

SCANNED

Malden  
100 Commercial St.

IMMEDIATE RESPONSE ACTION (IRA)  
STATUS REPORT NO. 13  
WEST END BROOK - MALDEN RIVER CULVERTS  
RTN 3-0362 AND 3-13754  
MALDEN, MASSACHUSETTS

prepared by

Haley & Aldrich, Inc.  
Boston, Massachusetts

submitted for

Massachusetts Electric Company  
Northboro, Massachusetts

File No. 06558-628  
September 2002

**SCANNED**

Haley & Aldrich, Inc.  
465 Medford Street  
Suite 2200  
Boston, MA 02129-1400  
Tel: 617.886.7400  
Fax: 617.886.7600  
www.HaleyAldrich.com



12 September 2002  
File No. 06558-t 28

Department of Environmental Protection  
Metropolitan Boston - Northeast Region  
205A Lowell Street  
Wilmington, Massachusetts 01887

Attention: Jennifer Wang

Subject: Immediate Response Action Status Report No. 13  
RTN 3-0362 & 3-13754  
West End Brook - Malden River Culverts  
Malden, Massachusetts

Ladies and Gentlemen:

On behalf of Massachusetts Electric Company (MEC), Haley & Aldrich, Inc. is providing the following Immediate Response Action (IRA) Status Report No. 13 for RTNs 3-0362 & 3-13754 at the above referenced site. This release to surface water was found to be related to the former manufactured gas plant (MGP) located at 100 Commercial Street (RTN 3-0362). Therefore, MEC submitted a Transmittal Form BWSC-107A which linked the release to surface water under RTN 3-13754 to the release which applies to the MGP in a letter to the Massachusetts Department of Environmental Protection (DEP) dated 9 May 1997. The former MGP is a Tier Classified site (Tier IB) in MCP Phase II with reclassification to Tier IB (Permit No. 7378) effective on 28 December 1999. Prior to this date the site was classified Tier II.

This status report describes IRA activities conducted from March to September 2002 and summarizes the additional IRA activities that are planned to occur during the next six months.

#### BACKGROUND/RELEASE DESCRIPTION

On 14 May 1996, the appearance of a sheen at portions of the West End Brook culvert (WEB) and the Malden River was reported to DEP by MEC. This release was assigned release tracking number (RTN) 3-13754. Verbal approval was obtained from DEP on 14 May 1996 to assess the source of the sheen including accessing the culvert to make observations and performing sampling. Absorbent booms were installed at the juncture of the WEB and the Malden River Culvert (MRC).

The release is described as an intermittent release of oil or hazardous material into a culverted surface water body (WEB and/or MRC) which periodically causes a recurring, discontinuous sheen. Portions of the culverted surface water bodies run beneath or near properties which were formerly occupied by an MGP as shown on Figure 1 and are located adjacent to areas

#### OFFICES

Cleveland  
Ohio

Dayton  
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Denver  
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where tar contaminated materials have been identified in previous subsurface explorations for the portion of the former MGP located at 100 Commercial Street (RTN 3-0362).

## SUMMARY OF PREVIOUS IRA ACTIVITIES

IRA assessment and remedial activities have been underway since May 1996 to eliminate sheens in the culverts resulting from seepage of MGP related contaminants. These activities have included the following: sediment sampling and analysis, monitoring of sheen activity, drilling and sampling of soils outside the culverts, removal of contaminated sediments and debris, installation of absorbent and containment booms, repair of existing expansion joints, grouting of weep holes, lining of catch basins and drain lines that discharge into the culverts and installation of one seepage collar below and around the outside of the culvert. On-going activities include operation of a DNAPL recovery system adjacent to the culvert, inspection of culvert booms, and annual inspection of the culverts. These activities are described in IRA Status Reports No. 1 to 12 and in modifications to the IRA Plan dated 11 September 1996, 2 July 1997, 12 March 1998, 27 October 1998, 13 September 1999, 8 March 2000, 13 September 2000 and 22 November 2000 and are summarized below:

*IRA Status Report No. 1 and Update Plan* dated 11 September 1996 and second IRA Status report dated 12 March 1997 described the activities undertaken since notification in May 1996 and described a plan for eliminating the sheen. A brief summary of previous IRA assessment findings is given below:

Halley & Aldrich observed tar seepage occurring at two expansion joint locations inside the WEB. Tar was observed below the sediments at this expansion joint location in the culvert base slab and sheens appeared to be formed from coal tar in the sediment rising to the top of the surface water. Expansion joints are keyed but not structurally connected with steel reinforcing, allowing the culvert sections to expand and contract along the axis of the culvert alignment. The culvert drawings indicate that the expansion joints were filled with a 1/2 inch thickness of a pre-molded joint filler. It appears that the coal tar had decomposed the filler material thereby creating an opening for contaminant seepage. According to the culvert drawings and confirmed by our observations, expansion joints are located approximately 90 feet apart along the alignment.

Weep holes (4 inch diameter) are present along the north and south sides of the WEB culvert at approximately 10 feet intervals. The invert of the weep holes is El. 1.85 (NGVD). The conditions observed indicated that most weep holes were plugged with soil and little to no groundwater seepage is occurring at the weep holes. Only moderate water seepage was observed from weep holes at STA 13 +58 (north and south sides), located at the juncture of the WEB and the MRC. Other weep holes were dry or indicated only slight (non-measurable) flow.

Samples of sediment and water were obtained inside the culvert and analyzed for polynuclear aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs). Elevated concentrations of PAHs and VOCs were detected in samples obtained from expansion joint locations.

Haley & Aldrich also conducted a subsurface exploration program consisting of drilling seven test borings and installation of observation wells during the period 25 to 30 July 1996. Test borings were drilled adjacent to the culvert at expansion joint locations to assess the presence of tar saturated material and the potential for tar seepage into the culvert and to collect samples for grain size analyses to assess the potential for grouting of the soil. Tar saturated material was encountered in several borings, as described in the first status report.

*IRA Status Report No. 2* dated 12 March 1997 included a description of the following IRA activities:

- Assessment of potential structural impacts of the proposed work on the culvert structure as required by the MDC for the permit process. A permit dated 25 February 1997 was issued by the MDC for the work.
- Development of remedial alternatives for preventing coal tar seepage from entering the culvert.
- Preparation of contract documents, including drawings and technical specifications for conduct of the proposed remedial work.
- Completion and issuance of Contract Documents to five qualified Contractors for bidding purposes. A pre-bid meeting and site visit was held on 26 February 1997 to address Contractor questions.

Additional development of remedial alternatives and modification of the bid documents was performed during the period March to June 1997 and the contract documents were rebid in June 1997. An IRA Update Plan dated 2 July 1997 was prepared and submitted to DEP describing the proposed remedial options as outlined in the revised contract documents for bidding. The IRA activities conducted under the Update Plan included the following work within the WEB from STA 10 +40 (Commercial Street) to the juncture of the WEB and the MRC at STA 13 +58:

1. Preparation, implementation and management of a health and safety plan and procedures as outlined in Section 01540 - Health and Safety.
2. Removal of 78 tons of contaminated sediment within the WEB and management of contaminated media in accordance with the requirements contained in Section 02220 - Contaminated Media Management Plan.
3. Grouting of leaking joints or cracks to reduce seepage during joint replacement work.
4. Grouting of weep holes from STA 10 +38 to STA 13 +58 at north and south sides of the culvert. Repair of concrete around pipe penetrations.



5. Replacement of the existing expansion joint material and installation of a "strip and seal" waterproofing system at the joint surface at four expansion joint locations within the WEB.

*IRA Status Report No. 3* dated 5 September 1997 summarized the IRA activities conducted in accordance with the IRA Plan Update dated 2 July 1997 described above. The work was undertaken by T. Ford Company during the period 12 July to 25 August 1997 and included the following:

1. Installation of temporary cofferdams in the WEB and removal of approximately 78 tons of contaminated sediments.
2. Seepage injection grouting, routing, cleaning and recaulking of four expansion joints, at STA 10 +40, STA 11 +30, STA 12 +20 and STA 13 +10 and installation of an epoxy and hypalon strip surface seal.
3. Grouting, cleaning and filling of approximately 60 weep hole with a hydraulic cement/epoxy filler.
4. Local surface grouting and filling around drain lines which discharge into the culvert.
5. Seepage injection grouting of base slab crack at approximately STA 13 +30.

A post-remediation survey was conducted inside the WEB and MRC on 9 October 1997 to assess potential sources for the continued presence of sheens. The limit of the survey included the WEB, from the juncture of the WEB and the MRC at STA 14 +00 to STA 7 +00 (on the park side of the Orange Line embankment) and a portion of the MRC from the juncture of the WEB to upstream STA 9 +00 and to downstream STA 3 +25. A summary of the observations and conclusions are outlined below:

- Evidence of coal tar seepage was observed in small quantities at the expansion joints within the limits of Parcel A at STA 9 +50 and 8 +60 in the WEB. Previous observations made in 1995 and 1996 did not indicate active coal tar seepage at these joints. Minor sheen activity was observed in the WEB, likely as a result of seepage from the joints and associated weep holes within this area.
- The coal tar contained in sediments within the MRC may have contributed to the sheen activity in the culvert. Sediment thickness (average of 6 inches) and water depth did not permit direct observation of the expansion joints, however, minor seepage may have occurred at these locations.
- The rehabilitated expansion joints in the WEB culvert were observed to be in good condition with no observed coal tar seepage.

Based upon these post-remediation observations MEC prepared a new bid package for contracting additional work to be performed inside the WEB and the MRC. The additional

work included sediment removal, expansion joint rehabilitation and weep hole sealing as described in the *IRA Update Plan and Status Report No. 4* dated 12 March 1998.

As described in *IRA Status Report No. 5*, dated 11 September 1998, the additional work described in the *IRA Plan Update* dated 12 March 1998 was bid upon and awarded to Fleet Environmental, Inc. (Fleet) in June 1998.

*IRA Status Report No. 6* described activities that occurred during the period late August 1998 to March 1999. Fleet mobilized equipment the week of 24 August 1998, and began repair related activities the following week. Work began in the WEB which was staged from the culvert opening at Commercial Street. Work began in the MRC in November 1998 and was completed in December 1998. The work in the MRC was staged from the culvert opening in the MRC at STA 7 +80. As work was beginning in the MRC, it became apparent that additional measures would be necessary to mitigate migration of coal tar material at the exterior and interior of the culvert. Additional IRA assessment and remedial measures, outlined in the *IRA Plan Update* dated 27 October 1998, included installation of a seepage collar below the base and outside the exterior walls of the MRC, repair of additional expansion joints, removal of sediments and installation of observation/collection wells. Additional joint repair and sediment removal in the chamber area where the WEB meets the MRC, was undertaken by T. Ford Company. This work began in December 1998 and was completed in January 1999. The following activities were performed under the *IRA Plan Updates* dated 12 March and 27 October 1998:

#### **Culvert Section Preparation/Sediment and Coal Tar Removal**

- Dams were erected up and downstream of the working area to isolate each culvert channel section and the sections were unwatered. The WEB sections extended for a length of approximately 200 ft. from approximately STA 8 +00 to STA 10 +00. The MRC sections extended for a length of approximately 280 ft., from STA 5 +00 to STA 7 +30. The chamber area work extended from WEB STA 13 +60 to MRC STAs 7 +80 and 8 +10. Absorbent booms were located downstream of the lower dam at each channel section to capture fugitive sheens.
- Sediments were removed from the culvert sections and chamber area by a small bobcat loader. The inside of the culvert was broom cleaned and then pressure washed to remove residual coal tar staining. Sediments were temporarily stored on-site in rolloff containers prior to removal off-site to Environmental Soil Management Inc. (ESMI) in Loudon, New Hampshire.
- DNAPL coal tar, which had been seeping into the culvert through an expansion joint at STA 13 +72 of the north side of the WEB culvert, was removed using oil absorbent pads and "snare" (oil absorbent pom-poms) and placed into 55 gallon drums. Sand bag dams were constructed on the upstream and downstream side of this joint to isolate and contain the DNAPL. Absorbent pads and booms were placed inside and outside the isolated area.

### **Weep Hole Sealing/Expansion Joint and Other Culvert Repair**

- Weep holes through the exterior walls of the north and south sides of the WEB culvert, within the dammed section, were cleaned and sealed with hydraulic cement and epoxy grout. No weep holes are present in the MRC.
- An expanding chemical grout was injected beneath and into each expansion joint to temporarily stop the flow of water and coal tar into the culvert and create a dry joint for application of the new joint repair system. The existing expansion joint filler was removed to the top of the base slab keyway. The joint and surrounding surface was cleaned by sand blasting before sealing.
- The inside of the joint, down to the keyway, was filled with a polysulfide caulking material and a strip and seal epoxy and flexible liner system was installed over a total of approximately 287 linear ft. of expansion joint at the following locations: WEB STAs 9 +50, 8 +60 and 8 +30; MRC STAs 5 +20, 6 +10 and 7 +00; and Chamber Area at WEB STA 13 +72, MRC STA 7 +87, and at STA 8 +02 of the single channel section of the MRC.
- Local surface grouting and filling was performed with a cement grout around two drain lines which discharge into the south WEB side at STA 9 +70 and STA 10 +11, and around one which discharges into the north WEB side near STA 8 +20.
- A blue stained area of the WEB southern culvert outer wall was noted to be leaking near the base of the wall. This area of the wall, near STA 9 +00, was injected with an expanding chemical grout to halt the leaking.
- Repairs were also made to the culvert wall concrete at expansion joint location MRC STA 7 +00 (east wall) which had spalled off during the joint repair work.

### **Observation/Collection Wells**

- Two 8-inch diameter wells (B801-OW and B803-OW) were installed by Geologic Inc. in November 1998 on the north and south side of the WEB culvert at approximately STA 13 +80 to allow for monitoring of coal tar (DNAPL) levels and limited DNAPL collection and removal. The wells were installed to a depth of approximately 20 ft. directly adjacent (within several feet) to the culvert wall and intercepted the crushed stone layer below the base slab of the culvert. The purpose of the wells was to assess the feasibility of DNAPL collection and recovery.

### **Grout Seepage Collar**

- Knowle: Industrial Service, Inc. was retained by Fleet to install a cement grout collar around and beneath the MRC at approximately STA 7 +30. The grout collar was installed to contain and cut off migration of coal tar through the crushed stone below

the culvert base slab and pervious backfill adjacent to the culvert sidewalls. The grout was pumped under low pressure through ports in the floor and outside walls of the culvert.

The IRA Plan Update called for the installation of observation wells at either side of the grout collar to allow for subsequent monitoring of coal tar migration, however, observations of the grout holes indicated that coal tar had migrated beyond this location. As a result of these observations, well installation at this grout collar location was not performed.

*IRA Status Report No. 7* described assessment and remedial activities that occurred during the period March to September 1999. These activities consisted of the following:

- Sampled sediments in the MRC from STA 0 +00 to STA 5 +00 to assess the extent of the contamination and the need to conduct sediment removal in this area. Ten sediment samples were collected by Haley & Aldrich on 8 April 1999 at the approximate locations shown on Figure 2. The samples were analyzed for PAH by 8270, VOCs by 8260 and MADEP Method EPH/VPH.
- Monitored the presence of DNAPL in large diameter wells B801-OW and B803-OW installed in November 1998 and redeveloped the wells in May 1999.
- T. Ford Co. of Georgetown, Massachusetts mobilized to the WEB and performed the following activities from STA 13 +70 to STA 10 +40 during the period July through September 1999:
  1. Set up stop logs and unwatered culvert sections to inspect the previously repaired expansion joints at STA 10 +40, STA 11 +28.5, STA 12 +18.5, and STA 13 +08 in the WEB. Joints at STA 12 +18.5 and 11 +28.5 indicated some evidence of failure from separation of the strip and seal liner from the epoxy or tears in the liner. In addition, the underlying joint compound indicated evidence of degradation due to contact with coal tar. Although other joints in this section of the WEB did not indicate evidence of failure it was decided to replace all of the joints exposed in this section based on the observations at the failed joints.
  2. Removed sediments that accumulated in the culvert sections from STA 10 +40 to STA 13 +70 and the sediment trap. Approximately 32.6 tons of sediment was removed by Bobcat excavator and stored in two covered watertight roll-off containers. The roll-offs were transported to ESMI in Loudon, New Hampshire under a Bill-of-Lading on 3 September 1999. The original BOL was transmitted to DEP in November 1999.
  3. Replaced the existing expansion joints at all four locations. Previous polysulfide joint compound indicated evidence of degradation from coal tar. Coal tar immersion tests performed on a variety of polysulfide and Viton



based fluoroelastomer joint compounds indicated that the Viton based joint compound was the most resistant to coal tar constituents. The joints were replaced with Viton based PelSeal 2012/2112 manufactured by DuPont. The joint material was placed in lifts of 1/8 to 1/4 inch in thickness at two locations within the depth of the joint. The epoxy and hypalon liner system was placed directly over the joints after curing of the joint compound. A stainless steel plate was placed over the liner system to protect the liner and bolted to the upstream side.

*IRA Status Report No. 8 and IRA Plan Modification* described assessment and remedial activities that occurred during the period September 1999 to March 2000 and described additional IRA activities to be conducted. The activities completed during this period consisted of the following:

- Continued to monitor the presence of DNAPL in the large diameter wells B801-OW and B803-OW installed in November 1998 and redeveloped the wells in October 1999.
- Inspected by TV survey and relined approximately 200 linear feet of drain line and three catch basins which discharge into the WEB. The drain lines and catch basins are identified as CB106, 107 and 108 on Figure 2. Similar work had previously been conducted at the site. This work was performed by Eastern Pipe Service, Inc. of Merrimack, New Hampshire in November 1999.
- Removed 182.6 tons of accumulated sediments and repaired six expansion joints within the MRC from STA 5 +00 to the end of the culvert at STA 0 +00. The joints were replaced with Viton based PelSeal 2012/2112. The epoxy and hypalon liner system was placed directly over the joints after curing of the Viton joint compound. A stainless steel plate was placed over the liner system at the base of the culvert to protect the liner and bolted to the upstream side.
- Constructed a new culvert roof opening at MRC STA 5 +20 to facilitate equipment access and sediment removal.
- Placed absorbent booms in the MRC. A permanent boom was placed near the new opening and a temporary boom was placed at the end of the culvert near STA 0 +00. The booms are monitored weekly and are replaced as necessary. Periodically collected and disposed of debris that collects behind the booms.

This work was conducted by T. Ford Co. under contract with MEC.

*IRA Status Report No. 9 and IRA Plan Modification* dated 13 September 2000 described assessment and remedial activities that occurred during the period March to September 2000 and described additional IRA activities to be conducted.

- Performed annual inspection of the MRC and the WEB in April (west and south barrels) and May 2000 (east and north barrels). In general, the expansion joints were found in good condition; however, NAPL was observed in the east barrel MRC downstream from the expansion joint at station 13 +72 to the culvert outfall adjacent to Anthony's Restaurant. A supplemental inspection of the single barrel section of the MRC from the junction of the MRC and WEB to Centre Street was performed in June 2000. Tar residue and differential settlement of culvert sections were observed at the expansion joint at STA 11 +85 in the single barrel MRC and hardened tar was observed adjacent to a storm drain connection beneath Centre Street.
- Replaced three expansion joint seals at the juncture of the WEB and MRC at STA 7 +87, STA 8 +07 and STA 13 +72.5. Polysulfide joint repairs made in December 1998/January 1999 were replaced with Viton based PelSeal 2012/2112. An epoxy and hypalon liner system was placed directly over the joints and a stainless steel plate was placed over the liner system at the base of the culvert to protect the liner.
- Removed approximately 15 cy of impacted sediments from the MRC from the sediment trap at STA 0 +00 to the chamber area. The sediment was transported under Uniform Hazardous Waste Manifest to ESMI in Loudon, New Hampshire for thermal treatment.
- Installed an 8-inch diameter stainless steel recovery well (RW-1) adjacent to the culvert between the Operations Building and Maintenance Garage on the KeySpan property. The well was installed with a 2-ft diameter bucket auger. Water and oil removed during well development on 8 April 2000 and DNAPL recovered on 5 May 2000 were removed from the site under Uniform Hazardous Waste Manifests to the Clean Harbors Braintree facility.
- Installed tar relief port (TRP-1) through the culvert base slab and the crushed stone layer below the culvert, into the surface of the underlying organic deposit, approximately 8 ft. upstream of the expansion joint at STA 13 +73.5 where a coal tar seep was observed in the past. The casing and riser were extended above the top of the culvert.
- Monitored for the presence of DNAPL in large diameter wells B801-OW and B803-OW installed in November 1998. The wells were gauged for DNAPL on a weekly basis. Coal tar had not been observed since the wells were redeveloped.

The scope of the IRA activities was modified to include the following:

1. Inspection of all previously repaired expansion joints in the WEB and the MRC and the expansion joints in the single box section of the MRC from the juncture of the WEB north to Centre Street as part of a yearly inspection program.
2. Removal or displacement of sediments in areas where joints require replacement or other repair. Sediments will be removed if the thickness of the sediments impedes

On-going activities scheduled for the next reporting period include the following:

- **DNAPL Collection System Monitoring and Ongoing NAPL Monitoring:** Ongoing system monitoring will consist of monitoring system parameters, estimation of the amount of DNAPL collected from the recovery well, and gauging of the nearby monitoring wells. Therefore, we will continue periodic monitoring of the recovery well (RV-1), B506-OW, B206-OW, TRP-1, B801-OW, and B803-OW.
- **Culvert Boom Inspection and Periodic Replacement:** Ongoing culvert boom inspection activities will consist of weekly inspections of the condition of the booms, collection of debris trapped by the booms as necessary, and periodic replacement of the booms deployed at the culvert opening near STA 5+20.

#### **NEW SITE INFORMATION**

No new site information was gathered during this status report period.

#### **REMEDIATION WASTE MANAGEMENT**

Coal tar recovered from the DNAPL recovery system was stored temporarily in a DOT-approved steel drums within the recovery shed with secondary containment. One drum of coal tar was removed from the site by Clean Harbors of Braintree, Massachusetts on May 29, 2002 under a Hazardous Waste Manifest.

#### **SEAL AND SIGNATURE OF LSP**

The LSP seal and signature for this IRA Status Report are provided on the original IRA Transmittal Form (BWSC-105) enclosed with this submittal. A copy of Form BWSC-105 is also included in Appendix A herein.

**CLOSURE**

If you have any questions regarding the content of this IRA Status Report, please contact Keith Johnson or Richard Standish at Haley & Aldrich, Inc.; (617) 886-7318 and 860-659-4248 respectively

Sincerely yours,  
HALEY & ALDRICH, INC.

for

*Wanda E. Johnson*

Keith E. Johnson  
Vice President

for *Richard P. Standish*

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

**Attachments:**

- Figure 1 - Site Plan
- Figure 2 - Site and Subsurface Exploration Location Plan
- Appendix A - BWSC-105 (Copy) with Attachment

- c: City of Malden; Mayor Richard C. Howard  
Massachusetts Electric Company; Ms. Michele V. Leone (2 copies)  
KeySpan Energy Delivery; Mr. Alexander G. Taft  
Metropolitan District Commission; Mr. Paul DiPietro  
Malden Redevelopment Authority; Mr. Steve Wishoski  
Board of Health, City of Malden; Mr. Walter F. Carlan; Director  
City of Malden; Mr. Jack Kelly; City Engineer  
Coast Guard Petty Officer Stevens

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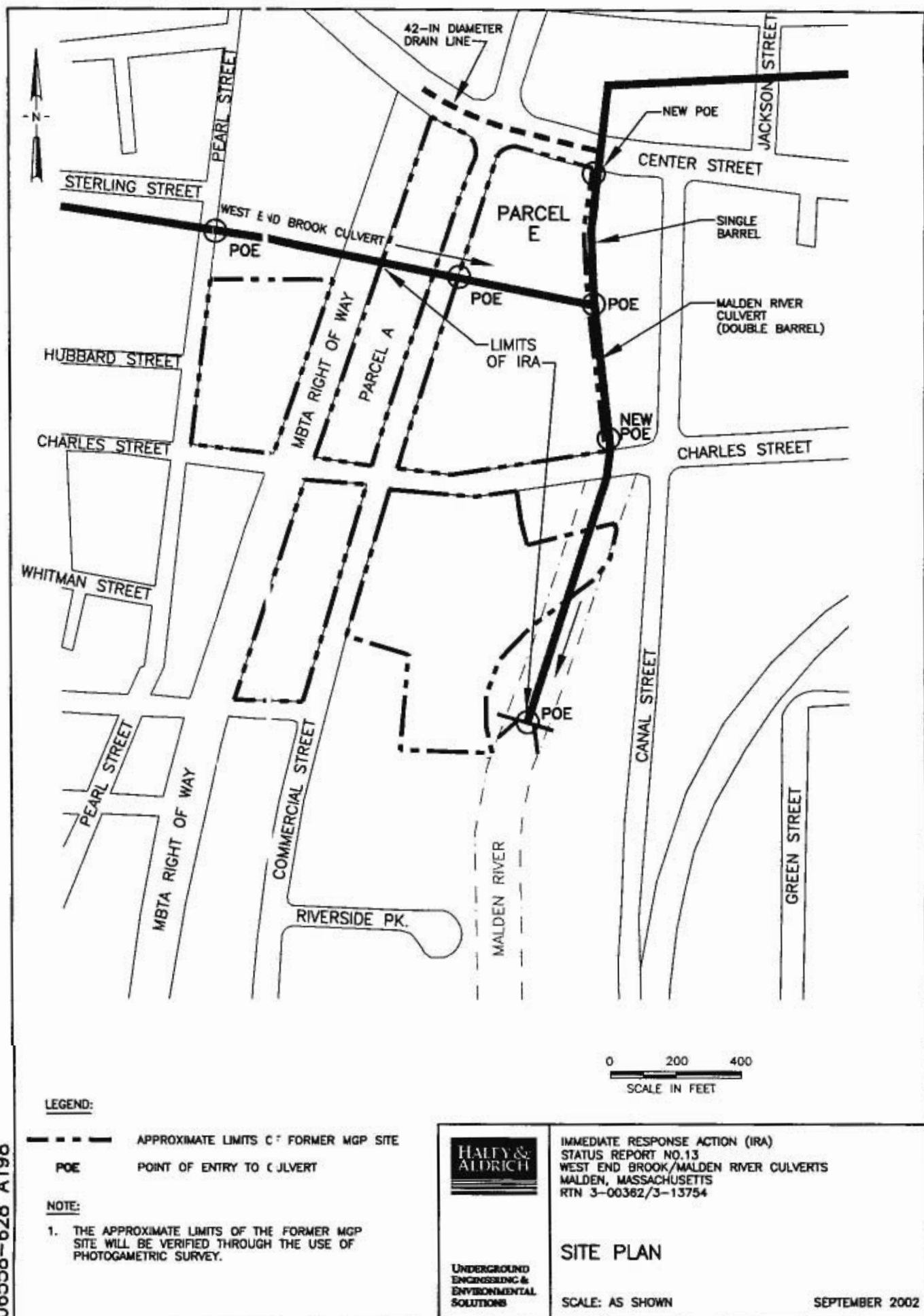


FIGURE 1



UNDERGROUND  
ENGINEERING &  
ENVIRONMENTAL  
SOLUTIONS

Haley & Aldrich, Inc.  
465 Medford St., Suite 2200  
Boston, MA 02129-1400  
Tel: 617.886.7400  
Fax: 617.886.7600  
www.HaleyAldrich.com

*01/2*  
**Malden**  
**100 Commercial ST**

**Letter of Transmittal**

Date 12 September 2002  
File Number 06558-628  
From Joshua S. Wernig

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To Department of Environmental Protection  
Metropolitan Boston – Northeast Region  
205A Lowell Street  
Wilmington, Massachusetts 01887

Attention Ms. Jennifer Wang

Copy to

Subject Immediate Response Action Status Report No. 13  
RTN 3-0362 & 3-13754  
West End Brook – Malden River Culverts  
Malden, Massachusetts

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Copies	Date	Description
1	9/12/2002	Immediate Response Action Status Report No. 13 RTN 3-0362 & 3-13754 West End Brook – Malden River Culverts
1	9/12/2002	Original BWSC-105 form

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Transmitted via ☐ First class mail ☐ Overnight express ☒ Hand delivery ☐ Other

**Remarks**

Ms. Wang,

Enclosed please find the Immediate Response Action Status Report No. 13 and BWSC – 105 form for the West End Brook – Malden River Culverts in Malden, MA.

Please call if there are any questions.



Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup

J. L. BWSC-105

Release Tracking Number

IMMEDIATE RESPONSE ACTION (IRA)

TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

3 - 362

A. RELEASE OR THREAT OF RELEASE LOCATION:

Release Name: (optional) West End Brook/Malden River Culverts

Street: 100 Commercial Street

Location Aid: Charles Street

City/Town: Malden

ZIP Code: 02148-5510

☒ Check here if a Tier Classification Submittal has been provided to DEP for this Release Tracking Number.

☐ Check here if this location is Adequately Regulated, pursuant to 310 CMR 40.0110-0114.

Specify Program: ☐ CERCLA ☐ HSWA Corrective Action ☐ Solid Waste Management ☐ RCRA State Program (21C Facilities)

Related Release Tracking Numbers That This IRA Addresses: 3-13754

B. THIS FORM IS BEING USED TO: (check all that apply)

☐ Submit an IRA Plan (complete Sections A, B, C, D, E, H, I, J and K).

☐ Check here if this IRA Plan is an update or modification of a previously approved written IRA Plan. Date Submitted: \_\_\_\_\_

☐ Submit an Imminent Hazard Evaluation (complete Sections A, B, C, F, H, I, J and K).

☒ Submit an IRA Status Report (complete Sections A, B, C, E, H, I, J and K).

☐ Submit a Request to Terminate an Active Remedial System and/or Terminate a Continuing Response Action(s) Taken to Address an Imminent Hazard (complete Sections A, B, C, D, E, H, I, J and K).

☐ Submit an IRA Completion Statement (complete Sections A, B, C, D, E, G, H, I, J and K).

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. RELEASE OR THREAT OF RELEASE CONDITIONS THAT WARRANT IRA:

Identify Media and Receptors Affected: (check all that apply) ☐ Air ☐ Groundwater ☒ Surface Water ☒ Sediments ☐ Soil

☒ Wetland ☐ Storm Drain ☐ Paved Surface ☐ Private Well ☐ Public Water Supply ☐ Zone 2 ☐ Residence

☐ School ☐ Unknown ☐ Other Specify: \_\_\_\_\_

Identify Conditions That Require IRA, Pursuant to 310 CMR 40.0412: (check all that apply) ☒ 2 Hour Reporting Condition(s)

☐ 72 Hour Reporting Condition(s) ☐ Substantial Release Migration ☐ Other Condition(s)

Describe: Intermittent release of oil or hazardous material into a surface water body which causes a recurring, discontinuous sheen to be periodically observed.

Identify Oils and Hazardous Materials Released: (check all that apply) ☒ Oils ☐ Chlorinated Solvents ☐ Heavy Metals

☒ Others Specify: Coal Tar

D. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply)

☐ Assessment and/or Monitoring Only

☐ Excavation of Contaminated Soils

☐ Re-use, Recycling or Treatment

☐ On Site ☐ Off Site Est. Vol.: \_\_\_\_\_ cubic yards

Describe: \_\_\_\_\_

☐ Store ☐ On Site ☐ Off Site Est. Vol.: \_\_\_\_\_ cubic yards

☐ Landfill ☐ Cover ☐ Disposal Est. Vol.: \_\_\_\_\_ cubic yards

☐ Removal of Drums, Tanks or Containers

Describe: \_\_\_\_\_

☐ Deployment of Absorbent or Containment Materials

☐ Temporary Covering or Caps

☐ Bioremediation

☐ Soil Vapor Extraction

☐ Structure Venting System

☐ Product or NAPL Recovery

☐ Groundwater Treatment Systems

☐ Air Sparging

☐ Temporary Water Supplies

SECTION D IS CONTINUED ON THE NEXT PAGE.



Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup

BWSC-105

Release Tracking Number

IMMEDIATE RESPONSE ACTION (IRA)

TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

3 - 362

D. DESCRIPTION OF RESPONSE ACTIONS continued:

- ☐ Removal of Other Contaminated Media  
Specify Type and Volume: \_\_\_\_\_
- ☐ Temporary Evacuation or Relocation of Residents
- ☐ Other Response Actions Describe: \_\_\_\_\_
- ☐ Fencing and Sign Posting
- ☐ Check here if this IRA involves the use of Innovative Technologies (DEP is interested in using this information to aid in creating an Innovative Technologies Clearinghouse).  
Describe Technologies: \_\_\_\_\_

E. TRANSPORT OF REMEDIATION WASTE: (If Remediation Waste has been sent to an off-site facility, answer the following questions)

Name of Facility: Environmental Soil Management, Inc./Clean Harbors, Inc.

Town and State: Loudon, NH/Quincy, MA

Quantity of Remediation Waste Transported to Date: See attached table

F. IMMINENT HAZARD EVALUATION SUMMARY: (check one of the following)

- ☐ Based upon an evaluation, an Imminent Hazard exists in connection with this Release or Threat of Release.
- ☐ Based upon an evaluation, an Imminent Hazard does not exist in connection with this Release or Threat of Release.
- ☐ Based upon an evaluation, it is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release, and further assessment activities will be undertaken.
- ☐ Based upon an evaluation, it is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release. However, response actions will address those conditions that could pose an Imminent Hazard.

G. IRA COMPLETION STATEMENT:

- ☐ Check here if future response actions addressing this Release or Threat of Release will be conducted as part of the Response Actions planned for a Site that has already been Tier Classified under a different Release Tracking Number, or a Site that is identified on the Transition List as described in 310 CMR 40.0600 (i.e., a Transition Site, which includes Sites with approved Waivers). These additional response actions must occur according to the deadlines applicable to the earlier Release Tracking Number (i.e., Site ID Number).

State Release Tracking Number (i.e., Site ID Number) of Tier Classified Site or Transition Site: \_\_\_\_\_

If any Remediation Waste will be stored, treated, managed, recycled or reused at the site following submission of the IRA Completion Statement, you must submit either a Release Assessment Measure (RAM) Plan or a Phase IV Remedy Implementation Plan, along with the appropriate transmittal form, as an attachment to the IRA Completion Statement.

H. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> if Section B of this form indicates that an **Immediate Response Action Plan** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purpose(s) of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Imminent Hazard Evaluation** is being submitted, this Imminent Hazard Evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and the assessment activity(ies) undertaken to support this Imminent Hazard Evaluation complies(y) with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000;

> if Section B of this form indicates that an **Immediate Response Status Report** is being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purpose(s) of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Immediate Response Action Completion Statement** or a **Request to Terminate an Active Remedial System and/or Terminate a Continuing Response Action(s) Taken to Address an Imminent Hazard** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

SECTION H IS CONTINUED ON THE NEXT PAGE.





Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup

BWSC-105

Release Tracking Number

IMMEDIATE RESPONSE ACTION (IRA)

TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

3 - 362

H. LSP Opinion (continued):

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

☒ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: Richard P. Standish LSP #: 2242 Stamp:

Telephone: 860-659-4248 Ext.: 3139

FAX: (optional) 860-659-4003

Signature: Richard P. Standish

Date: 4 SEPT 2002



I. PERSON UNDERTAKING IRA:

Name of Organization: Massachusetts Electric Company

Name of Contact: Michele A. Leone Title: Senior Environmental Engineer

Street: 55 Bearfoot Road

City/Town: Northboro State: MA ZIP Code: 01532-0000

Telephone: 508-421-7564 Ext.:  FAX: (optional) 508-890-4706

☐ Check here if there has been a change in the person undertaking the IRA.

J. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA: (check one)

☒ RP or PRP Specify: ☐ Owner ☐ Operator ☐ Generator ☐ Transporter Other RP or PRP: Party of Interest

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Undertaking IRA Specify Relationship:

K. CERTIFICATION OF PERSON UNDERTAKING IRA:

I, Michele A. Leone, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By Michele A. Leone Title: Senior Environmental Engineer  
(signature)

For Massachusetts Electric Company Date:   
(print name of person or entity recorded in Section I)

Enter address of the person providing certification if different from address recorded in Section I:

Street:

City/Town:  State:  ZIP Code:

Telephone:  Ext.:  FAX: (optional)

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

**E. TRANSPORT OF REMEDIATION WASTE**

(Updated through 12 September 2002)

**QUANTITIES OF REMEDIATION WASTE TRANSPORTED TO DATE**

Remediation Waste	ESMI	Clean Harbors, Inc.
Sediment	421.48	---
Soil Spoil (RW-1)	12 tons	
Oily equipment - PPE, booms, etc.	---	8 drums
Oily equipment - PPE, booms, etc.	---	4 flexbin
Oily equipment - PPE, booms, etc.	---	23 cubic yards
Coal tar	---	21 drums
Well Development (sediment/water)	---	3446 gallons (MAO1)
DNAPL	---	2506 gallons (DO18)
Decon water	---	3 drums

**H. LSP OPINION**

Response Actions on which this opinion is based were subject to the Tier I Permit issued by DEP on 28 December 1999 and the Order of Conditions issued by the Malden Conservation Commission on 21 September 1999.

G:\06558\628\TR105TBL.XLS

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NORTHEAST REGIONAL OFFICE



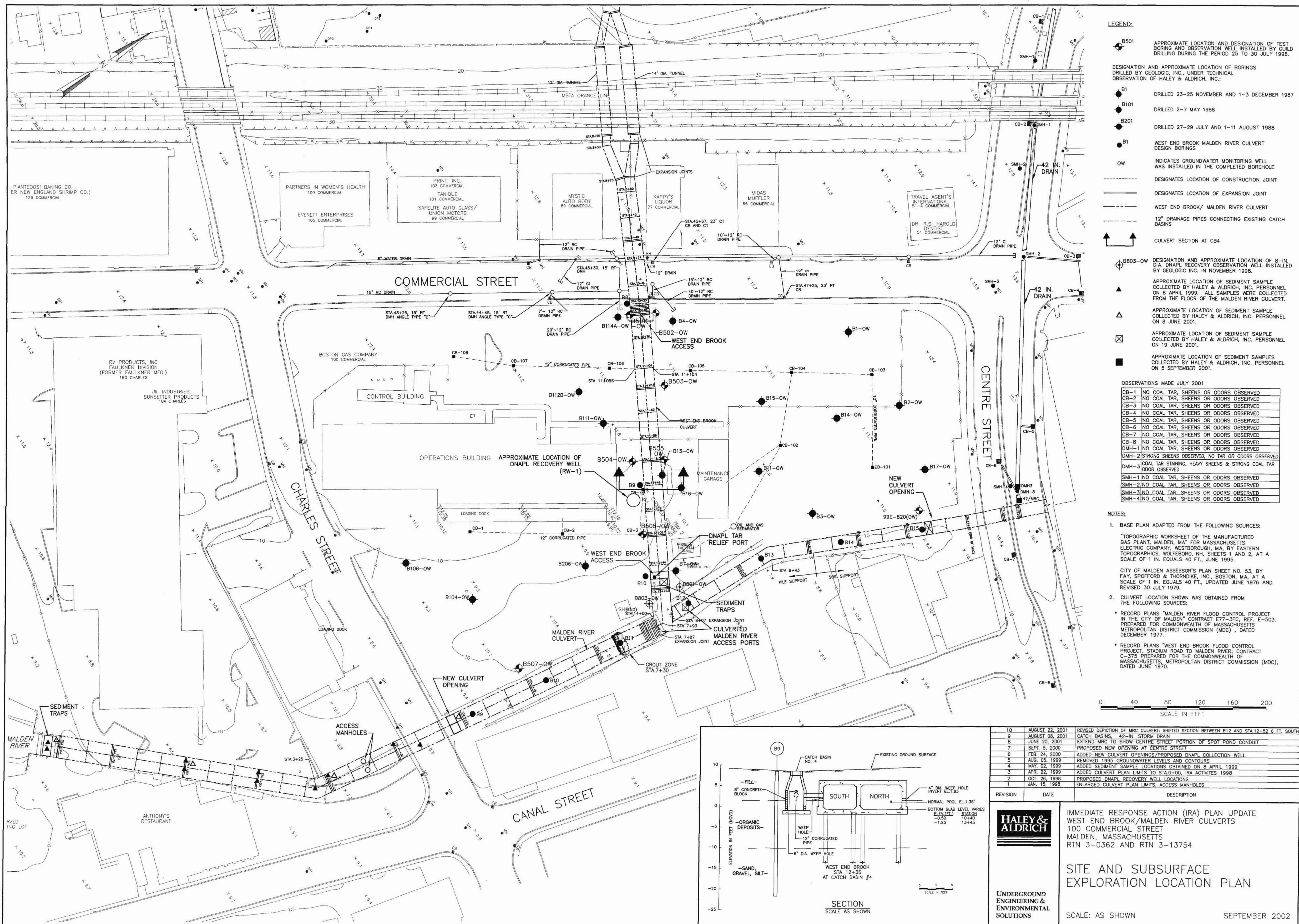


FIGURE 2



**APPENDIX A**

**3WSC-105 (Copy) With Attachment**





Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup

BWSC-105

Release Tracking Number

IMMEDIATE RESPONSE ACTION (IRA)

TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

3 - 362

H. LSP Opinion (continued):

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

☒ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: Richard P. Standish LSP #: 2242 Stamp:

Telephone: 860-659-4248 Ext.: 3139

FAX: (optional) 860-659-4003

Signature: Richard P. Standish

Date: 4 SEPT 2002



I. PERSON UNDERTAKING IRA:

Name of Organization: Massachusetts Electric Company

Name of Contact: Michele A. Leone Title: Senior Environmental Engineer

Street: 55 Bearfoot Road

City/Town: Northboro State: MA ZIP Code: 01532-0000

Telephone: 508-421-7564 Ext.:  FAX: (optional) 508-890-4706

☐ Check here if there has been a change in the person undertaking the IRA.

J. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA: (check one)

☒ RP or PRP Specify: ☐ Owner ☐ Operator ☐ Generator ☐ Transporter Other RP or PRP: Party of Interest

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Undertaking IRA Specify Relationship:

K. CERTIFICATION OF PERSON UNDERTAKING IRA:

I, Michele A. Leone, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: Michele A. Leone Title: Senior Environmental Engineer  
(signature)

For: Massachusetts Electric Company  
(print name of person or entity recorded in Section I)

Date:

Enter address of the person providing certification, if different from address recorded in Section I:

Street:

City/Town:  State:  ZIP Code:

Telephone:  Ext.:  FAX: (optional)

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

**E. TRANSPORT OF REMEDIATION WASTE**

(Updated through 12 September 2002)

**QUANTITIES OF REMEDIATION WASTE TRANSPORTED TO DATE**

Remediation Waste	ESMI	Clean Harbors, Inc.
Sediment	421.48	---
Soil Spoil (RW-1)	12 tons	
Oily equipment - PPE, boots, etc.	---	8 drums
Oily equipment - PPE, boots, etc.	---	4 flexbin
Oily equipment - PPE, boots, etc.	---	23 cubic yards
Coal tar	---	21 drums
Well Development (sediment/water)	---	3446 gallons (MAO1)
DNAPL	---	2506 gallons (DO18)
Decon water	---	3 drums

**H. LSP OPINION**

Response Actions on which this opinion is based were subject to the Tier I Permit issued by DEP on 28 December 1999 and the Order of Conditions issued by the Malden Conservation Commission on 21 September 1999.

SCANNED

ENVIRONMENTAL  
PROTECTION  
AGENCY  
U.S. DEPARTMENT OF JUSTICE

IMMEDIATE RESPONSE ACTION (IRA)  
STATUS REPORT NO. 12  
WEST END BROOK - MALDEN RIVER CULVERTS  
RTN 3-0362 AND 3-13754  
MALDEN, MASSACHUSETTS  
100 Commercial St

prepared by

Haley & Aldrich, Inc.  
Boston, Massachusetts

submitted for

Massachusetts Electric Company  
Northboro, Massachusetts

File No. 06558-628  
March 2002

Haley & Aldrich, Inc.  
465 Medford Street  
Suite 2200  
Boston, MA 02129-1400  
Tel: 617.886.7400  
Fax: 617.886.7600  
www.HaleyAldrich.com



12 March 2002  
File No. 06558-628

Department of Environmental Protection  
Metropolitan Boston - Northeast Region  
205A Lowell Street  
Wilmington, Massachusetts 01887

Attention: Jennifer Wang

Subject: Immediate Response Action Status Report No. 12  
RTN 3-0362 & 3-13754  
West End Brook - Malden River Culverts  
Malden, Massachusetts

Ladies and Gentlemen:

On behalf of Massachusetts Electric Company (MEC), Haley & Aldrich, Inc. is providing the following Immediate Response Action (IRA) Status Report No. 12 for RTNs 3-0362 & 3-13754 at the above referenced site. This release to surface water was found to be related to the former manufactured gas plant (MGP) located at 100 Commercial Street (RTN 3-0362). Therefore, MEC submitted a Transmittal Form BWSC-107A which linked the release to surface water under RTN 3-13754 to the release which applies to the MGP in a letter to the Massachusetts Department of Environmental Protection (DEP) dated 9 May 1997. The former MGP is a Tier Classified site (Tier IB) in MCP Phase II with reclassification to Tier IB (Permit No. 7-78) effective on 28 December 1999. Prior to this date the site was classified Tier II.

This status report describes IRA activities conducted from September 2001 to March 2002 and summarizes the additional IRA activities that are planned to occur during the next six months.

#### **BACKGROUND /RELEASE DESCRIPTION**

On 14 May 1996 the appearance of a sheen at portions of the West End Brook culvert (WEB) and the Malden River was reported to DEP by MEC. This release was assigned release tracking number RTN 3-13754. Verbal approval was obtained from DEP on 14 May 1996 to assess the source of the sheen including accessing the culvert to make observations and performing sampling. Absorbent booms were installed at the juncture of the WEB and the Malden River Culvert (MRC).

The release is described as an intermittent release of oil or hazardous material into a culverted surface water body (WEB and/or MRC) which periodically causes a recurring, discontinuous sheen. Portions of the culverted surface water bodies run beneath or near properties which were formerly occupied by an MGP as shown on Figure 1 and are located adjacent to areas

#### **OFFICES**

Cleveland  
Ohio

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Newark  
New Jersey

Portland  
Maine

Rochester  
New York

San Diego  
California

Tucson  
Arizona

Washington  
District of Columbia

where tar contaminated materials have been identified in previous subsurface explorations for the portion of the former MGP located at 100 Commercial Street (RTN 3-0362).

## SUMMARY OF PREVIOUS IRA ACTIVITIES

IRA assessment and remedial activities have been underway since May 1996 to eliminate sheens in the culverts resulting from seepage of MGP related contaminants. These activities have included the following: sediment sampling and analysis, monitoring of sheen activity, drilling and sampling of soils outside the culverts, removal of contaminated sediments and debris, installation of absorbent and containment booms, repair of existing expansion joints, grouting of weep holes, lining of catch basins and drain lines that discharge into the culverts and installation of grout collars below and around the outside of the culvert. These activities are described in IRA Status Reports No. 1 to 11 and in modifications to the IRA Plan dated 11 September 1996, 2 July 1997, 12 March 1998, 27 October 1998, 13 September 1999, 8 March 2000, 13 September 2000 and 22 November 2000 and are summarized below:

*IRA Status Report No. 1 and Update Plan* dated 11 September 1996 and second IRA Status report dated 12 March 1997 described the activities undertaken since notification in May 1996 and described a plan for eliminating the sheen. A brief summary of previous IRA assessment findings is given below:

Haley & Aldrich observed tar seepage occurring at two expansion joint locations inside the WEB. Tar was observed below the sediments at this expansion joint location in the culvert base slab and sheens appeared to be formed from coal tar in the sediment rising to the top of the surface water. Expansion joints are keyed but not structurally connected with steel reinforcing, allowing the culvert sections to expand and contract along the axis of the culvert alignment. The culvert drawings indicate that the expansion joints were filled with a 1/2 inch thickness of a pre-molded joint filler. It appears that the coal tar had decomposed the filler material thereby creating an opening for contaminant seepage. According to the culvert drawings and confirmed by our observations, expansion joints are located approximately 90 feet apart along the alignment.

Weep holes (4 inch diameter) are present along the north and south sides of the WEB culvert at approximately 10 feet intervals. The invert of the weep holes is El. 1.85 (NGVD). The conditions observed indicate that most weep holes are plugged with soil and little to no groundwater seepage is occurring at the weep holes. Only moderate water seepage was observed from weep holes at STA 13+58 (north and south sides), located at the juncture of the WEB and the MRC. Other weep holes were dry or indicated only slight (non-measurable) flow.

Samples of sediment and water were obtained inside the culvert and analyzed for polynuclear aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs). Elevated concentrations of PAHs and VOCs were detected in samples obtained from expansion joint locations.

Haley & Aldrich also conducted a subsurface exploration program consisting of drilling seven test borings and installation of observation wells during the period 25 to 30 July 1996. Test



borings were drilled adjacent to the culvert at expansion joint locations to assess the presence of tar saturated material and the potential for tar seepage into the culvert and to collect samples for grain size analyses to assess the potential for grouting of the soil. Tar saturated material was encountered in several borings, as described in the first status report.

*IRA Status Report No. 2* dated 12 March 1997 included a description of the following IRA activities:

- Assessment of potential structural impacts of the proposed work on the culvert structure as required by the MDC for the permit process. A permit dated 25 February 1997 was issued by the MDC for the work.
- Development of remedial alternatives for preventing coal tar seepage from entering the culvert.
- Preparation of contract documents, including drawings and technical specifications for conduct of the proposed remedial work.
- Completion and issuance of Contract Documents to five qualified Contractors for bidding purposes. A pre-bid meeting and site visit was held on 26 February 1997 to address Contractor questions.

Additional development of remedial alternatives and modification of the bid documents was performed during the period March to June 1997 and the contract documents were rebid in June 1997. An IRA Update Plan dated 2 July 1997 was prepared and submitted to DEP describing the proposed remedial options as outlined in the revised contract documents for bidding. The IRA activities conducted under the Update Plan included the following work within the WEB from STA 10+40 (Commercial Street) to the juncture of the WEB and the MRC at STA 13+58:

1. Preparation, implementation and management of a health and safety plan and procedures as outlined in Section 01540 - Health and Safety.
2. Removal of 78 tons of contaminated sediment within the WEB and management of contaminated media in accordance with the requirements contained in Section 02220 - Contaminated Media Management Plan.
3. Grouting of leaking joints or cracks to reduce seepage during joint replacement work.
4. Grouting of weep holes from STA 10+38 to STA 13+58 at north and south sides of the culvert. Repair of concrete around pipe penetrations.
5. Replacement of the existing expansion joint material and installation of a "strip and seal" waterproofing system at the joint surface at four expansion joint locations within the WEB.

As described in *IIA Status Report No. 5*, dated 11 September 1998, the additional work described in the IIA Plan Update dated 12 March 1998 was bid upon and awarded to Fleet Environmental, Inc. (Fleet) in June 1998.

*IRA Status Report No. 6* described activities that occurred during the period late August 1998 to March 1999. Fleet mobilized equipment the week of 24 August 1998, and began repair related activities the following week. Work began in the WEB which was staged from the culvert opening at Commercial Street. Work began in the MRC in November 1998 and was completed in December 1998. The work in the MRC was staged from the culvert opening in the MRC at STA 7+80. As work was beginning in the MRC, it became apparent that additional measures would be necessary to mitigate migration of coal tar material at the exterior and interior of the culvert. Additional IRA assessment and remedial measures, outlined in the IRA Plan Update dated 27 October 1998, included installation of a seepage collar below the base and outside the exterior walls of the MRC, repair of additional expansion joints, removal of sediments and installation of observation/collection wells. Additional joint repair and sediment removal in the chamber area where the WEB meets the MRC, was undertaken by T. Ford Company. This work began in December 1998 and was completed in January 1999. The following activities were performed under the IRA Plan Updates dated 12 March and 27 October 1998:

#### **Culvert Section Preparation/Sediment and Coal Tar Removal**

- Dams were erected up and downstream of the working area to isolate each culvert channel section and the sections were unwatered. The WEB sections extended for a length of approximately 200 ft. from approximately STA 8+00 to STA 10+00. The MRC sections extended for a length of approximately 280 ft., from STA 5+00 to STA 7+80. The chamber area work extended from WEB STA 13+60 to MRC STAs 7+80 and 8+10. Absorbent booms were located downstream of the lower dam at each channel section to capture fugitive sheens.
- Sediments were removed from the culvert sections and chamber area by a small bobcat loader. The inside of the culvert was broom cleaned and then pressure washed to remove residual coal tar staining. Sediments were temporarily stored on-site in rolloff containers prior to removal off-site to Environmental Soil Management Inc. (ESMI) in Loudon, New Hampshire.
- DNAPL coal tar, which had been seeping into the culvert through an expansion joint at STA 11+72 of the north side of the WEB culvert, was removed using oil absorbent pads and "snare" (oil absorbent pom-poms) and placed into 55 gallon drums. Sand bag dams were constructed on the upstream and downstream side of this joint to isolate and contain the DNAPL. Absorbent pads and booms were placed inside and outside the isolated area.

#### **Weep Hole Sealing/Expansion Joint and Other Culvert Repair**

- Weep holes through the exterior walls of the north and south sides of the WEB culvert, within the dammed section, were cleaned and sealed with hydraulic cement and epoxy grout. No weep holes are present in the MRC.
- An expanding chemical grout was injected beneath and into each expansion joint to temporarily stop the flow of water and coal tar into the culvert and create a dry joint for application of the new joint repair system. The existing expansion joint filler was removed to the top of the base slab keyway. The joint and surrounding surface was cleaned by sand blasting before sealing.
- The inside of the joint, down to the keyway, was filled with a polysulfide caulking material and a strip and seal epoxy and flexible liner system was installed over a total of approximately 287 linear ft. of expansion joint at the following locations: WEB STAs 9+50, 8+60 and 8+30; MRC STAs 5+20, 6+10 and 7+00; and Chamber Area at WEB STA 13+72, MRC STA 7+87, and at STA 8+02 of the single channel section of the MRC.
- Local surface grouting and filling was performed with a cement grout around two drain lines which discharge into the south WEB side at STA 9+70 and STA 10+11, and around one which discharges into the north WEB side near STA 8+20.
- A blue stained area of the WEB southern culvert outer wall was noted to be leaking near the base of the wall. This area of the wall, near STA 9+00, was injected with an expanding chemical grout to halt the leaking.
- Repairs were also made to the culvert wall concrete at expansion joint location MRC STA 7+00 (east wall) which had spalled off during the joint repair work.

#### **Observation/Collection Wells**

- Two 8-inch diameter wells (B801-OW and B803-OW) were installed by Geologic Inc. in November 1998 on the north and south side of the WEB culvert at approximately STA 13+80 to allow for monitoring of coal tar (DNAPL) levels and limited DNAPL collection and removal. The wells were installed to a depth of approximately 20 ft. directly adjacent (within several feet) to the culvert wall and intercepted the crushed stone layer below the base slab of the culvert. The purpose of the wells was to assess the feasibility of DNAPL collection and recovery.

#### **Grout Seepage Collar**

- Knowles Industrial Service, Inc. was retained by Fleet to install a cement grout collar around and beneath the MRC at approximately STA 7+30. The grout collar was installed to contain and cut off migration of coal tar through the crushed stone below the culvert base slab and pervious backfill adjacent to the culvert sidewalls. The grout

was pumped under low pressure through ports in the floor and outside walls of the culvert.

The IRA Plan Update called for the installation of observation wells at either side of the grout collar to allow for subsequent monitoring of coal tar migration, however, observations of the grout holes indicated that coal tar had migrated beyond this location. As a result of these observations, well installation at this grout collar location was not performed.

*IRA Status Report No. 7* described assessment and remedial activities that occurred during the period March to September 1999. These activities consisted of the following:

- Sampled sediments in the MRC from STA 0+00 to STA 5+00 to assess the extent of the contamination and the need to conduct sediment removal in this area. Ten sediment samples were collected by Haley & Aldrich on 8 April 1999 at the approximate locations shown on Figure 2. The samples were analyzed for PAH by 8270, VCCs by 8260 and MADEP Method EPH/VPH.
- Monitored the presence of DNAPL in large diameter wells B801-OW and B803-OW installed in November 1998 and redeveloped the wells in May 1999.
- T. Ford Co. of Georgetown, Massachusetts mobilized to the WEB and performed the following activities from STA 13+70 to STA 10+40 during the period July through September 1999:
  1. Set up stop logs and unwatered culvert sections to inspect the previously repaired expansion joints at STA 10+40, STA 11+28.5, STA 12+18.5, and STA 13+08 in the WEB. Joints at STA 12+18.5 and 11+28.5 indicated some evidence of failure from separation of the strip and seal liner from the epoxy or tears in the liner. In addition, the underlying joint compound indicated evidence of degradation due to contact with coal tar. Although other joints in this section of the WEB did not indicate evidence of failure it was decided to replace all of the joints exposed in this section based on the observations at the failed joints.
  2. Removed sediments that accumulated in the culvert sections from STA 10+40 to STA 13+70 and the sediment trap. Approximately 32.6 tons of sediment was removed by Bobcat excavator and stored in two covered watertight roll-off containers. The roll-offs were transported to ESMI in Loudon, New Hampshire under a Bill-of-Lading on 3 September 1999. The original BOL was transmitted to DEP in November 1999.
  3. Replaced the existing expansion joints at all four locations. Previous polysulfide joint compound indicated evidence of degradation from coal tar. Coal tar immersion tests performed on a variety of polysulfide and Viton based fluoroelastomer joint compounds indicated that the Viton based joint compound was the most resistant to coal tar constituents. The joints were

replaced with Viton based PelSeal 2012/2112 manufactured by DuPont. The joint material was placed in lifts of 1/8 to 1/4 inch in thickness at two locations within the depth of the joint. The epoxy and hypalon liner system was placed directly over the joints after curing of the joint compound. A stainless steel plate was placed over the liner system to protect the liner and bolted to the upstream side.

*IRA Status Report No. 8 and IRA Plan Modification* described assessment and remedial activities that occurred during the period September 1999 to March 2000 and described additional IRA activities to be conducted. The activities completed during this period consisted of the following:

- Continued to monitor the presence of DNAPL in the large diameter wells B801-OW and B803-OW installed in November 1998 and redeveloped the wells in October 1999.
- Inspected by TV survey and relined approximately 200 linear feet of drain line and three catch basins which discharge into the WEB. The drain lines and catch basins are identified as CB106, 107 and 108 on Figure 2. Similar work had previously been conducted at the site. This work was performed by Eastern Pipe Service, Inc. of Merrimack, New Hampshire in November 1999.
- Removed 182.6 tons of accumulated sediments and repaired six expansion joints within the MRC from STA 5+00 to the end of the culvert at STA 0+00. The joints were replaced with Viton based PelSeal 2012/2112. The epoxy and hypalon liner system was placed directly over the joints after curing of the Viton joint compound. A stainless steel plate was placed over the liner system at the base of the culvert to protect the liner and bolted to the upstream side.
- Constructed a new culvert roof opening at MRC STA 5+20 to facilitate equipment access and sediment removal.
- Placed adsorbent booms in the MRC. A permanent boom was placed near the new opening and a temporary boom was placed at the end of the culvert near STA 0+00. The booms are monitored weekly and are replaced as necessary. Periodically collected and disposed of debris that collects behind the booms.

This work was conducted by T. Ford Co. under contract with MEC.

*IRA Status Report No. 9 and IRA Plan Modification* dated 13 September 2000 described assessment and remedial activities that occurred during the period March to September 2000 and described additional IRA activities to be conducted.

- Performed annual inspection of the MRC and the WEB in April (west and south barrels) and May 2000 (east and north barrels). In general, the expansion joints were found in good condition; however, NAPL was observed in the east barrel MRC



downstream from the expansion joint at station 13+72 to the culvert outfall adjacent to Anthony's Restaurant. A supplemental inspection of the single barrel section of the MRC from the junction of the MRC and WEB to Centre Street was performed in June 2000. Tar residue and differential settlement of culvert sections were observed at the expansion joint at STA 11+85 in the single barrel MRC and hardened tar was observed adjacent to a storm drain connection beneath Centre Street.

- Replaced three expansion joint seals at the juncture of the WEB and MRC at STA 7+87, STA 8+07 and STA 13+72.5. Polysulfide joint repairs made in December 1998/January 1999 were replaced with Viton based PelSeal 2012/2112. An epoxy and hypalon liner system was placed directly over the joints and a stainless steel plate was placed over the liner system at the base of the culvert to protect the liner.
- Removed approximately 15 cy of impacted sediments from the MRC from the sediment trap at STA 0+00 to the chamber area. The sediment was transported under Uniform Hazardous Waste Manifest to ESMI in Loudon, New Hampshire for thermal treatment.
- Installed an 8" diameter stainless steel recovery well adjacent to the culvert between the Operations Building and Maintenance Garage on the KeySpan property. The well was installed with a 2-ft diameter bucket auger. Water and oil removed during well development on 8 April 2000 and DNAPL recovered on 5 May 2000 were removed from the site under Uniform Hazardous Waste Manifests to the Clean Harbors Braintree facility.
- Installed a relief port (TRP-1) through the culvert base slab and the crushed stone layer below the culvert, into the surface of the underlying organic deposit, approximately 8 ft. upstream of the expansion joint at STA 13+73.5 where a coal tar seep was observed in the past. The casing and riser were extended above the top of the culvert.
- Monitored for the presence of DNAPL in large diameter wells B801-OW and B803-OW installed in November 1998. The wells were gauged for DNAPL on a weekly basis. Coal tar has not been observed since the wells were redeveloped.

The scope of the IRA activities was modified to include the following:

1. Inspection of all previously repaired expansion joints in the WEB and the MRC and the expansion joints in the single box section of the MRC from the juncture of the WEB north to Centre Street as part of a yearly inspection program.
2. Removal or displacement of sediments in areas where joints require replacement or other repair. Sediments will be removed if the thickness of the sediments impedes joint repair or if contamination potentially contributing to a seep is noted in the sediment. Repair or replace joints where evidence of coal tar seepage is evident or suspected.

3. Construction of a new culvert roof opening at MRC STA 11+60 to facilitate equipment access and sediment removal for joint repair in the single barrel Malden River Culvert.
4. Repair or replacement of expansion joint at STA 11+85 MRC and other joints where evidence of coal tar seepage was noted during the annual culvert inspections.
5. Performance of a TV Camera survey in the 42-in. storm drain in Centre Street that drains into the culvert.
6. Installation of a permanent DNAPL recovery system at RW-1 and conduct of a field trial pump test.

*IRA Status Report No. 10* dated 12 March 2001 described assessment and remedial activities that occurred during the period September 2000 to March 2001. The tasks completed during this period consisted of the following:

- Continued weekly or bi-weekly monitoring of the large diameter wells B801-OW and B803-OW installed in November 1998. The wells have not revealed the presence of measurable LNAPL or DNAPL thickness since well redevelopment.
- Continued weekly or bi-weekly monitoring of recovery well RW-1 revealed the well stabilized with approximately 64 inches of DNAPL (approximately 18 gallons) in the well itself. A successful field trial of DNAPL recovery was conducted on 14 and 15 October 2000 using a pneumatic down-hole pump. Approximately 41 gallons of DNAPL were recovered over a 32-hour period at a rate of 1.3 gallons per hour (gph), during which 3 inches of draw-down of the DNAPL was measured. The well maintained approximately 17.2 gallons of DNAPL (95 percent of the initial 18 gallons) during the test. The DNAPL was stored in a DOT approved steel drum staged within a fenced area at the site and transported offsite on 2 November 2000 under Uniform Hazardous Waste Manifest.
- Continued weekly or bi-weekly monitoring of the tar relief port (TRP-1) revealed varying amounts of DNAPL between 4 and 10 inches.
- Weekly or twice-weekly inspection and periodic replacement of the culvert booms deployed at the culvert opening near STA 5+20. Periodic collection of debris trapped by the booms.

*IRA Status Report No. 11* dated 12 September 2001 described assessment and remedial activities that occurred during the period March 2001 to September 2001. The tasks completed during this period consisted of the following:

- Continued weekly or bi-weekly monitoring of the large diameter wells B801-OW and B803-OW installed in November 1998 have not revealed the presence of measurable LNAPL or DNAPL thickness since well redevelopment.
- Continued weekly or bi-weekly monitoring of recovery well RW-1 (prior to ongoing DNAPL recovery efforts) showed the well stabilized with approximately 65 inches of DNAPL, approximately 18 gallons in the well.
- Continued weekly or bi-weekly monitoring of the tar relief port (TRP-1) has revealed varying amounts of DNAPL measured between  $4\frac{1}{2}$  and  $9\frac{1}{4}$  inches.
- Weekly or twice-weekly inspection and periodic replacement of the culvert booms deployed at the culvert opening near STA 5+20. Periodic collection of debris trapped by the booms.
- Performed annual inspection of the MRC (west barrel) and the WEB(north and south barrels) in June. In general, the expansion joints were found in good condition; however, the Hypalon liner at STA 8+20 (located in the split section of the WEB beneath the MBTA Tracks) was punctured with an approximate 1/8" diameter hole. The Viton seal beneath the membrane appeared intact and undamaged and no coal tar was observed. Coal tar was observed migrating into the culvert (WEB) from a small crack in the hydraulic cement seal of a pipe connecting catch basin CB-4 to the culvert. This catch basin connection is located between the Operations Building and Maintenance Garage. Also, coal tar impacted sediments were noted in WEB downstream of CB-4 piping and in the west barrel of the MRC to the Malden River outfall adjacent to Anthony's Restaurant. A supplemental inspection of the single barrel section of the MRC from the junction of the MRC and WEB to Centre Street was also performed in June 2001. Sheens and coal tar impacted sediment were noted south of the expansion joints at STA 12+30 and STA 12+52. No sheens or coal tar impacted sediments were observed upstream of the joint at STA12+52 at this time (as described below, during joint replacement of STA 12+52 in July 2001, evidence of coal tar was observed within a 42 inch drainpipe entering the culvert approximately 5 ft upstream of STA12+52). No evidence of coal tar seepage was noted from the existing expansion joints downstream of STA 11+10. Inspection of the joint at STA 11+85 revealed it did not appear to be an expansion joint, therefore no repair was necessary at this location.
- Replaced six joints of the single barrel MRC at STA 12+52, 12+30, 11+10, 10+50, 9+90 and 9+00. Steel covers were installed at STA 8+20, 8+70, 9+49 in both barrels of WEB and plates were installed over newly replaced joints in the single barrel MRC at STA 12+52, 12+30, 11+10, 10+50, 9+90 and 9+00. The punctured Hypalon liner at STA 8+20 (WEB) was repaired on 13 June 2001.
- Coal tar intrusion at the CB-4 influent pipe seal was repaired on 13 June 2001.

- Prior to replacing joints in the single barrel MRC, a new opening, approximately 8 ft by 8 ft, was cut into the culvert roof under an MDC permit dated 15 March 2001. Approximately 2 ft of soil was excavated from above the culvert and stockpiled nearby. The location of the new culvert opening is at STA 11+30, approximately 230 ft. north of the south end of the single culvert.
- Installed the DNAPL recovery system between 16 July and 9 August 2001 adjacent to the Operations Building on the KeySpan property. System operation and design details were submitted to DEP in Addendum to Immediate Response Action (IRA) Plan Modification dated 22 November 2000 based on the results of a field trial pump test conducted in October 2000. Air and coal tar transmission lines between the shed and recovery well were run in a trench inside 4-inch PVC conduit. Approximately 1 cubic yard of excess soil was generated during trenching and stockpiled on polyethylene on site. The system was started on 9 August 2001 and adjusted to recover DNAPL at a rate of approximately 1 gallon per hour (gph). Three (3) inches of drawdown of the tar was measured over the first four days of operation, after which drawdown steadily increased. After 8 days of continuous operation, the thickness of the tar had been reduced to 37 inches and approximately 175 gallons of tar had been recovered. The system was shut off on 17 August 2001 for a few days to allow DNAPL to recharge and to prevent pumping groundwater into the system. The system was restarted at a lower pumping rate on 22 August 2001 after the DNAPL was measured at a thickness of 55 inches. The system has been intermittently operated and shut down to determine DNAPL recharge rates in order to determine the optimal pumping rate.

The scope of the IRA activities was modified to include the following:

1. Expanded investigation of the drainage network including a TV camera survey beneath Centre Street of the 42-inch diameter storm drain that drains into the MRC and related drain pipes beneath Commercial Street and an invert pipe elevation survey.
2. Repair of the 42-inch diameter storm drain beneath Centre Street or other drain lines if shown by the TV survey to be an observed avenue for coal tar seepage into the MRC.

#### STATUS OF ASSESSMENT AND REMEDIAL ACTIVITIES

During the September 2001 to March 2002 operating period, the following assessment and remedial tasks were undertaken:

##### IRA Activities

- Continued weekly or bi-weekly monitoring of the large diameter wells B801-OW and B803-OW installed in November 1998 have not revealed the presence of measurable LNAPL or DNAPL thickness since well redevelopment.

- Continued operation of the DNAPL Recovery System has removed 141 gallons of tar since 12 September 2001 and a total of 451 gallons since the start-up of the recovery system. The system has been operated intermittently in order to allow DNAPL to recharge and to prevent pumping groundwater into the system. Continued weekly or bi-weekly monitoring of recovery well RW-1 has revealed varying amounts of DNAPL measured between 30 and 56 inches in thickness depending on the DNAPL recovery system operational status and recovery pumping rates.
- Continued weekly or bi-weekly monitoring of the tar relief port (TRP-1) has revealed varying amounts of DNAPL measured between 3 and 8 inches in thickness.
- Weekly or twice-weekly inspection and periodic replacement of the culvert booms deployed at the culvert opening near STA 5+20. Periodic collection of debris trapped by the booms.
- As part of the annual culvert inspection activities, impacted sediments were removed from the sediment trap located at the mouth of the MRC and placed in a watertight roll-off for characterization and off-site removal. See further discussion below.
- A TV camera survey was conducted by Azurix North America from Westbrook, Maine on 29 October and 16 November 2001 which included the following limits of survey: the 12 inch drain pipe from 99 Commercial Street to 65 Commercial Street, the 15 inch drain pipe from the intersection of Charles Street and Commercial Street to the South barrel of the WEB, catch basin CB-108 to catch basin CB-101 within the KeySpan property, catch basin CB-104 to catch basin CB-102 within the KeySpan property, catch basin CB-1 to catch basin CB-4 within the KeySpan property, the 42 inch drain line along Centre Street from approximately 80 feet west of man-hole DMH-1 to the single barrel MRC, as well as the drain at the intersection of Commercial Street and Centre Street from man-hole DMH-2 to catch basin CB-4. The 42-inch drain line in Centre Street was added to the survey based on observations made during the culvert inspection.
- Prior to the TV camera survey, record plans of the drainage system in Commercial and Centre Streets were reviewed and observations were made in selected manhole locations within Centre Street.

Activities scheduled to commence in the spring and summer 2002 include the following:

- **Annual Culvert Observation:** The annual inspection will cover the WEB from approximately Pearl Street to the intersection of the WEB and MRC. The MRC will be inspected from Centre Street to the culvert outflow.
- **Drain Line Elevation Survey:** We plan to conduct an elevation survey of the drainage components along Center and Commercial Street to compare drain line



inverts with local tar and groundwater elevations and to evaluate potential for tar migration into the drainage system.

- **Lining of the 42-inch Diameter Storm Drain in Centre Street:** Plans and specifications are currently being prepared for the lining of an approximately 500 foot section of the 42-inch diameter storm drain beneath Centre Street to mitigate the coal tar seepage observed during the camera survey of the storm drain system.
- **DNAPL Collection System Monitoring and Ongoing NAPL Monitoring:** Ongoing system monitoring will consist of monitoring system parameters, estimation of the amount of DNAPL collected from the recovery well, and gauging of the nearby monitoring wells. Therefore, we will continue periodic monitoring of the recovery well (RW-1), B506-OW, B206-OW, TRP-1, B801-OW, and B803-OW.
- **Removal of Contaminated Sediments:** Contaminated sediments will be removed from the MRC from approximately STA 12+70 to the mouth of the culvert following relining of the 42-in diameter storm drain in Centre Street. Sediments will also be removed from the WEB from approximately STA 12+20 (South Barrel only) to the juncture of the WEB and the MRC. Contaminated sediments have not been removed from the culvert barrel sections during this period based on the observation of active tar seepage into the 42-inch diameter storm drain beneath Centre Street. This situation will be addressed by lining of the 42-inch drain line.

## NEW SITE INFORMATION

### Sediment Quality Data

- **MRC Single Barrel:** Two samples (DMH-3 and 42/MRC) collected on 5 September 2001 during the annual inspection reported in IRA Status Report 11, taken in situ near the junction of the 42-inch line were analyzed for VOCs, SVOCs, PCBs, RCRA 8 Metals, Total Petroleum Hydrocarbons and Hazardous Characteristics (pH, flashpoint, corrosivity). The results of the testing summarized on Table I indicate the sediment contain VOCs (primarily naphthalene and trimethylbenzenes), PAHs, and low levels of chromium arsenic, and lead. PCBs were not detected.
- **DNAPL Recovery System Piping Trench:** One sample (Trench) collected on 28 September 2001 from the approximately 1 cubic yard of excess soil from the DNAPL Recovery System Piping Trench was analyzed for VOCs, SVOCs, PCBs, RCRA 8 Metals, Total Petroleum Hydrocarbons and Hazardous Characteristics (pH, flashpoint, corrosivity). The soil was added to the roll-off container containing culvert sediment. The results of the testing are summarized on Table I indicate the soils contain PAHs, and low levels of barium, chromium arsenic, and lead. PCBs were not detected.
- **Culvert Sediment Roll-Off:** One composite sample (SED Comp-1) collected on 10 October 2001 from the roll-off containing culvert sediment and the excess soil from

the DNAPL recovery system piping trench discussed above was analyzed for VOCs, SVOCs, PCBs, RCRA 8 Metals, Total Petroleum Hydrocarbons and Hazardous Characteristics (pH, flashpoint, corrosivity). The results of the testing summarized on Table I indicate the sediments/soils contain VOCs (primarily xylenes and naphthalene), PAHs, and low levels of barium, chromium arsenic, and lead. PCBs were not detected.

Sediment sample locations are shown on Figure 2 and the laboratory data is included in Appendix B.

#### **New Observations**

During the camera survey conducted on the drain line system on and around the KeySpan property, coal tar infiltration was observed at all joints within the 42-inch diameter storm drain located along Centre Street from DMH-2 to DMH-3 (See Figure 2 for catch basin and manhole location and numbering scheme). Sheens and strong coal tar odor were observed in manhole DMH-2 located in the intersection of Centre and Commercial Streets. A brown coal tar film was also observed on the water surface within the 42-inch diameter storm drain located along Centre Street from DMH-2 to DMH-3. Heavy sheens, strong coal tar odors and impacted sediments were observed within DMH-3, approximately 10 feet west of the single barrel MRC. Impacted sediments and coal tar odors were also observed within the 42-inch diameter storm drain near the opening into the MRC. No active coal tar seepage was noted in areas previously lined. Sediment samples were collected from DMH-3 and near the opening within the 42-inch diameter storm drain. Sample results are summarized in Table I.

The drainage network along Centre and Commercial Street was evaluated by reviewing existing plans and manhole observations to locate the connections between the Commercial Street drain lines and the 42-inch diameter storm drain beneath Centre Street. No connection was observed between the Commercial and Centre Street storm drain line systems.

#### **REMEDIATION WASTE MANAGEMENT**

On November 8, 2001 12.48 tons of contaminated soil from trenching for the DNAPL system and sediments from the sediment trap at the mouth of the MRC were removed for off-site treatment at Environmental Soil Management, Inc. (ESMI), 67 International Drive, Loudon, New Hampshire 03301.

Coal tar recovered from the DNAPL recovery system is temporarily stored in DOT- approved steel drums within the recovery shed with secondary containment. The storage plan was reviewed and approved by the Malden Fire Department and a 500-gallon storage permit was issued. Three (3) 55-gallon drums were removed from the site and transported by Clean Harbors of Braintree, Massachusetts on 11 February 2002 under Hazardous Waste Manifest along with three (3) flexbins containing personal protective equipment (PPE) and tar stained debris.

Additional remediation waste associated with upcoming IRA activities will be generated following repair of the 42-inch diameter storm drain. These include contaminated sediments within the culvert and contaminated debris trapped by the booms. Contaminated sediments will be placed in watertight roll-off containers and sampled for off-site treatment at ESMI. Absorbent booms and pads will be collected, stored in flexbins and disposed of off-site by Clean Harbors.

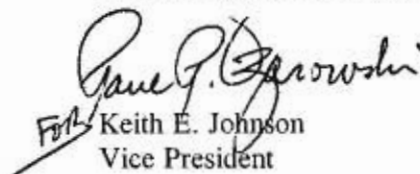
#### SEAL AND SIGNATURE OF LSP

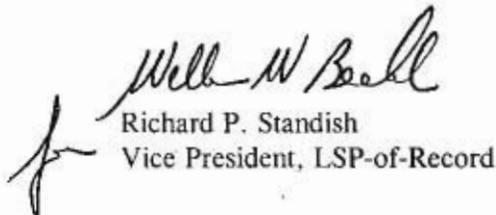
The LSP seal and signature for this IRA Status Report are provided on the original IRA Transmittal Form (BWSC-105) enclosed with this submittal. A copy of Form BWSC-105 is also included in Appendix A herein.

#### CLOSURE

If you have any questions regarding the content of this IRA Status Report, please contact Keith Johnson or Richard Standish at Haley & Aldrich, Inc.; (617) 886-7318 and 860-659-4248 respectively.

Sincerely yours,  
HALEY & ALDRICH, INC.

  
Keith E. Johnson  
Vice President

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

#### Attachments:

- Table I - Sediment Quality Data
- Figure 1 - Site Plan
- Figure 2 - Site and Subsurface Exploration Location Plan
- Appendix A - BWSC-105 (Copy) with Attachment
- Appendix B - Sediment Quality Data

- c: City of Malden; Mayor Richard C. Howard  
Massachusetts Electric Company; Ms. Michele A. Vose (2 copies)  
KeySpan Energy Delivery; Mr. Alexander G. Taft  
Metropolitan District Commission; Mr. Paul DiPietro  
Malden Redevelopment Authority; Mr. Steve Wishoski  
Board of Health, City of Malden; Mr. Walter F. Carlan; Director  
City of Malden; Mr. Jack Kelly; City Engineer  
Coast Guard Petty Officer Stevens

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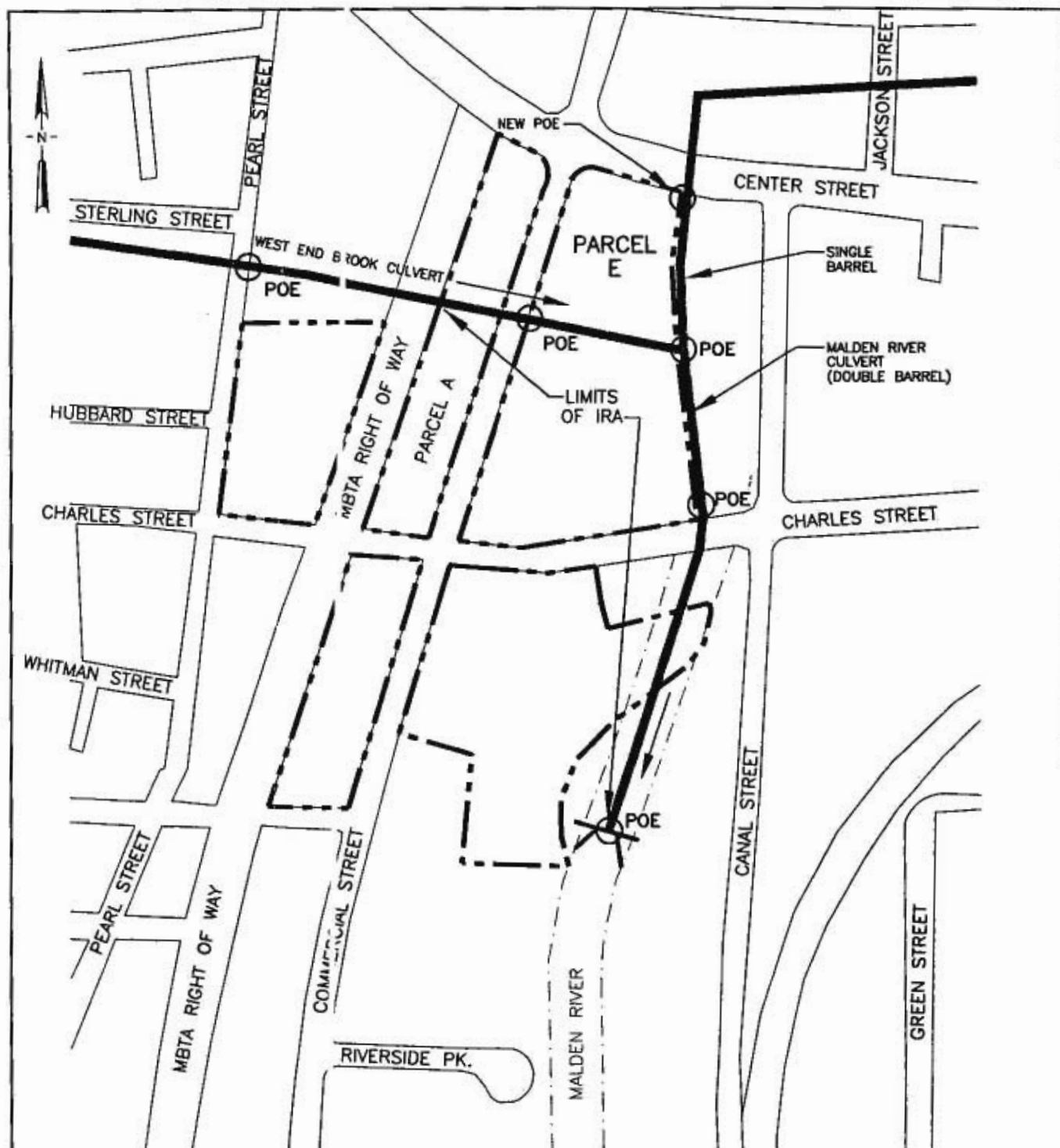


TABLE I  
SUMMARY OF MALDEN RIVER CULVERT AND WEST IND BROOK SEDIMENT SAMPLES  
FORMER MANUFACTURED GAS PLANT SITE  
MALDEN, MASSACHUSETTS

SAMPLE DESIGNATION	42/MRC	DMH-3	TRENCH	SED COMP-1
SAMPLING DATE	9/5/2001	9/5/2001	9/28/2001	10/10/2001
SAMPLE TYPE	Sediment	Sediment	Soil	Roll-off
<b>VOCs (ug/kg)</b>				
1,2,4-Trimethylbenzene	ND (300)	850	ND (5600)	ND (16000)
1,3,5-Trimethylbenzene	460	ND (600)	ND (5600)	ND (16000)
meta-Xylene and para-Xylene	ND (300)	ND (600)	ND (1100)	4000
Naphthalene	22000 e	41000 e	ND (5600)	200000
<b>SVOCs (ug/kg)</b>				
1-Methylnaphthalene	-	-	4600	15000
2-Methylnaphthalene	3400	3300	3100	18000
Acenaphthene	8100	3100	3900	6200
Acenaphthylene	1700	660	6500	ND (2800)
Anthracene	6500	2900	5400	5600
Benzo(a)anthracene	4300	1300	10000	4400
Benzo(a)pyrene	3900	1200	11000	3700
Benzo(e)pyrene	-	-	6900	ND (2800)
Benzo(b)fluoranthene	2600	830	8000	3100
Benzo(g,h,i)perylene	2200	440	6400	ND (2800)
Benzo(k)fluoranthene	2500	750	7400	4000
bis(2-Ethylhexyl)phthalate	1300	ND (390)	ND (1100)	ND (5700)
Carbazole	1400	900	600	ND (2800)
Chrysene	4000	1300	11000	4900
Dibenzo(a,h)anthracene	560 J	ND (390)	2000	ND (2800)
Dibenzofuran	5400	2400	960	4200
Fluoranthene	11000	4100	16000	12000
Fluorene	10000	3800	3100	7500
Indeno(1,2,3-cd)pyrene	2700	590	7600	ND (4000)
Naphthalene	14000	12000	3000	30000
Perylene	-	-	2600	ND (2800)
Phenanthrene	21000	8600	13000	21000
Pyrene	10000	3400	24000	11000
<b>RCRA METALS (mg/kg)</b>				
Arsenic, Total	2.2	2.3	7.2	11
Barium, Total	ND (25)	ND (24)	17	36
Cadmium, Total	ND (0.64)	ND (0.60)	ND (0.42)	ND (0.45)
Chromium, Total	ND (13)	ND (12)	7.8	18
Lead, Total	36	18	43	180
Mercury, Total	ND (0.041)	ND (0.040)	ND (0.23)	ND (0.23)
Selenium, Total	ND (13)	ND (12)	ND (0.84)	ND (0.90)
Silver, Total	ND (6.4)	ND (6.0)	ND (0.42)	ND (0.45)
<b>TPH (mg/kg)</b>	870	530	-	-
<b>Polychlorinated Biphenyls (ug/kg)</b>				
Aroclor 1016	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1221	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1232	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1242	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1248	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1254	ND (99)	ND (92)	ND (266)	ND (284)
Aroclor 1260	ND (99)	ND (92)	ND (266)	ND (284)
<b>RCRA Hazardous Waste Characterization</b>				
Corrosivity (as pH)	7.4	6.0	7.6	8.2
Ignitability (as Flashpoint, °F)	> 165	> 165	> 150	> 150
Reactive Cyanide (mg/kg)	ND (5)	ND (5)	ND (0.22)	ND (0.22)
Reactive Sulfide (mg/kg)	ND (100)	ND (100)	ND (1.80)	0.72

NOTES AND ABBREVIATIONS:

1. ND(2): Compound not detected above quantization limit; number in parentheses is the detection limit.
2. J: Value is an estimate, detected at a concentration below the reporting limit for the analyte.
3. -: Sample was not tested for this analyte.
4. Only detected compounds are listed above, except for PCE which are all listed.
5. e: Indicates concentration exceeded calibration range for the analyte.



0 200 400  
SCALE IN FEET

**LEGEND:**

--- APPROXIMATE LIMITS OF FORMER MGP SITE  
POE POINT OF ENTRY TO CULVERT

**NOTE:**

1. THE APPROXIMATE LIMITS OF THE FORMER MGP SITE WILL BE VERIFIED THROUGH THE USE OF PHOTOGRAMMETRIC SURVEY.

**HALCYON & ALDRICH**

UNDERGROUND  
ENGINEERING &  
ENVIRONMENTAL  
SOLUTIONS

IMMEDIATE RESPONSE ACTION (IRA)  
STATUS REPORT NO.12  
WEST END BROOK/MALDEN RIVER CULVERTS  
MALDEN, MASSACHUSETTS  
RTN 3-00362/3-13754

**SITE PLAN**

SCALE: AS SHOWN

MARCH 2002

06558-628 A189

FIGURE 1



**APPENDIX A**

**BVSC-105 (Copy) With Attachment**



IMMEDIATE RESPONSE ACTION (IRA)  
TRANSMITTAL FORM

Release Tracking  
Number

3 - 362

Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

A. RELEASE OR THREAT OF RELEASE LOCATION:

Release Name: West End Brook/Malden River Culverts

(optional)

Street: 100 Commercial Street

Location Aid: Charles Street

City/Town: Malden

ZIP: 02148-5510

Code:

☒ Check here if a Tier Classification Submittal has been provided to DEP for this Release Tracking Number.

☐ Check here if this location is Adequately Regulated, pursuant to 310 CMR 40.0110-0114.

Specify Program: ☐ CERCLA ☐ HSWA Corrective Action ☐ Solid Waste Management ☐ RCRA State Program (21C Facilities)

Related Release Tracking Numbers That This IRA

3-13754

Addresses:

B. THIS FORM IS BEING USED TO: (check all that apply)

☐ Submit an IRA Plan (complete Sections A, B, C, D, E, H, I, J and K).

☐ Check here if this IRA Plan is an update or modification of a previously approved written IRA Plan. Date Submitted: \_\_\_\_\_

☐ Submit an Imminent Hazard Evaluation (complete Sections A, B, C, F, H, I, J and K).

☒ Submit an IRA Status Report (complete Sections A, B, C, E, H, I, J and K).

☐ Submit a Request to Terminate an Active Remedial System and/or Terminate a Continuing Response Action(s) Taken to Address an Imminent Hazard (complete Sections A, B, C, F, E, H, I, J and K).

☐ Submit an IRA Completion Statement (complete Sections A, B, C, D, E, G, H, I, J and K).

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. RELEASE OR THREAT OF RELEASE CONDITIONS THAT WARRANT

IRA: Identify Media and Receptors Affected: (check all that apply)

☐ Air ☐ Groundwater ☒ Surface Water ☒ Sediments ☐ Soil

☒ Wetland ☐ Storm Drain ☐ Paved Surface ☐ Private Well ☐ Public Water Supply ☐ Zone 2 ☐ Residence

☐ School ☐ Unknown ☐ Other Specify \_\_\_\_\_

Identify Conditions That Require IRA, Pursuant to 310 CMR 40.0412: (check all that apply)

☒ 2 Hour Reporting Condition(s)

☐ 72 Hour Reporting Condition(s) ☐ Substantial Release Migration ☐ Other Condition(s)

Describe Intermittent release of oil or hazardous material into a surface water body  
which causes a recurring discontinuous sheen to be periodically observed.

Identify Oils and Hazardous Materials Released: (check all that apply)

☒ Oils ☐ Chlorinated Solvents ☐ Heavy Metals

☒ Others Specify: Coal Tar

D. DESCRIPTION OF RESPONSE ACTIONS:

(check all that apply)

☐ Assessment and/or Monitoring Only

☐ Excavation of Contaminated Soils

☐ Re-use, Recycling or Treatment

☐ On Site ☐ Off Site Est. Vol. \_\_\_\_\_ cubic yards

Describe \_\_\_\_\_

☐ Store ☐ On Site ☐ Off Site Est. Vol.: \_\_\_\_\_ cubic yards

☐ Landfill ☐ Cover ☐ Disposal Est. Vol.: \_\_\_\_\_ cubic yards

☐ Removal of Drums, Tanks or Containers

Describe \_\_\_\_\_

☐ Deployment of Absorbent or Containment Materials

☐ Temporary Covers or Caps

☐ Bioremediation

☐ Soil Vapor Extraction

☐ Structure Venting System

☐ Product or NAPL Recovery

☐ Groundwater Treatment Systems

☐ Air Sparging

☐ Temporary Water Supplies

SECTION D IS CONTINUED ON THE NEXT PAGE.



**IMMEDIATE RESPONSE ACTION (IRA)  
TRANSMITTAL FORM**

Release Tracking  
Number

3 - 362

Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

**D. DESCRIPTION OF RESPONSE ACTIONS (continued):**

☐ Removal of Other Contaminated Media

Specify Type and  
Volume: \_\_\_\_\_

☐ Temporary Evacuation or Relocation of  
Residents

☐ Fencing and Sign Posting

☐ Other Response Actions Describe \_\_\_\_\_

☐ Check here if this IRA involves the use of Innovative Technologies (DEP is interested in using this information to aid in creating an Innovative Technologies Clearinghouse).

Describe  
Technologies: \_\_\_\_\_

**E. TRANSPORT OF REMEDIATION WASTE:** (if Remediation Waste has been sent to an off-site facility, answer the following questions)

Name of Facility: Environmental Soil Management, Inc. / Clean Harbors, Inc.

Town and State: Loudon, NH/Quincy, MA

Quantity of Remediation Waste Transported to Date: See attached table

**F. IMMINENT HAZARD EVALUATION SUMMARY:** (check one of the following)

☐ Based upon an evaluation, an Imminent Hazard exists in connection with this Release or Threat of Release.

☐ Based upon an evaluation, an Imminent Hazard does not exist in connection with this Release or Threat of Release.

☐ Based upon an evaluation, it is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release, and further assessment activities will be undertaken.

☐ Based upon an evaluation, it is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release. However, response actions will address those conditions that could pose an Imminent Hazard.

**G. IRA COMPLETION STATEMENT:**

☐ Check here if future response actions addressing this Release or Threat of Release will be conducted as part of the Response Actions planned for a Site that has already been Tier Classified under a different Release Tracking Number, or a Site that is identified on the Transition List as described in 310 CMR 40.060 (i.e., a Transition Site, which includes Sites with approved Waivers). These additional response actions must occur according to the deadlines applicable to the earlier Release Tracking Number (i.e., Site ID Number).

State Release Tracking Number (i.e., Site ID Number) of Tier Classified Site or Transition Site: \_\_\_\_\_

If any Remediation Waste will be stored, treated, managed, recycled or reused at the site following submission of the IRA Completion Statement, you must submit either a Release Abatement Measure (RAM) Plan or a Phase IV Remedy Implementation Plan, along with the appropriate transmittal form, as an attachment to the IRA Completion Statement.

**H. LSP OPINION:**

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> if Section B of this form indicates that an **Immediate Response Action Plan** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Imminent Hazard Evaluation** is being submitted, this Imminent Hazard Evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and the assessment activity(ies) undertaken to support this Imminent Hazard Evaluation complies(y) with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000;

> if Section B of this form indicates that an **Immediate Response Status Report** is being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Immediate Response Action Completion Statement** or a **Request to Terminate an Active Remedial System and/or Terminate a Continuing Response Action(s) Taken to Address an Imminent Hazard** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

SECTION H IS CONTINUED ON THE NEXT PAGE.



IMMEDIATE RESPONSE ACTION (IRA)  
TRANSMITTAL FORM

Release Tracking  
Number

3 - 362

Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

H. LSP Opinion (continued):

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

☒ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: Richard P. Standish LSP #: 2242 Stamp:

Telephone 860-659-4248 Ext.: 3139

FAX: 860-659-4003  
(optional)

Signature: Richard P. Standish

Date: 4 MARCH 2002



I. PERSON UNDERTAKING IRA:

Name of Organization: Massachusetts Electric Company

Name of Contact: Michele A. Vose Title: Senior Environmental Engineer

Street: 55 Bearfoot Road

City/Town: Northborough State: MA ZIP Code: 01532-0000

Telephone: 508-421-7564 Ext.: \_\_\_\_\_ FAX: 508-890-4706  
(optional)

☐ Check here if there has been a change in the person undertaking the IRA.

J. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA: (check one)

☒ RP or PRP Specify ☐ Owner ☐ Operator ☐ Generator ☐ Transporter Other RP or PRP: Party of Interest

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Undertaking IRA Specify Relationship: \_\_\_\_\_

K. CERTIFICATION OF PERSON UNDERTAKING IRA:

I, Michele A. Vose, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: M. Vose Title: Senior Environmental Engineer  
(signature)

For Massachusetts Electric Company  
(print name of person or entity recorded in Section I)

Date: 03/08/02

Enter address of the person providing certification, if different from address recorded in Section I:

Street: \_\_\_\_\_

City/Town: \_\_\_\_\_ State: \_\_\_\_\_ ZIP Code: \_\_\_\_\_

Telephone: \_\_\_\_\_ Ext.: \_\_\_\_\_ FAX: \_\_\_\_\_  
(optional)

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

**E. TRANSPORT OF REMEDIATION WASTE**

(Updated through 20 February 2002)

**QUANTITIES OF REMEDIATION WASTE TRANSPORTED TO DATE**

Remediation Waste	ESMI	Clean Harbors, Inc.
Sediment	421.48	---
Soil Spoil (RW-1)	12 tons	
Oily equipment - PPE, booms, etc.	---	8 drums
Oily equipment - PPE, booms, etc.	---	4 flexbin
Oily equipment - PPE, booms, etc.	---	23 cubic yards
Coal tar	---	20 drums
Well Development (sediment/water)	---	3446 gallons (MAO1)
DNAPL	---	2506 gallons (DO18)
Decon water	---	3 drums

**H. LSP OPINION**

Response Actions on which this opinion is based were subject to the Tier I Permit issued by DEP on 28 December 1999 and the Order of Conditions issued by the Malden Conservation Commission on 21 September 1999.



**APPENDIX B**  
**Sediment Quality Data**

# GROUNDWATER? ANALYTICAL

Groundwater Analytical, Inc.  
P.O. Box 1200  
228 Main Street  
Buzzards Bay, MA 02532  
Telephone (508) 759-4441  
FAX (508) 759-4475

September 21, 2001

Mr. Steve Provencal  
Haley & Aldrich, Inc.  
465 Medford Street  
Boston, MA 02129-1400

**Project:** Malden Culvert/0658-608  
**Lab ID:** 44233  
**Sampled:** 09-05-01

Dear Steve:


Enclosed are the Metals, PCBs, Volatile Organics, Semivolatile Organics, Hydrocarbon Fingerprint, Ignitability, Reactivity and Corrosivity Analyses performed for the above referenced project. This project was processed for Standard Two Week turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,



Jonathan R. Sanford  
President

JRS/amb  
Enclosures

## EPA Method 8260B Volatile Organics by GC/MS

Field ID: 42/MRC  
Project: Malden Culvert/0655 1-608  
Client: Haley & Aldrich, Inc.  
Container: 40 mL VOA Vial  
Preservation: Methanol/Cool  
Matrix: Soil  
% Moisture: 20

Laboratory ID: 44233-01  
QC Batch ID: VM2-2185-E  
Sampled: 09-05-01  
Received: 09-07-01  
Analyzed: 09-19-01  
Dilution Factor: 1  
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/Kg	600
74-87-3	Chloromethane	BRL	ug/Kg	600
75-01-4	Vinyl Chloride	BRL	ug/Kg	600
74-83-9	Bromomethane	BRL	ug/Kg	600
75-00-3	Chloroethane	BRL	ug/Kg	600
75-69-4	Trichlorofluoromethane	BRL	ug/Kg	600
60-29-7	Diethyl Ether	BRL	ug/Kg	600
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	300
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/Kg	3,000
67-64-1	Acetone	BRL	ug/Kg	3,000
75-15-0	Carbon Disulfide	BRL	ug/Kg	3,000
75-09-2	Methylene Chloride	BRL	ug/Kg	1,200
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	300
1634-04-4	Methyl tert-butyl Ether (MTBE)	BRL	ug/Kg	300
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	300
590-20-7	2,2-Dichloropropane	BRL	ug/Kg	300
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	300
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	3,000
74-97-5	Bromochloromethane	BRL	ug/Kg	300
109-99-9	Tetrahydrofuran (THF)	BRL	ug/Kg	3,000
67-66-3	Chloroform	BRL	ug/Kg	300
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	300
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	300
563-58-6	1,1-Dichloropropene	BRL	ug/Kg	300
71-43-2	Benzene	BRL	ug/Kg	300
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	300
79-01-6	Trichloroethene	BRL	ug/Kg	300
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	300
74-95-3	Dibromomethane	BRL	ug/Kg	300
75-27-4	Bromodichloromethane	BRL	ug/Kg	300
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	300
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	3,000
108-88-3	Toluene	BRL	ug/Kg	300
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	300
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	300
127-18-4	Tetrachloroethene	BRL	ug/Kg	300
142-28-9	1,3-Dichloropropane	BRL	ug/Kg	300
591-78-6	2-Hexanone	BRL	ug/Kg	3,000
124-48-1	Dibromochloromethane	BRL	ug/Kg	300
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/Kg	300
108-90-7	Chlorobenzene	BRL	ug/Kg	300
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/Kg	300
100-41-4	Ethylbenzene	BRL	ug/Kg	300

# GROUNDWATER ANALYTICAL

## El'A Method 8260B (Continued) Volatile Organics by GC/MS

Field ID: 42/MRC  
Project: Malden Culvert/06558-608  
Client: Haley & Aldrich, Inc  
Container: 40 mL VOA Vial  
Preservation: Methanol/Cool  
Matrix: Soil  
% Moisture: 20

Laboratory ID: 44233-01  
QC Batch ID: VM2-2185-E  
Sampled: 09-05-01  
Received: 09-07-01  
Analyzed: 09-19-01  
Dilution Factor: 1  
Page: 2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	300
95-47-6	ortho-Xylene	BRL	ug/Kg	300
100-42-5	Styrene	BRL	ug/Kg	300
75-25-2	Bromoform	BRL	ug/Kg	300
98-82-8	Isopropylbenzene	BRL	ug/Kg	300
108-86-1	Bromobenzene	BRL	ug/Kg	300
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	300
96-18-4	1,2,3-Trichloropropane	BRL	ug/Kg	300
103-65-1	n-Propylbenzene	BRL	ug/Kg	300
95-49-8	2-Chlorotoluene	BRL	ug/Kg	300
108-67-8	1,3,5-Trimethylbenzene	460	ug/Kg	300
106-43-4	4-Chlorotoluene	BRL	ug/Kg	300
98-06-6	tert-Butylbenzene	BRL	ug/Kg	300
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/Kg	300
135-98-8	sec-Butylbenzene	BRL	ug/Kg	300
541-73-1	1,3-Dichlorobenzene	BRL	ug/Kg	300
99-87-6	4-Isopropyltoluene	BRL	ug/Kg	300
106-46-7	1,4-Dichlorobenzene	BRL	ug/Kg	300
95-50-1	1,2-Dichlorobenzene	BRL	ug/Kg	300
104-51-8	n-Butylbenzene	BRL	ug/Kg	300
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/Kg	300
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/Kg	300
87-68-3	Hexachlorobutadiene	BRL	ug/Kg	300
91-20-3	Naphthalene	22,000 e	ug/Kg	300
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/Kg	300

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	90 %	80 - 120 %
1,2-Dichloroethane-d <sub>4</sub>	93 %	80 - 120 %
Toluene-d <sub>8</sub>	98 %	81 - 117 %
4-Bromofluorobenzene	102 %	74 - 121 %

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified in Tables 6 and 7 of the method, and additional analytes as specified by MA DEP Method 1 Standards (310 C.M.R. 40.0973) and recommended by NH DES for initial waste site investigations, effective 12/1/97. Results are reported on a dry weight basis. Analysis performed utilizing methanol extraction technique.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

e Indicates concentration exceeded calibration range for the analyte.

## EPA Method 8260B Volatile Organics by GC/MS

Field ID: DMH-3  
Project: Malden Culvert/0658-608  
Client: Haley & Aldrich, Inc  
Container: 40 mL VOA Vial  
Preservation: Methanol / Cool  
Matrix: Soil  
% Moisture: 15

Laboratory ID: 44233-02  
QC Batch ID: VM2-2185-E  
Sampled: 09-05-01  
Received: 09-07-01  
Analyzed: 09-19-01  
Dilution Factor: 2  
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/Kg	1,200
74-87-3	Chloromethane	BRL	ug/Kg	1,200
75-01-4	Vinyl Chloride	BRL	ug/Kg	1,200
74-83-9	Bromomethane	BRL	ug/Kg	1,200
75-00-3	Chloroethane	BRL	ug/Kg	1,200
75-69-4	Trichlorofluoromethane	BRL	ug/Kg	1,200
60-29-7	Diethyl Ether	BRL	ug/Kg	1,200
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	600
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/Kg	6,000
67-64-1	Acetone	BRL	ug/Kg	6,000
75-15-0	Carbon Disulfide	BRL	ug/Kg	6,000
75-09-2	Methylene Chloride	BRL	ug/Kg	2,400
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	600
1634-04-4	Methyl tert-butyl Ether (MTBE)	BRL	ug/Kg	600
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	600
590-20-7	2,2-Dichloropropane	BRL	ug/Kg	600
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	600
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	6,000
74-97-5	Bromochloromethane	BRL	ug/Kg	600
109-99-9	Tetrahydrofuran (THF)	BRL	ug/Kg	6,000
67-66-3	Chloroform	BRL	ug/Kg	600
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	600
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	600
563-58-6	1,1-Dichloropropene	BRL	ug/Kg	600
71-43-2	Benzene	BRL	ug/Kg	600
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	600
79-01-6	Trichloroethene	BRL	ug/Kg	600
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	600
74-95-3	Dibromomethane	BRL	ug/Kg	600
75-27-4	Bromodichloromethane	BRL	ug/Kg	600
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	600
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	6,000
108-88-3	Toluene	BRL	ug/Kg	600
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	600
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	600
127-18-4	Tetrachloroethene	BRL	ug/Kg	600
142-28-9	1,3-Dichloropropane	BRL	ug/Kg	600
591-78-6	2-Hexanone	BRL	ug/Kg	6,000
124-48-1	Dibromochloromethane	BRL	ug/Kg	600
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/Kg	600
108-90-7	Chlorobenzene	BRL	ug/Kg	600
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/Kg	600
100-41-4	Ethylbenzene	BRL	ug/Kg	600



# GROUNDWATER ANALYTICAL

## EPA Method 8260B (Continued) Volatile Organics by GC/MS

Field ID: DMH-3  
Project: Malden Culvert/0655 8-608  
Client: Haley & Aldrich, Inc  
Container: 40 mL VOA Vial  
Preservation: Methanol / Cool  
Matrix: Soil  
% Moisture: 15

Laboratory ID: 44233-02  
QC Batch ID: VM2-2185-E  
Sampled: 09-05-01  
Received: 09-07-01  
Analyzed: 09-19-01  
Dilution Factor: 2  
Page: 2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	600
95-47-6	ortho-Xylene	BRL	ug/Kg	600
100-42-5	Styrene	BRL	ug/Kg	600
75-25-2	Bromoform	BRL	ug/Kg	600
98-82-8	Isopropylbenzene	BRL	ug/Kg	600
108-86-1	Bromobenzene	BRL	ug/Kg	600
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	600
96-18-4	1,2,3-Trichloropropane	BRL	ug/Kg	600
103-65-1	n-Propylbenzene	BRL	ug/Kg	600
95-49-8	2-Chlorotoluene	BRL	ug/Kg	600
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/Kg	600
106-43-4	4-Chlorotoluene	BRL	ug/Kg	600
98-06-6	tert-Butylbenzene	BRL	ug/Kg	600
95-63-6	1,2,4-Trimethylbenzene	850	ug/Kg	600
135-98-8	sec-Butylbenzene	BRL	ug/Kg	600
541-73-1	1,3-Dichlorobenzene	BRL	ug/Kg	600
99-87-6	4-Isopropyltoluene	BRL	ug/Kg	600
106-46-7	1,4-Dichlorobenzene	BRL	ug/Kg	600
95-50-1	1,2-Dichlorobenzene	BRL	ug/Kg	600
104-51-8	n-Butylbenzene	BRL	ug/Kg	600
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/Kg	600
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/Kg	600
87-68-3	Hexachlorobutadiene	BRL	ug/Kg	600
91-20-3	Naphthalene	41,000 e	ug/Kg	600
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/Kg	600

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	85 %	80 - 120 %
1,2-Dichloroethane-d <sub>4</sub>	96 %	80 - 120 %
Toluene-d <sub>8</sub>	100 %	81 - 117 %
4-Bromofluorobenzene	106 %	74 - 121 %

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified in Tables 5 and 7 of the method, and additional analytes as specified by MA DEP Method 1 Standards (310 C.M.R. 40.0973) and recommended by NH DES for initial waste site investigations, effective 12/1/97. Results are reported on a dry weight basis. Analysis performed utilizing methanol extraction technique.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.  
e Indicates concentration exceeded calibration range for the analyte.

**ASTM Method D3328-90 (Modified)  
Hydrocarbon Fingerprinting by GC/FID**

Field ID: 42/MRC  
Project: Malden Culvert/065.18-608  
Client: Haley & Aldrich, Inc.  
Container: 500 mL Glass  
Preservation: Cool  
Matrix: Soil  
% Moisture: 20

Laboratory ID: 44233-03  
QC Batch ID: HF-1568-M  
Sampled: 09-05-01  
Received: 09-07-01  
Extracted: 09-10-01  
Analyzed: 09-13-01  
Dilution Factor: 1

**Qualitative Identification**

This sample has GC/FID characteristics that are similar to:

1. Petroleum products in the n-C9 to n-C36 range.

Analyte	Concentration	Units	Reporting Limit
Total Petroleum Hydrocarbons	870	mg/Kg	73

QC Surrogate Compound	Recovery	QC Limits
<i>ortho</i> -Terphenyl	91 %	60 - 140 %

**Method Reference:** Comparison of Waterborne Petroleum Oils by Gas Chromatography, Volume 11.02, Water, American Society for Testing and Materials (1990). Analytical protocol modified by use of an internal standard. Results are quantified on the basis of 5 $\alpha$ -androstane. Sample preparation protocol modified by use of microwave accelerated solvent extraction. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

**ASTM Method D3328-90 (Modified)  
Hydrocarbon Fingerprinting by GC/FID**

Field ID:	DMH-3	Laboratory ID:	44233-04
Project:	Malden Culvert/065511-608	QC Batch ID:	HF-1568-M
Client:	Haley & Aldrich, Inc.	Sampled:	09-05-01
Container:	500 mL Glass	Received:	09-07-01
Preservation:	Cool	Extracted:	09-10-01
Matrix:	Soil	Analyzed:	09-13-01
% Moisture:	15	Dilution Factor:	1

**Qualitative Identification**

This sample has GC/FID characteristics that are similar to:

1. Petroleum products in the n-C9 to C-36 range.

Analyte	Concentration	Units	Reporting Limit
Total Petroleum Hydrocarbons	530	mg/Kg	70

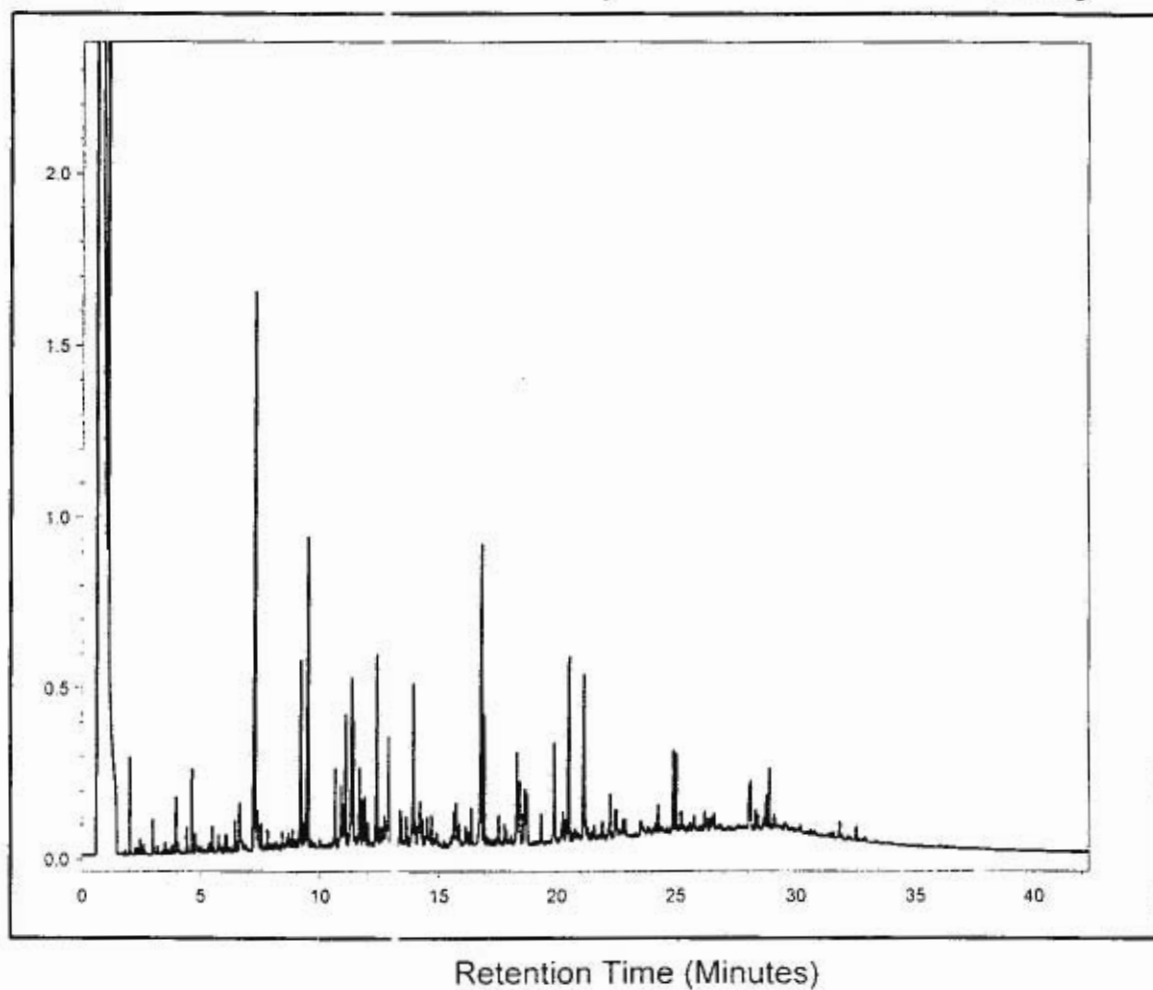
QC Surrogate Compound	Recovery	QC Limits
ortho-Terphenyl	86 %	60 - 140 %

**Method Reference:** Comparison of Waterborne Petroleum Oils by Gas Chromatography, Volume 11.02, Water, American Society for Testing and Materials (1990). Analytical protocol modified by use of an internal standard. Results are quantified on the basis of 5 $\alpha$ -androstane. Sample preparation protocol modified by use of microwave accelerated solvent extraction. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

Lab ID: 44233-04

Hydrocarbons Laboratory



# GROUNDWATER ANALYTICAL

## EPA Method 8082 Polychlorinated Biphenyls (PCBs) by GC/ECD

Field ID: DMH-3  
Project: Malden Culvert/0655E-608  
Client: Haley & Aldrich, Inc.  
Container: 500 mL Glass  
Preservation: Cool  
Matrix: Soil  
% Moisture: 15

Laboratory ID: 44233-04  
QC Batch ID: PB-1412-M  
Sampled: 09-05-01  
Received: 09-07-01  
Extracted: 09-10-01  
Analyzed: 09-11-01  
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
12674-11-2	Aroclor 1016	BRL	ug/Kg	92
11104-28-2	Aroclor 1221	BRL	ug/Kg	92
11141-16-5	Aroclor 1232	BRL	ug/Kg	92
53469-21-9	Aroclor 1242	BRL	ug/Kg	92
12672-29-6	Aroclor 1248	BRL	ug/Kg	92
11097-69-1	Aroclor 1254	BRL	ug/Kg	92
11096-82-5	Aroclor 1260	BRL	ug/Kg	92

QC Surrogate Compound	Recovery	QC Limits
Tetrachloro- <i>m</i> -xylene	89 %	25 - 121 %
Decachlorobiphenyl	107 %	28 - 138 %

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as Aroclor analytes formerly specified by EPA Method 8080A. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.



**Trace Metals by ICP-AES and CVAA**

Field ID: 42/MRC  
Project: Malden Culvert/06558-608  
Client: Haley & Aldrich, Inc.  
Container: 500 mL Glass  
Preservation: Cool  
Matrix: Soil

Laboratory ID: 44233-03  
Sampled: 09-05-01  
Received: 09-07-01  
% Solids 80

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	2.2	mg/Kg	1.3	09-10-01	MM-1431-S	6010B
7440-39-3	Barium, Total	BRL	mg/Kg	25	09-10-01	MM-1431-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.64	09-11-01	MM-1431-S	6010B
7440-47-3	Chromium, Total	BRL	mg/Kg	13	09-10-01	MM-1431-S	6010B
7439-92-1	Lead, Total	36	mg/Kg	13	09-10-01	MM-1431-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.041	09-10-01	MM-1083-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	13	09-11-01	MM-1431-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	6.4	09-10-01	MM-1431-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).  
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.  
Reporting limits are adjusted for sample dilution and sample size.

# GROUNDWATER ANALYTICAL

## Trace Metals by ICP-AES and CVAA

Field ID: DMH-3  
Project: Malden Culvert/06558-603  
Client: Haley & Aldrich, Inc.  
Container: 500 mL Glass  
Preservation: Cool  
Matrix: Soil

Laboratory ID: 44233-04  
Sampled: 09-05-01  
Received: 09-07-01  
% Solids: 85

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	2.3	mg/Kg	1.2	09-10-01	MM-1431-S	6010B
7440-39-3	Barium, Total	BRL	mg/Kg	24	09-10-01	MM-1431-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.60	09-11-01	MM-1431-S	6010B
7440-47-3	Chromium, Total	BRL	mg/Kg	12	09-10-01	MM-1431-S	6010B
7439-92-1	Lead, Total	18	mg/Kg	12	09-10-01	MM-1431-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.040	09-10-01	MM-1083-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	12	09-11-01	MM-1431-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	6.0	09-10-01	MM-1431-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).  
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.  
Reporting limits are adjusted for sample dilution and sample size.

**RCRA Hazardous Waste Characterization**

Field ID: 42/MRC  
Project: Malden Culvert/06558-6( 8  
Client: Haley & Aldrich, Inc.  
Container: 500 mL Glass  
Preservation: Cool  
Matrix: Solid

Laboratory ID: 44233-03  
Sampled: 09-05-01  
Received: 09-07-01

Analyte	Result	Units	Reporting Limit	RCRA Limit	Analyzed	Method
Corrosivity (as pH)	7.4	pH	N/A	> 2.0 and < 12.5	09-12-01	EPA 9045C
Ignitability (as Flashpoint)	> 165	°F	70	†	09-12-01	EPA 1010-Mod
Reactive Cyanide	1 RL	mg/Kg	5	250 <sup>◇</sup>	09-12-01	SW-846 Chp. 7.3.1
Reactive Sulfide	1 RL	mg/Kg	100	500 <sup>◇</sup>	09-12-01	SW-846 Chp. 7.3.4

**Method References:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

**Report Notations:** BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† When ignited, burns so vigorously and persistently that it creates a hazard (40 C.F.R. 261.22).

◇ Current EPA guidance level (SW-846).

**RCRA Hazardous Waste Characterization**

Field ID: **DMH-3**  
Project: **Malden Culvert/06558-618**  
Client: **Haley & Aldrich, Inc.**  
Container: **500 mL Glass**  
Preservation: **Cool**  
Matrix: **Solid**

Laboratory ID: **44233-04**  
Sampled: **09-05-01**  
Received: **09-07-01**

Analyte	Result	Units	Reporting Limit	RCRA Limit	Analyzed	Method
Corrosivity (as pH)	<b>6.0</b>	pH	N/A	>2.0 and <12.5	09-12-01	EPA 9045C
Ignitability (as Flashpoint)	<b>&gt; 165</b>	°F	70	†	09-12-01	EPA 1010-Mod
Reactive Cyanide	I RL	mg/Kg	5	250 <sup>◊</sup>	09-12-01	SW-846 Chp. 7.3.1
Reactive Sulfide	I RL	mg/Kg	100	500 <sup>◊</sup>	09-12-01	SW-846 Chp. 7.3.4

**Method References:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

**Report Notations:** BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† When ignited, burns so vigorously and persistently that it creates a hazard (40 C.F.R. 261.22).

◊ Current EPA guidance level (SW-846).

**Project Narrative**

Project: Malden Culvert/06558-6011  
Client: Haley & Aldrich, Inc.

Lab ID: 44233  
Received: 09-07-01

**A. Physical Condition of Sample(s)**

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged in appropriate containers with the correct preservation.

**B. Project Documentation**

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

**C. Analysis of Sample(s)**

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.



## CHAIN OF CUSTODY RECORD

H&A FILE NO.	06558-60K	LABORATORY	Groundwater Analytical	DELIVERY DATE	9/7/01
PROJECT NAME	Malinda Culvert	ADDRESS	228 Main St. Buzzards Bay, MA	TURNAROUND TIME	Standard
H&A CONTACT	D. Parnavel	CONTACT	Eric Jensen	PROJECT MANAGER	W. Johnson

Sample No.	Date	Time	Depth	Type	Analyte Requested										Number of Containers	Comments (special instructions, precautions, additional method numbers, etc.)	
					① VOA	② ABNs PAH only	③ Metals RCRA (6 PP(13))	④ Pesticides PCBs	⑤ VPH Full Suite C-ranges only	⑥ EPH Full Suite C-ranges only	⑦ TPH (specify)	⑧ TCLP (specify)	⑨ Reactivity Ignitability Corrosivity				
44233																	
42/MRC	9/5/01	1535	-	Sediment	X	X	X	X			X						① VOCs by 14th level Method
DMH-3	9/5/01	1830	-	Sediment	X	X	X	X			X						② SVOCs by 8270
																	③ RCRA 8 Metals
																	④ PCBs
																	⑤ TPH by GC/FID
																	⑥ pH, Flashpoint, corrosivity

Sampled and Relinquished by	Received by	Liquid		Sampling Comments
Print Louis A. Baugh Firm Haly + Albed, Inc. Date 9/7/01 Time 16:15	Print Frank Bepko Jr. Firm H & F ICA Date 9/7/01 Time 16:15	<del>LIQUID</del>	<del>VOLUME</del>	<del>16.3°C</del>
Relinquished by	Received by			
Sign [Signature] Print Alan Maddigan Firm Groundwater Date 9/7/01 Time 16:35	Sign Alan Maddigan Print Alan Maddigan Firm Groundwater Date 9/7/01 Time 16:35			
Relinquished by	Received by			
Sign [Signature] Print Alan Maddigan Firm Groundwater Date 9/7/01 Time 16:35	Sign Alan Maddigan Print Alan Maddigan Firm Groundwater Date 9/7/01 Time 16:35			
A Sample chilled	C NaOH	E H <sub>2</sub> O <sub>2</sub>	G Methanol	
B Sample filtered	D HNO <sub>3</sub>	F HCL	H Sodium Disulfate	
X				
X X X X				
A/A	A A A A	A A →		
40 mL 8 oz 8 oz 1 oz		4 oz 4 oz		
PRESERVATION KEY				
VOA Vial				
Amber Glass				
Clear Glass				
Preservative				
Volume				
Evidence samples were tampered with?	YES NO			
If YES, please explain in section below.				

**Quality Assurance/Quality Control****A. Program Overview**

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

**B. Definitions**

**Batches** are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

**Laboratory Control Samples** are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Percent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

**Method Blanks** are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

**Surrogate Compounds** are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

# GROUNDWATER ANALYTICAL

## Quality Control Report Laboratory Control Sample

Category: EPA Method 8260B  
QC Batch ID: VM2-2185-EL  
Matrix: Soil  
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	2,500	2,100	85 %	70 - 130 %
71-43-2	Benzene	2,500	2,400	96 %	70 - 130 %
79-01-6	Trichloroethene	2,500	2,000	81 %	70 - 130 %
108-88-3	Toluene	2,500	2,300	93 %	70 - 130 %
108-90-7	Chlorobenzene	2,500	2,300	91 %	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	92 %	80 - 120 %
1,2-Dichloroethane-d <sub>4</sub>	98 %	80 - 120 %
Toluene-d <sub>8</sub>	101 %	81 - 117 %
4-Bromofluorobenzene	111 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based on the historical average recovery plus or minus three standard deviation units.

# GROUNDWATER ANALYTICAL

## Quality Control Report Method Blank

Category: EPA Method 8260B  
QC Batch ID: VM2-2185-EB  
Matrix: Soil  
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/Kg	500
74-87-3	Chloromethane	BRL	ug/Kg	500
75-01-4	Vinyl Chloride	BRL	ug/Kg	500
74-83-9	Bromomethane	BRL	ug/Kg	500
75-00-3	Chloroethane	BRL	ug/Kg	500
75-69-4	Trichlorofluoromethane	BRL	ug/Kg	500
60-29-7	Diethyl Ether	BRL	ug/Kg	500
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	250
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/Kg	2500
67-64-1	Acetone	BRL	ug/Kg	2,500
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,500
75-09-2	Methylene Chloride	BRL	ug/Kg	1000
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	250
1634-04-4	Methyl tert-butyl Ether (MTBE)	BRL	ug/Kg	250
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	250
590-20-7	2,2-Dichloropropane	BRL	ug/Kg	250
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	250
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,500
74-97-5	Bromochloromethane	BRL	ug/Kg	250
109-99-9	Tetrahydrofuran (THF)	BRL	ug/Kg	2,500
67-66-3	Chloroform	BRL	ug/Kg	250
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	250
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	250
563-58-6	1,1-Dichloropropene	BRL	ug/Kg	250
71-43-2	Benzene	BRL	ug/Kg	250
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	250
79-01-6	Trichloroethene	BRL	ug/Kg	250
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	250
74-95-3	Dibromomethane	BRL	ug/Kg	250
75-27-4	Bromodichloromethane	BRL	ug/Kg	250
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,500
108-88-3	Toluene	BRL	ug/Kg	250
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	250
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	250
127-18-4	Tetrachloroethene	BRL	ug/Kg	250
142-28-9	1,3-Dichloropropane	BRL	ug/Kg	250
591-78-6	2-Hexanone	BRL	ug/Kg	2,500
124-48-1	Dibromochloromethane	BRL	ug/Kg	250
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/Kg	250
108-90-7	Chlorobenzene	BRL	ug/Kg	250
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/Kg	250
100-41-4	Ethylbenzene	BRL	ug/Kg	250

**Quality Control Report  
Method Blank**

Category: EPA Method 8260B  
QC Batch ID: VM2-2185-EB  
Matrix: Soil  
Page: 2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	250
95-47-6	ortho-Xylene	BRL	ug/Kg	250
100-42-5	Styrene	BRL	ug/Kg	250
75-25-2	Bromoform	BRL	ug/Kg	250
98-82-8	Isopropylbenzene	BRL	ug/Kg	250
108-86-1	Bromobenzene	BRL	ug/Kg	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	250
96-18-4	1,2,3-Trichloropropane	BRL	ug/Kg	250
103-65-1	n-Propylbenzene	BRL	ug/Kg	250
95-49-8	2-Chlorotoluene	BRL	ug/Kg	250
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/Kg	250
106-43-4	4-Chlorotoluene	BRL	ug/Kg	250
98-06-6	tert-Butylbenzene	BRL	ug/Kg	250
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/Kg	250
135-98-8	sec-Butylbenzene	BRL	ug/Kg	250
541-73-1	1,3-Dichlorobenzene	BRL	ug/Kg	250
99-87-6	4-Isopropyltoluene	BRL	ug/Kg	250
106-46-7	1,4-Dichlorobenzene	BRL	ug/Kg	250
95-50-1	1,2-Dichlorobenzene	BRL	ug/Kg	250
104-51-8	n-Butylbenzene	BRL	ug/Kg	250
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/Kg	250
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/Kg	250
87-68-3	Hexachlorobutadiene	BRL	ug/Kg	250
91-20-3	Naphthalene	BRL	ug/Kg	250
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/Kg	250
QC Surrogate Compounds		Recovery	QC Limits	
Dibromofluoromethane		95 %	80 - 120 %	
1,2-Dichloroethane-d <sub>4</sub>		93 %	80 - 120 %	
Toluene-d <sub>8</sub>		105 %	81 - 117 %	
4-Bromofluorobenzene		109 %	74 - 121 %	

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified in Tables 6 and 7 of the method, and additional analytes as specified by MA DEP Method 1 Standards (310 C.M.R. - 0.0973) and recommended by NH DES for initial waste site investigations, effective 12/1/97. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.



**Quality Control Report  
Laboratory Control Sample**

Category: ASTM Method D3328-90 (Modified)  
QC Batch ID: HF-1568-M  
Matrix: Soil  
Units: mg/Kg

Analyte	Spiked	Measured	Recovery	QC Limits
Fuel Oil No. 2	130	100	75 %	60 - 140 %

QC Surrogate Compound	Recovery	QC Limits
ortho-Terphenyl	94 %	60 - 140 %

**Method Reference:** Comparison of Waterborne Petroleum Oils by Gas Chromatography, Volume 11.02, Water, American Society for Testing and Materials (1990). Analytical protocol modified by use of an internal standard. Results are quantified on the basis of 5 $\alpha$ -androstane. Sample preparation protocol modified by use of microwave accelerated solvent extraction. Results are reported on a dry weight basis.

**Report Notations:** All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

**Quality Control Report  
Method Blank**

Category: ASTM Method D3328-90 (Modified)  
QC Batch ID: HF-1568-M  
Matrix: Soil

Analyte	Concentration	Units	Reporting Limit
Total Petroleum Hydrocarbons	BRL	mg/Kg	60

QC Surrogate Compound	Recovery	QC Limits
ortho-Terphenyl	97 %	60 - 140 %

**Method Reference:** Comparison of Waterborne Petroleum Oils by Gas Chromatography, Volume 11.02, Water, American Society for Testing and Materials (1990). Analytical protocol modified by use of an internal standard. Results are quantified on the basis of 5 $\alpha$ -androstane. Sample preparation protocol modified by use of microwave accelerated solvent extraction. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that it can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

**Quality Control Report  
Laboratory Control Sample**

Category: EPA Method 8082  
QC Batch ID: PB-1412-M  
Matrix: Soil  
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
11096-82-5	Aroclor 1260	330	320	97%	70 - 130 %
QC Surrogate Compound		Recovery		QC Limits	
Tetrachloro- <i>m</i> -xylene		84%		25 - 121 %	
Decachlorobiphenyl		98%		28 - 138 %	

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are calculated on a dry weight basis.

**Report Notations:** All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

**Quality Control Report  
Method Blank**

Category: EPA Method 8082  
QC Batch ID: PB-1412-M  
Matrix: Soil

CAS Number	Analyte	Concentration	Units	Reporting Limit
12674-11-2	Aroclor 1016	BRL	ug/Kg	80
11104-28-2	Aroclor 1221	BRL	ug/Kg	80
11141-16-5	Aroclor 1232	BRL	ug/Kg	80
53469-21-9	Aroclor 1242	BRL	ug/Kg	80
12672-29-6	Aroclor 1248	BRL	ug/Kg	80
11097-69-1	Aroclor 1254	BRL	ug/Kg	80
11096-82-5	Aroclor 1260	BRL	ug/Kg	80
QC Surrogate Compound		Recovery	QC Limits	
Tetrachloro- <i>m</i> -xylene		79 %	25 - 121 %	
Decachlorobiphenyl		92 %	28 - 138 %	

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as Aroclor analytes for nery specified by EPA Method 8080A. Results are reported on a dry weight basis.

**Report Notations:** BRL indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

## Quality Control Report Laboratory Control Sample

Category: EPA Method 8270C TCL  
QC Batch ID: SV-1031-M  
Matrix: Soil  
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-95-2	Phenol	5,300	4,300	81 %	26 - 90 %
95-57-8	2-Chlorophenol	5,300	4,300	81 %	25 - 102 %
106-46-7	1,4-Dichlorobenzene	2,700	2,200	82 %	28 - 104 %
621-64-7	N-Nitrosodi-n-propylamine	2,700	2,400	90 %	41 - 126 %
120-82-1	1,2,4-Trichlorobenzene	2,700	2,100	78 %	38 - 107 %
59-50-7	4-Chloro-3-methylphenol	5,300	4,600	85 %	26 - 103 %
83-32-9	Acenaphthene	2,700	2,200	83 %	31 - 137 %
100-02-7	4-Nitrophenol	5,300	2,200	41 %	11 - 114 %
121-14-2	2,4-Dinitrotoluene	2,700	2,200	81 %	28 - 89 %
87-86-5	Pentachlorophenol	5,300	2,800	52 %	17 - 109 %
129-00-0	Pyrene	2,700	2,300	86 %	35 - 142 %
QC Surrogate Compound		Recovery		QC Limits	
2-Fluorophenol		71 %		25 - 121 %	
Phenol-d <sub>5</sub>		69 %		24 - 113 %	
Nitrobenzene-d <sub>5</sub>		77 %		23 - 120 %	
2-Fluorobiphenyl		78 %		30 - 115 %	
2,4,6-Tribromophenol		84 %		19 - 122 %	
Terphenyl-d <sub>14</sub>		85 %		18 - 137 %	

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

**Report Notations:** All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.



## Quality Control Report Method Blank

Category: EPA Method 8270C TCL  
QC Batch ID: SV-1031-M  
Matrix: Soil  
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
110-86-1	Pyridine	BRL	ug/Kg	330
108-95-2	Phenol	BRL	ug/Kg	330
111-44-4	bis (2-Chloroethyl)ether	BRL	ug/Kg	330
95-57-8	2-Chlorophenol	BRL	ug/Kg	330
541-73-1	1,3-Dichlorobenzene	BRL	ug/Kg	330
106-46-7	1,4-Dichlorobenzene	BRL	ug/Kg	330
95-50-1	1,2-Dichlorobenzene	BRL	ug/Kg	330
95-48-7	2-Methylphenol	BRL	ug/Kg	330
108-60-1	2,2'-Oxybis(1-chloropropane)	BRL	ug/Kg	330
106-44-5	4-Methylphenol	BRL	ug/Kg	330
621-64-7	N-Nitrosodi-n-propylamine	BRL	ug/Kg	330
67-72-1	Hexachloroethane	BRL	ug/Kg	330
98-95-3	Nitrobenzene	BRL	ug/Kg	330
78-59-1	Isophorone	BRL	ug/Kg	330
88-75-5	2-Nitrophenol	BRL	ug/Kg	330
105-67-9	2,4-Dimethylphenol	BRL	ug/Kg	330
111-91-1	bis (2-Chloroethoxy)methane	BRL	ug/Kg	330
120-83-2	2,4-Dichlorophenol	BRL	ug/Kg	330
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/Kg	330
91-20-3	Naphthalene	BRL	ug/Kg	330
106-47-8	4-Chloroaniline	BRL	ug/Kg	330
87-68-3	Hexachlorobutadiene	BRL	ug/Kg	330
59-50-7	4-Chloro-3-methylphenol	BRL	ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL	ug/Kg	330
77-47-4	Hexachlorocyclopentadiene	BRL	ug/Kg	330
88-06-2	2,4,6-Trichlorophenol	BRL	ug/Kg	330
95-95-4	2,4,5-Trichlorophenol	BRL	ug/Kg	830
91-58-7	2-Chloronaphthalene	BRL	ug/Kg	330
88-74-4	2-Nitroaniline	BRL	ug/Kg	830
131-11-3	Dimethylphthalate	BRL	ug/Kg	330
208-96-8	Acenaphthylene	BRL	ug/Kg	330
606-20-2	2,6-Dinitrotoluene	BRL	ug/Kg	330
99-09-2	3-Nitroaniline	BRL	ug/Kg	830
83-32-9	Acenaphthene	BRL	ug/Kg	330
51-28-5	2,4-Dinitrophenol	BRL	ug/Kg	830
100-02-7	4-Nitrophenol	BRL	ug/Kg	830
132-64-9	Dibenzofuran	BRL	ug/Kg	330
121-14-2	2,4-Dinitrotoluene	BRL	ug/Kg	330
84-66-2	Diethylphthalate	BRL	ug/Kg	330
7005-72-3	4-Chlorophenyl phenyl ether	BRL	ug/Kg	330
86-73-7	Fluorene	BRL	ug/Kg	330

## Quality Control Report Method Blank

Category: EPA Method 8270C TCL  
QC Batch ID: SV-1031-M  
Matrix: Soil  
Page: 2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
100-01-6	4-Nitroaniline	BRL	ug/Kg	830
534-52-1	4,6-Dinitro-2-methylphenol	BRL	ug/Kg	830
86-30-6	N-Nitrosodiphenylamine	BRL	ug/Kg	330
101-55-3	4-Bromophenyl phenyl ether	BRL	ug/Kg	330
118-74-1	Hexachlorobenzene	BRL	ug/Kg	330
87-86-5	Pentachlorophenol	BRL	ug/Kg	830
85-01-8	Phenanthrene	BRL	ug/Kg	330
120-12-7	Anthracene	BRL	ug/Kg	330
86-74-8	Carbazole	BRL	ug/Kg	330
84-74-2	Di-n-butylphthalate	BRL	ug/Kg	330
206-44-0	Fluoranthene	BRL	ug/Kg	330
129-00-0	Pyrene	BRL	ug/Kg	330
85-68-7	Butylbenzylphthalate	BRL	ug/Kg	330
91-94-1	3,3'-Dichlorobenzidine	BRL	ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL	ug/Kg	330
218-01-9	Chrysene	BRL	ug/Kg	330
117-81-7	bis (2-Ethylhexyl)phthalate	BRL	ug/Kg	330
117-84-0	Di-n-octylphthalate	BRL	ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL	ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL	ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL	ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL	ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL	ug/Kg	330

QC Surrogate Compounds	Recovery	QC Limits
2-Fluorophenol	69 %	25 - 121 %
Phenol-d <sub>5</sub>	73 %	24 - 113 %
Nitrobenzene-d <sub>5</sub>	72 %	23 - 120 %
2-Fluorobiphenyl	75 %	30 - 115 %
2,4,6-Tribromophenol	79 %	19 - 122 %
Terphenyl-d <sub>14</sub>	84 %	18 - 137 %

**Method Reference:** Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

**Report Notations:** BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that it can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.  
 ◊ Indicates additional target analyte.

**Quality Control Report  
Laboratory Control Sample**Category **Metals**  
Matrix **Soil**

CAS Number	Analyte	Method	QC Batch	Units	Spiked	Measured	Recovery	QC Limits
7440-38-2	Arsenic	6010B	MM-1431-SL	mg/Kg	100	81	81 %	80 - 120 %
7440-39-3	Barium	6010B	MM-1431-SL	mg/Kg	100	84	84 %	80 - 120 %
7440-43-9	Cadmium	6010B	MM-1431-SL	mg/Kg	100	83	83 %	80 - 120 %
7440-47-3	Chromium	6010B	MM-1431-SL	mg/Kg	100	85	85 %	80 - 120 %
7439-92-1	Lead	6010B	MM-1431-SL	mg/Kg	100	81	81 %	80 - 120 %
7439-97-6	Mercury	7471A	MP-1083-SL	mg/Kg	0.17	0.17	100 %	80 - 120 %
7782-49-2	Selenium	6010B	MM-1431-SL	mg/Kg	100	82	82 %	80 - 120 %
7440-22-4	Silver	6010B	MM-1431-SL	mg/Kg	100	81	81 %	80 - 120 %

**Method References:** Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).**Report Notations:** All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

**Certifications and Approvals****CONNECTICUT, Department of Health Services, PH-0586****Potable Water, Wastewater/Trade Waste, Sewage/Effluent, and Soil**

pH, Conductivity, Acidity, Alkalinity, Hardness, Chloride, Fluoride, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, Orthophosphate, Total Dissolved Solids, Cyanide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Titanium, Vanadium, Zinc, Purgeable Halocarbons, Purgeable Aromatics, Pesticides, PCBs, PCBs in Oil, Ethylene Dibromide, Phenols, Oil and Grease.

**MAINE, Department of Human Services, MA103****Drinking Water**

Reciprocal certification in accordance with Massachusetts certification for drinking water analytes.

**Waste Water**

Reciprocal certification in accordance with Massachusetts certification for waste water analytes.

**MASSACHUSETTS, Department of Environmental Protection, M-MA-103****Potable Water**

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Nitrate-N, Nitrite-N, Fluoride, Sodium, Sulfate, Cyanide, Turbidity, Residual Free Chlorine, Calcium, Total Alkalinity, Total Dissolved Solids, pH, Trihalomethanes, Volatile Organic Compounds, 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane, Total Coliform, Fecal Coliform, Heterotrophic Plate Count, E-Coli

**Non-Potable Water**

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc, pH, Specific Conductance, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Kjeldahl-N, Orthophosphate, Total Phosphorus, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Cyanide, Non-Filterable Residue, Total Residual Chlorine, Oil and Grease, Total Phenolics, Volatile Halocarbons, Volatile Aromatics, Chlordane, Aldrin, Dieldrin, DDD, DDE, DDT, Heptachlor, Heptachlor Epoxide, Polychlorinated Biphenyls (water), Polychlorinated Biphenyls (oil)

**MICHIGAN, Department of Environmental Quality****Drinking Water**

Trihalomethanes, Regulated and Unregulated Volatile Organic Compounds by EPA Method 524.2; 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane by EPA Method 504.1

**NEW HAMPSHIRE, Department of Environmental Services, 202798****Drinking Water**

Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrite-N, Orthophosphate, Residual Free Chlorine, Turbidity, Total Filterable Residue, Calcium Hardness, pH, Alkalinity, Sodium, Sulfate, Total Cyanide, Insecticides, Herbicides, Base/Neutrals, Trihalomethanes, Volatile Organics, Vinyl Chloride, DBCP, EDB, Nitrate-N.

**Wastewater**

Metals by Graphite Furnace, Metals by ICP, Mercury, pH, Specific Conductivity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Non-Filterable Residue, Oil & Grease, Total Phenolics, Total Residual Chlorine, PCBs in Water, PCBs in Oil, Pesticides, Volatile Organics, Total Cyanide.

**RHODE ISLAND, Department of Health, 54****Surface Water, Air, Wastewater, Potable Water, Sewage**

Chemistry: Organic and Inorganic

## ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive  
Westborough, Massachusetts 01581-1019  
(508) 898-9220

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65 NY:11148

## CERTIFICATE OF ANALYSIS

Client: Haley & Aldrich, Inc.	Laboratory Job Number: L0109122
Address: 465 Medford Street, Suite 2200	Invoice Number: 55320
Boston, MA 02129-1400	Date Received: 01-OCT-01
Attn: Mr. Steve Provencal	Date Reported: 09-OCT-01
Project Number: 06558-608	Delivery Method: Alpha
Site: MALDEN MGP	

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ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0109122-01	TREICH	

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report

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Authorized by: Scott McLean

Scott McLean - Laboratory Director  
This document electronically signed



ALPHA ANALYTICAL LABORATORIES  
NARRATIVE REPORTLaboratory Job Number: L0109122

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Alpha Report L0109122:

## Semi-Volatile Organics

It should be noted that one or more of the matrix spike/matrix spike duplicate percent recoveries associated with Alpha Samples L0109122-01 are below the acceptance criteria required by the method. This is being attributed to sample matrix interference.

## Total Metals

It should be noted that the matrix spike percent recovery for the analysis of Selenium associated with Alpha Sample(s) L0109122-01 and -02 is invalid because the sample concentration is greater than four times the spike amount added.

## Volatile Organics

It should be noted that due to target contamination, Alpha Sample L0109122-01 required analysis on dilution.

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200315-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L010912-01

Date Collected: 28-SEP-2001 07:30

TRENCH

Date Received : 01-OCT-2001

Sample Matrix: SOIL

Date Reported : 09-OCT-2001

Condition of Sample: Satisfactory

Field Prep: None

Number &amp; Type of Containers: 3-Arber, 1-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Solids, Total	94	%	0.10	30 2540G		1004 11:57	NL
pH	7.6	SU	-	1 9045C		1001 21:27	AT
Flash Point	> 50	deg F	70	1 1010		1003 10:30	NL
Cyanide, Reactive	NI	mg/kg	0.22	1 7.3		1002 16:49	AT
Sulfide, Reactive	1.8	mg/kg	0.45	1 7.3		1002 16:49	AT
Total Metals				1 3051			
Arsenic, Total	7.2	mg/kg	0.42	1 6010B	1002 15:20	1004 03:00	RW
Barium, Total	1	mg/kg	0.42	1 6010B	1002 15:20	1004 03:00	RW
Cadmium, Total	NI	mg/kg	0.42	1 6010B	1002 15:20	1004 03:00	RW
Chromium, Total	7.8	mg/kg	0.42	1 6010B	1002 15:20	1004 03:00	RW
Lead, Total	4	mg/kg	2.1	1 6010B	1002 15:20	1004 03:00	RW
Mercury, Total	NI	mg/kg	0.23	1 7470A	1004 15:15	1005 10:46	DM
Selenium, Total	NI	mg/kg	0.84	1 6010B	1002 15:20	1004 03:00	RW
Silver, Total	NI	mg/kg	0.42	1 6010B	1002 15:20	1004 03:00	RW
Volatile Organics 8260 via High 035				1 8260B		1004 02:27	BT
Methylene chloride	NI	ug/kg	11000				
1,1-Dichloroethane	NI	ug/kg	1700				
Chloroform	NI	ug/kg	1700				
Carbon tetrachloride	NI	ug/kg	1100				
1,2-Dichloropropane	NI	ug/kg	3900				
Dibromochloromethane	NI	ug/kg	1100				
1,1,2-Trichloroethane	NI	ug/kg	1700				
Tetrachloroethene	NI	ug/kg	1100				
Chlorobenzene	NI	ug/kg	1100				
Trichlorofluoromethane	NI	ug/kg	5600				
1,2-Dichloroethane	NI	ug/kg	1100				
1,1,1-Trichloroethane	NI	ug/kg	1100				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSISLaboratory Sample Number: L0109122-01  
TRENCH

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Volatile Organics 8260 via High 1035 continued							
Bromodichloromethane	NI	ug/kg	1100		1 8260B	1004 02:27 BT	
trans-1,3-Dichloropropene	NI	ug/kg	1100				
cis-1,3-Dichloropropene	NI	ug/kg	1100				
1,1-Dichloropropene	NI	ug/kg	5600				
Bromoform	NI	ug/kg	1100				
1,1,2,2-Tetrachloroethane	NI	ug/kg	1100				
Benzene	NI	ug/kg	1100				
Toluene	NI	ug/kg	1700				
Ethylbenzene	NI	ug/kg	1100				
Chloromethane	NI	ug/kg	5600				
Bromomethane	NI	ug/kg	2200				
Vinyl chloride	NI	ug/kg	2200				
Chloroethane	NI	ug/kg	2200				
1,1-Dichloroethene	NI	ug/kg	1100				
trans-1,2-Dichloroethene	NI	ug/kg	1700				
Trichloroethene	NI	ug/kg	1100				
1,2-Dichlorobenzene	NI	ug/kg	5600				
1,3-Dichlorobenzene	NI	ug/kg	5600				
1,4-Dichlorobenzene	NI	ug/kg	5600				
Methyl tert butyl ether	NI	ug/kg	2200				
p/m-Xylene	NI	ug/kg	1100				
o-Xylene	NI	ug/kg	1100				
cis-1,2-Dichloroethene	NI	ug/kg	1100				
Dibromomethane	NI	ug/kg	11000				
1,4-Dichlorobutane	NI	ug/kg	11000				
Iodomethane	NI	ug/kg	11000				
1,2,3-Trichloropropane	NI	ug/kg	11000				
Styrene	NI	ug/kg	1100				
Dichlorodifluoromethane	NI	ug/kg	11000				
Acetone	NI	ug/kg	11000				
Carbon disulfide	NI	ug/kg	11000				
2-Butanone	NI	ug/kg	11000				
Vinyl acetate	NI	ug/kg	11000				
4-Methyl-2-pentanone	NI	ug/kg	11000				
2-Hexanone	NI	ug/kg	11000				
Ethyl methacrylate	NI	ug/kg	11000				
Acrolein	NI	ug/kg	28000				
Acrylonitrile	NI	ug/kg	11000				
Bromochloromethane	NI	ug/kg	5600				
Tetrahydrofuran	NI	ug/kg	22000				
2,2-Dichloropropane	NI	ug/kg	5600				
1,2-Dibromoethane	NI	ug/kg	5600				
1,3-Dichloropropane	NI	ug/kg	5600				
1,1,1,2-Tetrachloroethane	NI	ug/kg	1100				
Bromobenzene	NI	ug/kg	5600				
n-Butylbenzene	NI	ug/kg	1100				
sec-Butylbenzene	NI	ug/kg	1100				
tert-Butylbenzene	NI	ug/kg	5600				
o-Chlorotoluene	NI	ug/kg	5600				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSISLaboratory Sample Number: L010912-01  
TRENCH

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	

Volatile Organics 8260 via High 5035 continued			1	8260B	1004-02-27-8T		
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p-Chlorotoluene	N)	ug/kg	5600
1,2-Dibromo-3-chloropropane	N)	ug/kg	5600
Hexachlorobutadiene	N)	ug/kg	5600
Isopropylbenzene	N)	ug/kg	1100
p-Isopropyltoluene	N)	ug/kg	1100
Naphthalene	N)	ug/kg	5600
n-Propylbenzene	N)	ug/kg	1100
1,2,3-Trichlorobenzene	N)	ug/kg	5600
1,2,4-Trichlorobenzene	N)	ug/kg	5600
1,3,5-Trimethylbenzene	N)	ug/kg	5600
1,2,4-Trimethylbenzene	N)	ug/kg	5600
trans-1,4-Dichloro-2-butene	N)	ug/kg	5600
Ethyl ether	N)	ug/kg	5600

## Surrogate Recovery

1,2-Dichloroethane-d4	91.0	%
Toluene-d8	102.	%
4-Bromofluorobenzene	102.	%
Dibromofluoromethane	81.0	%

SVOC's by GC/MS 8270			1	8270C	1002-11-15 1004-12-11 PB	
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Acenaphthene	3100	ug/kg	530
Benzidine	N)	ug/kg	5300
1,2,4-Trichlorobenzene	N)	ug/kg	530
Hexachlorobenzene	N)	ug/kg	530
Bis(2-chloroethyl) ether	N)	ug/kg	530
1-Chloronaphthalene	N)	ug/kg	530
2-Chloronaphthalene	N)	ug/kg	640
1,2-Dichlorobenzene	N)	ug/kg	530
1,3-Dichlorobenzene	N)	ug/kg	530
1,4-Dichlorobenzene	N)	ug/kg	530
3,3'-Dichlorobenzidine	N)	ug/kg	5300
2,4-Dinitrotoluene	N)	ug/kg	640
2,6-Dinitrotoluene	N)	ug/kg	530
Azobenzene	N)	ug/kg	530
Fluoranthene	1000	ug/kg	530
4-Chlorophenyl phenyl ether	N)	ug/kg	530
4-Bromophenyl phenyl ether	N)	ug/kg	530
Bis(2-chloroisopropyl) ether	N)	ug/kg	530
Bis(2-chloroethoxy) methane	N)	ug/kg	530
Hexachlorobutadiene	N)	ug/kg	1100
Hexachlorocyclopentadiene	N)	ug/kg	1100
Hexachloroethane	N)	ug/kg	530
Isophorone	N)	ug/kg	530
Naphthalene	3100	ug/kg	530
Nitrobenzene	N)	ug/kg	530
NIPA/DPA	N)	ug/kg	1600
n-Nitrosodi-n-propylamine	N)	ug/kg	530

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSISLaboratory Sample Number: L010912-01  
TRENCH

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
SVOC's by GC/MS 8270 continued				1 8270C	1002 11-15	1004 12-11	28
Bis(2-ethylhexyl)phthalate	N)	ug/kg	1100				
Butyl benzyl phthalate	N)	ug/kg	530				
Di-n-butylphthalate	N)	ug/kg	530				
Di-n-octylphthalate	N)	ug/kg	530				
Diethyl phthalate	N)	ug/kg	530				
Dimethyl phthalate	N)	ug/kg	530				
Benzo(a)anthracene	10000	ug/kg	530				
Benzo(a)pyrene	10000	ug/kg	530				
Benzo(b)fluoranthene	8000	ug/kg	530				
Benzo(k)fluoranthene	7000	ug/kg	530				
Chrysene	10000	ug/kg	530				
Acenaphthylene	6000	ug/kg	530				
Anthracene	5000	ug/kg	530				
Benzo(ghi)perylene	6000	ug/kg	530				
Fluorene	3000	ug/kg	530				
Phenanthrene	10000	ug/kg	530				
Di benzo(a,h)anthracene	2000	ug/kg	530				
Indeno(1,2,3-cd)pyrene	7000	ug/kg	740				
Pyrene	20000	ug/kg	530				
Benzo(e)pyrene	6000	ug/kg	530				
Biphenyl	N)	ug/kg	530				
Perylene	2000	ug/kg	530				
Aniline	N)	ug/kg	1100				
4-Chloroaniline	N)	ug/kg	530				
1-Methylnaphthalene	4000	ug/kg	530				
2-Nitroaniline	N)	ug/kg	530				
3-Nitroaniline	N)	ug/kg	530				
4-Nitroaniline	N)	ug/kg	740				
Di benzo(furan)	900	ug/kg	530				
a,a-Dimethylphenethylamine	N)	ug/kg	5300				
Hexachloropropene	N)	ug/kg	5300				
Nitrosodi-n-butylamine	N)	ug/kg	1100				
2-Methylnaphthalene	3000	ug/kg	850				
1,2,4,5-Tetrachlorobenzene	N)	ug/kg	2100				
Pentachlorobenzene	N)	ug/kg	2100				
a-Naphthylamine	N)	ug/kg	2100				
b-Naphthylamine	N)	ug/kg	2100				
Phenacetin	N)	ug/kg	1100				
Dimethoate	N)	ug/kg	2100				
4-Aminobiphenyl	N)	ug/kg	1100				
Pentachloronitrobenzene	N)	ug/kg	1100				
Isodrin	N)	ug/kg	1100				
p-Dimethylaminoazobenzene	N)	ug/kg	1100				
Chlorobenzilate	N)	ug/kg	2100				
3-Methylcholanthrene	N)	ug/kg	2100				
Ethyl Methanesulfonate	N)	ug/kg	1600				
Acetophenone	N)	ug/kg	2100				
Nitrosodipiperidine	N)	ug/kg	2100				
7,12-Dimethylbenz(a)anthracene	N)	ug/kg	1100				

Comments: Complete list of References and Glossary of Terms found in Addendum I



ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSISLaboratory Sample Number: L010912-01  
TRENCH

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
SVOC's by GC/MS 8270 continued				1	8270C	1002 11:15	1004 12:11 PB
n-Nitrosodimethylamine	N)	ug/kg	5300				
2,4,6-Trichlorophenol	N)	ug/kg	530				
p-Chloro-m-cresol	N)	ug/kg	530				
2-Chlorophenol	N)	ug/kg	640				
2,4-Dichlorophenol	N)	ug/kg	1100				
2,4-Dimethylphenol	N)	ug/kg	1100				
2-Nitrophenol	N)	ug/kg	2100				
4-Nitrophenol	N)	ug/kg	1100				
2,4-Dinitrophenol	N)	ug/kg	2100				
4,6-Dinitro-o-cresol	N)	ug/kg	2100				
Pentachlorophenol	N)	ug/kg	2100				
Phenol	N)	ug/kg	740				
2-Methylphenol	N)	ug/kg	640				
3-Methylphenol/4-Methylphenol	N)	ug/kg	640				
2,4,5-Trichlorophenol	N)	ug/kg	530				
2,6-Dichlorophenol	N)	ug/kg	1100				
Benzoic Acid	N)	ug/kg	5300				
Benzyl Alcohol	N)	ug/kg	1100				
Carbazole	610	ug/kg	530				
Pyridine	N)	ug/kg	5300				
2-Picoline	N)	ug/kg	2100				
Pronamide	N)	ug/kg	2100				
Methyl methanesulfonate	N)	ug/kg	2100				
Surrogate Recovery							
2-Fluorophenol	71.0	%					
Phenol-d6	81.0	%					
Nitrobenzene-d5	71.0	%					
2-Fluorobiphenyl	61.0	%					
2,4,6-Tribromophenol	81.0	%					
4-Terphenyl-d14	61.0	%					
Polychlorinated Biphenyls				1	8081	1002 09:15	1003 13:25 AK
Aroclor 1221	N)	ug/kg	266.				
Aroclor 1232	N)	ug/kg	266.				
Aroclor 1242/1016	N)	ug/kg	266.				
Aroclor 1248	N)	ug/kg	266.				
Aroclor 1254	N)	ug/kg	266.				
Aroclor 1260	N)	ug/kg	266.				
Surrogate Recovery							
2,4,5,6-Tetrachloro-m-xylene	213.	%					
Decachlorobiphenyl	110.	%					
Hydrocarbon Scan by GC 8100M				1	8100M	1002 10:30	1003 23:06 PD
Mineral Spirits	N)	mg/kg	530				
Gasoline	N)	mg/kg	530				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSISLaboratory Sample Number: L0109112-01  
TRENCH

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Hydrocarbon Scan by GC 8100M continued							
Fuel Oil #2/Diesel	N)	mg/kg	530				
Fuel Oil #4	N)	mg/kg	530				
Fuel Oil #6	N)	mg/kg	530				
Motor Oil	N)	mg/kg	530				
Kerosene	N)	mg/kg	530				
Transformer Oil	N)	mg/kg	530				
Unknown Hydrocarbon	3000	mg/kg	530				
Surrogate Recovery							
o-Terphenyl	71.0	%					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0109122

Parameter	Value 1	Value 2	RPD	Units
Solids, Total for sample(s) 01 (L0109122-01, WG94254)				
Solids, Total	94.	94.	0	g
pH for sample(s) 01 (L0109122-01, WG93962)				
pH	7.6	7.5	1	SU
Cyanide, Reactive for sample(s) 01 (L0109122-01, WG94069)				
Cyanide, Reactive	N)	ND	NC	mg/kg
Sulfide, Reactive for sample(s) 01 (L0109122-01, WG94068)				
Sulfide, Reactive	1.8	1.6	12	mg/kg
Total Metals for sample(s) 01 (L0109124-02, WG94094)				
Arsenic, Total	1.9	1.8	5	mg/kg
Barium, Total	31.	38.	3	mg/kg
Cadmium, Total	N)	ND	NC	mg/kg
Chromium, Total	2.8	2.8	0	mg/kg
Lead, Total	N)	ND	NC	mg/kg
Selenium, Total	N)	ND	NC	mg/kg
Silver, Total	N)	ND	NC	mg/kg
Total Metals for sample(s) 01 (L0109201-01, WG94286)				
Mercury, Total	N)	ND	NC	mg/kg
Polychlorinated Biphenyls for sample(s) 01 (L0109122-01, WG94028)				
Aroclor 1221	N)	ND	NC	ug/kg
Aroclor 1232	N)	ND	NC	ug/kg
Aroclor 1242/1016	N)	ND	NC	ug/kg
Aroclor 1248	N)	ND	NC	ug/kg
Aroclor 1254	N)	ND	NC	ug/kg
Aroclor 1260	N)	ND	NC	ug/kg
Surrogate Recovery				
2,4,5,6-Tetrachloro-m-xylene	213.	166.	25	g
Decachlorobiphenyl	110.	112.	22	g
Hydrocarbon Scan by GC 8100M for sample(s) 01 (L0109122-01, WG94030)				
Mineral Spirits	N)	ND	NC	mg/kg
Gasoline	N)	ND	NC	mg/kg
Fuel Oil #2/Diesel	N)	ND	NC	mg/kg
Fuel Oil #4	N)	ND	NC	mg/kg
Fuel Oil #6	N)	ND	NC	mg/kg
Motor Oil	N)	ND	NC	mg/kg
Kerosene	N)	ND	NC	mg/kg
Transformer Oil	N)	ND	NC	mg/kg
Unknown Hydrocarbon	3100	3000	0	mg/kg

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0109122

Continued

Parameter	Value 1	Value 2	RPD	Units
Hydrocarbon Scan by GC 8100M for sample(s) 01 (L0109122-01, WG94030)				
Surrogate Recovery				
o-Terphenyl	72.0	73.0	1	%

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0109122

Parameter	% Recovery
pH LCS for sample(s) 01 (WG93962)	
pH	101
Sulfide, Reactive LCS for sample(s) 01 (WG94068)	
Sulfide, Reactive	93
Total Metals LCS for sample(s) 01 (WG94094)	
Arsenic, Total	102
Barium, Total	94
Cadmium, Total	103
Chromium, Total	98
Lead, Total	103
Selenium, Total	109
Silver, Total	92
Total Metals LCS for sample(s) 01 (WG94286)	
Mercury, Total	102
SVOC's by GC/MS 8210 LCS for sample(s) 01 (WG94031)	
Acenaphthene	87
1,2,4-Trichlorobenzene	78
2-Chloronaphthalene	94
1,2-Dichlorobenzene	67
1,4-Dichlorobenzene	63
2,4-Dinitrotoluene	100
2,6-Dinitrotoluene	120
Fluoranthene	98
4-Chlorophenyl phenyl ether	97
n-Nitrosodi-n-propylamine	85
Butyl benzyl phthalate	100
Anthracene	74
Pyrene	95
Hexachloropropene	76
p-Chloro-m-cresol	100
2-Chlorophenol	79
2-Nitrophenol	92
4-Nitrophenol	110
2,4-Dinitrophenol	40
Pentachlorophenol	100
Phenol	79
Surrogate Recovery	
2-Fluorophenol	77
Phenol-d6	86
Nitrobenzene-d5	80
2-Fluorobiphenyl	93
2,4,6-Tribromophenol	100
4-Terphenyl-d14	93



ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0109122

Continued

Parameter	% Recovery
Polychlorinated Biphenyle LCS for sample(s) 01 (WG94028)	
Aroclor 1242/1016	130
Aroclor 1260	130
Surrogate Recovery	
2,4,5,6-Tetrachloro-m-xylene	133
Decachlorobiphenyl	117
Hydrocarbon Scan by GC 8100M LCS for sample(s) 01 (WG94030)	
Petroleum Spike	97
Surrogate Recovery	
o-Terphenyl	75
Total Metals SPIKE for sample(s) 01 (L0109124-03, WG94094)	
Arsenic, Total	83
Barium, Total	88
Cadmium, Total	113
Chromium, Total	100
Lead, Total	101
Selenium, Total	208
Silver, Total	83
Total Metals SPIKE for sample(s) 01 (L0109247-01, WG94286)	
Mercury, Total	86

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH MS/MSD ANALYSIS

Laboratory Job Number: L0109122

Parameter	MS %	MSD %	RPD
Volatile Organics 8260 via HgI 5035 for sample(s) 01 (L0109247-01, WG94386)			
Chlorobenzene	100	96	4
Benzene	100	93	7
Toluene	100	95	5
1,1-Dichloroethene	93	85	9
Trichloroethene	100	91	9
SVOC's by GC/MS 8270 for sample(s) 01 (L0109122-01, WG94031)			
Acenaphthene	67	86	25
1,2,4-Trichlorobenzene	61	74	19
2-Chloronaphthalene	69	81	16
1,2-Dichlorobenzene	55	72	27
1,4-Dichlorobenzene	53	69	26
2,4-Dinitrotoluene	76	88	15
2,6-Dinitrotoluene	83	94	12
Fluoranthene	94	130	32
4-Chlorophenyl phenyl ether	68	84	21
n-Nitrosodi-n-propylamine	65	86	28
Butyl benzyl phthalate	73	87	18
Anthracene	62	81	27
Pyrene	75	120	46
Hexachloropropene	32	28	13
p-Chloro-m-cresol	71	85	18
2-Chlorophenol	61	85	33
2-Nitrophenol	75	94	22
4-Nitrophenol	80	99	21
2,4-Dinitrophenol	20	24	18
Pentachlorophenol	52	56	7
Phenol	61	85	33

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
Cyanide, Reactive	NI	mg/kg	1.1	1 7.3			1002 16:49 AT
Blank Analysis for sample(s) 01							
Sulfide, Reactive	NI	mg/kg	2.2	1 7.3			1002 16:49 AT
Blank Analysis for sample(s) 01							
Total Metals				1 3051			
Arsenic, Total	NI	mg/kg	0.40	1 6010B	1002 15:20	1004 01:14	RW
Barium, Total	NI	mg/kg	0.40	1 6010B	1002 15:20	1004 01:14	RW
Cadmium, Total	NI	mg/kg	0.40	1 6010B	1002 15:20	1004 01:14	RW
Chromium, Total	NI	mg/kg	0.40	1 6010B	1002 15:20	1004 01:14	RW
Lead, Total	NI	mg/kg	2.0	1 6010B	1002 15:20	1004 01:14	RW
Selenium, Total	NI	mg/kg	0.80	1 6010B	1002 15:20	1004 01:14	RW
Silver, Total	NI	mg/kg	0.40	1 6010B	1002 15:20	1004 01:14	RW
Blank Analysis for sample(s) 01							
Total Metals							
Mercury, Total	NI	mg/kg	0.25	1 7470A	1004 15:15	1005 10:46	DM
Blank Analysis for sample(s) 01							
Volatile Organics 8260 via High 5035				1 8260B			1003 21:30 BT
Methylene chloride	NI	ug/kg	500				
1,1-Dichloroethane	NI	ug/kg	75.				
Chloroform	NI	ug/kg	75.				
Carbon tetrachloride	NI	ug/kg	50.				
1,2-Dichloropropane	NI	ug/kg	180				
Dibromochloromethane	NI	ug/kg	50.				
1,1,2-Trichloroethane	NI	ug/kg	75.				
Tetrachloroethene	NI	ug/kg	50.				
Chlorobenzene	NI	ug/kg	50.				
Trichlorofluoromethane	NI	ug/kg	250				
1,2-Dichloroethane	NI	ug/kg	50.				
1,1,1-Trichloroethane	NI	ug/kg	50.				
Bromodichloromethane	NI	ug/kg	50.				
trans-1,3-Dichloropropene	NI	ug/kg	50.				
cis-1,3-Dichloropropene	NI	ug/kg	50.				
1,1-Dichloropropene	NI	ug/kg	250				
Bromoform	NI	ug/kg	50.				
1,1,2,2-Tetrachloroethane	NI	ug/kg	50.				
Benzene	NI	ug/kg	50.				
Toluene	NI	ug/kg	75.				
Ethylbenzene	NI	ug/kg	50.				
Chloromethane	NI	ug/kg	250				
Bromomethane	NI	ug/kg	100				

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
Volatile Organics 8260 via High 035 continued				1 8260B		1003 21:30 BT	
Vinyl chloride	NI	ug/kg	100				
Chloroethane	NI	ug/kg	100				
1,1-Dichloroethene	NI	ug/kg	50.				
trans-1,2-Dichloroethene	NI	ug/kg	75.				
Trichloroethene	NI	ug/kg	50.				
1,2-Dichlorobenzene	NI	ug/kg	250				
1,3-Dichlorobenzene	NI	ug/kg	250				
1,4-Dichlorobenzene	NI	ug/kg	250				
Methyl tert butyl ether	NI	ug/kg	100				
p/m-Xylene	NI	ug/kg	50.				
o-Xylene	NI	ug/kg	50.				
cis-1,2-Dichloroethene	NI	ug/kg	50.				
Dibromomethane	NI	ug/kg	500				
1,4-Dichlorobutane	NI	ug/kg	500				
Iodomethane	NI	ug/kg	500				
1,2,3-Trichloropropane	NI	ug/kg	500				
Styrene	NI	ug/kg	50.				
Dichlorodifluoromethane	NI	ug/kg	500				
Acetone	NI	ug/kg	500				
Carbon disulfide	NI	ug/kg	500				
2-Butanone	NI	ug/kg	500				
Vinyl acetate	NI	ug/kg	500				
4-Methyl-2-pentanone	NI	ug/kg	500				
2-Hexanone	NI	ug/kg	500				
Ethyl methacrylate	NI	ug/kg	500				
Acrolein	NI	ug/kg	1200				
Acrylonitrile	NI	ug/kg	500				
Bromochloromethane	NI	ug/kg	250				
Tetrahydrofuran	NI	ug/kg	1000				
2,2-Dichloropropane	NI	ug/kg	250				
1,2-Dibromoethane	NI	ug/kg	250				
1,3-Dichloropropane	NI	ug/kg	250				
1,1,1,2-Tetrachloroethane	NI	ug/kg	50.				
Bromobenzene	NI	ug/kg	250				
n-Butylbenzene	NI	ug/kg	50.				
sec-Butylbenzene	NI	ug/kg	50.				
tert-Butylbenzene	NI	ug/kg	250				
o-Chlorotoluene	NI	ug/kg	250				
p-Chlorotoluene	NI	ug/kg	250				
1,2-Dibromo-3-chloropropane	NI	ug/kg	250				
Hexachlorobutadiene	NI	ug/kg	250				
Isopropylbenzene	NI	ug/kg	50.				
p-Isopropyltoluene	NI	ug/kg	50.				
Naphthalene	NI	ug/kg	250				
n-Propylbenzene	NI	ug/kg	50.				
1,2,3-Trichlorobenzene	NI	ug/kg	250				
1,2,4-Trichlorobenzene	NI	ug/kg	250				

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP ANAL	ID
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Blank Analysis for sample(s) 01  
Volatile Organics 8260 via High 035 continued 1 #260B 1003 21:30 BT

1,3,5-Trimethylbenzene	NI	ug/kg	250			
1,2,4-Trimethylbenzene	NI	ug/kg	250			
trans-1,4-Dichloro-2-butene	NI	ug/kg	250			
Ethyl ether	NI	ug/kg	250			

## Surrogate Recovery

1,2-Dichloroethane-d4	81.0	%				
Toluene-d8	100.	%				
4-Bromofluorobenzene	103.	%				
Dibromofluoromethane	81.0	%				

Blank Analysis for sample(s) 01  
SVOC's by GC/MS 8270 1 #270C 1004 11:15 1004 07:53 PB

Acenaphthene	NI	ug/kg	500			
Benzidine	NI	ug/kg	5000			
1,2,4-Trichlorobenzene	NI	ug/kg	500			
Hexachlorobenzene	NI	ug/kg	500			
Bis(2-chloroethyl)ether	NI	ug/kg	500			
1-Chloronaphthalene	NI	ug/kg	500			
2-Chloronaphthalene	NI	ug/kg	600			
1,2-Dichlorobenzene	NI	ug/kg	500			
1,3-Dichlorobenzene	NI	ug/kg	500			
1,4-Dichlorobenzene	NI	ug/kg	500			
3,3'-Dichlorobenzidine	NI	ug/kg	5000			
2,4-Dinitrotoluene	NI	ug/kg	600			
2,6-Dinitrotoluene	NI	ug/kg	500			
Azobenzene	NI	ug/kg	500			
Fluoranthene	NI	ug/kg	500			
4-Chlorophenyl phenyl ether	NI	ug/kg	500			
4-Bromophenyl phenyl ether	NI	ug/kg	500			
Bis(2-chloroisopropyl)ether	NI	ug/kg	500			
Bis(2-chloroethoxy)methane	NI	ug/kg	500			
Hexachlorobutadiene	NI	ug/kg	1000			
Hexachlorocyclopentadiene	NI	ug/kg	1000			
Hexachloroethane	NI	ug/kg	500			
Isophorone	NI	ug/kg	500			
Naphthalene	NI	ug/kg	500			
Nitrobenzene	NI	ug/kg	500			
NDPA/DPA	NI	ug/kg	1500			
n-Nitrosodi-n-propylamine	NI	ug/kg	500			
Bis(2-ethylhexyl)phthalate	NI	ug/kg	1000			
Butyl benzyl phthalate	NI	ug/kg	500			
Di-n-butylphthalate	NI	ug/kg	500			
Di-n-octylphthalate	NI	ug/kg	500			
Diethyl phthalate	NI	ug/kg	500			
Dimethyl phthalate	NI	ug/kg	500			



ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
SVOCS by GC/MS 8270 continued				1	8270C	2002-11-13	2004-07-23 PB
Benzo(a)anthracene	N)	ug/kg	500				
Benzo(a)pyrene	N)	ug/kg	500				
Benzo(b)fluoranthene	N)	ug/kg	500				
Benzo(k)fluoranthene	N)	ug/kg	500				
Chrysene	N)	ug/kg	500				
Acenaphthylene	N)	ug/kg	500				
Anthracene	N)	ug/kg	500				
Benzo(ghi)perylene	N)	ug/kg	500				
Fluorene	N)	ug/kg	500				
Phenanthrene	N)	ug/kg	500				
Dibenzo(a,h)anthracene	N)	ug/kg	500				
Indeno(1,2,3-cd)pyrene	N)	ug/kg	700				
Pyrene	N)	ug/kg	500				
Benzo(e)pyrene	N)	ug/kg	500				
Biphenyl	N)	ug/kg	500				
Perylene	N)	ug/kg	500				
Aniline	N)	ug/kg	1000				
4-Chloroaniline	N)	ug/kg	500				
1-Methylnaphthalene	N)	ug/kg	500				
2-Nitroaniline	N)	ug/kg	500				
3-Nitroaniline	N)	ug/kg	500				
4-Nitroaniline	N)	ug/kg	700				
Dibenzofuran	N)	ug/kg	500				
a,a-Dimethylphenethylamine	N)	ug/kg	5000				
Hexachloropropene	N)	ug/kg	5000				
Nitrosodi-n-butylamine	N)	ug/kg	1000				
2-Methylnaphthalene	N)	ug/kg	800				
1,2,4,5-Tetrachlorobenzene	N)	ug/kg	2000				
Pentachlorobenzene	N)	ug/kg	2000				
a-Naphthylamine	N)	ug/kg	2000				
b-Naphthylamine	N)	ug/kg	2000				
Phenacetin	N)	ug/kg	1000				
Dimethoate	N)	ug/kg	2000				
4-Aminobiphenyl	N)	ug/kg	1000				
Pentachloronitrobenzene	N)	ug/kg	1000				
Isodrin	N)	ug/kg	1000				
p-Dimethylaminoazobenzene	N)	ug/kg	1000				
Chlorobenzilate	N)	ug/kg	2000				
3-Methylcholanthrene	N)	ug/kg	2000				
Ethyl Methanesulfonate	N)	ug/kg	1500				
Acetophenone	N)	ug/kg	2000				
Nitrosodipiperidine	N)	ug/kg	2000				
7,12-Dimethylbenz(a)anthracene	N)	ug/kg	1000				
n-Nitrosodimethylamine	N)	ug/kg	5000				
2,4,6-Trichlorophenol	N)	ug/kg	500				
p-Chloro-m-cresol	N)	ug/kg	500				
2-Chlorophenol	N)	ug/kg	600				

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
SVOC's by GC/MS 8270 continued				1	8270C	1002 11:15	1004 07:53 PB
2,4-Dichlorophenol	NI	ug/kg	1000				
2,4-Dimethylphenol	NI	ug/kg	1000				
2-Nitrophenol	NI	ug/kg	2000				
4-Nitrophenol	NI	ug/kg	1000				
2,4-Dinitrophenol	NI	ug/kg	2000				
4,6-Dinitro-o-cresol	NI	ug/kg	2000				
Pentachlorophenol	NI	ug/kg	2000				
Phenol	NI	ug/kg	700				
2-Methylphenol	NI	ug/kg	600				
3-Methylphenol/4-Methylphenol	NI	ug/kg	600				
2,4,5-Trichlorophenol	NI	ug/kg	500				
2,6-Dichlorophenol	NI	ug/kg	1000				
Benzoic Acid	NI	ug/kg	5000				
Benzyl Alcohol	NI	ug/kg	1000				
Carbazole	NI	ug/kg	500				
Pyridine	NI	ug/kg	5000				
2-Picoline	NI	ug/kg	2000				
Pronamide	NI	ug/kg	2000				
Methyl methanesulfonate	NI	ug/kg	2000				
Surrogate Recovery							
2-Fluorophenol	90.0	%					
Phenol-d6	98.0	%					
Nitrobenzene-d5	91.0	%					
2-Fluorobiphenyl	89.0	%					
2,4,6-Tribromophenol	93.0	%					
4-Terphenyl-d14	90.0	%					
Blank Analysis for sample(s) 01							
Polychlorinated Biphenyls				1	8082	1002 09:15	1007 11:07 AK
Aroclor 1221	NI	ug/kg	250.				
Aroclor 1232	NI	ug/kg	250.				
Aroclor 1242/1016	NI	ug/kg	250.				
Aroclor 1248	NI	ug/kg	250.				
Aroclor 1254	NI	ug/kg	250.				
Aroclor 1260	NI	ug/kg	250.				
Surrogate Recovery							
2,4,5,6-Tetrachloro-m-xylene	108.	%					
Decachlorobiphenyl	87.0	%					
Blank Analysis for sample(s) 01							
Hydrocarbon Scan by GC 8100M				1	8100M	1002 10:30	1003 13:56 PD
Mineral Spirits	NI	mg/kg	100				
Gasoline	NI	mg/kg	100				

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109122

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
Hydrocarbon Scan by GC 8100M continued				1	8100M	1002 10:30	1003 19:58 20
Fuel Oil #2/Diesel	NC	mg/kg	100				
Fuel Oil #4	NC	mg/kg	100				
Fuel Oil #6	NC	mg/kg	100				
Motor Oil	NC	mg/kg	100				
Kerosene	NC	mg/kg	100				
Transformer Oil	NC	mg/kg	100				
Unknown Hydrocarbon	NC	mg/kg	100				
Surrogate Recovery							
o-Terphenyl	104.	%					

RECEIVED

ALPHA ANALYTICAL LABORATORIES  
Eight Walkup Drive  
Westborough, Massachusetts 01581-1019  
(508) 898-9220

OCT 18 2001

Haley & Aldrich, Inc.

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65 NY:11148

CERTIFICATE OF ANALYSIS

Client: Haley & Aldrich, Inc.	Laboratory Job Number: L0109474
Address: 465 Medford Street, Suite 2200	Invoice Number: 55559
Boston, MA 02129-1400	Date Received: 11-OCT-01
Attn: Mr. Steve Provencal	Date Reported: 16-OCT-01
Project Number: 06558-608	Delivery Method: Alpha
Site: MALDEN MGP	

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ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0109474-01	SEI COMP-1	

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

---

Authorized by: Scott McLean

Scott McLean - Laboratory Director  
This document electronically signed

ALPHA ANALYTICAL LABORATORIES  
NARRATIVE REPORT

Laboratory Job Number: L0109474

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Alpha Report L0109474:

Semi-Volatile Organics

It should be noted that one or more laboratory control sample percent recoveries are outside the in-house acceptance criteria for the method. All associated samples were non-detect for the affected compounds, therefore no further action was taken.

It should be noted one or more of the matrix spike percent recoveries are outside the acceptance criteria required by the method. The elevated recoveries have been attributed to the non-homogenous nature of the sample utilized.

Total Metals

It should be noted that the matrix spike percent recovery for the analysis of Barium associated with Alpha Sample(s) L0109474-01 is outside the in-house acceptance criteria for the method. A post analytical spike was performed with an acceptable recovery of 84%.

It should be noted that the matrix spike percent recovery for the analysis of Lead associated with Alpha Sample(s) L0109474-01 is invalid because the sample concentration is greater than four times the spike amount added.



ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200315-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0109414-01

Date Collected: 10-OCT-2001 13:30

SED COMP-1

Date Received : 11-OCT-2001

Sample Matrix: SOIL

Date Reported : 16-OCT-2001

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Glass,1-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Solids, Total	83.	%	0.10	30 2540G		1013 13:15	NL
pH	8.2	SU	-	1 9045C		1011 23:46	JG
Flash Point	>150	deg F	70	1 1010		1012 11:30	NL
Cyanide, Reactive	ND	mg/kg	0.22	1 7.3		1015 14:45	JG
Sulfide, Reactive	0.72	mg/kg	0.45	1 7.3		1015 14:45	JG
Total Metals				1 3051			
Arsenic, Total	11.	mg/kg	0.45	1 6010B	1012 14:15	1016 09:40	MG
Barium, Total	16.	mg/kg	0.45	1 6010B	1012 14:15	1016 09:40	MG
Cadmium, Total	ND	mg/kg	0.45	1 6010B	1012 14:15	1016 09:40	MG
Chromium, Total	18.	mg/kg	0.45	1 6010B	1012 14:15	1016 09:40	MG
Lead, Total	180	mg/kg	2.2	1 6010B	1012 14:15	1016 09:40	MG
Mercury, Total	ND	mg/kg	0.23	1 7470A	1012 11:15	1012 14:32	DM
Selenium, Total	ND	mg/kg	0.90	1 6010B	1012 14:15	1016 09:40	MG
Silver, Total	ND	mg/kg	0.45	1 6010B	1012 14:15	1016 09:40	MG
Volatile Organics 8260 via High 5035				1 8260B		1012 19:44	BT
Methylene chloride	ND	ug/kg	33000				
1,1-Dichloroethane	ND	ug/kg	4900				
Chloroform	ND	ug/kg	4900				
Carbon tetrachloride	ND	ug/kg	3300				
1,2-Dichloropropane	ND	ug/kg	11000				
Dibromochloromethane	ND	ug/kg	3300				
1,1,2-Trichloroethane	ND	ug/kg	4900				
Tetrachloroethene	ND	ug/kg	3300				
Chlorobenzene	ND	ug/kg	3300				
Trichlorofluoromethane	ND	ug/kg	16000				
1,2-Dichloroethane	ND	ug/kg	3300				
1,1,1-Trichloroethane	ND	ug/kg	3300				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0109474-01  
SED CQ4P-1

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Volatile Organics 8260 via High 5035 continued							
Bromodichloromethane	ND	ug/kg	3300	1 8260B		1012 19:44 BT	
trans-1,3-Dichloropropene	ND	ug/kg	3300				
cis-1,3-Dichloropropene	ND	ug/kg	3300				
1,1-Dichloropropene	ND	ug/kg	16000				
Bromoform	ND	ug/kg	3300				
1,1,2,2-Tetrachloroethane	ND	ug/kg	3300				
Benzene	ND	ug/kg	3300				
Toluene	ND	ug/kg	4900				
Ethylbenzene	ND	ug/kg	3300				
Chloromethane	ND	ug/kg	16000				
Bromomethane	ND	ug/kg	6600				
Vinyl chloride	ND	ug/kg	6600				
Chloroethane	ND	ug/kg	6600				
1,1-Dichloroethene	ND	ug/kg	3300				
trans-1,2-Dichloroethene	ND	ug/kg	4900				
Trichloroethene	ND	ug/kg	3300				
1,2-Dichlorobenzene	ND	ug/kg	16000				
1,3-Dichlorobenzene	ND	ug/kg	16000				
1,4-Dichlorobenzene	ND	ug/kg	16000				
Methyl tert butyl ether	ND	ug/kg	6600				
p/m-Xylene	4000	ug/kg	3300				
o-Xylene	ND	ug/kg	3300				
cis-1,2-Dichloroethene	ND	ug/kg	3300				
Dibromomethane	ND	ug/kg	33000				
1,4-Dichlorobutane	ND	ug/kg	33000				
Iodomethane	ND	ug/kg	33000				
1,2,3-Trichloropropane	ND	ug/kg	33000				
Styrene	ND	ug/kg	3300				
Dichlorodifluoromethane	ND	ug/kg	33000				
Acetone	ND	ug/kg	33000				
Carbon disulfide	ND	ug/kg	33000				
2-Butanone	ND	ug/kg	33000				
Vinyl acetate	ND	ug/kg	33000				
4-Methyl-2-pentanone	ND	ug/kg	33000				
2-Hexanone	ND	ug/kg	33000				
Ethyl methacrylate	ND	ug/kg	33000				
Acrolein	ND	ug/kg	82000				
Acrylonitrile	ND	ug/kg	33000				
Bromochloromethane	ND	ug/kg	16000				
Tetrahydrofuran	ND	ug/kg	66000				
2,2-Dichloropropane	ND	ug/kg	16000				
1,2-Dibromoethane	ND	ug/kg	16000				
1,3-Dichloropropane	ND	ug/kg	16000				
1,1,1,2-Tetrachloroethane	ND	ug/kg	3300				
Bromobenzene	ND	ug/kg	16000				
n-Butylbenzene	ND	ug/kg	3300				
sec-Butylbenzene	ND	ug/kg	3300				
tert-Butylbenzene	ND	ug/kg	16000				
o-Chlorotoluene	ND	ug/kg	16000				

Comments: Complete list of References and Glossary of Terms found in Addendum I

**ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS**

Laboratory Sample Number: L0109474-01  
SED COM1-1

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Volatile Organics 8260 via High 5035 continued				1 8260B		1012 19:44	BT
p-Chlorotoluene	ND	ug/kg	16000				
1,2-Dibromo-3-chloropropane	ND	ug/kg	16000				
Hexachlorobutadiene	ND	ug/kg	16000				
Isopropylbenzene	ND	ug/kg	3300				
p-Isopropyltoluene	ND	ug/kg	3300				
Naphthalene	200000	ug/kg	16000				
n-Propylbenzene	NI	ug/kg	3300				
1,2,3-Trichlorobenzene	NI	ug/kg	16000				
1,2,4-Trichlorobenzene	NI	ug/kg	16000				
1,3,5-Trimethylbenzene	NI	ug/kg	16000				
1,2,4-Trimethylbenzene	NI	ug/kg	16000				
trans-1,4-Dichloro-2-butene	NI	ug/kg	16000				
Ethyl ether	NI	ug/kg	16000				
Surrogate Recovery							
1,2-Dichloroethane-d4	81.0	%					
Toluene-d8	91.0	%					
4-Bromofluorobenzene	105.	%					
Dibromofluoromethane	81.0	%					
SVOC's by GC/MS 8270				1 8270C		1012 12:30 1016 12:01	PR
Acenaphthene	6100	ug/kg	2800				
Benzidine	ND	ug/kg	28000				
1,2,4-Trichlorobenzene	ND	ug/kg	2800				
Hexachlorobenzene	ND	ug/kg	2800				
Bis(2-chloroethyl) ether	ND	ug/kg	2800				
1-Chloronaphthalene	ND	ug/kg	2800				
2-Chloronaphthalene	ND	ug/kg	3400				
1,2-Dichlorobenzene	ND	ug/kg	2800				
1,3-Dichlorobenzene	ND	ug/kg	2800				
1,4-Dichlorobenzene	ND	ug/kg	2800				
3,3'-Dichlorobenzidine	ND	ug/kg	28000				
2,4-Dinitrotoluene	ND	ug/kg	3400				
2,6-Dinitrotoluene	ND	ug/kg	2800				
Azobenzene	ND	ug/kg	2800				
Fluoranthene	12000	ug/kg	2800				
4-Chlorophenyl phenyl ether	ND	ug/kg	2800				
4-Bromophenyl phenyl ether	ND	ug/kg	2800				
Bis(2-chloroisopropyl) ether	ND	ug/kg	2800				
Bis(2-chloroethoxy) methane	ND	ug/kg	2800				
Hexachlorobutadiene	ND	ug/kg	5700				
Hexachlorocyclopentadiene	ND	ug/kg	5700				
Hexachloroethane	ND	ug/kg	2800				
Isophorone	ND	ug/kg	2800				
Naphthalene	10000	ug/kg	2800				
Nitrobenzene	ND	ug/kg	2800				
NDPA/DPA	ND	ug/kg	8500				
n-Nitrosodi-n-propylamine	ND	ug/kg	2800				

Comments: Complete list of References and Glossary of Terms found in Addendum I

**ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS**

Laboratory Sample Number: L010947-01  
SED COM-1

PARAMETER	RE SULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
SVOC's by GC/MS 8270 continued							
Bis(2-ethylhexyl)phthalate	ND	ug/kg	5700	1-8270C	1012	12:30	1016 12:01 PB
Butyl benzyl phthalate	ND	ug/kg	2800				
Di-n-butylphthalate	ND	ug/kg	2800				
Di-n-octylphthalate	ND	ug/kg	2800				
Diethyl phthalate	ND	ug/kg	2800				
Dimethyl phthalate	ND	ug/kg	2800				
Benzo(a)anthracene	4400	ug/kg	2800				
Benzo(a)pyrene	3700	ug/kg	2800				
Benzo(b)fluoranthene	3100	ug/kg	2800				
Benzo(k)fluoranthene	4000	ug/kg	2800				
Chrysene	4500	ug/kg	2800				
Acenaphthylene	NI	ug/kg	2800				
Anthracene	5600	ug/kg	2800				
Benzo(ghi)perylene	NI	ug/kg	2800				
Fluorene	7100	ug/kg	2800				
Phenanthrene	21000	ug/kg	2800				
Dibenzo(a,h)anthracene	NI	ug/kg	2800				
Indeno(1,2,3-cd)pyrene	NI	ug/kg	4000				
Pyrene	11000	ug/kg	2800				
Benzo(e)pyrene	NI	ug/kg	2800				
Biphenyl	NI	ug/kg	2800				
Perylene	NI	ug/kg	2800				
Aniline	NI	ug/kg	5700				
4-Chloroaniline	NI	ug/kg	2800				
1-Methylnaphthalene	15000	ug/kg	2800				
2-Nitroaniline	NI	ug/kg	2800				
3-Nitroaniline	NI	ug/kg	2800				
4-Nitroaniline	NI	ug/kg	4000				
Dibenzofuran	4200	ug/kg	2800				
a,a-Dimethylphenethylamine	NI	ug/kg	28000				
Hexachloropropene	NI	ug/kg	28000				
Nitrosodi-n-butylamine	ND	ug/kg	5700				
2-Methylnaphthalene	18000	ug/kg	4500				
1,2,4,5-Tetrachlorobenzene	ND	ug/kg	11000				
Pentachlorobenzene	ND	ug/kg	11000				
a-Naphthylamine	ND	ug/kg	11000				
b-Naphthylamine	ND	ug/kg	11000				
Phenacetin	ND	ug/kg	5700				
Dimethoate	ND	ug/kg	11000				
4-Aminobiphenyl	ND	ug/kg	5700				
Pentachloronitrobenzene	ND	ug/kg	5700				
Isodrin	ND	ug/kg	5700				
p-Dimethylaminoazobenzene	ND	ug/kg	5700				
Chlorobenzilate	ND	ug/kg	11000				
3-Methylcholanthrene	ND	ug/kg	11000				
Ethyl Methanesulfonate	ND	ug/kg	8500				
Acetophenone	ND	ug/kg	11000				
Nitrosodipiperidine	ND	ug/kg	11000				
7,12-Dimethylbenz(a)anthracene	ND	ug/kg	5700				

Comments: Complete list of References and Glossary of Terms found in Addendum I

**ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS**

Laboratory Sample Number: L01094-4-01  
SED COMP-1

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
SVOC's by GC/MS 8270 continued				1	8270C	1012 12:30	1016 12:01 PB
n-Nitrosodimethylamine	ND	ug/kg	28000				
2,4,6-Trichlorophenol	ND	ug/kg	2800				
p-Chloro-m-cresol	ND	ug/kg	2800				
2-Chlorophenol	ND	ug/kg	3400				
2,4-Dichlorophenol	ND	ug/kg	5700				
2,4-Dimethylphenol	ND	ug/kg	5700				
2-Nitrophenol	ND	ug/kg	11000				
4-Nitrophenol	ND	ug/kg	5700				
2,4-Dinitrophenol	ND	ug/kg	11000				
4,6-Dinitro-o-cresol	ND	ug/kg	11000				
Pentachlorophenol	ND	ug/kg	11000				
Phenol	ND	ug/kg	4000				
2-Methylphenol	ND	ug/kg	3400				
3-Methylphenol/4-Methylphenol	ND	ug/kg	3400				
2,4,5-Trichlorophenol	ND	ug/kg	2800				
2,6-Dichlorophenol	ND	ug/kg	5700				
Benzoic Acid	ND	ug/kg	28000				
Benzyl Alcohol	ND	ug/kg	5700				
Carbazole	ND	ug/kg	2800				
Pyridine	ND	ug/kg	28000				
2-Picoline	ND	ug/kg	11000				
Pronamide	ND	ug/kg	11000				
Methyl methanesulfonate	ND	ug/kg	11000				
Surrogate Recovery							
2-Fluorophenol	83.0	%					
Phenol-d6	63.0	%					
Nitrobenzene-d5	85.0	%					
2-Fluorobiphenyl	73.0	%					
2,4,6-Tribromophenol	82.0	%					
4-Terphenyl-d14	72.0	%					
Polychlorinated Biphenyls				1	8082	1016 05:31	AK
Aroclor 1221	ND	ug/kg	284.				
Aroclor 1232	ND	ug/kg	284.				
Aroclor 1242/1016	ND	ug/kg	284.				
Aroclor 1248	ND	ug/kg	284.				
Aroclor 1254	ND	ug/kg	284.				
Aroclor 1260	ND	ug/kg	284.				
Surrogate Recovery							
2,4,5,6-Tetrachloro-m-xylene	102.	%					
Decachlorobiphenyl	81.0	%					
Hydrocarbon Scan by GC 8100M				1	8100M	1016 01:15	PD
Mineral Spirits	ND	mg/kg	230				
Gasoline	ND	mg/kg	230				

Comments: Complete list of References and Glossary of Terms found in Addendum I



ALPHA ANALYTICAL LABORATORIES  
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0109474-01  
SED COMP-1

PARAMETER	RI	SULT	UNITS	RDL	REF METHOD	DATE		ID
						PREP	ANAL	
Hydrocarbon Scan by GC 8100M continued								
Fuel Oil #2/Diesel		NI	mg/kg	230	1-8100M		1016-01-15	PD
Fuel Oil #4		NI	mg/kg	230				
Fuel Oil #6		NI	mg/kg	230				
Motor Oil		NI	mg/kg	230				
Kerosene		NI	mg/kg	230				
Transformer Oil		NI	mg/kg	230				
Unknown Hydrocarbon		3100	mg/kg	230				
Surrogate Recovery								
o-Terphenyl		116.	%					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0109474

Parameter	Value 1	Value 2	RPD	Units
Solids, Total for sample(s) 01 (L0109462-01, WG95003)				
Solids, Total	87.	84.	4	%
pH for sample(s) 01 (L0109519-02, WG94856)				
pH	7.2	7.2	0	SU
Cyanide, Reactive for sample(s) 01 (L0109474-01, WG95115)				
Cyanide, Reactive	ND	ND	NC	mg/kg
Sulfide, Reactive for sample(s) 01 (L0109474-01, WG95114)				
Sulfide, Reactive	0.72	0.91	23	mg/kg
Total Metals for sample(s) 01 (L0109478-02, WG95021)				
Arsenic, Total	11.	14.	0	mg/kg
Barium, Total	200	170	16	mg/kg
Cadmium, Total	ND	ND	NC	mg/kg
Chromium, Total	11.	10.	10	mg/kg
Lead, Total	1100	1500	7	mg/kg
Selenium, Total	ND	ND	NC	mg/kg
Silver, Total	ND	ND	NC	mg/kg
Polychlorinated Biphenyls for sample(s) 01 (L0109437-04, WG94958)				
Aroclor 1221	ND	ND	NC	ug/kg
Aroclor 1232	ND	ND	NC	ug/kg
Aroclor 1242/1016	ND	ND	NC	ug/kg
Aroclor 1248	ND	ND	NC	ug/kg
Aroclor 1254	ND	ND	NC	ug/kg
Aroclor 1260	ND	ND	NC	ug/kg
Surrogate Recovery				
2,4,5,6-Tetrachloro-m-xylene	91.0	95.0	1	%
Decachlorobiphenyl	90.0	86.0	5	%
Hydrocarbon Scan by GC 8100M for sample(s) 01 (L0109519-02, WG94955)				
Mineral Spirits	ND	ND	NC	mg/kg
Gasoline	ND	ND	NC	mg/kg
Fuel Oil #2/Diesel	ND	ND	NC	mg/kg
Fuel Oil #4	ND	ND	NC	mg/kg
Fuel Oil #6	ND	ND	NC	mg/kg
Motor Oil	ND	ND	NC	mg/kg
Kerosene	ND	ND	NC	mg/kg
Transformer Oil	ND	ND	NC	mg/kg
Unknown Hydrocarbon	370	330	11	mg/kg
Surrogate Recovery				
o-Terphenyl	117.	118.	1	%

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0109474

Parameter	% Recovery
pH LCS for sample(s) 01 (WG94856)	
pH	100
Sulfide, Reactive LCS for sample(s) 01 (WG95114)	
Sulfide, Reactive	102
Total Metals LCS for sample(s) 01 (WG95021)	
Arsenic, Total	104
Barium, Total	98
Cadmium, Total	105
Chromium, Total	103
Lead, Total	110
Selenium, Total	108
Silver, Total	102
Total Metals LCS for sample(s) 01 (WG94942)	
Mercury, Total	87
SVOC's by GC/MS 8210 LCS for sample(s) 01 (WG94961)	
Aceraphthene	90
1,2,4-Trichlorobenzene	74
2-Chloronaphthalene	81
1,2-Dichlorobenzene	72
1,4-Dichlorobenzene	74
2,4-Dinitrotoluene	100
2,6-Dinitrotoluene	85
Fluoranthene	96
4-Chlorophenyl phenyl ether	93
n-Nitrosodi-n-propylamine	94
Butyl benzyl phthalate	120
Anthracene	83
Pyrene	97
Hexachloropropene	84
P-Chloro-M-Cresol	87
2-Chlorophenol	77
2-Nitrophenol	82
4-Nitrophenol	89
2,4-Dinitrophenol	52
Pentachlorophenol	91
Phenol	84
Surrogate Recovery	
2-Fluorophenol	84
Phenol-d6	83
Nitrobenzene-d5	98
2-Fluorobiphenyl	85
2,4,6-Tribromophenol	98
4-Terphenyl-d14	98

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0109474

Continued

Parameter	% Recovery
Polychlorinated Biphenyls LCS for sample(s) 01 (WG94958)	
Aroclor 1242/1016	98
Aroclor 1260	107
Surrogate Recovery	
2,4,5,6-Tetrachloro-m-xylene	115
Decachlorobiphenyl	99
Hydrocarbon Scan by GC 8100M LCS for sample(s) 01 (WG94955)	
Petroleum Spike	82
Surrogate Recovery	
o-Terphenyl	134
Total Metals SPIKE for sample(s) 01 (L0109478-03, WG95021)	
Arsenic, Total	113
Barium, Total	147
Cadmium, Total	133
Chromium, Total	124
Lead, Total	0
Selenium, Total	98
Silver, Total	113
Total Metals SPIKE for sample(s) 01 (L0109474-01, WG94942)	
Mercury, Total	84

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH MS/MSD ANALYSIS

Laboratory Job Number: L0109474

Parameter	MS %	MSD %	RPD
Volatile Organics 8260 via Hg: 5035 for sample(s) 01 (L0109359-05, WG94659)			
Chlorobenzene	99	95	4
Benzene	100	98	2
Toluene	99	96	3
1,1-Dichloroethene	94	91	3
Trichloroethene	93	90	3
SVOC's by GC/MS 8270 for sample(s) 01 (L0109474-01, WG94961)			
Acenaphthene	100	77	26
1,2,4-Trichlorobenzene	82	63	26
2-Chloronaphthalene	75	62	19
1,2-Dichlorobenzene	75	59	24
1,4-Dichlorobenzene	70	56	22
2,4-Dinitrotoluene	110	81	30
2,6-Dinitrotoluene	78	62	23
Fluoranthene	160	97	49
4-Chlorophenyl phenyl ether	88	66	29
n-Nitrosodi-n-propylamine	97	76	24
Butyl benzyl phthalate	120	97	21
Anthracene	100	74	30
Pyrene	140	88	46
Hexachloropropene	74	55	29
P-Chloro-M-Cresol	84	66	24
2-Chlorophenol	79	57	32
2-Nitrophenol	79	57	32
4-Nitrophenol	100	75	29
2,4-Dinitrophenol	62	48	25
Pentachlorophenol	33	26	24
Phenol	79	57	32

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109474

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
Cyanide, Reactive	ND	mg/kg	1.1	1 7.3		1015 14:45	JG
Blank Analysis for sample(s) 01							
Sulfide, Reactive	ND	mg/kg	2.2	1 7.3		1015 14:45	JG
Blank Analysis for sample(s) 01							
Total Metals				1 3051			
Arsenic, Total	ND	mg/kg	0.40	1 6010B	1012 14:15	1016 08:58	MG
Barium, Total	ND	mg/kg	0.40	1 6010B	1012 14:15	1016 08:58	MG
Cadmium, Total	ND	mg/kg	0.40	1 6010B	1012 14:15	1016 08:58	MG
Chromium, Total	ND	mg/kg	0.40	1 6010B	1012 14:15	1016 08:58	MG
Lead, Total	ND	mg/kg	2.0	1 6010B	1012 14:15	1016 08:58	MG
Selenium, Total	ND	mg/kg	0.80	1 6010B	1012 14:15	1016 08:58	MG
Silver, Total	ND	mg/kg	0.40	1 6010B	1012 14:15	1016 08:58	MG
Blank Analysis for sample(s) 01							
Total Metals							
Mercury, Total	ND	mg/kg	0.25	1 7470A	1012 11:15	1012 14:32	DM
Blank Analysis for sample(s) 01							
Volatile Organics 8260 via High 5035				1 8260B		1012 14:48	BT
Methylene chloride	ND	ug/kg	500				
1,1-Dichloroethane	ND	ug/kg	75.				
Chloroform	ND	ug/kg	75.				
Carbon tetrachloride	ND	ug/kg	50.				
1,2-Dichloropropane	ND	ug/kg	180				
Dibromochloromethane	ND	ug/kg	50.				
1,1,2-Trichloroethane	ND	ug/kg	75.				
Tetrachloroethene	ND	ug/kg	50.				
Chlorobenzene	ND	ug/kg	50.				
Trichlorofluoromethane	ND	ug/kg	250				
1,2-Dichloroethane	ND	ug/kg	50.				
1,1,1-Trichloroethane	ND	ug/kg	50.				
Bromodichloromethane	ND	ug/kg	50.				
trans-1,3-Dichloropropene	ND	ug/kg	50.				
cis-1,3-Dichloropropene	ND	ug/kg	50.				
1,1-Dichloropropene	ND	ug/kg	250				
Bromoform	ND	ug/kg	50.				
1,1,2,2-Tetrachloroethane	ND	ug/kg	50.				
Benzene	ND	ug/kg	50.				
Toluene	ND	ug/kg	75.				
Ethylbenzene	ND	ug/kg	50.				
Chloromethane	ND	ug/kg	250				
Bromomethane	ND	ug/kg	100				



ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109474

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
Volatile Organics 8260 via High	035 continued			1 8260B		1012 14:46	BT
Vinyl chloride	NI	ug/kg	100				
Chlcroethane	NI	ug/kg	100				
1,1-Dichloroethene	NI	ug/kg	50.				
trans-1,2-Dichloroethene	NI	ug/kg	75.				
Trichloroethene	NI	ug/kg	50.				
1,2-Dichlorobenzene	NI	ug/kg	250				
1,3-Dichlorobenzene	NI	ug/kg	250				
1,4-Dichlorobenzene	NI	ug/kg	250				
Methyl tert butyl ether	NI	ug/kg	100				
p/m-Xylene	NI	ug/kg	50.				
o-Xylene	NI	ug/kg	50.				
cis-1,2-Dichloroethene	NI	ug/kg	50.				
Dibromomethane	NI	ug/kg	500				
1,4-Dichlorobutane	NI	ug/kg	500				
Iodomethane	NI	ug/kg	500				
1,2,3-Trichloropropane	NI	ug/kg	500				
Styrene	NI	ug/kg	50.				
Dichlorodifluoromethane	NI	ug/kg	500				
Acetone	NI	ug/kg	500				
Carbon disulfide	NI	ug/kg	500				
2-Butanone	NI	ug/kg	500				
Vinyl acetate	NI	ug/kg	500				
4-Methyl-2-pentanone	NI	ug/kg	500				
2-Hexanone	NI	ug/kg	500				
Ethyl methacrylate	NI	ug/kg	500				
Acrolein	NI	ug/kg	1200				
Acrylonitrile	NI	ug/kg	500				
Bromochloromethane	NI	ug/kg	250				
Tetrahydrofuran	NI	ug/kg	1000				
2,2-Dichloropropane	NI	ug/kg	250				
1,2-Dibromoethane	NI	ug/kg	250				
1,3-Dichloropropane	NI	ug/kg	250				
1,1,1,2-Tetrachloroethane	NI	ug/kg	50.				
Bromobenzene	NI	ug/kg	250				
n-Butylbenzene	NI	ug/kg	50.				
sec-Butylbenzene	NI	ug/kg	50.				
tert-Butylbenzene	NI	ug/kg	250				
o-Chlorotoluene	NI	ug/kg	250				
p-Chlorotoluene	NI	ug/kg	250				
1,2-Dibromo-3-chloropropane	NI	ug/kg	250				
Hexachlorobutadiene	NI	ug/kg	250				
Isopropylbenzene	NI	ug/kg	50.				
p-Isopropyltoluene	NI	ug/kg	50.				
Naphthalene	NI	ug/kg	250				
n-Propylbenzene	NI	ug/kg	50.				
1,2,3-Trichlorobenzene	NI	ug/kg	250				
1,2,4-Trichlorobenzene	NI	ug/kg	250				

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109474

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP ANAL	ID
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Blank Analysis for sample(s) 01

Volatile Organics 8260 via High 5035 continued 1 8260B 1012 14:48 BT

1,3,5-Trimethylbenzene	ND	ug/kg	250			
1,2,4-Trimethylbenzene	ND	ug/kg	250			
trans-1,4-Dichloro-2-butene	ND	ug/kg	250			
Ethyl ether	ND	ug/kg	250			

Surrogate Recovery

1,2-Dichloroethane-d4	96.0	%				
Toluene-d8	101.	%				
4-Bromofluorobenzene	105.	%				
Dibromofluoromethane	92.0	%				

Blank Analysis for sample(s) 01

SVOC's by GC/MS 8270 1 8270C 1012 12:30 1015 19:47 PB

Acenaphthene	ND	ug/kg	500			
Benidine	ND	ug/kg	5000			
1,2,4-Trichlorobenzene	ND	ug/kg	500			
Hexachlorobenzene	ND	ug/kg	500			
Bis(2-chloroethyl)ether	ND	ug/kg	500			
1-Chloronaphthalene	ND	ug/kg	500			
2-Chloronaphthalene	ND	ug/kg	600			
1,2-Dichlorobenzene	ND	ug/kg	500			
1,3-Dichlorobenzene	ND	ug/kg	500			
1,4-Dichlorobenzene	ND	ug/kg	500			
3,3'-Dichlorobenzidine	ND	ug/kg	5000			
2,4-Dinitrotoluene	ND	ug/kg	600			
2,6-Dinitrotoluene	ND	ug/kg	500			
Azobenzene	ND	ug/kg	500			
Fluoranthene	ND	ug/kg	500			
4-Chlorophenyl phenyl ether	ND	ug/kg	500			
4-Bromophenyl phenyl ether	ND	ug/kg	500			
Bis(2-chloroisopropyl)ether	ND	ug/kg	500			
Bis(2-chloroethoxy)methane	ND	ug/kg	500			
Hexachlorobutadiene	ND	ug/kg	1000			
Hexachlorocyclopentadiene	ND	ug/kg	1000			
Hexachloroethane	ND	ug/kg	500			
Iscphorone	ND	ug/kg	500			
Naphthalene	ND	ug/kg	500			
Nitrobenzene	ND	ug/kg	500			
NDEA/DPA	ND	ug/kg	1500			
n-Nitrosodi-n-propylamine	ND	ug/kg	500			
Bis(2-ethylhexyl)phthalate	ND	ug/kg	1000			
Butyl benzyl phthalate	ND	ug/kg	500			
Di-n-butylphthalate	ND	ug/kg	500			
Di-n-octylphthalate	ND	ug/kg	500			
Diethyl phthalate	ND	ug/kg	500			
Dimethyl phthalate	ND	ug/kg	500			

ALPHA ANALYTICAL LABORATORIES  
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0109474

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	
Blank Analysis for sample(s) 01							
SVOC's by GC/MS 8270 continued				1 8270C	1012 12:30	1015 19:47	PB
Benzo (a) anthracene	ND	ug/kg	500				
Benzo (a) pyrene	ND	ug/kg	500				
Benzo (b) fluoranthene	ND	ug/kg	500				
Benzo (k) fluoranthene	ND	ug/kg	500				
Chrysene	ND	ug/kg	500				
Acenaphthylene	ND	ug/kg	500				
Anthracene	ND	ug/kg	500				
Benzo (ghi) perylene	ND	ug/kg	500				
Fluorene	ND	ug/kg	500				
Phenanthrene	ND	ug/kg	500				
Dibenzo (a, h) anthracene	ND	ug/kg	500				
Indeno (1, 2, 3- cd) pyrene	ND	ug/kg	700				
Pyrene	ND	ug/kg	500				
Benzo (e) pyrene	ND	ug/kg	500				
Biphenyl	ND	ug/kg	500				
Perylene	ND	ug/kg	500				
Aniline	ND	ug/kg	1000				
4-Chloroaniline	ND	ug/kg	500				
1-Methylnaphthalene	ND	ug/kg	500				
2-Nitroaniline	ND	ug/kg	500				
3-Nitroaniline	ND	ug/kg	500				
4-Nitroaniline	ND	ug/kg	700				
Dibenzofuran	ND	ug/kg	500				
a, a-Dimethylphenethylamine	ND	ug/kg	5000				
Hexachloropropene	ND	ug/kg	5000				
Nitrosodi-n-butylamine	ND	ug/kg	1000				
2-Methylnaphthalene	ND	ug/kg	800				
1, 2, 4, 5-Tetrachlorobenzene	ND	ug/kg	2000				
Pentachlorobenzene	ND	ug/kg	2000				
a-Naphthylamine	ND	ug/kg	2000				
b-Naphthylamine	ND	ug/kg	2000				
Phenacetin	ND	ug/kg	1000				
Dimethoate	ND	ug/kg	2000				
4-Aminobiphenyl	ND	ug/kg	1000				
Pentachloronitrobenzene	ND	ug/kg	1000				
Iscdrin	ND	ug/kg	1000				
p-Dimethylaminoazobenzene	ND	ug/kg	1000				
Chlorobenzilate	ND	ug/kg	2000				
3-Methylcholanthrene	ND	ug/kg	2000				
Ethyl Methanesulfonate	ND	ug/kg	1500				
Acetophenone	ND	ug/kg	2000				
Nitrosodipiperidine	ND	ug/kg	2000				
7, 12-Dimethylbenz (a) anthracene	ND	ug/kg	1000				
n-Nitrosodimethylamine	ND	ug/kg	5000				
2, 4, 6-Trichlorophenol	ND	ug/kg	500				
p-Chloro-m-cresol	ND	ug/kg	500				
2-Chlorophenol	ND	ug/kg	600				

**ALPHA ANALYTICAL LABORATORIES**  
**QUALITY ASSURANCE BATCH BLANK ANALYSIS**

Laboratory Job Number: L0109474

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE		ID
					PREP	ANAL	

Blank Analysis for sample(s) 01

SVOC's by GC/MS 8270 continued 1 8270C 1012 12:30 1015 19:47 PB

2,4-Dichlorophenol	ND	ug/kg	1000
2,4-Dimethylphenol	ND	ug/kg	1000
2-Nitrophenol	ND	ug/kg	2000
4-Nitrophenol	ND	ug/kg	1000
2,4-Dinitrophenol	ND	ug/kg	2000
4,6-Dinitro-o-cresol	ND	ug/kg	2000
Pentachlorophenol	ND	ug/kg	2000
Phenol	ND	ug/kg	700
2-Methylphenol	ND	ug/kg	600
3-Methylphenol/4-Methylphenol	ND	ug/kg	600
2,4,5-Trichlorophenol	ND	ug/kg	500
2,6-Dichlorophenol	ND	ug/kg	1000
Benzoic Acid	ND	ug/kg	5000
Benzyl Alcohol	ND	ug/kg	1000
Carbazole	ND	ug/kg	500
Pyridine	ND	ug/kg	5000
2-Picoline	ND	ug/kg	2000
Pronamide	ND	ug/kg	2000
Methyl methanesulfonate	ND	ug/kg	2000

Surrogate Recovery

2-Fluorophenol	63.0	%
Phenol-d6	63.0	%
Nitrobenzene-d5	71.0	%
2-Fluorobiphenyl	65.0	%
2,4,6-Tribromophenol	61.0	%
4-Terphenyl-d14	73.0	%

Blank Analysis for sample(s) 01

Polychlorinated Biphenyls 1 8082 1016 02:56 AK

Aroclor 1221	ND	ug/kg	250.
Aroclor 1232	ND	ug/kg	250.
Aroclor 1242/1016	ND	ug/kg	250.
Aroclor 1248	ND	ug/kg	250.
Aroclor 1254	ND	ug/kg	250.
Aroclor 1260	ND	ug/kg	250.

Surrogate Recovery

2,4,5,6-Tetrachloro-m-xylene	105.	%
Decachlorobiphenyl	17.0	%

Blank Analysis for sample(s) 01

Hydrocarbon Scan by GC 8100M 1 8100M 1015 20:02 PD

Mineral Spirits	ND	mg/kg	100
Gasoline	ND	mg/kg	100

ALPHA ANALYTICAL LABORATORIES  
ADDENDUM I

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REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Update III, 1997.
30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.

METHOD Method number by which analysis was performed.

ID Initials of the analyst.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at its own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

## Volatile Organics by Method 8260 B

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
1,2-Dichloroethane-d <sub>4</sub>	75%	125%	75%	125%		
4-Bromofluorobenzene	75%	125%	75%	125%		
Toluene-d <sub>8</sub>	75%	125%	75%	125%		
Dibromofluoromethane	75%	125%	75%	125%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LC%)	percent recovery				duplicate and/or MSD	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,1-Dichloroethene	61%	145%	59%	172%	all target compounds	
Trichloroethene	71%	120%	62%	137%	20%	30%
Chlorobenzene	75%	130%	60%	133%		
Benzene	76%	127%	66%	142%		
Toluene	76%	125%	59%	139%		

## Volatile Organics by Method 8021 B

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
4-Bromochlorobenzene	70%	110%	70%	120%		
4-Bromofluorobenzene	70%	110%	70%	120%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LC%)	percent recovery				duplicate and/or MSD	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,1-Dichloroethene	70%	130%	70%	130%	all target compounds	
Trichloroethene	70%	130%	70%	130%	20%	30%
Chlorobenzene	70%	130%	70%	130%		
Benzene	70%	130%	70%	130%		
Toluene	70%	130%	70%	130%		
Ethylbenzene	70%	130%	70%	130%		

## Semi-Volatile Organics by Method 8270C (includes PAHs)

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
Nitrobenzene-d <sub>5</sub>	23%	120%	23%	120%		
Phenol-d <sub>5</sub>	10%	120%	10%	120%		
2-Fluorophenol	21%	120%	25%	120%		
2-Fluorobiphenyl	43%	120%	30%	120%		
p-Terphenyl-d <sub>14</sub>	33%	120%	18%	120%		
2,4,6-Tribromophenol	10%	120%	19%	120%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LC%)	percent recovery				duplicate and/or MSD	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,2,4-Trichlorobenzene	39%	98%	38%	107%	all target compounds	
Acenaphthene	46%	118%	31%	137%	40%	50%
2,4-Dinitrotoluene	24%	96%	28%	89%		
Pyrene	26%	127%	35%	142%		
N-Nitroso-di-n-propylamine	41%	116%	41%	126%		
1,4-Dichlorobenzene	36%	97%	28%	104%		
Pentachlorophenol	9%	103%	17%	109%		
Phenol	12%	110%	26%	90%		
2-Chlorophenol	27%	123%	25%	102%		
4-Chloro-3-methylphenol	23%	97%	26%	103%		
4-Nitrophenol	10%	80%	11%	114%		



## Quality Control Acceptance Criteria

## PCB/Pesticides by Method 8082/8181

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
2,4,5,6-Tetrachloro-m-xylene	40%	120%	40%	120%		
Decachlorobiphenyl	40%	120%	40%	120%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LCS)	percent recovery				duplicate and/or MSD	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
Lindane	56%	123%	46%	127%	all target compounds	
Heptachlor	40%	131%	35%	130%	30%	50%
Aldrin	40%	120%	34%	132%		
Dieldrin	52%	126%	31%	134%		
Endrin	56%	121%	42%	139%		
4,4'-DDT	38%	127%	23%	134%		
Aroclor 1242/1016	40%	140%	40%	140%		
Aroclor 1260	40%	140%	40%	140%		

## Volatile Petroleum Hydrocarbons (VPH) by MA DEP 98-1

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
2,5-Dibromotoluene	70%	130%	70%	130%		
laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
all compounds	70%	130%	70%	130%	50%	50%

## Extractable Petroleum Hydrocarbons (EPH) by MA DEP 98-1

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
Chloro-octadecane	40%	140%	40%	140%		
ortho-Terphenyl	40%	140%	40%	140%		
2-Fluorobiphenyl (fractionation)	40%	140%	40%	140%		
2-Bromonaphthalene (fractionation)	40%	140%	40%	140%		
laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
all compounds	40%	140%	40%	140%	50%	50%

## TPH (GC-FID) by Method 8100M

surrogate spike % recovery	AQ Limits		Soil Limits		duplicate	
	LCL	UCL	LCL	UCL	AQ Limits	Soil Limits
					RPD	RPD
ortho-Terphenyl	40%	140%	40%	140%	40%	40%

## TPH by Method 418.1

matrix spike (MS) & laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
TPH	60%	140%	60%	140%	40%	40%

## Quality Control Acceptance Criteria

## Trace Metals by Method 6010B/7000 series

matrix spike (MS) & laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
target analyte	75%	125%	70%	140%	20%	35%

## Mercury by Method 7470A/7471/

matrix spike (MS) & laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
mercury	70%	130%	60%	140%	35%	45%

## Total Cyanide by Method 9010B

matrix spike (MS) & laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
cyanide	80%	120%	65%	135%	30%	40%

## Total Phenol by Method 9065

matrix spike (MS) & laboratory control sample (LCS)	percent recovery				duplicate	
	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
phenol	70%	130%	65%	135%	20%	30%