCP requirement found at 310 CMR 40.0444(1)(b).

The Site is located within a designated Industrial Zone, and there are no institutions, as defined by 310 CMR 40.0006, located within 500 ft. There are numerous residences within 0.5 miles of the Site and it is estimated that greater than 1,000 people live within 0.5 miles of the Site. Based on data obtained from MassGIS (24 July 2007), the Site overlies a medium yield, Non-potential Drinking Water Source Area. No Zone II, Sole Source Aquifers, or Interim Wellhead Protection Areas are located at the Site. Drinking water is supplied to the area by the MWRA.

The Site is not located within 3,000 ft of an Area of Critical Environmental Concern. The City of Malden-owned Callahan Park, a protected open space, is located west of the property, beyond the elevated MBTA railroad tracks. Callahan Park is part of the Disposal Site; response actions have been conducted at Callahan Park and have achieved a Class A-3 RAO. As part of the Class A-3 RAO, a Grant of Environmental Restriction has been recorded for Callahan Park. Another protected open space associated with the City of Malden is located approximately 300 ft northeast of the property. According to MassGIS, except for the culverted portion of the Malden River, no other surface water bodies, including wetlands, vernal pools, ponds, lakes, streams, rivers, Outstanding Resource Waters, and reservoirs, are located within 500 ft of the Site.

1.10 Risk Characterization Summary

The Risk Characterization produced the following two conclusions relevant to the RAM Areas:

- **100 Commercial Street:** A condition of No Significant Risk to human health exists under current conditions for the evaluated exposure scenarios for the receptors evaluated, including utility workers, trespassers, on-site commercial/industrial workers, landscapers, (AMEC, 2001).
- **51 Commercial Street:** The following current receptors were assumed to exist and evaluated in the risk characterization: office workers, utility workers, trespassers, and landscapers. The original Phase II Risk Characterization did not demonstrate a condition of No Significant Risk to the current landscaper scenario at 51 Commercial Street. However, this result was based on one sample collected from beneath a paved parking lot, which did not accurately represent the exposure point, and therefore, did not accurately characterize the risk to the landscaper. Additional soil samples were

collected from the landscaped areas of the property in June 2002, and the revised Risk Characterization was conducted using this data and the previously collected data point.

As described in the Class C p-RAO Statement (Haley & Aldrich, 2004), the amendment to the Method 3 Risk Characterization and Substantial Hazard Evaluation, including the new site-specific data, concluded that No Substantial Hazard, as well as a condition of No Significant Risk, to human health exists for the current landscaper scenario (as well as the current office worker, utility worker, and the trespasser) at the 51 Commercial Street property (AMEC, 2001 and 2003).

Refer to the Class C p-RAO statement and Method 3 Risk Characterization (AMEC, 2003 and 2001, respectively) for additional information on the results of human health and ecological risk assessments completed for the Site.

2. RELEASE ABATEMENT MEASURE PLAN

2.1 Objectives

Responsive to MCP requirement found at 310 CMR 40.0444(1)(c).

The objectives of this RAM are to accomplish the following four actions:

1. Install, start up, and conduct operation, maintenance, and monitoring (OMM) activities for a NAPL recovery system at 51 Commercial Street.
2. Manage remediation waste generated during floor and foundation removal from the prior structure at 51 Commercial Street, construction of the new building foundation and Engineered Barrier under the foundation at 51 Commercial Street, and waste from construction and operation of the NAPL recovery systems.
3. Install an Engineered Barrier beneath the proposed building at 51 Commercial Street.
4. Restore, restart, and conduct OMM activities on an existing NAPL recovery system at 100 Commercial Street composed of existing NAPL recovery well RW-1; equipment shed; and related piping, equipment, and appurtenances installed during prior IRAs.

2.2 Activities

Responsive to MCP requirement found at 310 CMR 40.0444(1)(c).

The RAM activities to be implemented are listed below, by property:

2.2.1 51 Commercial Street

RAM activities on the 51 Commercial Street property consist of three elements, including:

1. **NAPL Recovery System:** The NAPL recovery system will consist of seven (7) recovery wells, equipment/storage shed, pneumatic pumps operating on timers, an aboveground storage tank (AST) for the storage of NAPL collected from the recovery well(s), a compressor to operate the pneumatic pumps, and controls. The NAPL AST and compressor will be housed in a 12-foot by 8-foot building to be constructed in the southwest corner of the property. Appendix C provides a detailed technical specification for the NAPL recovery system proposed on the 51 Commercial Street property, including a piping and instrumentation diagram (P/ID), proposed layout of the equipment in the building, and schematic showing the underground piping layout.
2. **Soil Management:** Prior to constructing the new building, the floor and foundation of the old building will be excavated and removed. In addition, excess soil that cannot be re-used may be generated during foundation construction, drilling, and trenching activities. Excess soil or soil that is unsuitable for reuse (e.g., structurally unsound, tar saturated, etc.) will be

stockpiled on Site prior to transportation off Site for either recycling or disposal. Soil stockpiling, debris handling, and health and safety are detailed below and in Appendix C, which provides technical specifications for RAM activities on 51 Commercial Street. In addition, some landscaping improvements may be incorporated into final construction, including limited soil management and placement of clean loam and a geotextile to such landscaped areas, if any.

3. **Engineered Barrier Construction:** An Engineered Barrier is proposed beneath the new building at 51 Commercial Street. The MassDEP has established regulatory requirements and draft design guidance for an Engineered Barrier in two documents: 1) regulatory requirements as defined in the MCP at 310 CMR 40.0996(4)(c); and 2) design guidance in the draft document entitled "Guidance on the Use, Design, Construction, and Monitoring of Engineered Barriers" (MassDEP, 2002).

Appendix C summarizes the anticipated approach to be taken with respect to integrating an Engineered Barrier into the future building. However, as noted in Appendix C, the final foundation design of the proposed building is incomplete; as such, IESI has not included the final Engineered Barrier design in their technical specifications (Appendix C). National Grid intends on completing the underground components for the NAPL collection system described above prior to constructing the new building so as to minimize disruption to the future business. To avoid delaying the NAPL collection system installation while waiting for the final foundation design, National Grid has opted to submit this RAM Plan without the final Engineered Barrier design details. Once the foundation design is completed, the details of the foundation and the Engineered Barrier will be presented as a RAM Plan Modification.

2.2.2 100 Commercial Street

RAM activities on the 100 Commercial Street property consist of restoring and operating the existing NAPL recovery well and system. More specifically, the activities associated with NAPL recovery on this property are anticipated to include the following steps:

1. Perform site reconnaissance to assess the condition of the existing recovery well (RW-1), adjacent observation wells, pneumatic pump, air compressor, shed, electrical components, and accessible appurtenant features of the existing NAPL recovery system (de-energizing electrical components and performing other safety precautions beforehand, as appropriate);
2. Gauge thickness of NAPL in recovery well RW-1 and other operational, existing observation wells in the vicinity;
3. Perform manufacturer's recommended maintenance on system components, as applicable;
4. Repair or replace defective, deteriorated, or missing system components, as necessary;

5. Re-energize the NAPL recovery electrical system;
6. Test safety interlocks (e.g., high-high level alarms/switches), pneumatic pump, and air compressor system;
7. Start system;
8. Check for and repair leaks, if any, in piping, fittings, and connections;
9. Monitor rate of NAPL extraction and recovery in the well. Set timer switch control for duration and frequency of pump operation to recover NAPL while avoiding recovery/pumping of groundwater. Pending rate of NAPL recovery, assess the need for and configuration of manifold to fill multiple drums, if necessary; and
10. Monitor system performance (likely in conjunction with the proposed NAPL recovery system installed on the 51 Commercial Street property), performing periodic NAPL recovery system optimization by adjusting frequency and duration of pump operation as necessary (see Section 2.5 for additional details on the monitoring plan).

2.3 Schedule

Responsive to MCP requirement found at 310 CMR 40.0444(1)(c).

RAM activities are planned to begin in August 2007. It is anticipated that the construction of the NAPL recovery system will begin in August 2007 and will be activated by October 2007. The building construction is planned for the fall of 2007.

RAM activities will be considered complete when the objectives of the RAM Plan have been met, and when active and ongoing remedial actions related to the RAM have been terminated (310 CMR 40.0446(2)). RAM activities will be documented and presented in RAM status/remedial monitoring reports and a RAM Completion Report, which will be submitted in accordance with the schedule outlined in 310 CMR 40.0445.

2.4 Remediation Waste Management and Contingency Plan

Responsive to MCP requirement found at 310 CMR 40.0444(1)(d).

NAPL: NAPL collected in the AST (51 Commercial Street) and DOT-approved drums (100 Commercial Street) will be removed once the AST capacity (95 percent of total capacity) is reached or when the drum(s) are full. On-site accumulation and handling of NAPL in storage containers will conform to applicable provisions of the hazardous waste regulations at 310 CMR 30.000. Drums will be appropriately labeled as hazardous waste, and the shed structure will be properly labeled. A licensed hazardous waste contractor will remove and transport the NAPL off-site for disposal at a licensed facility under a uniform hazardous waste manifest.

Soil Management: Excess contaminated soil that is generated from excavations completed during installation of the NAPL recovery system or during the demolition and reconstruction

of the building at 51 Commercial Street⁴ will be stockpiled on site. Stockpiles will be on and covered with polyethylene sheeting. Soil that is observed to be grossly contaminated with tar based on visual inspection or soil that is structurally unsuitable for reuse on site will also be stockpiled. Stockpiled soils, as well as potential, limited quantities of soils generated from proposed initial landscaping activities described earlier, will be evaluated and sampled for EPH, VPH, and any other necessary constituents required for proper off-site recycling and/or disposal. Following completion of any required laboratory analyses for waste characterization, National Grid intends to remove the soil from the site either under a Uniform Hazardous Waste Manifest or a Bill of Lading (in accordance with the provisions of 310 CMR 40.0030), as appropriate.

Excavated materials will be monitored during excavation for visual and olfactory evidence of contamination (such as observed discoloration, texture, and odor). Soils that appear inconsistent with the existing data will be stockpiled separately and tested. The types and frequency of testing will be determined by the LSP and as required by the receiving facility.

Contingency Plan: If during the work, the presence of potentially hazardous conditions is evident, work in the area will be suspended and the area will be secured to protect against a health risk or release into the environment. These conditions include, but are not limited to: strong chemical odors, flooding, personal injury, exposure to toxic chemicals and encountering unexpected hazardous materials, uncontainerized wastes, buried containers, and drums.

Based on the results of site history review, subsurface explorations and chemical testing programs conducted at the site, no known specific point sources of contamination or abandoned underground storage tanks (USTs) have been identified to date. In the event that a UST, or other buried containers, drums, or tanks are encountered, or if a release of oil or potentially hazardous materials has occurred, notification to MassDEP (in accordance with 310 CMR 40.0300) and to the Malden Fire Department, as applicable, may be required.

2.5 Environmental Monitoring Plan and Controls

Responsive to MCP requirement found at 310 CMR 40.0444(1)(e).

Environmental monitoring and control vary based on the two main types of RAM activities: NAPL recovery and soil management.

2.5.1 NAPL Recovery Systems

Two separate NAPL recovery systems are proposed as part of RAM activities. While the systems operate on similar principles (e.g., pneumatic pumps), the 51 Commercial Street system consists of multiple recovery wells and a large AST to containerize recovered NAPL, whereas the existing 100 Commercial Street system is a single recovery well (RW-1) with NAPL accumulation in DOT-approved drums. Unless otherwise indicated, it is assumed that monitoring plans will be similar.

⁴ Generation of excess soil on 100 Commercial Street is not anticipated as part of RAM activities on that property, which generally involve re-starting an existing NAPL recovery system.

During operation of the NAPL recovery system, system operator/maintenance personnel will conduct periodic site visits. During routine system inspections, these personnel will monitor and adjust the system operating parameters (i.e., frequency of pumping) as needed. In addition, the system operator will perform routine maintenance as necessary. At a minimum, the routine inspections will include the following OMM activities:

- Volume of fluids contained within the NAPL AST and drum(s) (NAPL and groundwater) will be recorded.
- System overflow controls will be tested to ensure they are functioning properly.
- The valving network that controls the NAPL recovery will be adjusted to maximize the efficiency of each well.
- System piping will be checked for any leaks. Repairs will be made if leaks are detected.
- Regularly scheduled maintenance of the system equipment will be performed in accordance with the manufacturers' recommendations. Manufacturer information for each piece of equipment will be stored on site and in IEST's and Haley & Aldrich's offices for ease of use.
- The vapor phase GAC will be monitored for breakthrough with a PID and will be changed either when odors are noticed or when PID readings indicate that the carbon is no longer efficiently treating the vent effluent.
- As required by 310 CMR 40.0041(6)(c), during every site visit for OMM activities the following additional information will be recorded in the system log:
 - the name and affiliation of the person performing such inspection;
 - the date and time of such inspection;
 - the total volume of any non-aqueous phase oil or hazardous material recovered since the previous inspection;
 - a description of any maintenance activities performed during the inspection, or to be scheduled as a result of the inspection; and
 - a description of any problems or potential problems observed during the inspection.

Water levels and NAPL thickness measurements will be collected from both the operating recovery wells and surrounding observation wells. The measurements obtained from these wells will be used to adjust the frequency and duration of operation for the pumps and gauge the influence of the NAPL recovery operations.

It is anticipated that site visits will be conducted weekly during the first month of system operation, and monthly thereafter for the system on 51 Commercial Street, depending the actual rate of NAPL recovery. Similarly, at 100 Commercial Street the rate of recovery based on the IRA (2001-2003) indicates that the initial rate of recovery may be high (on the order of up to 22 gallons per day, on average), but then declines rapidly following the initial operating period to roughly 1 to 2 gallons per day, on average. Based on these results, we anticipate that pumping rates will decrease following the initial start up. Therefore we anticipate weekly visits during

over background for the 15-minute average. If the total VOC level adjacent to the work area is greater than 25 ppm, work activities will be shut down.

Engineering controls and other measures that will be employed by the Contractor during RAM activities include the following:

- A temporary fence will be installed around the remedial excavation area to deter site access.
- All trucks leaving the Site shall be covered and cleaned of spilled debris that might fall from the trucks during transport.
- Soil material shall be removed from truck tires within a designated area prior to leaving the Site. The Contractor shall clean any Site debris from local streets on a routine basis.
- Contaminated soil will be stockpiled on and covered by polyethylene sheeting.
- During remediation, the Contractor will be required to employ dust control measures to minimize the creation of airborne dust. At a minimum, standard dust control techniques such as watering down the Site will be required where heavy equipment will be traveling. The mitigation of dust generation and prevention of exposure to airborne materials during intrusive activities will be accomplished through use of water sprays. Stationary water sources equipped with hoses and/or other spray devices will be used to provide water to the areas being excavated. Exposed soil surfaces will be kept wet during work hours, as needed to mitigate dust.
- Odor control during contaminated soil earthwork will be addressed through one or more options, including but not limited to, covering inactive stockpiles with polyethylene, applying foam and/or water, or other similar odor suppressant compatible with ongoing operations, contaminants, media, and site requirements.

2.6 Federal, State and Local Permits and Requirements

Responsive to MCP requirement found at 310 CMR 40.0444(1)(f).

The following permits are anticipated for the remedial work to be conducted on the 51 Commercial Street property:

- Building permit;
- Demolition permit; and
- Electrical permits necessary for NAPL system equipment connection.

No other federal, state, or local permits are anticipated to implement the RAM. Public notice of proposed RAM activities will be provided to both the City of Malden Board of Health and Mayor's offices within the 20 days prior to implementing this RAM Plan as required under 310 CMR 40.1403(3)(d)(2). Copies of these notices are included in Appendix B.

2.7 LSP Seal and Signature

Responsive to MCP requirement found at 310 CMR 40.0444(1)(g).

The LSP seal and signature are provided on the attached RAM Plan Transmittal Form BWSC106, a copy of which is included in Appendix A.

2.8 Financial Assurance

Responsive to MCP requirement found at 310 CMR 40.0444(1)(h) and 310 CMR 40.0442(5).

At this time, it is expected that no more than 1,500 cubic yards of on-site soil containing contaminant concentrations in excess of applicable RCS-1 Reportable Concentrations will be generated during RAM activities. Therefore, in accordance with Section 40.0442(5) of the MCP, acknowledgment of the financial impacts and demonstration of sufficient financial reserves is not required.

2.9 Request for Supplemental Information

Responsive to MCP requirement found at 310 CMR 40.0444(1)(i).

If additional information is needed or questions arise regarding this RAM plan, please contact Richard Standish by telephone at (860) 290-3131 or by email at RStandish@HaleyAldrich.com or Michele Leone at National Grid at (508) 389-4296.

3. OTHER REQUIREMENTS - CONSTRUCTING STRUCTURES ON DISPOSAL SITES

The MCP, at 310 CMR 40.0442 (3), presents the requirements for constructing structures on Disposal Sites relevant to proposed work on the 51 Commercial Street property. The following sections present the MCP text in italics followed by the response:

Release Abatement Measures may include construction of a structure that could prevent or impede the implementation of likely response actions in the future, provided that prior to or concurrent with conducting such activities, the following are completed for the area within and adjacent to the footprint of the proposed structure in a manner that achieves the substantive technical standards set forth in 310 CMR 40.0800 and 40.0900: ...

(a) a site assessment;

A Phase II CSA was previously submitted to the MassDEP in December 2001 and included the 51 Commercial Street property. In addition, subsequent investigative data collected at this location has been presented in the Phase III RAP (June 2003), the Class C p-RAO (February 2004) that included the subject property, and this RAM Plan. The site has been adequately characterized.

(b) a risk characterization;

As previously discussed, Phase II CSA included a Method 3 Risk Characterization that included this property. In addition, the Risk Characterization was updated as part of the Class C p-RAO submitted in February 2004.

(c) a feasibility evaluation;

The remedial objectives presented in the Phase III RAP for the portion of the site that includes 51 Commercial Street are as follows:

1. Reduction of NAPL to less than ½-in.;
2. Reduce soil concentrations to less than UCLs;
3. Prevent exposure to soil to onsite workers;
4. Allow continued use of existing businesses.

The selected remedy ("Alternative 3-2") for the former MGP site and the 51 Commercial Street property includes recovery of shallow NAPL and provisional shallow NAPL migration control. Engineered Barriers (among other technologies) were not considered for the area because of the presence of soils exhibiting concentrations greater than UCLs beneath buildings. For example, the former building at 51 Commercial Street did not meet the criteria for an Engineered Barrier; therefore the use of Engineered Barrier was eliminated from consideration in the Phase III.

The long term goals at this portion of the site, in basic terms, are to reduce the NAPL thickness to less than ½-in. with the planned NAPL recovery

system, then evaluate further remedial response actions to address the residual contamination in soil, if feasible. It is very likely that it will be infeasible to reduce contaminant concentrations in soil below UCLs. The Phase III RAP identified the use of in-situ chemical oxidation as a viable remedial alternative following NAPL recovery. However, in-situ chemical oxidation is not anticipated to be cost-effective because of the presence of a highly organic layer that will have a significant oxidant demand in relation to that of the contaminants. Therefore, the only cost-effective and feasible remedial alternatives for this property that could be implemented would be NAPL recovery and the use of an Engineered Barrier. Excavation is not considered a feasible option at this time because of the cost, the potential community impact, the health and safety issues associated with the generation of odors, the relatively small area of the subject property, and the difficulty associated with disposal/off-site treatment of tar-saturated and highly-organic material.

Although use of an Engineered Barrier was dismissed in the Phase III evaluation because of the presence of the former building which did not meet the requirements for an Engineered Barrier, it is now possible to incorporate the necessary elements of the Engineered Barrier into the design for the new building since this existing building has been demolished as part of the redevelopment activities. Based on our experience at other MGP sites, we anticipate that the NAPL recovery operation could last up to 10 years. After the completion of mobile NAPL recovery, National Grid would have the option of extending the Engineered Barrier across the remainder of property in order to achieve a Permanent Solution for this portion of the site.

(d) if the Exposure Point Concentrations of contaminants under such structure exceed applicable soil Upper Concentration Limits (UCLs) specified in 310 CMR 40.0996(7), the reduction of concentrations to levels at or below UCLs to the extent feasible pursuant to 310 CMR 40.0860(4);

The presence of greater than 1/2-in. of NAPL in the subsurface exceeds the UCLs. NAPL greater than 1/2-in. is assumed to exist beneath the building. The NAPL system to be installed as part of this RAM is the most feasible and cost effective method to attempt to reduce the NAPL thickness to less than UCLs.

It is also likely that the concentrations of compounds in soil exceed UCLs. As discussed above, the Phase III RAP identified in-situ chemical oxidation as a viable remedial alternative following NAPL recovery. However, in-situ chemical oxidation is not anticipated to be cost-effective because of the presence of a highly organic layer that will have a significant oxidant demand in relation to that of the contaminants. Excavation is not considered a feasible option at this time because of the cost, the potential community impact, the health and safety issues associated with the generation of odors, the relatively small area of the subject property, and the difficulty associated with disposal/off-site treatment of tar-saturated and highly-organic material. As such, it is not feasible to reduce the concentration of compounds in soil to levels at or below UCLs. As discussed above, the only cost-effective and feasible remedial alternatives for this property that could be implemented

would be NAPL source control through recovery and the use of an Engineered Barrier.

(e) elimination or control of any source of oil and/or hazardous material as specified in 310 CMR 40.1003(5); and

The source of NAPL was the former MGP and tar processing facility. The NAPL in the ground can be considered a secondary source of oil and hazardous material and will be controlled at this location by the NAPL recovery system.

(f) any remedial actions deemed necessary to ensure the eventual achievement of a level of No Significant Risk for the entire disposal.

The installation of the NAPL recovery system and the necessary components of an Engineered Barrier will be implemented as part of this RAM and are considered remedial actions necessary to work toward achievement of a level of No Significant Risk for this property.

4. LSP OPINION

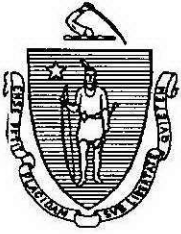
Richard P. Standish is the LSP-of-Record for this RAM. Haley & Aldrich will team with IESI as the Consultant-of-Record for the proposed remedial actions to be conducted on the site. The LSP seal and signature are provided on the attached RAM Plan Transmittal Form BWSC106, a copy of which is included in Appendix A.

This document contains material facts, data, and other information that support the LSP Opinion that, to the best of the LSP's knowledge, information and belief, the response actions that are the subject of this submittal (i) have been developed and implemented in accordance with the applicable provisions of M.G.L.c.21E and 310 CMR 40.0000, (ii) are appropriate and reasonable to accomplish the purposes of such response action as set forth in the applicable provisions of M.G.L.c.21E and 310 CMR 40.0000, and (iii) comply with the identified provisions of all orders, permits, and approvals identified in this submittal.

REFERENCES

1. AMEC, 2003. "Amendment to Method 3 Risk Characterization and Substantial Hazard Evaluation, Portion of Former Manufactured Gas Plant Site, Malden, Massachusetts." February. (submitted in the Partial Class C Response Action Outcome Statement prepared by Haley & Aldrich, Inc., dated February 2004)
2. AMEC, 2001. "Method 3 Risk Characterization for the Former Malden Manufactured Gas Plant Site, Malden, Massachusetts." December 24.
3. Haley & Aldrich, Inc., 2004. "Report on Partial Class C Response Action Outcome (RAOP) Statement, Former Malden MGP Site, Malden, Massachusetts, RTN 3-0362, Title: IB Permit 7378", dated February 2004.
4. Haley & Aldrich, Inc., 2003a. "Report on Phase III Remedial Action Plan, Former Malden MGP Site - Upland Portion, Malden, Massachusetts", dated June 2003.
5. Haley & Aldrich, Inc., 2003b. "Immediate Response Action Completion Report, RTN 3-0362 & 3-13754, West End Brook & Malden River Culverts", dated 12 September 2003.
6. Haley & Aldrich, Inc., 2001 "Report on Phase II Comprehensive Site Assessment, Former Malden MGP Site, Malden, Massachusetts", dated 28 December 2001.
7. Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup, "The Massachusetts Contingency Plan; 310 CMR 40.0000," dated 3 April 2006.
8. Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup, 2002. "Guidance on the Use, Design, Construction, and Monitoring of Engineered Barriers", Public Comment Draft, November 2002.

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COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST REGIONAL OFFICE

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IAN A. BOWLES
Secretary

ARLEEN O'DONNELL
Commissioner

MEMORANDUM

TO: File for RTIN 3-0362
Former Malden MGP Site- 100 Commercial St.
FROM: Rose Knox, - Audit Section
DATE: September 28, 2007
SUBJECT: Phone Notes

On September 25, 2007, I contacted Richard Standish, LSP-of-Record, regarding the subject site. I indicated that MassDEP was conducting an audit of the Post-RAO RAM Plan on Parcels A and E (51 and 100 Commercial Street) received by MassDEP on August 10, 2007. The Post-RAO RAM Plan states that an Engineered Barrier is planned for 51 Commercial Street (along with NAPL recovery) and I questioned whether the Phase III Feasibility Evaluation had been revised to support an Engineered Barrier as the only feasible alternative for Parcel A. Originally, the Phase III recommended in-situ chemical oxidation and NAPL recovery for this parcel. In accordance with 310 CMR 40.0442(4), the Phase III Feasibility Evaluation must support the selection of an Engineered Barrier as the only feasible alternative before the Engineered Barrier can be selected and constructed. Mr. Standish indicated that there is no plan at this time for the construction of an Engineered Barrier at 51 Commercial Street. The building that was present at 51 Commercial Street was destroyed by a bus a couple of years ago and the building was demolished leaving the slab in place. At some time in the future, the plan is to remove the slab and construct a new foundation, which could potentially be designed and constructed as an Engineered Barrier. A bank bought the parcel and is planning construction in the future. Mr. Standish stated that the Phase III Feasibility Evaluation would be revised and submitted to MassDEP prior to constructing the Engineered Barrier at 51 Commercial Street. I noted that given that there is no plan at this time to construct the Engineered Barrier, an audit of the Post-RAO RAM Plan would not be conducted at this time.

TABLE I
SUMMARY OF NAPL THICKNESS MONITORING: SELECT WELLS - 100 COMMERCIAL ST
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

MONITORING DATE	OBSERVED NAPL (DNAPL) THICKNESS (FT)					
	B206-OW	B506-OW	B801-OW	B803-OW	RW-1	TRP-1
6/27/07	--	--	--	--	--	0.33
1/26/06	7.58	ND	ND	ND	7.17	0.33
12/29/05	8	ND	--	ND	7.08	0.33
11/30/05	7.83	ND	ND	ND	6.83	0.33
10/31/05	7.83	ND	ND	ND	6.83	0.33
9/30/05	7.83	ND	ND	ND	6.83	0.33
8/25/05	--	ND	ND	ND	6.75	0.29
7/21/05	7.75	ND	ND	ND	6.83	0.33
6/23/05	7.92	ND	ND	ND	6.5	0.25
5/25/05	8	ND	ND	ND	6.42	0.25
4/25/05	8	ND	ND	ND	6.42	0.25
3/30/05	--	ND	ND	ND	6.42	0.25
2/2/05	7.5	ND	--	--	6.42	--
1/20/05	7.75	ND	ND	ND	6.58	0.25
6/28/04	8.16	ND	ND	ND	6.5	0.25
5/28/04	7.91	ND	ND	ND	5.92	0.33
4/28/04	7.83	ND	ND	ND	5.66	0.33
3/31/04	7.83	ND	ND	ND	5.5	0.375
2/24/04	7.83	ND	ND	ND	5.33	ND
1/14/04	--	--	ND	ND	5.33	0.38
1/13/04	7.92	0.5	--	--	--	--
1/6/04	7.91	0.46	ND	ND	5.33	0.38
12/24/03	7.88	0.5	ND	ND	5.33	0.42
12/19/03	7.92	0.46	ND	ND	5.33	0.46
12/11/03	--	0.46	--	--	5.33	0.42
12/4/03	7.92	0.5	ND	ND	5.33	0.46
11/26/03	7.92	0.54	ND	ND	5.33	0.46
11/17/03	7.88	0.5	ND	ND	5.33	0.42
11/10/03	7.92	0.46	ND	ND	5.33	0.42
11/6/03	7.88	0.46	ND	ND	5.33	0.46
10/28/03	--	0.25	ND	ND	5.33	0.58
10/21/03	7.92	0.33	ND	ND	5.29	0.58
10/17/03	7.92	0.33	ND	ND	5.17	0.54
10/6/03	7.92	0.25	ND	ND	5.17	0.58
9/29/03	7.88	0.17	ND	ND	5.08	0.5
9/26/03	7.92	0.04	ND	ND	5.04	0.5
9/18/03	7.92	ND	ND	ND	5	0.46
9/8/03	7.83	ND	ND	ND	5	0.56
8/22/03	7.84	ND	ND	ND	4.42	0.55
8/14/03	7.85	ND	ND	ND	4.17	0.56
8/7/03	7.84	ND	ND	ND	4.06	0.55
8/1/03	7.84	ND	ND	ND	3.08	0.53
7/26/03	7.82	ND	ND	ND	2.5	0.5
7/14/03	--	ND	--	--	2.17	--
7/7/03	7.83	ND	ND	ND	2	0.58
7/3/03	--	--	--	--	2.08	--
7/2/03	7.79	ND	ND	ND	--	0.6
6/26/03	7.75	ND	ND	ND	2.08	0.6
6/19/03	7.67	ND	ND	ND	3.13	0.56
6/12/03	7.75	0.04	ND	ND	3.67	0.5
6/6/03	7.83	0.04	ND	ND	3.5	0.52
5/29/03	7.83	0.04	ND	ND	2.71	0.46
5/21/03	7.92	0.08	ND	ND	1.67	0.46
5/14/03	7.92	0.08	ND	ND	3.33	0.5
5/5/03	7.92	0.08	ND	ND	--	0.52
4/29/03	7.88	0.08	ND	ND	4.33	0.54

TABLE I

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FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

MONITORING DATE	OBSERVED NAPL (DNAPL) THICKNESS (FT)					
	B206-OW	B506-OW	B801-OW	B803-OW	RW-1	TRP-1
4/25/03	7.92	0.25	ND	ND	4.42	0.54
4/17/03	7.88	0.33	ND	ND	4.42	0.58
4/9/03	7.88	0.38	ND	ND	4.42	0.63
4/4/03	7.92	0.38	ND	ND	4.42	0.63
3/24/03	--	0.92	ND	ND	4.42	0.67
3/18/03	7.58	0.83	ND	ND	4.17	--
3/10/03	7.67	0.75	ND	ND	4.42	--
3/7/03	--	0.75	--	--	4.5	--
2/26/03	--	0.33	ND	ND	4.58	--
2/21/03	--	0.25	ND	ND	4.5	--
2/10/03	--	0.17	ND	ND	4.67	--
2/7/03	--	0.25	ND	ND	4.67	--
1/29/03	--	0.08	ND	ND	4.67	--
1/24/03	7.75	0.67	ND	ND	4.58	--
1/14/03	--	0.17	ND	ND	4.67	0.67
1/10/03	--	0.17	ND	ND	4.58	0.58
12/31/02	8.25	0.92	ND	ND	4.5	0.75
12/24/02	7.75	1	ND	ND	4.5	0.67
12/17/02	7.75	0.83	ND	ND	4.67	0.58
12/13/02	--	0.83	ND	ND	4.5	0.67
12/2/02	--	0.83	ND	ND	4.33	0.67
11/26/02	--	0.92	ND	ND	4.25	0.58
11/22/02	7.67	0.83	ND	ND	4.83	0.58
11/12/02	7.67	0.96	ND	ND	4.83	0.67
10/28/02	6.75	1.08	ND	ND	4.67	0.33
10/25/02	--	--	--	--	4.67	0.42
10/14/02	--	0.92	ND	ND	4.5	0.58
10/8/02	--	1	ND	ND	4.5	0.67
10/4/02	--	1.33	ND	ND	4.67	0.67
9/25/02	--	--	ND	ND	4.67	0.71
9/20/02	--	1.25	ND	ND	4.54	0.38
9/11/02	7.83	1.29	ND	ND	4.67	0.58
9/6/02	--	--	--	--	4.33	--
8/27/02	7.83	1.79	ND	ND	4.04	0.71
8/23/02	--	--	--	--	4.16	--
8/16/02	--	1.08	ND	ND	4.25	0.66
8/9/02	--	1	ND	ND	4.33	0.67
7/30/02	7.83	1	ND	ND	3.08	0.63
7/24/02	7.79	1.08	ND	ND	2.17	0.67
7/19/02	7.92	1	ND	ND	3.75	0.67
7/9/02	--	1.08	ND	ND	4.33	0.46
7/3/02	7.79	0.86	--	--	4.38	0.5
6/28/02	7.83	0.96	ND	ND	4.33	0.46
6/19/02	7.83	1.08	ND	ND	4.33	0.71
6/13/02	7.83	1.25	ND	ND	4.25	0.67
6/5/02	--	1.25	ND	ND	4.17	0.67
5/31/02	7.83	1.17	ND	ND	4.08	0.54
5/22/02	--	1.08	ND	ND	3.83	0.54
5/16/02	--	1.33	ND	ND	4	0.67
5/8/02	8.04	1.08	ND	ND	4.25	0.63
5/2/02	--	1.08	ND	ND	4.42	0.63
4/26/02	7.92	1.33	ND	ND	4.33	0.63
4/18/02	--	--	--	--	4.46	--
4/9/02	7.83	1.29	ND	ND	4.33	0.67
4/5/02	--	--	--	--	4.29	0.67
3/28/02	--	1.75	ND	ND	4.25	0.67

TABLE I

SUMMARY OF NAPL THICKNESS MONITORING: SELECT WELLS - 100 COMMERCIAL ST
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

MONITORING DATE	OBSERVED NAPL (DNAPL) THICKNESS (FT)					
	B206-OW	B506-OW	B801-OW	B803-OW	RW-1	TRP-1
3/18/02	--	1.58	ND	ND	4.42	0.58
3/8/02	7.92	1.75	ND	ND	4.63	0.67
2/27/02	7.92	1.42	--	--	4.5	0.67
2/22/02	--	1.58	--	--	4.5	0.75
2/15/02	--	1.75	--	--	3.63	0.75
2/8/02	8	1.25	--	--	4.54	0.75
1/28/02	8.25	1.33	--	--	4.42	0.67
1/22/02	7.96	1.17	--	--	4.46	--
1/18/02	--	--	--	--	4.42	--
1/11/02	--	--	--	--	4.67	--
1/3/02	8.08	1.75	ND	ND	4.33	0.5
12/28/01	9.21	2.17	ND	ND	4.17	0.67
12/21/01	--	1.75	ND	ND	3.25	--
12/7/01	8.25	1.67	ND	ND	2.5	0.67
11/26/01	--	1.83	ND	ND	3.58	--
11/21/01	--	1.83	ND	ND	2.5	0.42
11/15/01	--	0.66	ND	ND	3	0.66
11/2/01	7.18	1.26	ND	ND	3.58	--
10/24/01	7.18	0.76	ND	ND	3.5	--
10/15/01	7.33	1.27	ND	ND	3.25	--
10/4/01	--	--	--	--	3.83	--
10/3/01	6.94	0.83	ND	ND	--	0.2
9/29/01	7.58	1.33	ND	ND	5	0.75
9/20/01	7.32	0.97	ND	ND	4.67	0.67
9/14/01	7.92	1.33	ND	ND	--	0.67
9/7/01	7.92	1.33	ND	ND	--	--
8/30/01	7.88	1.15	ND	ND	--	--
8/24/01	7.92	--	ND	ND	--	0.42
8/13/01	7.92	--	ND	ND	--	0.63
8/10/01	7.92	1.23	ND	ND	5.08	0.63
7/30/01	7.96	1.19	ND	ND	5.42	0.58
7/27/01	8	0.92	ND	ND	5.42	0.63
7/19/01	8	0.92	ND	ND	5.42	0.6
7/13/01	7.92	0.92	ND	ND	5.42	0.58
7/6/01	7.92	0.92	ND	ND	5.42	0.63
6/27/01	7.92	0.92	ND	ND	5.42	0.65
6/21/01	7.92	0.92	ND	ND	5.42	0.67
6/6/01	7.88	0.92	ND	ND	--	0.67
5/22/01	7.85	0.9	ND	ND	5.42	0.71
5/14/01	7.83	0.83	ND	ND	5.42	0.75
5/10/01	7.83	0.96	--	--	5.42	0.5
5/4/01	7.83	1	ND	ND	5.42	0.58
4/27/01	7.88	1.08	ND	ND	5.46	--
4/24/01	--	--	--	--	--	0.54
4/18/01	7.88	1.21	ND	ND	5.46	0.65
4/13/01	7.88	1.25	ND	ND	5.42	0.67
4/4/01	7.83	1.29	ND	ND	--	0.71
3/27/01	7.83	1.25	ND	ND	--	0.75
3/20/01	7.83	1.17	ND	ND	5.33	0.77
3/15/01	7.75	1.33	ND	ND	5.33	0.75
2/27/01	7.71	1.52	ND	ND	5.33	0.67
2/20/01	7.67	1.67	ND	ND	5.33	0.67
2/15/01	7.58	1.83	ND	ND	--	0.67
2/12/01	--	--	--	--	5.33	--
2/6/01	7.58	1.75	--	--	5.33	0.67
2/2/01	7.63	1.73	ND	ND	5.33	0.69

TABLE I

SUMMARY OF NAPL THICKNESS MONITORING: SELECT WELLS - 100 COMMERCIAL ST
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

MONITORING DATE	OBSERVED NAPL (DNAPL) THICKNESS (FT)					
	B206-OW	B506-OW	B801-OW	B803-OW	RW-1	TRP-1
1/24/01	7.67	1.67	ND	ND	5.33	0.75
1/18/01	7.67	1.65	ND	ND	5.33	0.73
1/12/01	--	1.58	ND	ND	--	0.71
1/11/01	7.67	--	--	--	--	--
1/4/01	7.58	1.54	ND	ND	5.33	0.71
12/21/00	--	1.47	ND	ND	5.33	0.67
12/13/00	--	1.46	ND	ND	5.33	0.67
11/28/00	7.71	1.27	ND	ND	5.33	0.67
11/22/00	7.67	1.17	--	--	5.33	0.71
11/17/00	7.67	1.29	ND	ND	5.33	0.58
11/8/00	7.67	1.42	ND	ND	5.33	0.33
10/26/00	7.67	1.38	--	--	5.25	0.46
10/13/00	7.75	1.4	ND	ND	5.33	0.75
9/28/00	7.71	1.38	--	--	5.33	0.85
9/14/00	7.92	1.08	ND	ND	5.33	0.92
9/5/00	7.83	0.96	ND	ND	5.33	1.08
8/29/00	7.83	0.92	ND	ND	5.33	1.13
8/17/00	7.67	1.17	ND	ND	5.33	--
8/15/00	--	--	--	--	--	0.67
7/7/00	7.75	0.92	ND	ND	5.42	ND
6/22/00	7.75	1.25	ND	ND	5.33	ND
6/15/00	--	--	--	--	5.33	ND
6/14/00	7.75	1.29	ND	ND	--	--
5/31/00	7.75	0.67	ND	ND	--	ND
5/25/00	7.79	1.5	ND	ND	5	ND
5/18/00	--	--	--	--	5.58	ND
5/16/00	7.75	0.92	ND	ND	--	--
5/12/00	--	--	--	--	5.08	--
5/8/00	7.83	1	ND	ND	--	ND
5/5/00	7.83	1.08	--	--	5.75	--
4/28/00	7.67	1.5	ND	ND	4.67	--
4/17/00	--	1.25	--	--	--	--
4/6/00	7.75	1.17	ND	ND	--	--
4/4/00	--	--	--	--	0.33	--
3/23/00	--	1.4	ND	ND	NA	NA
4/26/99	7.8	1.5	--	--	NA	NA
4/28/98	7	1.7	NA	NA	NA	NA
7/25/97	8	--	NA	NA	NA	NA

NOTES:

1. "--" Indicates that a measurement was not made at this monitoring location on this date.
2. "ND" Indicates that less than 0.04 (1/2 inch) of DNAPL was observed at this location.
3. "NA" Not Applicable; the monitoring well and/or recovery well did not exist at the date indicated.
4. Monitoring well B206-OW and DNAPL extraction well RW-1 were constructed with a sump into the layer of organic silt and peat; therefore the observed DNAPL thickness in these wells is greater than the actual NAPL thickness in the subsurface.
5. Non-aqueous phase liquid (NAPL) present as dense non-aqueous phase liquid (DNAPL), unless indicated otherwise.

TABLE II
SUMMARY OF NAPL THICKNESS MONITORING: SELECT WELLS - 65 AND 51 COMMERCIAL ST
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

MONITORING DATE	OBSERVED NAPL (DNAPL) THICKNESS (FT)				
	00A-B901-OW	00A-B903-OW	00A-B913-OW	00A-B914-OW	98A-B811-OW
11/2006 *	--	ND	--	--	--
7/31/01	--	--	--	--	**
12/4/00	ND	4.75	2.63	0.79	--
11/5/00	--	1.25	--	--	--
5/25/00	--	0.17	--	--	--
3/16/00	--	--	--	--	1.66
1/5/00	--	--	--	--	1.58
12/3/99	--	--	--	--	1.54

NOTES:

1. "--" Indicates that a measurement was not made at this monitoring location on this date.
2. "ND" Indicates that less than 0.04 (1/2 inch) of DNAPL was observed at this location.
3. ** - Sediment filled up well to approx. 7 feet bgs.
4. * - NAPL gauging conducted by Innovative Engineering Associates, Inc.
5. Non-aqueous phase liquid (NAPL) present as dense non-aqueous phase liquid (DNAPL), unless indicated otherwise.