Jones Environmental
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CLASS A-3 RESPONSE ACTION OUTCOME STATEMENT AND ACTIVITY AND USE LIMITATION

Former Jet-Line/Geochem
263 Howard Street
Lowell, Massachusetts

DEP RTN 3-0601
EPA ID No. MAD047075734
(Lightship Project No. 542.1.1)

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Prepared for:

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LSP SERVICES • CIVIL ENGINEERING • ASSESSMENT • PERMITTING • REMEDIATION • CONSTRUCTION MANAGEMENT

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1.0 INTRODUCTION

On behalf of Jones Environmental Services (Northeast), Inc. ("JES"), Lightship Engineering, LLC ("Lightship Engineering") has prepared this *Class A-3 Response Action Outcome ("RAO") Statement and Activity and Use Limitation ("AUL")* (the "RAO Report"), pursuant to 310 CMR 40.1056 and 40.1012. The RAO Report has been prepared in connection with a release of oil and/or hazardous materials ("OHM") at 263 Howard Street property in Lowell, Massachusetts (the "Site"). For the purpose of the RAO Report, the disposal site is defined by the 263 Howard Street property boundaries and the AUL Area is defined as the upland portion of the disposal site bounded by the approximate high water mark of River Meadows Brook to the northwest. A Site Locus Map and Disposal Site Map are attached as Figures 1-1 and 1-2, Appendix A, respectively.

This RAO Report provides documentation in support of a Class A-3 RAO Statement. A level of No Significant Risk ("NSR") has been achieved at the disposal site with the implementation of an Activity and Use Limitation ("AUL"). The AUL Opinion is being submitted concurrently with the RAO Report and a copy is attached as Appendix B.

1.1 BACKGROUND

The Site and surrounding area has been developed for industrial use since at least 1879. Prior to 1976 the Site was utilized as a railroad yard, boiler maintenance and repair facility, and metal recycling facility. Since 1976 the Site has been utilized as a Resource Conservation and Recovery Act ("RCRA") treatment, storage and disposal facility ("TSDF") operating under an Interim Hazardous Waste Facility (Part B) License. The TSDF was initially owned and operated by Geochem, Inc. ("Geochem"). Jet-Line Environmental Services, Inc. (a subsidiary of Basil Waste Management) ("Jet-Line") acquired the property and operated a TSDF at the Site between 1983 and 1997. The Interim Part B License was suspended for one year in 1987 and was revoked in 1997 due to RCRA violations. In 1998 JES acquired the Site and resumed TSDF operations under a reinstated Interim Part B License. The TSDF has been licensed for the reclamation, distillation, and storage of solvents, acids, alkalis, volatile and non-volatile organic compounds, plating and metal waste and still bottoms. The Site is presently utilized for the treatment and temporary storage of hazardous waste prior to off-site disposal.

There are two interconnected single-story buildings located on the east side of the Site. The eastern portion of the building (identified as "Building 1" on Figure 1-2, Appendix A) is a wood-framed structure with a wood floor and underlying crawl space constructed in 1976 for use as offices, a laboratory and bermed hazardous waste storage areas. The western portion of the building (identified as "Building 2" on Figure 1-2, Appendix A) is a concrete block structure

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with a concrete slab on-grade foundation constructed in 1979 for use as bermed hazardous waste storage area. In the mid 1990's the two buildings were connected via a passageway. A concrete loading dock is located on the northwest corner of Building 2. An outside storage area used to store plastics and empty containers is located in an unpaved area north of Building 1. The western portion of the Site is asphalt paved and is used to store empty trailers and drums. This area was reported to have been unpaved prior to 1988. The Site is bounded by River Meadow Brook to the northwest with the Lowell Connector beyond. Howard Street abuts the Site to the northeast. Across Howard Street to the northeast and east is a power plant. Tanner Streets abuts the Site to the southeast with a boiler works and machine shop beyond. The Silresin Chemical Corporation, Federal Superfund site is located approximately 1,000 feet southwest of the Site.

The Site is dual regulated by the United States Environmental Protection Agency ("EPA") RCRA Corrective Action Program and by the Massachusetts Department of Environmental Protection ("DEP"), Massachusetts Contingency Plan ("MCP") 310 CMR 40.0000. When the Interim Part B License was suspended in 1997, the DEP ordered the completion of comprehensive response actions at the Site in accordance with the MCP. Lightship Engineering was retained by JES in January 2002 to provide LSP services for the Site.

Several response actions have been conducted at the Site by others between 1984 through 2001. The response actions were conducted by the previous owners Geochem and their consultant Goldberg-Zoino & Associates, Inc. ("GZA"); Jet-Line and their consultant Wehran Engineering Corporation ("WE"); the City of Lowell and their consultant TRC, Inc. ("TRC"); the EPA and their consultant Roy F. Weston, Inc. ("Weston") and by JES and their previous consultants Phoenix and URS Corporation ("URS"). Historical response actions conducted at the Site are summarized in the following reports reviewed by Lightship Engineering:

- Phoenix, *Phase I Initial Site Investigation Report* and *Tier Classification*, dated February 1999, ("Phase I Report"): The following historical reports were appended to the Phase I Report: January 1985 GZA *Environmental Site Assessment*; July 1985 WE *Report on Subsurface Investigation*; May 1992 Weston *Final Preliminary Assessment Plus Report*; April 1994 Jet-Line *March 31, 1994 Sampling of Lowell Wells*; February 1995 Jet-Line *Final Assessment Report*; June 1996 Phoenix *LSP Evaluation Opinion*; and July 1998 TRC *Environmental Site Assessment*.
- URS, *Massachusetts Contingency Plan Phase II Comprehensive Site Assessment Report* ("Phase II Report"), dated August 14, 2001: A June 12, 2001 Imminent Hazard Evaluation and Comprehensive Method 3 Risk Characterization ("Method 3 Risk Characterization") prepared by Dr. Susan A. Sandstrom of Groton, Massachusetts was appended to the Phase II Report. A copy of the data tables (Tables 1 to 9) from the Phase II Report are included as Appendix C of this RAO

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Report. A copy of the Method 3 Risk Characterization is included as Appendix D of this RAO Report.

Volatile organic compounds ("VOC") were first detected in soil, groundwater and/or surface water samples collected at the Site by GZA and confirmed by WE in 1984 and 1985. VOCs detected have included: tetrachloroethylene ("PCE"); trichloroethylene ("TCE"); 1,1,1-trichloroethane ("1,1,1-TCA"); 1,1-dichloroethylene ("1,1-DCE"); 1,1-dichloroethane ("1,1-DCA"); trans-1, 2-dichloroethylene ("Trans-1, 2-DCE"); 1,2-dichloroethane ("1,2-DCA"); vinyl chloride ("VC"); methylene chloride ("MC"); chloroform; acetone; methyl ethyl ketone ("MEK"); benzene, toluene, ethylbenzene and total xylenes ("BTEX") and trichlorflouromethane ("Freon"). GZA and WE did not identify a specific source of the OHM detected. In 1992, based on a review of historical operations, the EPA and Weston identified four potential Areas of Concern ("AOC") at the Site as set forth below. The locations of the four historic AOC are indicated on the Historic AOC and Sampling Locations Map included as Figure 1-3, Appendix A.

- **AOC 1:** Hazardous waste storage areas, including a solvent recovery system, located in Building 1. The solvent recovery system, installed in 1978 and decommissioned in 1984, was historically used to recover 1,1,1-DCA, MC and Freon. No historic releases were reported in this area.
- **AOC 2:** Hazardous waste storage areas located in Building 2. No historic releases were reported in this area.
- **AOC 3:** A former catch basin/spill containment sump ("sump") located near the southeast corner of Building 2. The sump was reported to have been constructed of two separate pre-cast concrete squares a seam between the two pieces. The sump was reported to contain hazardous material and the DEP subsequently required assessment, remediation and closure of the sump area.
- **AOC 4:** A former catch basin located in the loading dock area north of Building 2. Two historic spills were documented to have occurred in this area including a spill of ethylbenzene and acetone from a 55-gallon drum in 1978 and spill of an unknown quantity of undefined "ignitable wastes" in 1981.

The Phase II Report documented the results of soil, groundwater, surface water and indoor and outdoor air sampling conducted at the Site between 1992 and 2001 to investigate potential impacts from potential past releases from the four AOCs as well as other areas of the Site including the paved parking areas on the west side of the Site. The compounds of concern identified at the Site consist primarily of TCE and PCE and their degradation products, 1,1,1-TCA, toluene and other select VOCs. The primary source appears to be the former sump in Building 2 (AOC 3).

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The Phase II Report also documented response actions conducted in the sump area in 1986 and 1987. In 1986 approximately 26 drums of liquid and three drums of sediment/soil were recovered from the sump and transported off-Site for disposal. In 1987 the sump was reported to have flooded with groundwater in which VOCs, including TCE, PCE, 1,1,1-TCA and MC, were detected. According to the Phase II, the sump was closed in accordance with DEP requirements and monitoring well MW-4 was installed to monitor groundwater conditions in the source area.

As part of the Phase II assessment completed by URS, comprehensive soil, groundwater, surface water and air sampling was conducted at the Site and a Method 3 Risk Characterization was completed. The Method 3 Risk Characterization, attached at Appendix D, concluded that a level of *No Significant Risk* ("NSR") to human health exists at the Site with the assumptions that the property continues to be for used for commercial or industrial purposes and that the passive vents installed in the crawl space below Building 1 remain in place. As set forth in the Method 3 Risk Characterization, a level of NSR had not been achieved with respect to public welfare and the environment as a result of the concentration of OHM that exceeded DEP Upper Concentration Limits ("UCLs") in groundwater at monitoring well MW-4.

On June 19, 2002, Lightship Engineering completed an MCP Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action ("Phase III") and Phase IV Implementation of Selected Remedial Alternative ("Phase IV") reports. The Phase III report identified soil vapor extraction and air sparging ("SVE/AS") as the recommended remedial action alternative to remediate groundwater in the vicinity of well MW-4 located in the former sump source area. Lightship Engineering and JES completed the installation of the SVE/AS remedial system consistent with the Phase IV report in April of 2003. Five SVE wells (SVE-1 to SVE-5) and three AS wells (AS-1 to AS-3) were installed at the locations indicated on Figure 1-2, Appendix A. The SVE/AS remediation system operated at the Site for 18 months between April 25, 2003 and October 25, 2004. Groundwater samples were collected on a quarterly basis during operation of the SVE/AS system (April 25, 2003, July 8, 2003, October 20, 2003, January 14, 2004, April 13, 2004 and July 19, 2004). Two rounds of post remediation groundwater samples were collected on October 28, 2004 and March 31, 2005 to confirm that a level of NSR to human health, safety, public welfare and the environment has been achieved at the Site. Results of the quarterly and post-remediation groundwater sampling completed indicated that the SVE/AS system was effective at reducing the VOC concentrations in groundwater at the Site to levels below Method 3 Upper Concentration Limits (UCLs).

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2.0 CONTENT OF THE RESPONSE ACTION OUTCOME STATEMENT

Pursuant to 310 CMR 40.1056(1) and (2), the content of the RAO and AUL are set forth below.

2.1 SITE NAME, ADDRESS AND RELEASE TRACKING NUMBER

Pursuant to 310 CMR 40.1056(1)(a), the site name, address and RTN are set forth below.

Former Jetline/Geochem
263 Howard Street
Lowell, Massachusetts

Release Tracking Number 3-00601

2.2 CLASS OF RESPONSE ACTION OUTCOME

Pursuant to 310 CMR 40.1056(1)(b), the class of RAO is set forth below.

A Class A-3 RAO is being submitted in connection with RTN 3-00601.

2.3 METHOD OF RISK CHARACTERIZATION

Pursuant to 310 CMR 40.1056(1)(c), the method of risk characterization is set forth below.

A Method 3 Risk Characterization has been completed in connection with RTN 3-00601 as set forth in Section 5.0.

2.4 RELATIONSHIP OF THIS RAO STATEMENT TO OTHER RAO STATEMENTS

Pursuant to 310 CMR 40.1056(1)(d), the relationship of the RAO Statement to any other RAO Statements that have been filed for the disposal site and a statement as to whether any additional response actions are needed for any other portions of the disposal site is set forth below.

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This RAO Statement being submitted in connection with RTN 3-00601 is not related to any other RAOs submitted to DEP. No other response actions are needed for any other portions of the disposal site.

2.5 POST-RAO ACTIVE OPERATION AND MAINTENANCE ACTIVITIES

Pursuant to 310 CMR 40.1056(1)(e), where the RAO Statement applies to a Class C RAO, an indication as to whether any Post-RAO Active Operation and Maintenance of the remedial action under 310 CMR 40.0896 will be conducted is set forth below.

As set forth above, a Class A-3 RAO is being submitted in connection with RTN 3-00601. Therefore, 310 CMR 40.1056(1)(e) is not applicable.

2.6 IMPLEMENTATION OF AN ACTIVITY AND USE LIMITATION

Pursuant to 310 CMR 40.1056(1)(f), an indication as to whether the RAO is based upon the implementation of an AUL, and if so, the type of AUL implemented at the disposal site is set forth below.

As set forth above, a Class A-3 RAO is being submitted in connection with RTN 3-00601. Pursuant to 310 CMR 40.1036(3)(c), Class A-3 RAOs shall rely upon implementation of one or more AULs to maintain a level of NSR. An AUL was recorded at the Middlesex County Registry of Deeds – North District in Lowell, Massachusetts on February 24, 2006. Pursuant to 310 CMR 40.1074(4)(a), a certified copy of the AUL is being submitted concurrently with this Class A-3 RAO report. Copies of the AUL Opinion and the AUL – Form 1075 are also attached as Appendix B.

2.7 ACHIEVEMENT OF THE REQUIREMENTS OF A CLASS A-3 RESPONSE ACTION OUTCOME

Pursuant to 310 CMR 40.1056(1)(g), an Opinion from a Licensed Site Professional ("LSP") as to whether the requirements of the applicable class of RAO specified in 310 CMR 40.1000 have been met is set forth below.

The requirements of a Class A-3 RAO, pursuant to 310 CMR 40.1036(3) have been achieved at the Site. The Opinion of the LSP is included in Section F of the RAO Statement transmittal form BWSC-104.

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2.8 CERTIFICATION OF RESPONSE ACTION OUTCOME

Pursuant to 310 CMR 40.1056(1)(h), a certification of the RAO Statement and all documents submitted with the RAO Statement as required by 310 CMR 40.0009 is set forth below.

Pursuant to 310 CMR 40.0009, a certification of the RAO Statement and all documents submitted with the RAO are set forth in Section J of the RAO Statement transmittal form BWSC-104.

2.9 UPPER CONCENTRATION LIMITS

Pursuant to 310 CMR 40.1056(1)(i), an indication as to whether OHM exceed one or more applicable UCLs in soil or groundwater, as described at 310 CMR 40.0996, is set forth below.

As set forth in Table 2-1, Appendix E, VOC concentrations detected in groundwater samples collected at the Site since July 2003, after the SVE/AS system was first activated, have not exceeded UCLs. This includes the two rounds of post-remediation groundwater samples collected at the Site in October 2004 and March 2005 after the SVE/AS system was deactivated.

2.10 DISPOSAL SITE MAP

Pursuant to 310 CMR 40.1056(2)(a), all investigatory and sampling points relevant to the response actions conducted at the Site to date are indicated on the Disposal Site Map and Historic AOC and Sampling Location Maps are included as Figures 1-2 and 1-3, Appendix A.

2.11 EVALUATION OF UNCONTROLLED SOURCES OF OHM

Pursuant to 310 CMR 40.1056(2)(b), for all Class A RAOs and where applicable to Class C RAOs, a demonstration that all uncontrolled sources, as specified in 310 CMR 40.1003(5) have been eliminated or controlled is set forth below.

As set forth in Section 1.0, there are no uncontrolled sources of OHM associated with RTN 3-00601 identified at the Site.

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2.12 ACHIEVEMENT OF A LEVEL OF NO SIGNIFICANT RISK

Pursuant to 310 CMR 40.1056(2)(c), information supporting the conclusion that a level of NSR has been achieved or exists at the disposal site is set forth below.

As set forth in Section 5.0, a Method 3 Risk Characterization was completed in 2001 pursuant to 310 CMR 40.0990. Based upon the results of the Method 3 Risk Characterization a level of NSR existed under current conditions. A level of NSR did not exist with respect to future residential receptors and, as a result of UCL exceedences, with respect to public welfare and the environment.

Since the Method 3 Risk Characterization was completed in 2001, an SVE/AS system was installed in the vicinity of MW-4 to remediate groundwater in the sump source area and thereby reduce VOC concentrations to a level below the Method 3 UCLs. The SVE/AS system operated at the Site for eighteen months between April 2003 and October 2004. Results of quarterly groundwater sampling completed during the operation of the system and post-remediation groundwater monitoring conducted in October 2004 and March 2005 indicate that VOC concentrations in groundwater have been reduced to levels below Method 3 UCLs. As set forth above, the Class A-3 RAO included an AUL that restricted the upland portion of the property to commercial/industrial purposes and that passive vents installed in the crawl space below Building 1 remain in place and operational. With the reduction of OHM concentrations to below UCLs and the implementation of an AUL, a level of NSR to human health, safety, public welfare and the environment has been achieved for current and future receptors.

2.13 ACHIEVEMENT OF NO SUBSTANTIAL HAZARD FOR CLASS C RESPONSE ACTION OUTCOMES

Pursuant to 310 CMR 40.1056(2)(d), information supporting the conclusion that no hazards remain at the disposal site in connection with a Class C RAO is set forth below.

As set forth above, a Class A-3 RAO is being submitted in connection with RTN 3-00601. Therefore, 310 CMR 40.1056(2)(d) is not applicable to RTN 3-00601.

2.14 EVALUATION OF ACHIEVING BACKGROUND

Pursuant to 310 CMR 40.1056(2)(e), information documenting the extent to which levels of OHM in the environment have been reduced to background and the results of an evaluation of the feasibility of achieving background at the disposal site is set forth below.

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As set forth in Section 6.0, an evaluation of the feasibility of achieving background was completed consistent with DEP's *Conducting Feasibility Evaluations Under The Massachusetts Contingency Plan ("MCP")* dated July 16, 2004.

2.15 EVALUATION OF UPPER CONCENTRATION LIMITS FOR CLASS A-4 AND B-3 RESPONSE ACTION OUTCOME STATEMENTS

Pursuant to 310 CMR 40.1056(2)(f), the results of the evaluation conducted pursuant to 310 CMR 40.0860 demonstrating that the achievement of UCLs in soil located at a depth greater than 15 feet from the ground surface or in the area beneath an engineered barrier is not feasible is set forth below.

As set forth above, a Class A-3 RAO is being submitted in connection with RTN 3-00601. Therefore, 310 CMR 40.1056(2)(f) is not applicable to RTN 3-00601.

2.16 CERTIFIED ACTIVITY AND USE LIMITATION

Pursuant to 310 CMR 40.1056(2)(g), information regarding AULs certified by the appropriate registry of deeds or land registration office, which have been implemented under 310 CMR 40.1070, are set forth below.

As set forth above, an AUL was recorded at the Middlesex County Registry of Deeds – North District on February 24, 2006. Pursuant to 310 CMR 40.1074(4)(a), a certified copy of the AUL is being submitted concurrently with this RAO Report.

2.17 ACTIVITY AND USE LIMITATION OPINION AND TRANSMITTAL FORM

Pursuant to 310 CMR 40.1056(2)(h), information regarding an AUL Opinion accompanied by an AUL Opinion form prescribed by the Department, where the RAO is based upon the implementation of an AUL, is set forth below.

The AUL Opinion and AUL Opinion Form (BWSC-113) are being submitted concurrently with this RAO Report. Copies of the AUL Opinion and AUL Opinion Form (BWSC-113) are also attached as Appendix B.

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2.18 OPERATION, MAINTENANCE AND MONITORING IN CONNECTION WITH THE CLASS A-3 RESPONSE ACTION OUTCOME STATEMENT

Pursuant to 310 CMR 40.1056(2)(i), a description of any operation, maintenance, and/or monitoring that will be required to confirm and/or maintain the conditions at the disposal site upon which the RAO is based is set forth below.

As set forth above, a level of NSR has been achieved at the Site with the implementation of an AUL. The AUL restricts the upland portion of the disposal site to commercial and industrial uses and requires that the passive vents installed in the crawl space below Building 1 remain in place and operational. No other operation, maintenance or monitoring is required to maintain the conditions of the Class A-3 RAO.

2.19 ACHIEVING A PERMANENT SOLUTION

Pursuant to 310 CMR 40.1056(2)(j), in connection with all Class C RAOs, information regarding the plan, as specified in 310 CMR 40.0861(2)(h), which presents definitive and enterprising steps to be taken toward achieving a Permanent Solution at the disposal site is set forth below.

As set forth above, a Class A-3 RAO is being submitted in connection with RTN 3-00601. Therefore, 310 CMR 40.1056(2)(j) is not applicable to RTN 3-00601.

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3.0 RESPONSE ACTIONS CONDUCTED AT THE SITE

A description of the release and response actions conducted at the Site, together with a description of site hydrogeologic conditions in support of the Class A-3 RAO for RTN 3-00601 is set forth below.

3.1 DESCRIPTION OF THE RELEASE AND COMPOUNDS OF CONCERN

A description of the release is set forth in Section 1.1. The compounds of concern identified at the Site consist primarily of TCE and PCE and their degradation products, 1,1,1-TCA, toluene and other select VOCs. The primary source appears to be the former sump located in the southeast corner of Building 2.

3.2 RESPONSE ACTIONS CONDUCTED

A description of historic response actions conducted at the Site by others between 1984 and 2001 and by Lightship Engineering since 2002 are set forth below.

3.2.1 Historic Response Actions Conducted By Others (1984-2001)

Details of historical response actions conducted at the Site by others between 1984 and 2001 are set forth in the Phase I and Phase II Reports previously submitted to DEP and are summarized below.

3.2.1.1 Soil Boring Advancement and Shallow Soil Sample Collection and Analysis

Soil samples have been collected from a total of seventeen locations across the Site at depths ranging from 0.5 to 2.0 feet below ground surface and submitted for laboratory analysis. The soil samples were collected from shallow depths ranging from 0.5 to 2.0 feet below ground surface in order to evaluate potential surface release in AOCs 1 and 4 and the outside parking areas on the west side of the property.

As set forth in the Phase II Report, soil encountered during drilling at the Site consisted of five to ten feet of urban fill comprised of sands and gravel with debris including wood, asphalt, bricks, concrete, cinders and scrap metal. The fill layer is underlain by approximately 10 to 15 feet of stratified silty sand or gravelly sand on top of dense glacial till. Peat or organic

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silt was observed above the silty sand at borings locations WE-2, GZA-1, GZA-2 and GZA-3. Groundwater was encountered at approximately eight to 10 feet below grade.

- **AOC 1:** In July 1985, WE submitted three soil samples collected from below Buildings 1 and 2 for VOC analysis (S-1, S-2 and S-3) at the locations indicated on Figure 1-3, Appendix A. A composite sample of S-1, S-2 and S-3 was also reported to have been submitted for PCBs, pesticides and EP-Toxicity Metals analyses. In 1994, six additional soil samples were collected from below Building 1 (Bldg 1 A-2, Bldg1 A-4, Bldg 1 B-1, Bldg 1 B-3, Bldg 1 I-1 and Bldg 1 I-3) at the locations indicated on Figure 1-3, Appendix A and were submitted for VOCs analysis. The results are summarized in Table 1 (from the URS Phase II Report), Appendix C. As set forth in Table 1, the shallow soil samples collected from AOC 1, beneath Building 1, contained select VOC compounds (1,1,1-TCA, TCE, PCE, BTX and chloroform) at concentrations below the MCP Method 1 S-2/GW-2 and GW-3 Soil Standards. No target VOCs were detected above the laboratory analytical reporting limit.
- **AOC 2:** As set forth in the Phase II Report, Building 2 has a concrete floor and no shallow soil samples were collected from AOC 2 due to the fact that no evidence of potential surface releases were identified in this Area.
- **AOC 3:** As set forth in the Phase II Report, a release was identified from the former catch basin/sump in Building 2 (AOC 3) as set forth in Section 3.2.1.5. No soil samples were reported to have been collected from this area during closure of the former catch basin in the late 1980s.
- **AOC 4:** In August 2000, URS collected three soil samples north of Building No. 1 (SS-1, SS-2 and SS-3) at the locations indicated on Figure 1-2, Appendix A. One of the samples (SS-1) was submitted for VOCs and PCB analyses. The results are summarized in Table 4 (from the URS Phase II Report), Appendix C. As set forth in Table 4, one shallow soil sample (SS-1) collected from AOC 4, located north of Building 2, contained VOCs. Two of the VOCs (1,1-DCE and TCE) were detected at concentrations above MCP Method 1 S-2/GW-2 Soil Standards but below S-2/GW-3 Soil Standards.
- **Outside Parking Areas:** In 1994, seven soil samples were collected from the outside parking areas (Pkg Lot 1 to Pkg Lot 5, Paved Lot 1 and Paved Lot 2) west of the building at the locations indicated on Figure 1-3, Appendix A and were submitted for VOC analysis. The results are summarized in Table 1 (from the URS Phase II Report), Appendix C. As set forth in Table 1, VOCs were not detected in shallow soil samples analyzed from the parking areas on the west side of the property with the exception of TCE detected in one soil sample analyzed from Paved Lot-1 at a concentration below the MCP Method 1 S-1 and S-2/GW-2 and GW-3 Soil Standards.

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As summarized above and as indicated on Figures 1-2 and 1-3, Appendix A, several soil samples were collected from across the disposal site and submitted for laboratory analysis. With the exception of the concentrations of 1,1-DCE and TCE detected in soil sample SS-1, no target analytes were detected above the applicable Method 1 Soil Standards or the laboratory analytical reporting limits.

3.2.1.2 Groundwater Monitoring Well Installation and Groundwater Sample Collection and Analysis

In December 1984, GZA installed three groundwater monitoring wells (GZA-1 to GZA-3) at the locations indicated on Figure 1-3, Appendix A. Groundwater samples were collected from these wells in December 1984 and submitted for VOC analysis. GZA and WE installed five additional wells in July 1985 (GZA-4, GZA-5, WE-1, WE-2 and WE-3) at the locations indicated on Figure 1-3, Appendix A. Groundwater samples were collected from these wells in July 1985 and submitted for VOCs analysis. Two additional wells (MW-4 and MW-5) were installed in 1987 at the locations indicated on Figure 1-3, Appendix A. Groundwater samples were collected in July 1987 from monitoring wells GZA-5, WE-1, WE-2, WE-3, MW-4 and MW-5 and were submitted for VOCs analysis. Groundwater samples collected for monitoring wells WE-2 and WE-3 in March 1994 were submitted for VOCs, semi-VOCs, polychlorinated biphenyls ("PCBs"), pesticides and total metals analyses. In September 2000, URS installed three additional groundwater monitoring wells (URS-1 to URS-3) to replace destroyed wells GZA-3, WE-1 and WE-2, at the locations indicated on Figure 1-2, Appendix A. Groundwater samples were collected from wells GZA-4, WE-3, MW-4, MW-5, URS-1, URS-2 and URS-3 in September 2000 and submitted for VOCs analysis. The results the historic groundwater samplings were summarized in Tables 2 and 6 (from the URS Phase II Report), Appendix C.

As set forth in Tables 2 and 6, one or more groundwater samples collected from each of the wells at the Site (GZA-1 to GZA-5, WE-1 to WE-3, MW-4, MW-5 and URS-1 to URS-3) contained one or more VOCs (including 1,1-DCE, 1,1,1-TCA, TCE, MC, 1,2-DCE, PCE, toluene and total xylenes) at concentrations above the MCP Method 1 GW-2 Groundwater Standards. Historically, groundwater samples collected from three wells at the Site (GZA-4, WE-1 and MW-4) have contained one or more VOCs (including TCE, PCE, 1,1,1-TCA and toluene) at concentrations above MCP Method 1 GW-3 Groundwater Standards and/or Method 3 UCLs. Metals were not detected in the groundwater samples collected from wells WE-2 and WE-3 at concentrations above MCP Method 1 GW-3 Groundwater Standards.

In general, the groundwater analytical results indicate that the highest VOC concentrations were detected in well MW-4 located in the southeast corner of Building No. 2 in the vicinity of the former catch basin/sump and in well GZA-4 which is located hydraulically

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downgradient of MW-4, between the Site building and River Meadows Brook. VOCs have been detected in wells located along the upgradient property boundaries (including WE-1, WE-2, GZA-2 and GZA-3). As set forth in the Phase II Report, VOCs may be migrating onto the Site from upgradient sources. The Silresin Chemical Corporation release site at 86 Tanner Street was identified as a potential upgradient source of VOCs in groundwater located approximately 1,000-feet south of the Site.

As set forth in the Phase II Report, groundwater is located at a depth of approximately eight to 10 feet below grade and flows in a northwesterly direction across the Site towards River Meadows Brook. Groundwater flow rates were estimated to range between 12.7 and 13.4 feet per year. The Phase II did not evaluate deep overburden or bedrock aquifer conditions at the Site. The dense till layer at 15 to 25 feet below ground surface is most likely serving as an aquitard to limit the downward vertical gradient of chlorinated solvents in groundwater.

3.2.1.3 Surface Water Sample Collection and Analysis

Surface water samples have been collected from River Meadows Brook upstream (US or SW-2) and downstream (DS or SW-1) of the Site in 1984, 1985, 1987 and 2000 at the locations indicated on Figures 1-2 and 1-3, Appendix A. The samples were submitted for VOCs analysis. The results of historic surface water sampling are summarized in Tables 3 and 8 (from the URS Phase II Report), Appendix C.

As set forth in Tables 3 and 8, VOCs including: MC; Tans-1,2-DCE: 1,1,1-TCA, 1,1-DCA and TCE have been detected in samples collected from surface water samples collected upstream and downstream of the Site. The VOC concentrations detected were below Massachusetts Surface Water Quality Standards or Guidelines.

3.2.1.4 Indoor and Outdoor Air Sample Collection and Analysis

In October 2000, two indoor air samples (NW Corner and SE Corner) were collected from the office/laboratory space of Building 1 at the locations indicated on Figure 1-2, Appendix A and were submitted for VOC analysis by EPA Method TO-14. Air samples were collected inside the office portion of the building where air quality concerns were considered representative of the greatest potential exposure risk with groundwater impacts. Other portions of the building include drum storage garage areas with service bay garage doors that appear well ventilated with service bay garage doors and a laboratory area which is also ventilated. In February 2001, passive vents were installed in the crawl space below Building 1 in order to minimize VOC migration from soil gas to indoor air. A second round of air samples were

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collected in March 2001 when the passive vents were in place and other chemicals in the building had been isolated. Air samples were collected from the same indoor locations (NW Corner and SE Corner) and from one outdoor location (Outdoor Yard) as indicated on Figure 1-2, Appendix A. These samples were also submitted for VOCs analysis by EPA Method TO-14. The results of historic indoor and outdoor air sampling are summarized in Table 9 (from the URS Phase II Report), Appendix C.

As set forth in Table 9, 13 VOCs were detected in air samples collected in October 2000. Five of these VOCs (1,1-DCA, 1,1,1-TCA, TCE, PCE and tolune) were detected at concentrations above DEP established background indoor concentrations. Five VOCs were detected in air samples collected in March 2001.

3.2.1.5 Former Catch Basin/ Sump Assessment and Closure Activities

As set forth in the Phase I Report, a catch basin/spill containment sump was discovered at the Site in 1986 in the southeast corner of Building 2 at the location indicated on Figure 1-2, Appendix A. The sump was reported to be approximately five feet long by ten feet wide and five feet deep and was reported to have been constructed of two separate pre-cast concrete pieces with a seam between the two pieces. On September 16, 1986, twenty-six drums of liquid and three drums of soil/sediment were removed from the sump. The liquid and soil/sediment waste removed was reported to be impacted primarily by VOCs (TCE, PCE, methylene chloride, Freon, 1,1,1-TCA) and some metals (barium, cadmium, chromium, lead, selenium and silver). In January 1987 the sump was reported to have flooded with groundwater that was found to contain VOCs including 1,1,1-TCA, TCE, PCE and methylene chloride. In March 1987, a groundwater monitoring well (MW-4) was installed in the sump area. A closure plan that included filling the sump with sand and capping the area with concrete was approved by the DEP in 1988.

As set forth in the Phase II Report, the material removed on September 16, 1986 was reported to have been transported off-Site for disposal. A copy of the disposal documentation, including the name and address of the disposal facility, was not included in the historical environmental assessment reports reviewed by Lightship Engineering. The disposal activities were reported to have occurred in 1986 well before the current owner, JES purchased the property in 2000 and well before Lightship Engineering was retained by JES to provide LSP services for the Site in 2002.

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3.2.2 Response Actions Conducted by Lightship Engineering (2002 to Present)

As set forth in Section 1.1, in June 2002 Lightship Engineering completed a Phase III report that identified SVE/AS as the recommended remedial action alternative to remediate soil and groundwater in the vicinity of well MW-4 located in the former catch basin/sump area in Building No. 2. Lightship Engineering and JES completed the installation of the SVE/AS remedial system consistent with the Phase IV report in April of 2003. The SVE/AS remediation system operated at the Site for 18 months between April 25, 2003 and October 25, 2004. Groundwater samples were collected on a quarterly basis during operation of the SVE/AS system. Post-remediation groundwater samples were collected to confirm that VOC concentrations in groundwater had been reduced to below UCLs. Details are set forth below.

3.2.2.1 SVE/AS System Installation and Operation

Lightship Engineering and JES completed the installation of the SVE/AS remedial system consistent with the Phase IV report in April of 2003. Five SVE wells (SVE-1 to SVE-5) and three AS wells (AS-1 to AS-3) were installed at the locations indicated on Figure 1-2, Appendix A. A low flow air compressor was installed to provide the AS injection air. The AS compressor was controlled by an auto-timer to provide cyclical AS operations to maximize remedial performance while minimizing power and treatment costs. The SVE equipment was set to operate continuously and consisted of a regenerative blower complete with moisture separator, inline filter, inlet/outlet silencers, re-circulation line, dilution air valve and control interlock to shut down the AS system if the SVE system was not operational. The SVE/AS transport piping was installed beneath the concrete floor to minimize surface obstructions in the vicinity of MW-4. A catalytic oxidizer equipped with a limestone scrubber was used for SVE off-gas treatment. The SVE/AS remediation system operated at the Site for 18 months between April 25, 2003 and October 25, 2004.

3.2.2.2 Groundwater Sample Collection and Analysis

Groundwater samples were collected on a quarterly basis during operation of the SVE/AS system (April 25, 2003, July 8, 2003, October 20, 2003, January 14, 2004, April 13, 2004 and July 19, 2004). Two rounds of post-remediation groundwater samples were collected on October 28, 2004 and March 31, 2005 to confirm that VOC concentrations in groundwater had been reduced to below UCLs. Groundwater samples were collected from wells GZA-4, MW-4, MW-5, URS-1, URS-2, URS-3, at the locations indicated on Figure 1-2, Appendix A. Groundwater samples were collected utilizing the low flow purging methodology consistent with DEP *Standard References for Monitoring Wells*. Upon completing the well purging, groundwater

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samples were collected from each of the monitoring wells and submitted to a Commonwealth of Massachusetts certified analytical laboratory for VOCs analysis by EPA Method 8260B. Laboratory analytical results are summarized in Table 2-1, Appendix E. Laboratory analytical data packages are included in Appendix F.

As set forth in Table 2-1, Appendix E, VOC concentrations in groundwater have decreased significantly since the SVE/AS system was activated in April 2003. Post-remediation samples collected from well MW-4 in the source area indicate that three VOCs (1,1-DCE, 1,1,1-TCA and TCE) remain at concentration above MCP Method 1 GW-2 Groundwater Standards but below Method 1 GW-3 Groundwater Standards and Method 3 UCLs. VOCs in downgradient well GZA-4 have also historically decreased with time. Concentrations of VOCs detected in the downgradient monitoring wells GZA-4 and WE-3 are also below Method 1 GW-3 Groundwater Standards.

Based on the historical and quarterly groundwater sampling results, the concentration of VOCs detected in groundwater has reduced as a result of the SVE/AS remediation system. Based upon the location of the source of OHM, groundwater flow direction and historical groundwater analytical results, the extent of the VOC plume appears limited to the property and the extent of the VOC plume appears to have stabilized. In addition, based on the significant decrease of VOCs detected in groundwater at the source area and in downgradient monitoring wells, it is anticipated that future VOC concentrations in groundwater will likely demonstrate a similar trend.

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4.0 CONCEPTUAL SITE MODEL

Based upon the results of the investigation activities conducted to date a Site-specific conceptual site model is set forth below.

OHM impacted soil, groundwater, surface water and indoor air has been detected at the Site associated with historic TSDF operations as well as potential off-Site sources. The compounds of concern identified at the Site consist primarily of VOCs including: TCE and PCE and their degradation products, 1,1,1-TCA, toluene and other select VOCs. The primary source appears to be the former catch basin/spill containment sump located in Building 2. In 1986 liquid and soil/sediment primarily impacted with VOCs (TCE, PCE, MC, Freon, 1,1,1-TCA) and some metals (barium, cadmium, chromium, lead, selenium and silver) was removed from the sump. Approximately 26 drums of liquid three drums of sediment/soil were recovered from the sump and disposed of off-Site in 1986. In 1987 sump was reported to have flooded with groundwater which was found to contain VOCs including: 1,1,1-TCA, TCE, PCE and MC. The catch basin/sump was closed in accordance with DEP requirements and in 1987 monitoring well MW-4 was installed to monitor groundwater conditions in the source area.

Results of groundwater sampling conducted at the Site indicate that the highest VOC concentrations were detected in well MW-4 located in the source area and in well GZA-4 which is located hydraulically downgradient of MW-4, between the Site building and the brook. VOCs have been detected in wells located along the upgradient property boundaries (including WE-1, WE-2, GZA-2 and GZA-3) and may be migrating onto the Site from upgradient sources. The Silresin Chemical Corporation release site at 86 Tanner Street was identified as a potential upgradient source of VOCs in groundwater located approximately 1,000 feet south of the Site.

Groundwater flows in a northwesterly direction across the Site towards River Meadows Brook. The Phase II did not evaluate deep overburden or bedrock aquifer conditions at the Site. The dense till layer at 15 to 25 feet below ground surface is most likely serving as an aquitard to limit the downward vertical gradient of chlorinated solvents in groundwater.

Numerous shallow soil samples were collected from AOC 1 inside Building 1, AOC 4 in the unpaved area north of Building 1 and in the paved parking areas on the west side of the property. Only one soil sample (SS-1, collected from AOC 4), located in the unpaved area north of Building 1, contained two VOCs (1,1-DCE and TCE) at concentrations above MCP Method 1 S-2/GW-2 Soil Standards.

The Method 3 Risk Characterization completed in 2001, concluded that a level of NSR existed under existing conditions (i.e., continued use of the property for commercial or industrial purposes and that the passive vents installed in the crawl space below Building 1 remain in place

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and operational). As set forth in the Method 3 Risk Characterization, a level of NSR had not been achieved in 2001 for future residential receptors and with respect to public welfare and the environment as a result of the VOCs (1,1,1-TCA and toluene) that exceeded UCLs in groundwater at monitoring well MW-4.

An SVE/AS system was installed in the vicinity of well MW-4 to remediate soil and groundwater in the source area. The SVE/AS remediation system operated at the Site for 18 months between April 25, 2003 and October 25, 2004. Post-remediation groundwater samples collected at the Site confirm that VOC concentrations in groundwater had been reduced to below UCLs. Therefore, a condition of NSR has been achieved with respect to public welfare and the environment. The implementation of an AUL, restricting the use of the upland portion of the property to commercial/industrial purposes and the requirement that passive vents in the crawl space beneath Building 1 remain in place and operational, a level of NSR has been achieved for current and future conditions and conditions at the Site support a Class A-3 RAO Statement.

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5.0 SITE RISK CHARACTERIZATION

Pursuant to 310 CMR 40.0990, a Method 3 Risk Characterization was completed to assess risk to health, public welfare, safety and the environment associated with RTN 3-00601. The Method 3 Risk Characterization was prepared by Dr. Susan A. Sundstrom of Groton, Massachusetts in June 2001. The Method 3 Risk Characterization was originally submitted to the DEP with the Phase II Report in August 2001. A copy of the Method 3 Risk Characterization is included in Appendix D of this report. Risks were evaluated with respect to exposure to OHM detected in soil, groundwater, indoor air and surface water at the Site.

5.1 CLASSIFICATION OF SOIL AND GROUNDWATER

5.1.1 Soil Classification

Pursuant to 310 CMR 40.0933, applicable soil categories are selected based upon the frequency, intensity of use and accessibility of the disposal site by adults and children. Pursuant to 310 CMR 40.0923, risk characterization shall consider current and reasonably foreseeable disposal site activities.

5.1.1.1 Frequency of Use

Frequency of use indicates how often a receptor makes use of, or has access to, a disposal site. Frequency of use is classified as either "High," "Low" or "Not Present" based upon specific criteria set forth in 310 CMR 40.0933(4)(a). Pursuant to 310 CMR 40.0933(4)(a)(3), children's frequency at the disposal site is classified as "Low" because the Site is located in an industrial area and is surrounded by a chain link fence; therefore, it is unlikely that children would be present on the Site frequently. Pursuant to 310 CMR 40.0933(4)(a) (2), although unlikely it is possible that adult employees could routinely walk this area of the Site and, therefore, adult frequency is classified as "High".

5.1.1.2 Intensity of Use

The intensity of use is based upon the activities and uses that occur at a disposal site. The intensity of use is classified as either "High" or "Low." Pursuant to 310 CMR 40.0933(4)(b), disposal site activities and uses, which have the potential to disturb soil, and result in either direct contact with the soil itself or inhalation of soil-derived dust shall be characterized as high

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intensity use activities. Examples of such activities include gardening, digging and recreational sports. Passive activities, which do not disturb the soil, such as walking, shall be classified as low intensity use activities. It is unlikely that children and adults may be present that would actively disrupt the soil. Therefore, the intensity of activities is considered "Low" for both adults and children.

5.1.1.3 Accessibility

Soils are classified as "Accessible," "Potentially Accessible" or "Isolated" based upon the depth to impact and the presence of impervious material if any. Pursuant to 310 CMR 40.0933(4)(c), impacted soils located within the first three feet of the surface in an unpaved area would be considered "Accessible." Soils from three to 15 feet below grade in unpaved areas, or soils from less than three feet below grade in paved areas, would be considered "Potentially Accessible." Soils greater than 15 feet below grade or beneath the footprint of a building would be considered "Isolated."

VOCs are present in shallow soil at SS-1 in an unpaved area northwest of the building, as indicated on Figure 1-2, Appendix A. Pursuant to 310 CMR 40.0933(4)(c)(1), VOCs are detected in soil located less than three feet below the surface and, therefore, are classified as "Accessible."

5.1.1.4 Site Specific Soil Classification

Pursuant to 310 CMR 40.0933(6), soil that is considered "Accessible" but where a child's frequency and intensity is low and an adults frequency and either, but not both, the adults frequency and intensity is High, is classified as S-2. Therefore, soils at the disposal site are classified as S-2.

5.1.2 Groundwater Classification

Groundwater classification is based upon several factors, including the current and potential use of water as a drinking water source, proximity to buildings and ecological risks. Pursuant to 310 CMR 40.0932 the applicable groundwater category shall be identified for both the groundwater currently affected by the release of petroleum and any area to which the impacted groundwater is expected to migrate. Groundwater is categorized into three categories: GW-1, GW-2 and GW-3.

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1. The GW-1 classification applies to groundwater located within the boundaries of a current or potential drinking water source area.
2. The GW-2 classification applies to groundwater located within 30 feet of an existing occupied building or structure, and where the annual average depth to groundwater is 15 feet or less. The Method 1 GW-2 Groundwater Cleanup Standard addresses the potential exposure to vapors collecting in buildings above or adjacent to impacted groundwater.
3. The GW-3 classification applies to all groundwater that can potentially impact surface water bodies. Pursuant to 310 CMR 40.0932(2), all groundwater is considered a potential source of discharge to a surface water body. Therefore, the GW-3 classification applies to all groundwater within the boundaries of the Commonwealth of Massachusetts.

Unlike the soil classifications, which are mutually exclusive, the potential exists for all three groundwater classifications to apply to a single disposal site. For example, a release within a Zone II Protection Area, that is within 30 feet of an occupied building, and where the groundwater elevation is less than 15 feet below grade would be governed by GW-1, GW-2 and GW-3 Method 1 Groundwater Cleanup Standards.

5.1.2.1 Site Specific Groundwater Classification

As indicated on Figure 5-1, Appendix A and set forth in the Phase II Report, the disposal site is not located within the boundaries of a Current or Potential Drinking Water Source Area. Therefore, the GW-1 groundwater classification is not applicable to the disposal site.

There are occupied buildings located within 30 feet of the disposal site and groundwater is located less than 15 feet below grade. Therefore, the GW-2 groundwater classification is applicable to the disposal site.

As set forth above, the GW-3 classification is applicable to all of the groundwater located within the boundaries of the Commonwealth of Massachusetts. Therefore, the GW-3 groundwater classification is applicable to the disposal site.

5.1.3 Hot Spot Evaluation

Pursuant to 310 CMR 40.0006, a hot spot means a discrete area where the concentrations of oil or hazardous material or the thickness of Non-aqueous Phase Liquid ("NAPL") are substantially higher than those present in the surrounding area. A hot spot shall be identified

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based on consideration of both the concentrations or thickness of an OHM within a contaminated area and the spatial pattern of that contamination. The aerial extent and spatial pattern of a hot spot may be determined through the analytical results from multiple samples taken within the area, or the results of limited sampling in combination with other knowledge about the release, such as the presence of discoloration, odors or a defined source area.

(a) Discrete areas where the average concentration within the area is greater than ten but less than one hundred times the average concentration in the immediate surrounding area is a Hot Spot unless there is no evidence that the discrete area would be associated with greater exposure potential than the surrounding area. In all cases, a discrete area where the concentration of an OHM is greater than one hundred times the concentration in the surrounding area shall be considered a Hot Spot. In no case shall concentrations of oil or hazardous material equal to or less than an applicable Method 1 Standard be considered indicative of a Hot Spot.

(b) Any discrete area where the average thickness of NAPL is greater than ten times the average thickness in the surrounding area is a Hot Spot.

As set forth in Section 3.0, NAPL has not been detected at the Site. As set forth in Table 2-1, Appendix E, post-remediation groundwater samples collected from five monitoring wells (MW-4, GZA-4, URS-2, URS-1 and WE-3) had OHM above the applicable Method 1 GW-2 Groundwater Standards and well below Method 3 UCLs. As set forth in the historical soil tables (Tables 1 and 4 of the Phase II Report, Appendix C), only one soil sample (SS-1) had OHM above the applicable Method 1 S-2/GW-2 Soil Standards. There is no evidence that the area of MW-4, GZA-4, URS-2 and WE-3 or SS-1 would be associated with a greater potential than the surrounding area. Therefore, a Hot Spot does not exist at the Site. In addition, consistent with the Master Massachusetts Contingency Plan ("MCP") Q&A guidance document dated November 2002, a Hot Spot cannot be created through remediation.

5.2 METHOD 3 RISK CHARACTERIZATION

The Method 3 Risk Characterization included in Appendix D was prepared pursuant to 310 CMR 40.0990 in order to assess risk to human health, public welfare, safety and the environment with respect to exposure to OHM detected in soil, groundwater, indoor air and surface water at the Site. It should be noted that the concentrations of OHM detected in environmental media since the completion of the Method 3 in August 2001 is less than what was utilized in the Method 3 Risk Characterization in 2001.

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5.2.1 Evaluation of Risk to Human Health

As set forth in the Method 3 Risk Characterization, Appendix D, risks to human health were evaluated for the exposure scenarios set forth below. The Method 3 Risk Characterization assumed that the Site will remain a commercial or industrial property and utilized indoor air data collected while the passive vents installed in the crawl space below Building 1 were in place.

- **Employees**: The primary exposure pathways for employees working at the Site are potential inhalation of VOCs in indoor air and direct contact with VOCs detected in soil. Under current and future conditions, a condition of NSR exists for employees.
- **Trespassers**: Older children (trespassers) could visit the Site and contact impacted surface soil. The primary exposure pathways for trespassers are ingestion and dermal contact with soil. Under current and future conditions, a condition of NSR exists for trespassers.
- **Construction Workers**: Under future conditions, Lightship Engineering assumed that construction work may be performed on the Site. Risks were evaluated for potential future construction workers who would contact impacted soil during excavation activities. Based on the Method 3 a condition of NSR exists for potential future construction workers.
- **Hypothetical Future Receptor**: As set forth above, an AUL is being implemented at the disposal site that will restrict use of the Site to commercial/industrial uses. Therefore, a complete exposure pathway does not exist with respect to the residential receptor and, therefore, that exposure was not evaluated.

5.2.2 Evaluation of Risk to Public Welfare

Pursuant to 310 CMR 40.0994(4), a level of No Significant Risk of harm to public welfare exists if:

(a) No nuisance conditions exist or will result from the release or threat of release of OHM, including:

1. The breathing zone of ambient and indoor air is currently and will, in the reasonably foreseeable future, remain free from persistent, noxious odors;
2. There is accessible drinking water that is and will, in the reasonably foreseeable future, remain free from noxious taste and odors; and
3. Livestock is and will remain, in the reasonably foreseeable future, free from harmful effects. No specific evaluation of livestock is required if it is

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reasonable to conclude that the human health and environmental risk characterizations conducted for the site are also protective of livestock exposures.

(b) No community that is currently affected and/or community for which it is reasonably foreseeable to conclude that it could be affected by the release experiences significant adverse impacts as set forth as the factors to be considered in 40.0994(2);

(c) The requirements of 310 CMR 40.0996 concerning the UCLs are met.

As set forth in the Method 3 Risk Characterization, Appendix D, a condition of NSR to public welfare and the environment was not met in 2001 because the concentration of 1,1,1-trichloroethane and toluene were detected in well MW-4 at concentrations above the Method 3 UCLs. As set forth in Table 2-1, significant decreases in VOC concentrations have occurred in groundwater since the SVE/AS system was activated in April 2003. Post-remediation groundwater samples collected from well MW-4 in the source area indicate that VOC concentrations are below Method 3 UCLs. Therefore, a level of NSR now exists with respect to public welfare.

5.2.3 Evaluation of Risk to Safety

Pursuant to 310 CMR 40.0960(3), a level of No Significant Risk to safety exists if the conditions at the disposal site which are related to a release of OHM do not currently and will not in the foreseeable future pose a threat of physical harm or bodily injury to people. Such release-related conditions may include, but are not limited to:

(a) the presence of rusted or corroded drums or containers, open pits, lagoons or other dangerous structures;

(b) any threat of fire or explosion, including the presence of explosive vapors resulting from a release of oil and/or hazardous material; and

(c) any uncontained materials, which exhibit the characteristics of corrosivity, reactivity or flammability described at 310 CMR 40.0347.

As set forth in the Method 3 Risk Characterization, Appendix D, a level of NSR exists with respect to safety.

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5.2.4 Evaluation of Risk to the Environment

As set forth in the Method 3 Risk Characterization, Appendix D, a Stage I Environmental Screening Risk Assessment was conducted for River Meadows Brook to determine whether there is current or potential future exposure of Environmental Receptors to OHM at or from the disposal site that may require further assessment. Exposure pathways may be eliminated if 1) significant risk is readily apparent; or 2) an exposure pathway is incomplete because environmental receptors would not be exposed; or 3) an exposure pathway is complete but does not pose a significant risk.

As set forth in the Phase II Report, VOCs are present in surface soil on the northwest side of the building and in surface water at River Meadows Brook. Because potential exposure of terrestrial and aquatic receptors was identified the potential for harm was evaluated further. As set forth in the Method 3 Risk Characterization, based on the size and quality of the potential habitat and the types of receptors likely to be present in the habitat, OHM in soil do not present an unacceptable risk to the environment. VOC concentrations detected in surface water were below the Massachusetts Surface Water Quality Standards or Guidelines and, therefore, are not considered significant.

Based upon the evaluation set forth above, a level of No Significant Risk exists with respect to the environment.

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6.0 FEASIBILITY OF APPROACHING OR ACHIEVING BACKGROUND CONDITIONS

Pursuant to 310 CMR 40.1056(2)(e), an evaluation of the feasibility of approaching or achieving background conditions is set forth below. The evaluation of approaching or achieving background conditions was completed consistent with DEP's *Conducting Feasibility Evaluations Under The MCP* dated July 16, 2004 (the "Feasibility Evaluation Document").

Pursuant to Section 9.3.2 of the Feasibility Evaluation Document, Conditions of Categorical Infeasibility for OHM in soil include:

- Excavations under Permanent Structures (Section 9.3.2.1); and
- Remediation of persistent OHM located in S-2 and S-3 soils (Section 9.3.2.4).

Pursuant to Section 9.3.3 of the Feasibility Evaluation Document, where technologically feasible, a Conditions of Achieving Background for OHM in groundwater include:

- Concentrations of OHM in groundwater at or below one half the Method 1 Groundwater Standards; or
- When groundwater treatment has reduced persistent OHM to the point of inflection.

As set forth in Section 5.1.1.4, persistent VOC compounds are located in S-2 soils and/or beneath Permanent Structures. In order to achieve or approach background in groundwater, it is likely that OHM impacted soil would be excavated from the area surrounding MW-4 that is under a permanent structure (Building 2). Soil removal is technologically infeasible as a result of being located under a permanent structure. Therefore, as set forth above, achieving or approaching background in connection with RTN 3-00601 is not feasible.

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7.0 ACTIVITY AND USE LIMITATION

Pursuant to 310 CMR 40.1056(1)(f), and 40.1056(2)(g) and (h), an AUL is required for this Class A-3 RAO. The AUL – Form 1075 was recorded at the Middlesex County Registry of Deeds – North District on February 24, 2006. An AUL Opinion and the AUL Opinion transmittal form BWSC-113A are being submitted concurrently with this report. Copies of the AUL Opinion, the AUL Opinion transmittal form BWSC-113A and AUL – Form 1075 are attached as Appendix B. The AUL Area is defined as the upland portion of the disposal Site bounded by the approximate high water mark of River Meadows Brook to the northwest as indicated on Figure 1-2, Appendix A.

A summary of the provisions of the AUL that is required to maintain a condition of NSR at the disposal site is set forth below.

7.1 PERMITTED ACTIVITIES AND USES

The following activities and uses shall be permitted without compromising the condition of NSR:

- Commercial and/or industrial use of the on-site building, provided that the passive vents installed in the crawl space below Building 1 are maintained and the interior layout and use remain the same;
- Excavation associated with emergency or short term (three months or less) underground utility and/or construction work, provided it is conducted in accordance with a Soil Management Plan and a Health and Safety Plan;
- Activities which are not identified by this Notice as being inconsistent with maintaining a condition of No Significant Risk; and
- Such other activities and uses which, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare, or the environment than the activities set forth in this paragraph.

7.2 PROHIBITED AND/OR LIMITED ACTIVITIES AND USES

The following activities and uses shall be prohibited and/or limited to achieve a condition of NSR:

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- Use of the Site as agricultural, institutional (with a residential or child care component), recreational or as a playground or other similar use where a child is likely to be present or other use which was not considered within the risk characterization and demonstrated to pose No Significant Risk of harm to human health, safety, public welfare, and the environment; and
- Significant alterations or changes in use of spaces in the existing buildings or construction of other buildings on-site without the installation of a passive venting system and vapor barrier and/or performance of indoor air monitoring which adequately demonstrates that VOCs are not migrating into the building at unacceptable levels.

7.3 OBLIGATIONS AND CONDITIONS NECESSARY TO MAINTAIN A CONDITION OF NSR

If applicable, obligations and/or conditions to be undertaken and/or maintained at the disposal site to maintain a condition of NSR as set forth in the AUL Opinion shall include the following:

- Maintenance and quarterly inspections of the passive vents installed in the crawl space below Building 1 to minimize vapor migration into the building;
- Performance of groundwater monitoring, indoor air monitoring, and/or soil gas sampling for any future building constructed at the site to determine whether impacts associated with the disposal site may pose a potential risk of exposure to building occupants;
- Performance of response actions in accordance with the Massachusetts Contingency Plan, should conditions and/or environmental monitoring conducted pursuant to the Obligation set forth above indicate that VOCs associated with the disposal site are migrating into the buildings; and
- A Soil Management Plan and Health and Safety Plan must be prepared and implemented prior to the commencement of any subsurface activities which may disturb OHM impacted soil at the Site.

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8.0 SUMMARY AND CONCLUSIONS

Pursuant to 310 CMR 40.1056, the conclusions, including a summary of the Site assessment findings, are set forth below.

A summary of the response actions conducted at the Site is set forth below.

- As set forth in Section 1.0, the Site has been impacted by a VOC release that consists primarily of TCE and PCE and their degradation products, 1,1,1-TCA, toluene and other select VOCs associated with RTNs 3-00601.
- The main source of the release at the Site appears to be the former catch basin/sump located in the northeast corner of Building 2. In 1986, approximately 26 drums of liquid and three drums of soil/sediment were recovered from the sump and disposed of off-Site.
- Subsurface investigations have included the advancement of soil borings, installation of monitoring wells and the collection of soil, groundwater, surface water and air samples at the locations across the Site as indicated on Figures 1-2 and 1-3, Appendix A.
- Historically, soil samples were collected from shallow soil borings in AOC 1, AOC 4 and the paved parking area on the west side of the property. Analytical summary tables of OHM detected are attached in Tables 1 and 4 (from the URS Phase II Report), Appendix C.
- Historically, surface water samples were collected from River Meadows Brook at locations upstream and down stream from the Site. Analytical summary tables of the compounds detected are attached in Tables 3 and 8 (from the URS Phase II Report), Appendix C.
- Indoor air samples have been collected on two occasions from locations inside the office area of Building 1. A passive vent was installed in the crawl space beneath Building 1 prior to the second air sampling event. An analytical summary table of the compounds detected is included as Table 9 (from the URS Phase II Report), Appendix C.
- Groundwater at the Site is estimated to be flowing in a northwesterly direction and discharging into River Meadows Brook.
- The 2001 Method 3 Risk Characterization concluded that a level of NSR to public health, safety, welfare and the environment existed under existing conditions (i.e., continued use of the upland portion of the property for commercial or industrial purposes and that the passive vents installed in the crawl space below Building 1

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remain in place and operational). A level of NSR had not been achieved in 2001 for future residential receptors and with respect to public welfare and the environment as a result of the VOC that exceeded UCLs in groundwater at monitoring well MW-4.

- An SVE/AS system was installed in the vicinity of well MW-4 to remediate soil and groundwater in the source area. The SVE/AS remediation system operated at the Site for 18 months between April 25, 2003 and October 25, 2004. Post-remediation groundwater samples collected at the Site confirmed that VOC concentrations in groundwater had been reduced to below UCLs.
- With the implementation of an AUL, restricting the upland portion of the property use to commercial/industrial purposes and the requirement that passive vents installed in the crawl space below Building 1 remain in place and operational, a level of NSR has been achieved for current and future conditions.
- Consistent with the Feasibility Document, additional remedial actions to achieve or approach background for persistent compounds that remain in soil and groundwater at the Site are considered infeasible.
- There are no on-going remedial operations at the Disposal Site.
- Based upon the results of assessment activities and the implementation of an AUL, a Class A-3 RAO is applicable to the Disposal Site. The Disposal Site and AUL boundaries are indicated on Figure 1-2, Appendix A.

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9.0 LIMITATIONS

1. Lightship Engineering is not responsible for the accuracy of the information provided to Lightship Engineering by third parties. Except as otherwise stated in this report, Lightship Engineering has not attempted to verify the accuracy or completeness of any such information.
2. The data presented in this report, and Lightship Engineering's opinions based on such data, is provided in accordance with Lightship Engineering's proposal for professional services and the terms and conditions between Jones Environmental Services (Northeast), Inc. and Lightship Engineering, pursuant to which the environmental professional services were rendered. The data reported and findings, observations, and conclusions expressed in this report are limited by Lightship Engineering's scope of work, including the extent of subsurface exploration and other tests.
3. This report is for the sole use of Jones Environmental Services (Northeast), Inc. Any reuse or reliance on this report by any other third party shall be done only with the written consent of Lightship Engineering.
4. The findings, observations, opinions, conclusions, and recommendations are not intended to, and do not imply a warranty or a guarantee, and are based solely upon site conditions at the time of Lightship Engineering's investigation. The findings, observations, opinions, conclusions, and recommendations should not be considered an opinion concerning the compliance of any past or present owner or operator of the Site with any federal, state, or local law or regulation. Nothing in this report constitutes a legal opinion or legal service and should not be relied upon as such.

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APPENDIX A

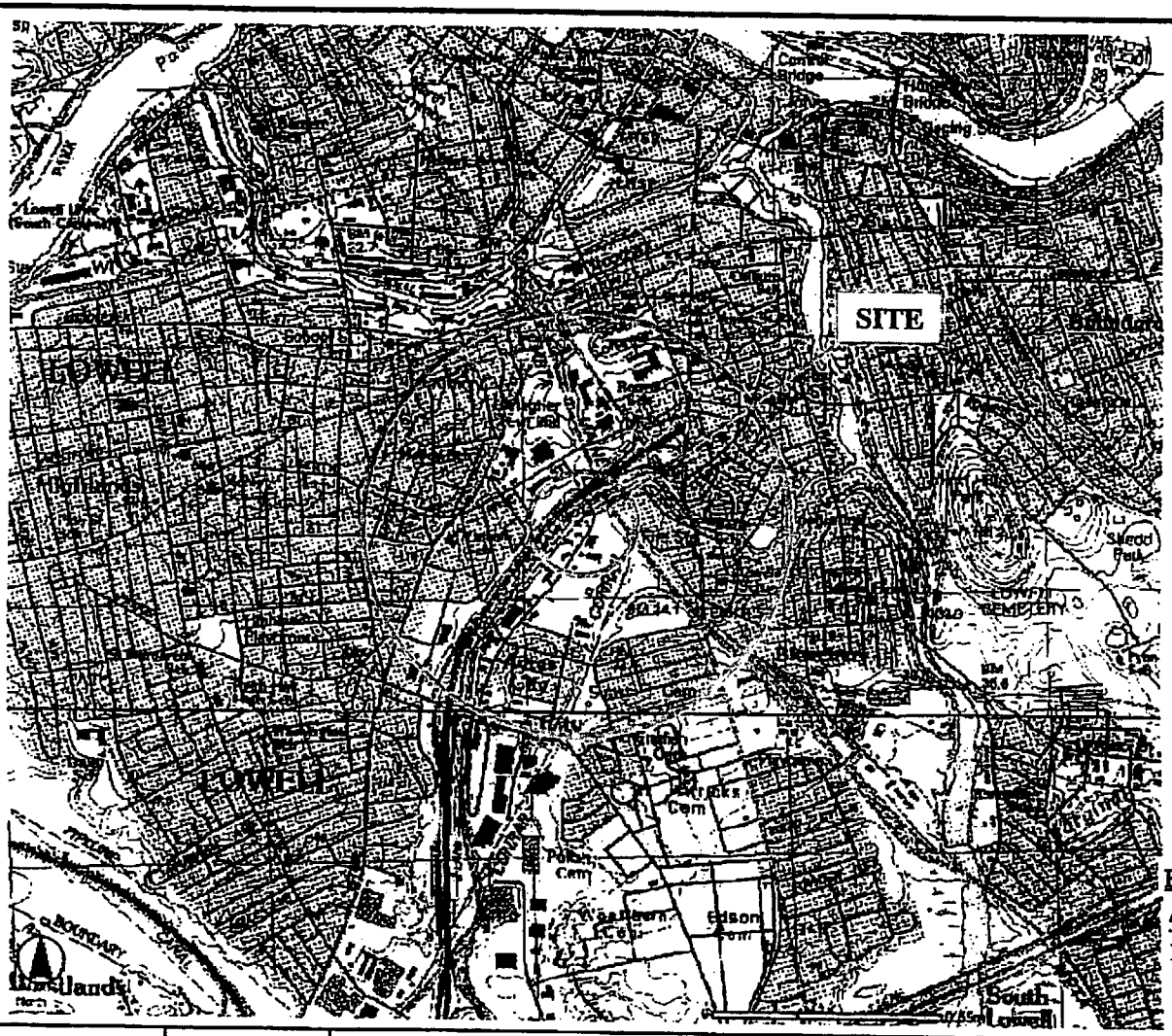
FIGURES

Figure 1-1 Site Locus Map

Figure 1-2 Disposal Site Map

Figure 1-3 Historic AOC and Sampling Locations Map

Figure 5-1 MassGIS Map



Radii:

500 Foot Radius
1/2 Mile Radius

N
W E
S

FIGURE 1-1
Site Locus Map
263 Howard Street, Lowell, MA

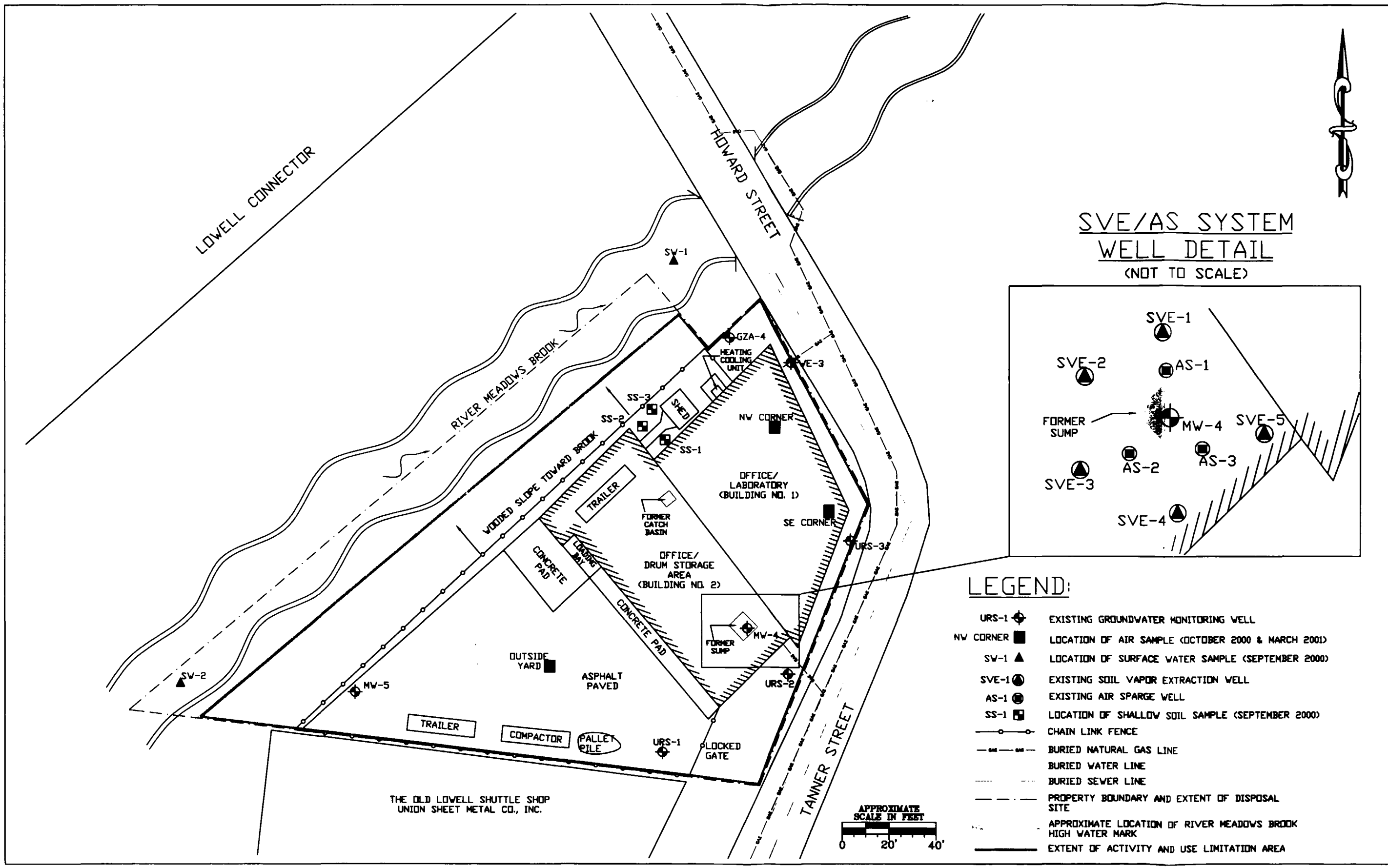
PREPARED FOR
Jones Environmental Services (Northeast), Inc.

Scale:
As Shown

SOURCE:
MassGIS Online DataViewer

LIGHTSHIP
ENGINEERING

ENVIRONMENTAL & LAND-USE CONSULTANTS
36 Cordage Park Circle, Suite 312, Plymouth, MA 02360



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542.1.1

Date: 11/22/05 | Drawn by: TWN
Sheet No. 1 of 1 | Scale: As Shown

FIGURE 1-2
SITE DISPOSAL MAP

Project
Former Jet-Line/Geochem
263 Howard Street
Lowell, MA

Client
Jones Environmental Services (Northeast), Inc.
461 Cooke Street
Farmington, CT

Source: URS Corporation Site Plan, Phase II MCP Site Investigation, Figure 2, 06/22/01.
542.1.1/20065/figures

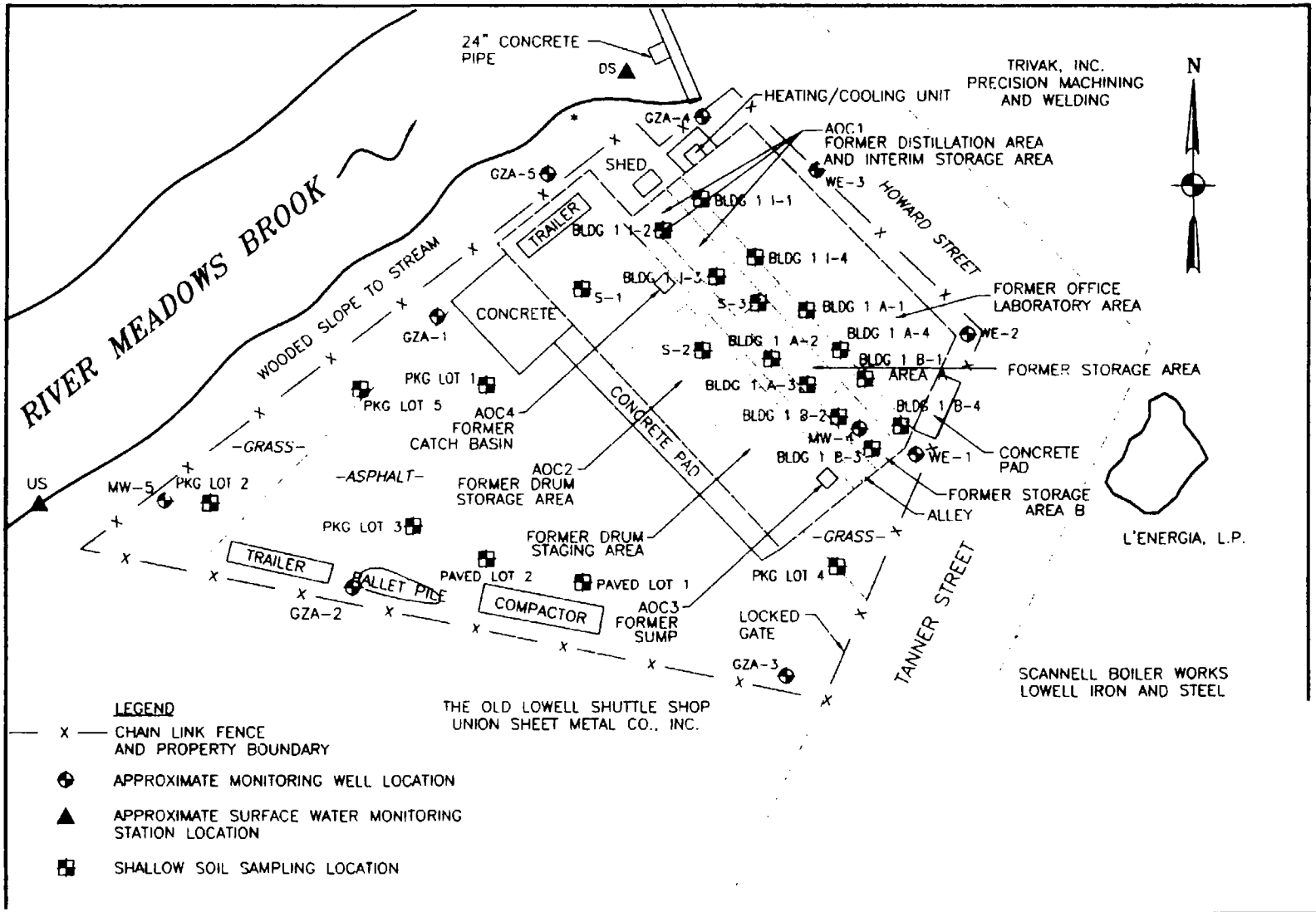

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FIGURE 1-3
Historic AOC and Sampling Locations Map
263 Howard Street, Lowell, MA

PREPARED FOR
Jones Environmental Services (Northeast), Inc.

Scale:
As Shown
SOURCE:
Phase II MCP
Site Investigation
URS Corp.,
477 Congress St.
Portland, ME

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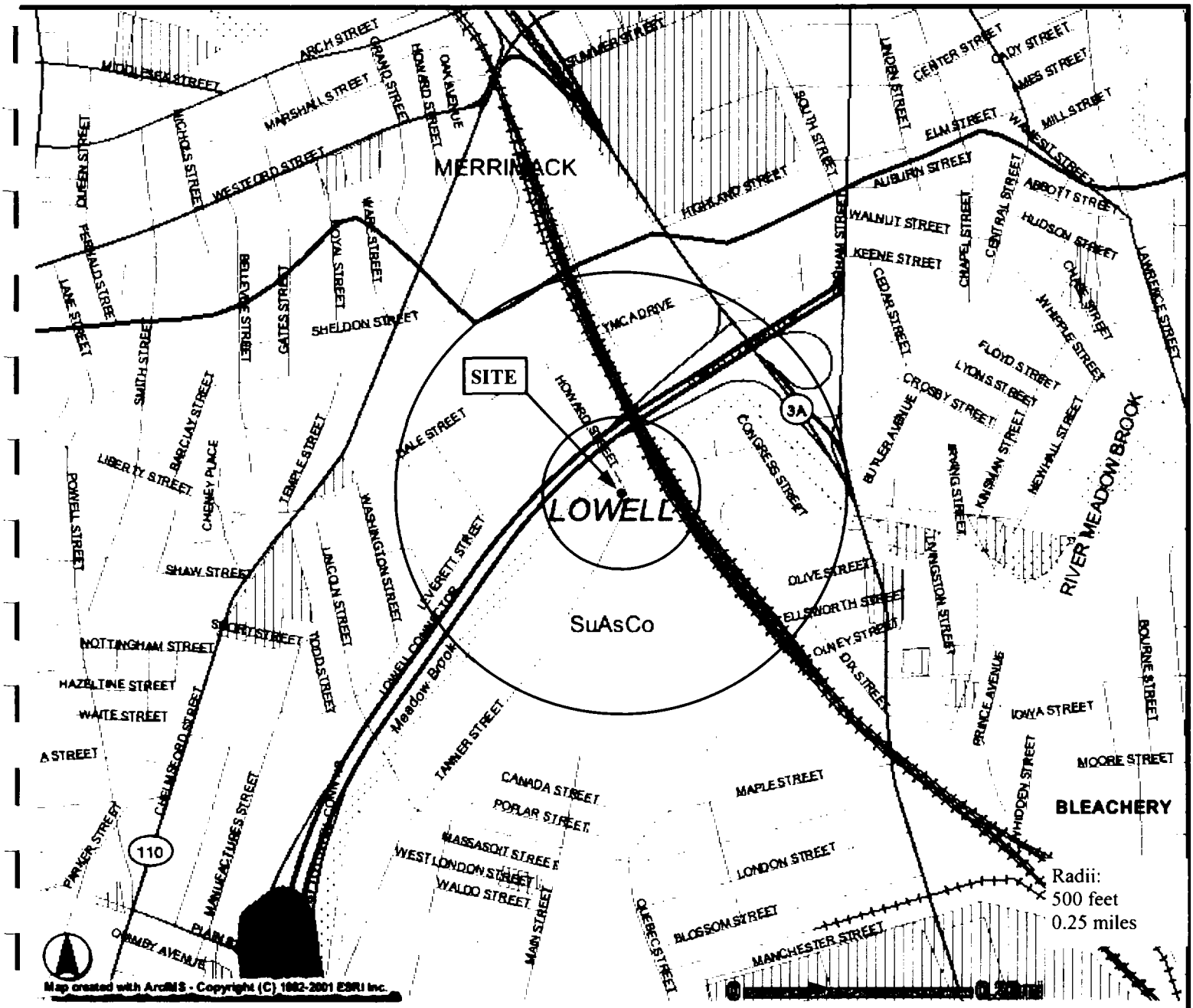


CLIENT	PROJECT	Figure 5-1	LIGHTSHIP ENGINEERING
Jones Environmental Services (Northeast), Inc. 461 Cooke Street Farmington, CT	Former Jet-Line/Geochem 263 Howard Street Lowell, MA	MassGIS Map	ENVIRONMENTAL & LAND-USE CONSULTANT 36 Cordage Park Circle • Suite 312 • Plymouth, Massachusetts 02360 • (508) 830-1144 • Fax (508) 830-3360

Source: MassGIS Online Viewer

APPENDIX B

ACTIVITY AND USE LIMITATION – FORM 1075

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113

ACTIVITY & USE LIMITATION (AUL) TRANSMITTAL FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

A. DISPOSAL SITE LOCATION:

1. Disposal Site Name: Former Jet-Line/Geochem

2. Street Address: 263 Howard Street

3. City/Town: Lowell 4. ZIP Code: 01852-0000

☑ 5. Check here if a Tier Classification Submittal has been provided to DEP for this disposal site.
☐ a. Tier 1A ☐ b. Tier 1B ☐ c. Tier 1C ☑ d. Tier 2

6. If a Tier I Permit has been issued, provide Permit Number: _____

B. THIS FORM IS BEING USED TO: (check one)

☑ 1. Submit a certified copy of a **Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1074.

☐ 2. Submit an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement** has been filed pursuant to 310 CMR 40.1080.

☐ 3. Submit a certified copy of an **Amended Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1081

☐ 4. Submit a certified copy of a **Partial Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(3).

☐ 5. Submit a certified copy of a **Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(1)(d).

☐ 6. Submit a certified copy of a **Grant of Environmental Restriction**, pursuant to 310 CMR 40.1071.

☐ 7. Submit a certified copy of an **Amendment of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1081(3).

☐ 8. Submit a certified copy of a **Partial Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(2).

☐ 9. Submit a certified copy of a **Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(1)(c).

☐ 10. Submit a certified copy of a **Confirmatory Activity and Use Limitation**, pursuant to 310 CMR 40.1085(4).

11. Provide Additional RTNs:

☐ a. Check here if this AUL Submittal covers additional Release Tracking Numbers (RTNs).

b. Provide the additional Release Tracking Number(s) covered by this AUL Submittal. ☐ - ☐ ☐ - ☐

(All sections of this transmittal form must be filled out unless otherwise noted above. BWSC113A is required for all submittals listed above)

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113

ACTIVITY & USE LIMITATION (AUL) TRANSMITTAL FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number: 3 - 601

C. AUL INFORMATION:

1. Document (per Section B) Recording and/or Registration Information:
   a. Name of Registry of Deeds and/or Land Registration Office: Middlesex County - North District
   b. Book and Page Number and/or Document Number: Book 19844/ Page 56
   c. Date of recording and/or registration: 02/24/2006 (mm/dd/yyyy)
2. Is the address of the property subject to AUL different from the disposal site address listed above?
   ☑ a. No ☐ b. Yes If yes, then fill out address section below.
3. Street Address: _____
4. City/Town: _____ 5. ZIP Code: _____

D. PERSON SUBMITTING AUL TRANSMITTAL FORM:

1. Check all that apply: ☐ a. change in contact name ☐ b. change of address ☐ c. change in the person undertaking response actions
2. Name of Organization: Jones Environmental Services (Northeast), Inc.
3. Contact First Name: Jim 4. Last Name: Green
5. Street: 263 Howard Street 6. Title: President, CEO & CFO
7. City/Town: Lowell 8. State: MA 9. ZIP Code: 01852-0000
10. Telephone: (978) 453-7772 11. Ext.: _____ 12. FAX: _____
13. Is the person described in this section the owner of the property?
    ☑ a. Yes ☐ b. No , if checked then Section G must be filled out by at least one owner.
    ☐ c. Check here if providing names and addresses of any additional owners in an attachment.

E. RELATIONSHIP TO DISPOSAL SITE OF PERSON SUBMITTING AUL TRANSMITTAL FORM: (check one)

☑ 1. RP or PRP ☑ a. Owner ☐ b. Operator ☐ c. Generator ☐ d. Transporter
☐ e. Other RP or PRP Specify: _____

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

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

☐ 4. Any Other Person Submitting AUL Specify: _____

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113

ACTIVITY & USE LIMITATION (AUL) TRANSMITTAL FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

F. REQUIRED ATTACHMENT AND SUBMITTALS:

☑ 1. Check here to certify that notice of the proposed Activity and Use Limitation (AUL) was given to all record-interest holders, if any, in accordance with 310 CMR 40.1074(1)(e), via certified mail.

☐ a. Check here if there were no record interest holders. b. Date of certified mailing: 12/13/2005 (mm/dd/yyyy)

☑ c. Check here to certify that names and addresses of all record holders notified is attached.

☑ 2. Check here to certify that within 30 days of recording and/or registering the AUL, including amending, releasing or terminating the AUL, a copy of the AUL was/will be provided to the Chief Municipal Officer, the Board of Health, the Zoning Official, and the Building Code Enforcement Official in the community(ies) where the the property subject to such Activity and Use Limitation is located.

☑ 3. Check here to certify that within 30 days of recording and/or registering the AUL, including amending, releasing or terminating the AUL, a Legal Notice was/will be published in a newspaper with circulation in the community(ies) where the property subject to the AUL is located.

☑ 4. Check here to certify that within 7 days of publishing a Legal Notice in a newspaper with circulation in the community(ies) where the property subject to the AUL is located, a copy of the notice was/will be submitted to DEP.

☑ 5. Check here to certify that within 30 days of recording and/or registering the AUL, including amending, releasing or terminating the AUL, a certified copy of the AUL, including the LSP Opininon containing the material facts, data, and other information, will be submitted to DEP.

☐ 6. Check here if any non-updatable information provided on this form is incorrect, e.g. Site Address/Location Aid. Send corrections to the DEP Regional Office.

☐ 7. If an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement** is being submitted, check here to certify that the LSP Opinion containing the material facts, data, and other information is attached.

G. CERTIFICATION OF OWNER OF PROPERTY, IF NOT PERSON SUBMITTING AUL TRANSMITTAL FORM:

1. I, _____, attest under the pains and penalties of perjury that I am the owner of said property(ies), subject to the AUL

2. _____ (Signature) 3. Date: _____ (mm/dd/yyyy)

4. Name of Organization: _____

5. Contact First Name: _____ 6. Last Name: _____

7. Street: _____ 8. Title: _____

9. City/Town: _____ 10. State: _____ 11. ZIP Code: _____

12. Telephone: _____ 13. Ext.: _____ 14. FAX: _____

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113

ACTIVITY & USE LIMITATION (AUL) TRANSMITTAL FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

H. CERTIFICATION OF PERSON MAKING SUBMITTAL:

1. I, Jim Green, 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.

Pursuant to 310 CMR 40.1074 (1)(f), I also hereby certify under penalties of perjury, that either I (if person submitting the AUL Transmittal Form is the property owner), or

Jones Environmental Services (Northeast), Inc.
2. Name of Property Owner

am/is identified on the Notice of AUL as the owner of the property subject to the AUL, owned such property on the date that the AUL was recorded and /or registered

3. By: _____ 4. Title: CFO, CEO & President
Signature

5. For: Jones Environmental Services (Northeast), Inc. 6. Date: 2/10/06
(Name of person or entity recorded in Section D) mm/dd/yyyy

☐ 7. Check here if the address of the person providing certification is different from address recorded in Section D.

8. Street: _____

9. City/Town: _____ 10. State: _____ 11. ZIP Code: _____

12. Telephone: _____ 13. Ext.: _____ 14. FAX: _____

YOU ARE SUBJECT TO AN ANNUAL COMPLIANCE ASSURANCE FEE OF UP TO $10,000 PER BILLABLE YEAR FOR THIS DISPOSAL SITE. YOU MUST LEGIBLY 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.

Date Stamp (DEP USE ONLY:)

BWSC-113

Release Tracking Number

3	0601

F. 1. C. Name and Address of Record Holder Notified

Mortgagee Notified by Certified Mail on December 13, 2005:

Lowell Properties, LLC
615 Tarklin Hill Road
New Bedford, MA 02745
Attn: Kirk Franklin

Form 1075

37

NOTICE OF ACTIVITY AND USE LIMITATION
M.G.L. c. 21E, § 6 and 310 CMR 40.0000

2006 00010193
Bk: 19844 Pg: 56 Page: 1 of 32
Recorded: 02/24/2006 03:26 PM

Disposal Site Name: Former Jet-Line/Geochem
DEP Release Tracking No.(s): 3000601

This Notice of Activity and Use Limitation ("Notice") is made as of this 10th day of February, 2006, by Jones Environmental Services (Northeast), Inc., a Massachusetts Corporation having a principal place of business at of 263 Howard Street, Lowell, Massachusetts 01852, together with its successors and assigns (collectively "Owner").

WITNESSETH:

WHEREAS, Jones Environmental Services (Northeast), Inc., is the owner in fee simple of that certain parcel of land located in Lowell, Middlesex County, Massachusetts with the buildings and improvements thereon, pursuant to a deed recorded with the Middlesex County Registry of Deeds in Book 3256, Page 312;

WHEREAS, said parcel of land, which is more particularly bounded and described in Exhibit A, attached hereto and made a part hereof ("Property") is subject to this Notice of Activity and Use Limitation. The Property is shown on a plan recorded in the Middlesex County Registry of Deeds in Plan Book 95, Plan 146;

WHEREAS, a portion of the Property ("Portion of the Property") is subject to this Notice of Activity and Use Limitation. The Portion of the Property is more particularly bounded and described in Exhibit A-1, attached hereto and made a part hereof. The Portion of the Property is shown as the "A.U.L Area"on a plan recorded with the Middlesex County Registry of Deeds in Plan Book 220, Plan 105;

WHEREAS, the Portion of the Property comprises part of a disposal site as the result of a release of oil and/or hazardous material. Exhibit B is a sketch plan showing the relationship of the Portion of the Property subject to this Notice of Activity and Use Limitation to the boundaries of said disposal site existing within the limits of the Property and to the extent such boundaries have been established. Exhibit B is attached hereto and made a part hereof; and

WHEREAS, one or more response actions have been selected for Portion of the Disposal Site in accordance with M.G.L. c. 21E ("Chapter 21E") and the Massachusetts Contingency Plan, 310 CMR 40.0000 ("MCP"). Said response actions are based upon (a) the restriction of human access to and contact with oil and/or hazardous material in soil and/or groundwater and/or (b) the restriction of certain activities occurring in, on, through, over or under the Portion of the Property. The basis for such restrictions is set forth in an Activity and Use Limitation Opinion ("AUL Opinion"), dated February 10, 2006, (which is attached hereto as Exhibit C and made a part hereof);

Property Address: 263 Howard St., Lowell

Box 15

NOW, THEREFORE, notice is hereby given that the activity and use limitations set forth in said AUL Opinion are as follows:

1. Activities and Uses Consistent with the AUL Opinion. The AUL Opinion provides that a condition of No Significant Risk to health, safety, public welfare or the environment exists for any foreseeable period of time (pursuant to 310 CMR 40.0000) so long as any of the following activities and uses occur on the Portion of the Property:

(i) Commercial and/or industrial use of the on-site building, provided that the passive vents installed in the crawl space below Building 1 are maintained and the interior layout and use remain the same;

(ii) Excavation associated with emergency or short term (three months or less) underground utility and/or construction work, provided it is conducted in accordance with a Soil Management Plan and a Health and Safety Plan;

(iii) Activities which are not identified by this Notice as being inconsistent with maintaining a condition of No Significant Risk; and

(iv) Such other activities and uses which, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare, or the environment than the activities set forth in this paragraph.

2. Activities and Uses Inconsistent with the AUL Opinion. Activities and uses which are inconsistent with the objectives of this Notice of Activity and Use Limitation, and which, if implemented at the Portion of the Property, may result in a significant risk of harm to health, safety, public welfare or the environment or in a substantial hazard, are as follows:

(i) Use of the Site as agricultural, institutional (with a residential or child care component), recreational or as a playground or other similar use where a child is likely to be present or other use which was not considered within the risk characterization and demonstrated to pose No Significant Risk of harm to human health, safety, public welfare, and the environment; and

(ii) Significant alterations or changes in use of spaces in the existing buildings or construction of other buildings on-site without the installation of a passive venting system and vapor barrier and/or performance of indoor air monitoring which adequately demonstrates that VOCs are not migrating into the buildings at unacceptable levels.

3. Obligations and Conditions Set Forth in the AUL Opinion. If applicable, obligations and/or conditions to be undertaken and/or maintained at the Portion of the Property to maintain a condition of No Significant Risk as set forth in the AUL Opinion shall include the following:

(i) Maintenance and quarterly inspections of the passive vents installed in the crawl space below Building 1 to minimize vapor migration into the building;

(ii) Performance of groundwater monitoring, indoor air monitoring, and/or soil gas sampling for any future building constructed at the site to determine whether impacts associated with the disposal site may pose a potential risk of exposure to building occupants;

(iii) Performance of response actions in accordance with the Massachusetts Contingency Plan, should conditions and/or environmental monitoring conducted pursuant to the Obligation set forth above indicate that VOCs associated with the disposal site are migrating into the buildings;and

(iv) A Soil Management Plan and Health and Safety Plan must be prepared and implemented prior to the commencement of any subsurface activities which may disturb OHM impacted soil at the Site.

4. Proposed Changes in Activities and Uses. Any proposed changes in activities and uses at the Portion of the Property which may result in higher levels of exposure to oil and/or hazardous material than currently exist shall be evaluated by an LSP who shall render an Opinion, in accordance with 310 CMR 40.1080 *et seq.*, as to whether the proposed changes will present a significant risk of harm to health, safety, public welfare or the environment. Any and all requirements set forth in the Opinion to meet the objective of this Notice shall be satisfied before any such activity or use is commenced.

5. Violation of a Response Action Outcome. The activities, uses and/or exposures upon which this Notice is based shall not change at any time to cause a significant risk of harm to health, safety, public welfare, or the environment or to create substantial hazards due to exposure to oil and/or hazardous material without the prior evaluation by an LSP in accordance with 310 CMR 40.1080 *et seq.*, and without additional response actions, if necessary, to achieve or maintain a condition of No Significant Risk or to eliminate substantial hazards.

If the activities, uses, and/or exposures upon which this Notice is based change without the prior evaluation and additional response actions determined to be necessary by an LSP in accordance with 310 CMR 40.1080 *et seq.*, the owner or operator of the Portion of the Property subject to this Notice at the time that the activities, uses and/or exposures change, shall comply with the requirements set forth in 310 CMR 40.0020.

6. Incorporation Into Deeds, Mortgages, Leases, and Instruments of Transfer. This Notice shall be incorporated either in full or by reference into all future deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer, whereby an interest in and/or a right to use the Property or a portion thereof is conveyed.

Owner hereby authorizes and consents to the filing and recordation and/or registration of this Notice, said Notice to become effective when executed under seal by the undersigned LSP, and recorded and/or registered with the appropriate Registry(ies) of Deeds and/or Land Registration Office(s).

WITNESS the execution hereof under seal this 10th day of February, 2006.

Jones Environmental Services (Northeast), Inc.

Owner
By: Mr. Jim Green
Its: CEO & President and chief financial officer

COMMONWEALTH OF MASSACHUSETTS

Plymouth, ss February 10, 2006

Then personally appeared the above-named Jim Green and acknowledged the foregoing instrument to be his free act and deed in his aforesaid respective capacities before me,

Notary Public:
My Commission Expires: 5/21/2010

The undersigned LSP hereby certifies that he executed the aforesaid Activity and Use Limitation Opinion attached hereto as Exhibit C and made a part hereof and that in his Opinion this Notice of Activity and Use Limitation is consistent with the terms set forth in said Activity and Use Limitation Opinion.

Date: February 10, 2006

Michael J. Pierdinock
LSP No. 4068
LSP SEAL:

COMMONWEALTH OF MASSACHUSETTS

Plymouth, ss February 10, 2006

Then personally appeared the above named Michael J. Pierdinock and acknowledged the foregoing instrument to be his free act and deed before me,

Notary Public:
My Commission Expires: 5/21/2010

Upon recording, return to:
Mr. Jim Green
Jones Environmental Services (Northeast), Inc.
263 Howard Street
Lowell, Massachusetts 01852

EXHIBIT A

Legal Description of Parcel of Land

A certain parcel of land in the City of Lowell, Middlesex County, Massachusetts, shown on a plan entitled "New York, New Haven and Hartford Railroad Office of Engineer – Real Estate Land in Lowell, Mass. To be conveyed to D.T. Sullivan Company, Inc., Scale 1"=40', July 1961" bounded and described as follows:

Beginning at the southerly corner of the herein described premises in the easterly side line of the State Highway Layout No. 4953 dated June 7, 1960, recorded with said Deeds, Book 1479, Page 12, on June 16, 1960, and in the division line of land now or formerly of said railroad and land now or formerly of H.A. Brewer; and

Thence northwesterly, bounding southwesterly on said State Highway, in a curve to the right having a radius of 1300 feet, 164.20 feet to a point;

Thence northwesterly, bounding southwesterly on said State Highway and tangent to said last described line, 89.85 feet to a point;

Thence northeasterly, bounding northwesterly on said State Highway in a line making an interior angle of 84° 26' 57" with said last described coarse, 54.00 feet to a point;

Thence northwesterly, bounding southwesterly on said State Highway, in a line making an exterior angle of 84° 26' 57" with said last described coarse, 36.69 feet to Howard Street;

Thence northeasterly, bounding northwesterly on said Howard Street, 72.44 feet more or less to a point; and

Thence southwesterly, bounding southeasterly on land now or formerly of H.A. Brewer, 240.89 feet, more or less to the point of beginning.

Containing 30,248 square feet more or less, or however otherwise said premises may be bounded and described, and be all or any of said measurements or distances more or less.

It is noted that the directional arrow which appears upon the plan referred to and delineated as a northerly arrow, appears to face in a northeasterly direction as compared to other plans on record.

EXHIBIT A-1

Legal Description of Area Subject to AUL

A.U.L. Area shown on a plan entitled "Plan of Land in Lowell, MA., Scale 1"=30', February 1, 2006" bounded and described as follows:

Beginning at the most Northerly corner of the South side of Howard Street.

Thence S 31 45'17" E a distance of 72.44 feet along Howard Street;

Thence S 26 38'13" W a distance of 115.43 feet to a point;

Thence N 83 40'48" W a distance of 221.90 feet to the High Water Mark;

Thence N 49 18'30" E a distance of 83.84 feet to a point;

Thence N 57 05'00" E a distance of 81.50 feet to a point;

Thence N 48 49'00" E a distance of 73.15 feet, last three courses along the High Water Mark;

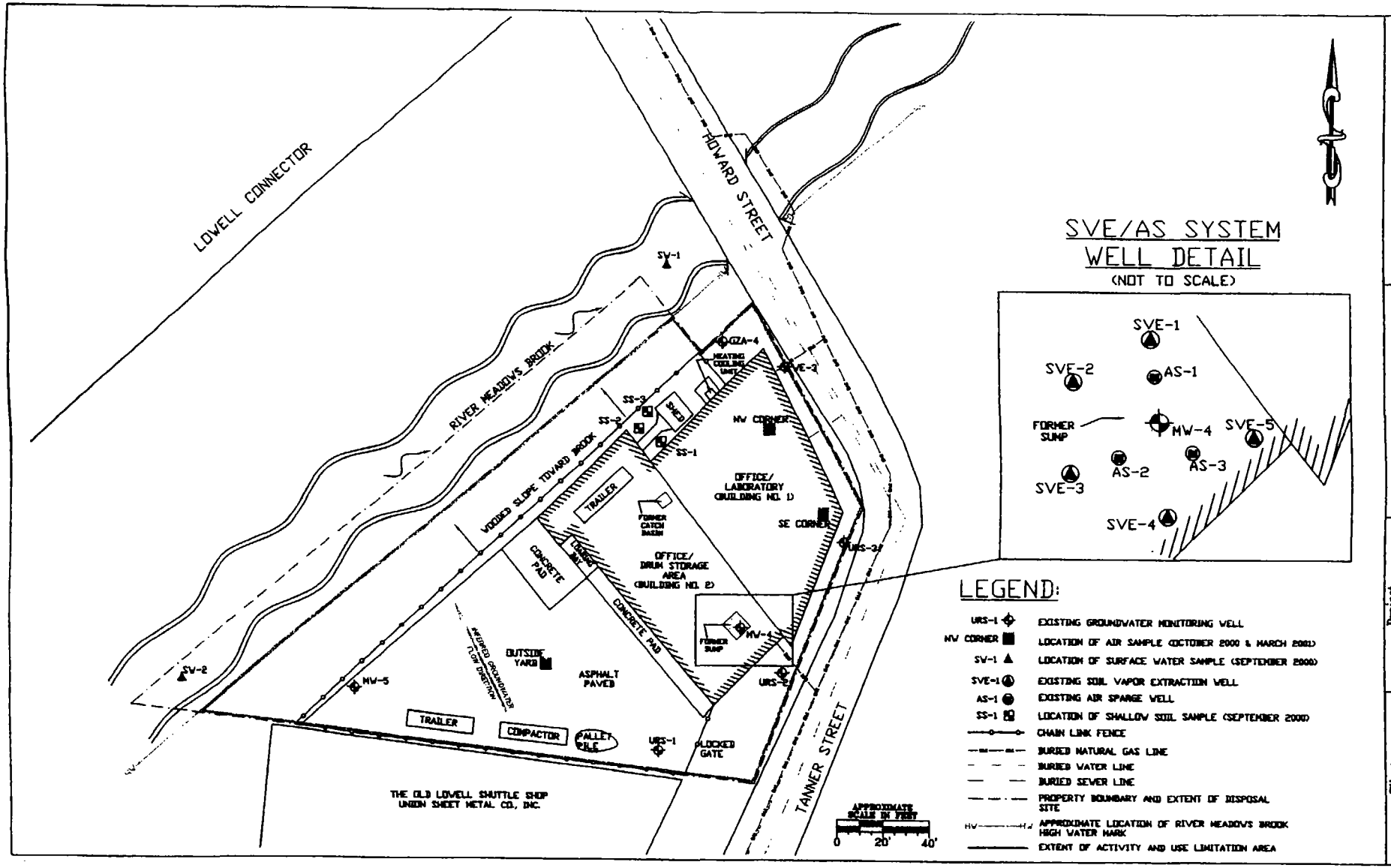
Thence S 31 45'17" E a distance of 34.12 feet to a point;

Thence N 52 41'40" E a distance of 36.69 feet to the point of beginning.

Said Lot contains an area of 25,383 square feet more or less.

EXHIBIT B

Sketch Plan Land Subject to AUL



LIGHTSHIP ENGINEERING

Date: 11/22/05 | Drawn by: TWN | 542.1.1

Sheet No. 1 of 1 | Scale: As Shown

EXHIBIT B
SKETCH PLAN

Project
Former Jet-Line/Goodyear
263 Howard Street
Lowell, MA

Client
Jones Environmental Services (Northeast), Inc.
461 Cooke Street
Farmington, CT

Source: URS Corporation Site Plan, Phase II MCP Site Investigation, Figure 2, 06/22/01.

Form 1075

EXHIBIT C

Activity and Use Limitation Opinion

ACTIVITY AND USE LIMITATION OPINION

Former Jet-Line/Geochem
263 Howard Street
Lowell, Massachusetts

Release Tracking Number 3-00601

February 10, 2006

Prepared for:

Jones Environmental Services (Northeast), Inc.
263 Howard Street
Lowell, Massachusetts 01852

Prepared by:

Lightship Engineering, LLC
36 Cordage Park Circle, Suite 312
Plymouth, Massachusetts 02360

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2.1 RTN ADDRESSED BY THIS AUL OPINION 2-2
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3.1 SITE ADDRESS 3-1
3.2 METES AND BOUNDS DESCRIPTION OF THE DISPOSAL SITE 3-1
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Figure 1-2 Disposal Site Map

APPENDIX B ACTIVITY AND USE LIMITATION OPINION FORMS

1.0 INTRODUCTION

Pursuant to 310 CMR 40.1074, this Activity and Use Limitation ("AUL") Opinion has been prepared, on behalf of Jones Environmental Services (Northeast), Inc. ("JES"), in connection with the disposal site located at 263 Howard Street in Lowell, Massachusetts (the "Site"). A Site Locus Map and a Disposal Site Map are attached as Figures 1-1 and 1-2, Appendix A, respectively. For the purpose of the AUL Opinion, the disposal site is defined by the 263 Howard Street property boundaries and the AUL Area is defined as the upland portion of the disposal site bounded by the approximate high water mark of River Meadows Brook to the northwest.

2.0 SITE HISTORY

The Site and surrounding area has been developed for industrial use since at least 1879. Prior to 1976 the Site was utilized as a railroad yard, boiler maintenance and repair facility, and metal recycling facility. Since 1976 the Site has been utilized as a Resource Conservation and Recovery Act ("RCRA") treatment, storage and disposal facility ("TSDF") operating under an Interim Hazardous Waste Facility (Part B) License. The Site is presently utilized for the treatment and temporary storage of hazardous waste prior to off-site disposal.

There are two interconnected single-story buildings located on the east side of the Site. The eastern portion of the building (identified as "Building 1" on Figure 1-2, Appendix A) is a wood-framed structure with a wood floor and underlying crawl space constructed in 1976 for use as offices, a laboratory and bermed hazardous waste storage areas. The western portion of the building (identified as "Building 2" on Figure 1-2, Appendix A) is a concrete block structure with a concrete slab on-grade foundation constructed in 1979 for use as bermed hazardous waste storage area. In the mid 1990's the two buildings were connected via a passageway. A concrete loading dock is located on the northwest corner of Building 2. An outside storage area used to store plastics and empty containers is located in an unpaved area north of Building 1. The western portion of the Site is asphalt paved and is used to store empty trailers and drums. This area was reported to have been unpaved prior to 1988. The Site is bounded by River Meadow Brook to the northwest with the Lowell Connector beyond. Howard Street abuts the Site to the northeast. Across Howard Street to the northeast and east is a power plant. Tanner Streets abuts the Site to the southeast with a boiler works and machine shop beyond. The Silresin Chemical Corporation, Federal Superfund site is located approximately 1,000 feet southwest of the Site.

The Site is dual regulated by the United States Environmental Protection Agency ("EPA") RCRA Corrective Action Program and by the Massachusetts Department of Environmental Protection ("DEP"), Massachusetts Contingency Plan ("MCP") 310 CMR 40.0000. The Site was first listed by the DEP on January 15, 1990 as a Location To Be Investigated.

Volatile organic compounds ("VOC") were first detected in soil, groundwater and surface water samples collected at the Site in 1984. Since 1984 numerous response actions have been conducted to identify and remediate the on-site source(s) of VOC. An MCP Phase I Limited Site Investigation Report ("Phase I") and Tier II Classification were submitted for the Site in 1999. As set forth in the Phase I, the compounds of concern identified at the Site consist primarily of TCE and PCE and their degradation products, 1,1,1-DCA, toluene and other select VOCs. The primary source appeared to be the former sump located near the southeast corner of Building 2. In 1986 approximately 26 drums of liquid and three drums of sediment/soil were recovered from the sump and transported off-Site for disposal. According to the Phase II Report, the sump was

closed in accordance with DEP requirements and monitoring well MW-4 was installed to monitor groundwater conditions in the source area.

An MCP Phase II Comprehensive Site Assessment Report ("Phase II") and Method 3 Risk Characterization were submitted for the Site in 2001. The Method 3 Risk Characterization concluded that a level of *No Significant Risk* ("NSR") to human health exists at the Site with the assumptions that the property continues to be used for commercial or industrial purposes and that the passive vents installed in the crawl space below Building 1 remain in place. As set forth in the Method 3 Risk Characterization, a level of NSR had not been achieved with respect to public welfare and the environment as a result of the concentrations of OHM that exceeded DEP Upper Concentration Limits ("UCLs") in groundwater at monitoring well MW-4.

In June 2002, MCP Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action ("Phase III") and Phase IV Implementation of Selected Remedial Alternative ("Phase IV") reports. The Phase III report identified soil vapor extraction and air sparging ("SVE/AS") as the recommended remedial action alternative to remediate groundwater in the vicinity of well MW-4 located in the former sump source area. In accordance with the Phase IV, an SVE/AS remediation system was installed and operated at the Site for approximately 18 months between April 2003 and October 2004. Quarterly groundwater samples were collected during operation of the SVE/AS system and post-remediation. The results confirm that VOC concentrations in groundwater have been reduced to below UCLs.

2.1 RTN ADDRESSED BY THIS AUL OPINION

This AUL Opinion addresses the RTN for the Site as set forth below:

- RTN 3-00601 (First Listed by DEP on January 15, 1990).

2.2 REASON FOR A NOTICE OF ACTIVITY AND USE LIMITATION

A Method 3 Risk Characterization was prepared to support a Response Action Outcome for the Site. Although the concentration of VOC measured in groundwater near the building exceed their respective Method 1, GW-2 Groundwater Standards, indoor air samples collected from the Site demonstrated that the passive vents installed in the crawl space have prevented significant VOC vapors from entering the building. In addition, VOC measured in soil exceed their respective Method 1, S-2/GW-2 Soil Standards, however, the Method 3 Risk Characterization demonstrated that the concentration of VOC detected in soil at the Site does not

pose risk to human health, public safety, welfare or the environment provided that the use of the property remains commercial/industrial.

In order to maintain a level of NSR, implementation of the AUL is necessary to ensure that the property continues to be used for commercial/industrial purposes and that the passive vents installed in the crawl space below Building 1 be maintained.

3.0 AUL OPINION METES AND BOUNDS DESCRIPTION

Pursuant to 310 CMR 40.1074(2)(a)1 and 2, the Site address and metes and bounds description of the parcel of land that comprises the disposal site and AUL area are set forth below.

3.1 SITE ADDRESS

Jones Environmental Services (Northeast), LLC
263 Howard Street
Lowell, Massachusetts 01852

3.2 METES AND BOUNDS DESCRIPTION OF THE DISPOSAL SITE

A certain parcel of land in the City of Lowell, Middlesex County, Massachusetts, shown on a plan entitled "New York, New Haven and Hartford Railroad Office of Engineer – Real Estate Land in Lowell, Mass. To be conveyed to D.T. Sullivan Company, Inc., Scale 1"=40', July 1961" bounded and described as follows:

Beginning at the southerly corner of the herein described premises in the easterly side line of the State Highway Layout No. 4953 dated June 7, 1960, recorded with said Deeds, Book 1479, Page 12, on June 16, 1960, and in the division line of land now or formerly of said railroad and land now or formerly of H.A. Brewer; and

Thence northwesterly, bounding southwesterly on said State Highway, in a curve to the right having a radius of 1300 feet, 164.20 feet to a point;

Thence northwesterly, bounding southwesterly on said State Highway and tangent to said last described line, 89.85 feet to a point;

Thence northeasterly, bounding northwesterly on said State Highway in a line making an interior angle of 84° 26' 57" with said last described coarse, 54.00 feet to a point;

Thence northwesterly, bounding southwesterly on said State Highway, in a line making an exterior angle of 84° 26' 57" with said last described coarse, 36.69 feet to Howard Street;

Thence northeasterly, bounding northwesterly on said Howard Street, 72.44 feet more or less to a point; and

Thence southwesterly, bounding southeasterly on land now or formerly of H.A. Brewer, 240.89 feet, more or less to the point of beginning.

Containing 30,248 square feet more or less, or however otherwise said premises may be bounded and described, and be all or any of said measurements or distances more or less.

It is noted that the directional arrow, which appears upon the plan referred to and delineated as a northerly arrow, appears to face in a northeasterly direction as compared to other plans on record.

3.3 METES AND BOUNDS DESCRIPTION OF THE PORTION OF THE DISPOSAL SITE ADDRESSED BY THIS AUL OPINION

A.U.L. Area shown on a plan entitled "Plan of Land in Lowell, MA., Scale 1"=30', February 1, 2006" bounded and described as follows:

Beginning at the most Northerly corner of the South side of Howard Street.

Thence S 31 45'17" E a distance of 72.44 feet along Howard Street;

Thence S 26 38'13" W a distance of 115.43 feet to a point;

Thence N 83 40'48" W a distance of 221.90 feet to the High Water Mark;

Thence N 49 18'30" E a distance of 83.84 feet to a point;

Thence N 57 05'00" E a distance of 81.50 feet to a point;

Thence N 48 49'00" E a distance of 73.15 feet, last three courses along the High Water Mark;

Thence S 31 45'17" E a distance of 34.12 feet to a point;

Thence N 52 41'40" E a distance of 36.69 feet to the point of beginning.

Said Lot contains an area of 25,383 square feet more or less.

The approximate extent of the disposal site and AUL area are indicated on Figure 1-2, Appendix A.

4.0 PERMITTED SITE ACTIVITIES AND USES

Pursuant to 310 CMR 40.1074(1)(b)(3), a description of disposal site activities and uses permitted at the disposal site are set forth below.

A condition of No Significant Risk to health, safety, public welfare or the environment exists for any foreseeable period of time so long as any of the following activities and uses occur within the AUL Area:

1) Commercial and/or industrial use of the on-site building, provided that the passive vents installed in the crawl space below Building 1 are maintained and the interior layout and use remain the same;
2) Excavation associated with emergency or short term (three months or less) underground utility and/or construction work, provided it is conducted in accordance with a Soil Management Plan and a Health and Safety Plan;
3) Activities which are not identified by this Notice as being inconsistent with maintaining a condition of No Significant Risk; and
4) Such other activities and uses which, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare, or the environment than the activities set forth in this paragraph.

5.0 OBLIGATIONS AND CONDITIONS FOR PERMITTED ACTIVITIES

Pursuant to 310 CMR 40.1074(1)(b)(4), a description of obligations and/or conditions for conducting permitted disposal site activities to meet the objectives of the AUL Opinion and maintain a level of NSR are set forth below.

1) Maintenance and quarterly inspections of the passive vents installed in the crawl space below Building 1 to minimize vapor migration into the building;
2) Performance of groundwater monitoring, indoor air monitoring, and/or soil gas sampling for any future building constructed at the site to determine whether impacts associated with the disposal site may pose a potential risk of exposure to building occupants;
3) Performance of response actions in accordance with the Massachusetts Contingency Plan, should conditions and/or environmental monitoring conducted pursuant to the Obligation set forth above indicate that VOCs associated with the disposal site are migrating into the buildings; and
4) A Soil Management Plan and Health and Safety Plan must be prepared and implemented prior to the commencement of any subsurface activities, which may disturb OHM impacted soil at the Site.

6.0 PROHIBITED OR LIMITED SITE ACTIVITIES AND USES

Pursuant to 310 CMR 40.1074(1)(b)(2), a description of disposal site activities and uses which are inconsistent with the objectives of this AUL Opinion and, if implemented, may result in a significant risk of harm to human health, safety, public welfare or the environment, is set forth below.

1) Use of the Site as agricultural, institutional (with a residential or child care component), recreational or as a playground or other similar use where a child is likely to be present or other use which was not considered within the risk characterization and demonstrated to pose No Significant Risk of harm to human health, safety, public welfare, and the environment; and

2) Significant alterations or changes in use of spaces in the existing buildings or construction of other buildings on-site without the installation of a passive venting system and vapor barrier and/or performance of indoor air monitoring which adequately demonstrates that VOCs are not migrating into the buildings at unacceptable levels.

7.0 AGREEMENT TO REFERENCE NOTICE OF AUL

Pursuant to 310 CMR 40.1074(2)(g), JES agrees to reference this AUL in all deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instruments which convey an interest in and/or a right to use the portions of the Site subject to the AUL pursuant to the Response Action Outcome ("RAO") Statement.

8.0 PROCEDURES FOR CHANGING PERMITTED SITE ACTIVITIES AND USES

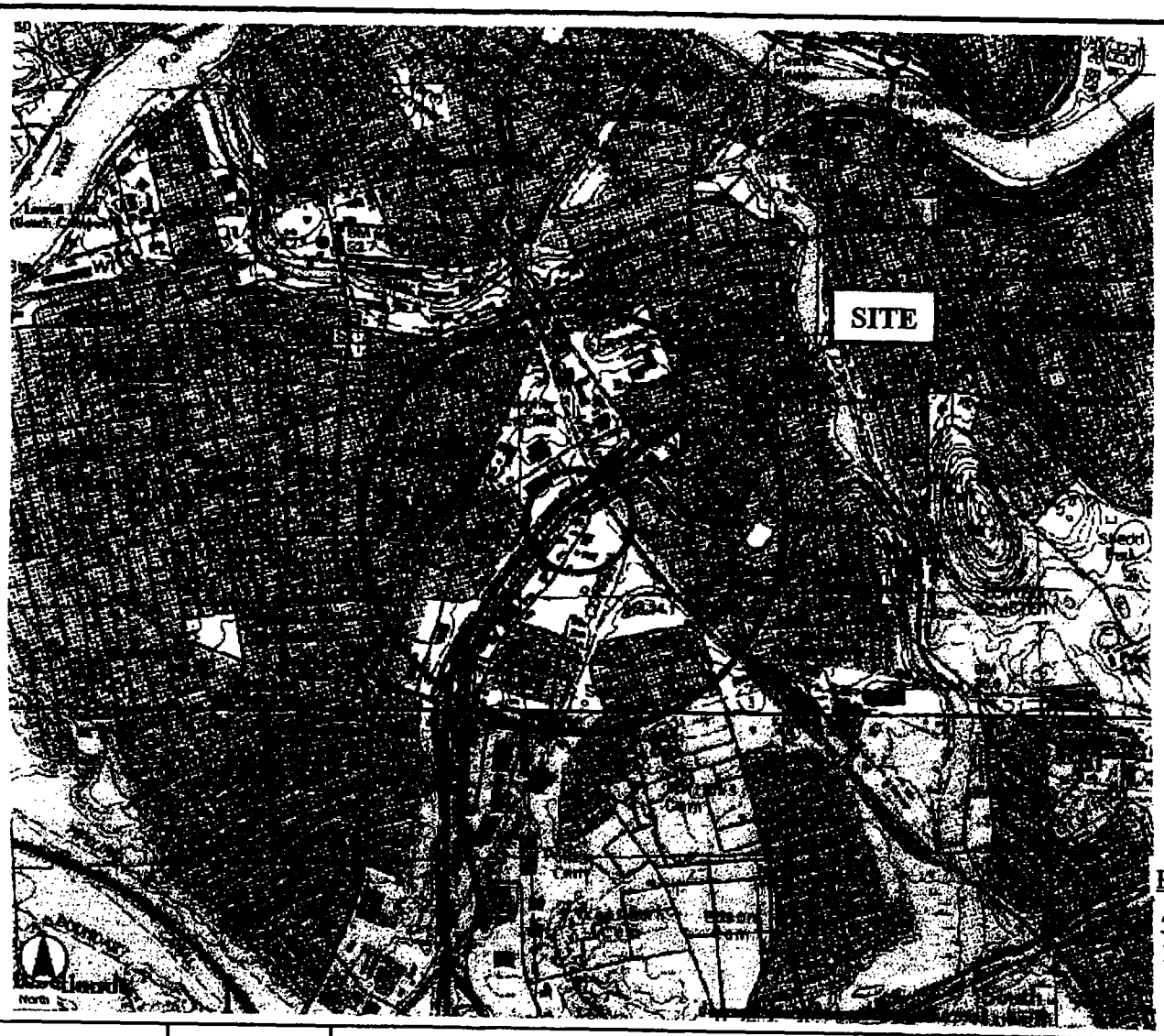
Pursuant to 310 CMR 40.1074(2)(h), a description of procedures to be followed to ensure that changes in permitted activities and/or uses continue to meet the objectives of the AUL is set forth below.

1. Any proposed changes in activities and/or uses within the boundaries of the disposal site addressed by this AUL Opinion, which may result in higher levels of exposure to oil and/or hazardous material than currently exist, will be evaluated by an LSP. The LSP will render an Opinion, consistent with 310 CMR 40.1080, as to whether the proposed changes will result in a significant risk of harm to human health, safety, public welfare or the environment. Any and all requirements set forth above to meet the objective of the AUL will be satisfied before any proposed changes in activity and/or use are initiated.

APPENDIX A

Site Figures

Figure 1-1 Site Locus Map
Figure 1-2 Disposal Site Map



Radii:

500 Foot Radius
1/2 Mile Radius

N
W E
S

FIGURE 1-1
Site Locus Map
263 Howard Street, Lowell, MA

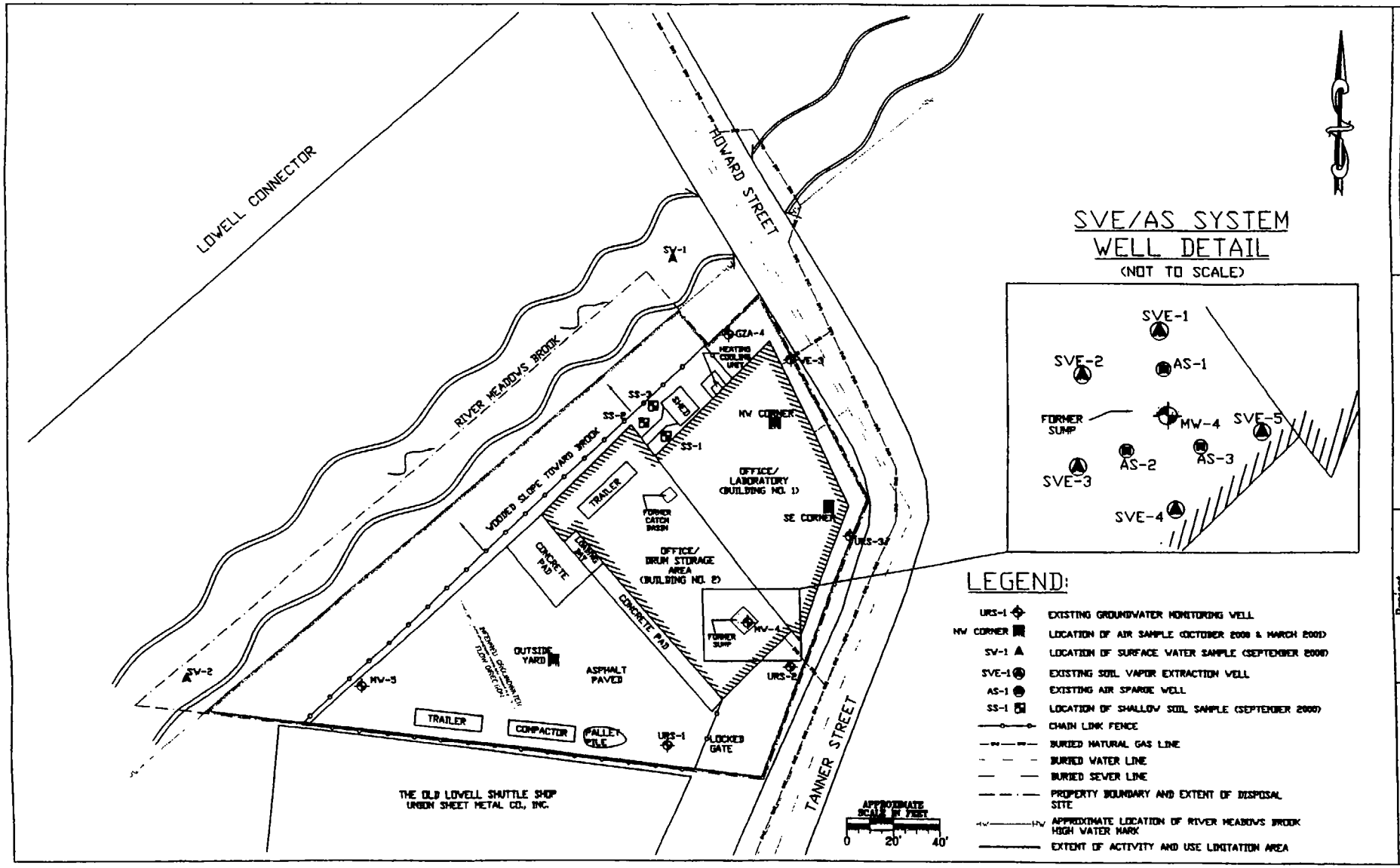
PREPARED FOR
Jones Environmental Services (Northeast), Inc.

Scale:
As Shown

SOURCE:
MassGIS Online DataViewer

LIGHTSHIP
ENGINEERING

ENVIRONMENTAL & LAND-USE CONSULTANTS
36 Cordage Park Circle, Suite 312, Plymouth, MA 02360


LOWELL CONNECTOR
HOWARD STREET
TANNER STREET
RIVER MEADOWS BROOK
WOODED SLOPE TOWARD BROOK
SV-1
SV-2
GZA-4
HEATING COOLING UNIT
SVE-3
SS-3
SS-2
SS-1
SHED
NW CORNER
OFFICE/ LABORATORY (BUILDING NO. 1)
TRAILER
FORMER CATCH BASIN
SE CORNER
URS-3
CONCRETE PAD
LOADING BAY
OFFICE/ DRUM STORAGE AREA (BUILDING NO. 2)
CONCRETE PAD
FORMER SUMP
MW-4
URS-2
MW-3
OUTSIDE YARD
ASPHALT PAVED
TRAILER
COMPACTOR
PALLET PILE
URS-1
LOCKED GATE
THE OLD LOWELL SHUTTLE SHOP
UNION SHEET METAL CO., INC.
SVE/AS SYSTEM
WELL DETAIL
(NOT TO SCALE)
SVE-1
SVE-2
AS-1
FORMER SUMP
MW-4
SVE-5
AS-2
AS-3
SVE-3
SVE-4
LEGEND:
URS-1 EXISTING GROUNDWATER MONITORING WELL
NW CORNER LOCATION OF AIR SAMPLE (OCTOBER 2000 & MARCH 2001)
SV-1 LOCATION OF SURFACE WATER SAMPLE (SEPTEMBER 2000)
SVE-1 EXISTING SOIL VAPOR EXTRACTION WELL
AS-1 EXISTING AIR SPARGE WELL
SS-1 LOCATION OF SHALLOW SOIL SAMPLE (SEPTEMBER 2000)
CHAIN LINK FENCE
BURIED NATURAL GAS LINE
BURIED WATER LINE
BURIED SEWER LINE
PROPERTY BOUNDARY AND EXTENT OF DISPOSAL SITE
HW APPROXIMATE LOCATION OF RIVER MEADOWS BROOK HIGH WATER MARK
EXTENT OF ACTIVITY AND USE LIMITATION AREA
APPROXIMATE SCALE IN FEET
0 20' 40'
LIGHTSHIP ENGINEERING
542.1.1
Drawn by: TWN
Scale: As Shown
Client
Jacobs Environmental Services (Northeast), Inc.
461 Cooke Street
Farmington, CT
Project
Former Joe-Line/Goodyear
263 Howard Street
Lowell, MA
FIGURE 1-2
SITE DISPOSAL MAP

APPENDIX B

Activity and Use Limitation Opinion Forms

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

A. DISPOSAL SITE LOCATION:

1. Disposal Site Name: Former Jet-Line/Geochem
2. Street Address: 263 Howard Street
3. City/Town: Lowell 4. ZIP Code: 01852-0000

B. THIS FORM IS BEING USED TO: (check one)

☑ 1. Provide the LSP Opinion for a **Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1074.

☐ 2. Provide the LSP Opinion for an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement**, pursuant to 310 CMR 40.1080. Include BWSC113A as an attachment to BWSC113. Section A and C do not need to be completed.

☐ 3. Provide the LSP Opinion for an **Amended Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1081(4).

☐ 4. Provide the LSP Opinion for a **Partial Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(3).

☐ 5. Provide the LSP Opinion for a **Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(1)(d).

☐ 6. Provide the LSP Opinion for a **Grant of Environmental Restriction**, pursuant to 310 CMR 40.1071.

☐ 7. Provide the LSP Opinion for an **Amendment of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1081(3).

☐ 8. Provide the LSP Opinion for a **Partial Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(2).

☐ 9. Provide the LSP Opinion for a **Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(1)(c).

☐ 10. Provide the LSP Opinion for a **Confirmatory Activity and Use Limitation**, pursuant to 310 CMR 40.1085(4).

(Unless otherwise noted above, all sections of this form (BWSC113A) must be completely filled out, printed, stamped, signed with black ink and attached as an exhibit to the AUL Document to be recorded and/or registered with the Registry of Deeds and/or Land Registration Office.)

C. AUL INFORMATION:

1. Is the address of the property subject to AUL different from the disposal site address listed above?

☑ a. No ☐ b. Yes If yes, then fill out address section below.

2. Street Address:
3. City/Town: 4. ZIP Code:

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

D. LSP SIGNATURE AND STAMP:

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 309 CMR4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> *if Section B indicates that a **Notice of Activity and Use Limitation** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1074;

> *if Section B indicates that an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement*** is being submitted, this evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1080;

> *if Section B indicates that an **Amended Notice of Activity and Use Limitation or Amendment to a Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 40.1081;

> *if Section B indicates that a **Termination or a Partial Termination of a Notice of Activity and Use Limitation, or a Release or Partial Release of a Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1083;

> *if Section B indicates that a **Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1071;

> *if Section B indicates that a **Confirmatory Activity and Use Limitation** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1085(4);

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.

1. LSP #: 4078
2. First Name: Michael J. 3. Last Name: Pierdinock
4. Telephone: (508) 830-3344 5. Ext.: 110 6. FAX: (508) 830-3360
7. Signature: 8. Date: 2/10/06 mm/dd/yyyy
9. LSP Stamp:

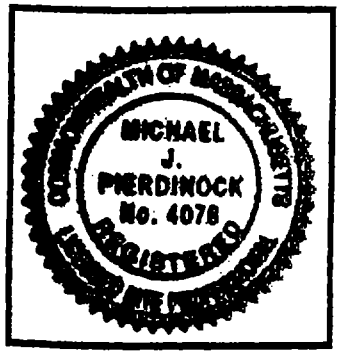


EXHIBIT D

Activity and Use Limitation Opinion Form (BWSC-113A)

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

A. DISPOSAL SITE LOCATION:

1. Disposal Site Name: Former Jet-Line/Geochem
2. Street Address: 263 Howard Street
3. City/Town: Lowell
4. ZIP Code: 01852-0000

B. THIS FORM IS BEING USED TO: (check one)

☑ 1. Provide the LSP Opinion for a **Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1074.

☐ 2. Provide the LSP Opinion for an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement**, pursuant to 310 CMR 40.1080. Include BWSC113A as an attachment to BWSC113. Section A and C do not need to be completed.

☐ 3. Provide the LSP Opinion for an **Amended Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1081(4).

☐ 4. Provide the LSP Opinion for a **Partial Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(3) .

☐ 5. Provide the LSP Opinion for a **Termination of a Notice of Activity and Use Limitation**, pursuant to 310 CMR 40.1083(1)(d).

☐ 6. Provide the LSP Opinion for a **Grant of Environmental Restriction**, pursuant to 310 CMR 40.1071.

☐ 7. Provide the LSP Opinion for an **Amendment of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1081(3).

☐ 8. Provide the LSP Opinion for a **Partial Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(2).

☐ 9. Provide the LSP Opinion for a **Release of a Grant of Environmental Restriction**, pursuant to 310 CMR 40.1083(1)(c).

☐ 10. Provide the LSP Opinion for a **Confirmatory Activity and Use Limitation**, pursuant to 310 CMR 40.1085(4).

(Unless otherwise noted above, all sections of this form (BWSC113A) must be completely filled out, printed, stamped, signed with black ink and attached as an exhibit to the AUL Document to be recorded and/or registered with the Registry of Deeds and/or Land Registration Office.)

C. AUL INFORMATION:

1. Is the address of the property subject to AUL different from the disposal site address listed above?

☑ a. No ☐ b. Yes If yes, then fill out address section below.

2. Street Address: _____
3. City/Town: _____
4. ZIP Code: _____

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC113A

ACTIVITY & USE LIMITATION (AUL) OPINION FORM

Pursuant to 310 CMR 40.1056 & 40.1070 - 40.1084 (Subpart J)

Release Tracking Number
3 - 601

D. LSP SIGNATURE AND STAMP:

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 309 CMR4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> *if Section B indicates that a **Notice of Activity and Use Limitation** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1074;

> *if Section B indicates that an **Evaluation of Changes in Land Uses/Activities and/or Site Conditions after a Response Action Outcome Statement*** is being submitted, this evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1080;

> *if Section B indicates that an **Amended Notice of Activity and Use Limitation or Amendment to a Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 40.1081;

> *if Section B indicates that a **Termination or a Partial Termination of a Notice of Activity and Use Limitation, or a Release or Partial Release of a Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1083;

> *if Section B indicates that a **Grant of Environmental Restriction** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1071;

> *If Section B indicates that a **Confirmatory Activity and Use Limitation** is being registered and/or recorded*, the Activity and Use Limitation that is the subject of this submittal (i) is being provided in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (ii) complies with 310 CMR 40.1085(4);

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.

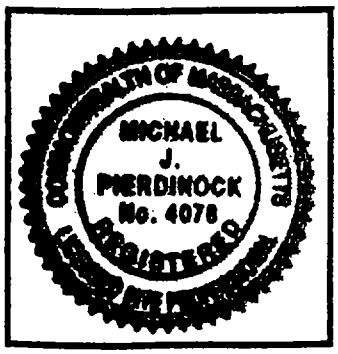
1. LSP #: 4078

2. First Name: Michael J. 3. Last Name: Pierdinock

4. Telephone: (508) 830-3344 5. Ext.: 110 6. FAX: (508) 830-3360

7. Signature: 8. Date: 2/10/06 mm/dd/yyyy

9. LSP Stamp:



APPENDIX C

DATA TABLES FROM PHASE II REPORT

Table 1	Historical Soil Analytical Data
Table 2	Historical Groundwater Analytical Data
Table 3	Historical Surface Water Analytical Data
Table 4	Summary of Soil Analytical Data
Table 5	Monitoring Well Construction Summary
Table 6	Summary of Groundwater Analytical Data
Table 7	Summary of Hydraulic Conductivity Data
Table 8	Summary of Surface Water Analytical Data
Table 9	Summary of Air Analytical Data

TAb... 1
HISTORICAL SOIL ANALYTICAL DATA
23 HOWARD STREET
LOWELL, MASSACHUSETTS

Compound	S-1/GW-2 Standard (mg/kg)	Location:	Concentration (mg/kg)															
			S-1	Bldg 1 A-2	Bldg 1 A-4	S-2	S-3	Bldg 1 B-1	Bldg 1 B-3	Bldg 1 I-1	Bldg 1 I-3	Pkg Lot1	Pkg Lot 2	Pkg Lot 3	Pkg Lot 4	Pkg Lot 5	Paved-Lot-1	Paved Lot 2
		Area of Concern	Building 1 - Storage Area A			Building 1 - Storage Area B				Interim Storage Area		Parking/Yard Area						
		Date:	Jul-85	Nov-94	Nov-94	Jul-85	Jul-85	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94	Nov-94
		Depth (ft bgs):	1.5 to 2.0	0.5 to 1	0.5 to 1	1.5 to 2.0	1.5 to 2.0	0.5 to 1	0.5 to 1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1,1,1-Trichloroethane	100		0.9	ND	ND	ND	0.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	20		ND	0.38	0.066	TRACE	ND	0.063	0.057	ND	0.088	ND	ND	ND	ND	ND	0.034	ND
Tetrachloroethene	20		ND	0.045	ND	ND	TRACE	ND	ND	ND	0.007	ND	ND	ND	ND	ND	ND	ND
Benzene	40		TRACE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	500		TRACE	ND	ND	TRACE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	500		TRACE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	10		ND	ND	5.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

mg/kg = milligrams per kilogram
ND = Not Detected
ft bgs = feet below ground surface

TABLE 2

HISTORICAL GROUNDWATER ANALYTICAL DATA
263 HOWARD STREET SITE
LOWELL, MASSACHUSETTS

Parameter	Solubility[1] (mg/l)	GW-2 Standard (mg/l)	UCL (mg/l)	Location:	Concentration (mg/l)											
					GZA-1		GZA-2		GZA-3		GZA-4		GZA-5		WE-1	
				Date:	Dec-84	Jul-85	Dec-84	Jul-85	Dec-84	Jul-85	Dec-84	Jul-85	Jul-85	1987	Jul-85	1987
Volatile Organic Compound																
1,1-Dichloroethene	400	0.001	100		0.16	0.15	0.016	ND	0.57	0.42	ND	ND	1.8	0.009	ND	0.12
1,1-Dichloroethane	5,500	9.0	100		0.097	0.06	ND	0.01	0.9	2.1	ND	ND	5.1	0.023	ND	0.22
1,1,1-Trichloroethane	720	4.0	100		0.24	0.05	0.005	0.04	0.68	0.65	ND	270	44	0.048	180	0.8
Trichloroethene	1,100	0.3	100		0.026	0.08	TRACE	ND	0.29	TRACE	ND	39	10	0.026	34	0.26
Methylene Chloride	20,000	50.0	100		ND	0.01	TRACE	ND	TRACE	ND	ND	58	9.8	0.029	ND	ND
Trans-1,2-Dichloroethene	600	20.0	100		ND	TRACE	ND	ND	0.01	ND	ND	ND	0.7	0.001	ND	ND
1,2-Dichloroethane	8,690	0.020	100		TRACE	ND	ND	ND	0.016	ND	ND	ND	ND	0.001	ND	ND
Tetrachloroethene	200	3.0	50		ND	ND	ND	ND	TRACE	ND	ND	ND	TRACE	ND	ND	ND
Trichlorofluoromethane	1,100	100.0	NE		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	530	6.0	100		ND	ND	ND	ND	ND	ND	ND	14	3	ND	8.8	ND
Ethylbenzene	150	30.0	100		ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND
Xylenes	200	6.0	100		ND	TRACE	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND
Acetone	1,000,000	50.0	100		ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND
2-Butanone	270,000	50.0	100		ND	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND
Other Organic Compounds																
Semivolatile Organic Compounds	varies	varies	varies		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls	varies	none	0.005		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides	varies	varies	varies		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals		GW-3 (mg/l)														
Aluminum	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	---	0.3	3		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	---	0.4	4		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	---	30	100		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	---	0.05	0.5		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	---	0.01	0.1		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (total)	---	2	20		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	---				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	---	0.03	0.3		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	---	0.001	0.02		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	---	0.08	1		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	---	none	none		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	---	0.08	0.8		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	---	0.007	0.4		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	---				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	---	0.4	4		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	---	2	20		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	---	0.9	20		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes

[1] = Source of Solubility values is Schwille, 1988. *Dense Chlorinated Solvents in Porous and Fractured Media Model Experiments*, Lewis Publishers, Chelsea, Michigan 48118 and The Massachusetts Contingency Plan, 1995

mg/l = milligrams per liter

UCL = Upper Concentration Limits. Compounds above UCLs are bold

ND = Not detected

NA = Not analyzed

--- = Typically low

TAL...

HISTORICAL GROUNDWATER ANALYTICAL DATA
363 HOWARD STREET SITE
LOWELL, MASSACHUSETTS

Parameter	Solubility [1] (mg/l)	GW-2 Standard (mg/l)	UCL (mg/l)	Location: Date:	Concentration (mg/l)							
					WE-2			WE-3			MW-4	MW-5
					Jul-85	1987	Mar-94	Jul-85	1987	Mar-94	1987	1987
Volatile Organic Compound												
1,1-Dichloroethene	400	0.001	100		ND	ND	0.005	ND	0.002	ND	7.4	0.16
1,1-Dichloroethane	5,500	9.0	100		ND	ND	ND	ND	0.001	ND	2.4	0.4
1,1,1-Trichloroethane	720	4.0	100		ND	0.006	0.495	0.04	0.081	0.005	490	3.2
Trichloroethene	1,100	0.3	100		0.1	ND	0.401	0.02	0.026	ND	5.9	0.74
Methylene Chloride	20,000	50.0	100		0.02	0.013	ND	ND	0.013	ND	ND	ND
Trans-1,2-Dichloroethene	600	20.0	100		ND	ND	ND	ND	ND	ND	ND	0.1
1,2-Dichloroethane	8,690	0.020	100		ND	ND	ND	ND	ND	ND	7.2	ND
Tetrachloroethene	200	3.0	50		0.02	ND	0.039	0.01	0.01	ND	7.2	ND
Trichlorofluoromethane	1,100	100.0	NE		ND	ND	ND	ND	ND	ND	0.5	ND
Toluene	530	6.0	100		ND	ND	ND	ND	ND	ND	140	0.1
Ethylbenzene	150	30.0	100		ND	ND	ND	ND	ND	ND	1.6	ND
Xylenes	200	6.0	100		ND	ND	ND	ND	ND	ND	7.6	ND
Acetone	1,000,000	50.0	100		ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	270,000	50.0	100		ND	ND	ND	ND	ND	ND	ND	ND
Other Organic Compounds												
Semivolatile Organic Compounds	varies	varies	varies		NA	NA	ND	NA	NA	ND	NA	NA
Polychlorinated Biphenyls	varies	none	0.005		NA	NA	ND	NA	NA	ND	NA	NA
Pesticides	varies	varies	varies		NA	NA	ND	NA	NA	ND	NA	NA
Metals		GW-3 (mg/l)										
Aluminum	---	none	none		NA	NA	6.65	NA	NA	35.5	NA	NA
Antimony	---	0.3	3		NA	NA	ND	NA	NA	ND	NA	NA
Arsenic	---	0.4	4		NA	NA	ND	NA	NA	0.01	NA	NA
Barium	---	30	100		NA	NA	0.07	NA	NA	0.19	NA	NA
Beryllium	---	0.05	0.5		NA	NA	ND	NA	NA	0.001	NA	NA
Cadmium	---	0.01	0.1		NA	NA	ND	NA	NA	0.002	NA	NA
Copper	---	none	none		NA	NA	0.02	NA	NA	0.04	NA	NA
Chromium (total)	---	2	20		NA	NA	0.01	NA	NA	0.05	NA	NA
Cobalt	---	none	none		NA	NA	0.01	NA	NA	0.03	NA	NA
Calcium	---	none	none		NA	NA	35.3	NA	NA	36.8	NA	NA
Cyanide	---				NA	NA	ND	NA	NA	ND	NA	NA
Iron	---	none	none		NA	NA	23.4	NA	NA	63.7	NA	NA
Lead	---	0.03	0.3		NA	NA	0.016	NA	NA	0.029	NA	NA
Magnesium	---	none	none		NA	NA	6.11	NA	NA	14.4	NA	NA
Manganese	---	none	none		NA	NA	0.1	NA	NA	0.55	NA	NA
Mercury	---	0.001	0.02		NA	NA	ND	NA	NA	ND	NA	NA
Nickel	---	0.08	1		NA	NA	0.04	NA	NA	0.08	NA	NA
Potassium	---	none	none		NA	NA	6.5	NA	NA	9.6	NA	NA
Selenium	---	0.08	0.8		NA	NA	ND	NA	NA	ND	NA	NA
Silver	---	0.007	0.4		NA	NA	ND	NA	NA	ND	NA	NA
Sodium	---				NA	NA	139	NA	NA	126	NA	NA
Thallium	---	0.4	4		NA	NA	ND	NA	NA	ND	NA	NA
Vanadium	---	2	20		NA	NA	0.01	NA	NA	0.05	NA	NA
Zinc	---	0.9	20		NA	NA	0.04	NA	NA	0.14	NA	NA

Notes

[1] = Source of Solubility values is Schwille, 1988. *Dense Chlorinated Solvents in Porous and Fractured Media Model Experiments*, Lewis Publishers, Chelsea, Michigan 48118 and The Massachusetts Contingency Plan, 1995.
mg/l = milligrams per liter
UCL = Upper Concentration Limits. Compounds above UCLs are bold
ND = Not detected
NA = Not analyzed
--- = Typically low

TABLE 3
HISTORICAL SURFACE WATER ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Parameter	sw-u' 12-84	sw-d' 12-84	sw-u' 7-85	sw-d' 7-85	sw-u' 1987	sw-d' 1987
methylene chloride	trace (5)[2]	26	ND	ND	14	16
trans-1,2-dichloroethylene	ND	trace (5)[2]	ND	10	ND	2
trichloroethylene	trace (5)[2]	17	10	20	5	5
1,1-dichloroethylene	ND	trace (5)[2]	ND	ND	ND	ND
1,1-dichloroethylane	ND	trace (5)[2]	ND	trace (5)[2]	ND	ND
1,1,1-trichloroethane	ND	120	ND	50	ND	ND
tetrachloroethylene	ND	trace (5)[2]	ND	ND	ND	ND
toluene	ND	ND	ND	trace (5)[2]	ND	ND
xylenes	ND	ND	ND	trace (5)[2]	ND	ND

Notes:

1. Surface water samples: u-upstream, d-downstream.
2. Value in (brackets) represents method detection limit associated with trace concentration de
3. ND = not detected above compound method detection limit.

TABLE 4
SUMMARY OF SOIL ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Compound	S-2/GW-2 Standard (ug/kg)	SS-1 Sep-00 (ug/kg)	SS-1 RDL (ug/kg)
Acetone	60,000	71 J	42
1,1-Dichloroethene	100	**340**	24
1,1-Dichloroethane	400,000	150	24
cis-1,2-Dichloroethene	500,000	38	24
1,1,1-Trichloroethane	500,000	4,000	24
Trichloroethene	20,000	**45,000**	240
Tetrachloroethene	30,000	2,100	24
Methylene chloride	200,000	97 U	48
Toluene	500,000	300	24
Ethylbenzene	1,000,000	74	24
m,p-Xylenes	500,000	360	24
o-Xylene	500,000	260	24
Isopropylbenzene	NA	45	24
n-Propylbenzene	NA	57	24
1,3,5-Trimethylbenzene	NA	69	24
1,2,4-Trimethylbenzene	NA	240	24
Naphthalene	1,000,000	1,000	24
Benzene	60,000	56	24
PCBs	2,000	ND	26
All other compounds		ND	-

Notes:

ug/kg = micrograms per kilogram
U = Qualified non detected during data validation review.
J = Qualified as estimated during data validation review.
NA = Non available
ND = Not Detected
ft bgs = feet below ground surface
RDL= Reported detection limits.
Bold = Concentrations above S-1/GW-2 and S-2/GW-2 standards

TABLE 5
MONITORING WELL CONSTRUCTION SUMMARY
JONES ENVIRONMENTAL SERVICES INC.
LOWELL, MASSACHUSETTS

Monitoring Well	Date of Installation	Top of PVC Elevation (ft)	Depth to Water Sept. 12, 2000 (ft)	Depth to Water Sept. 22, 2000 (ft)	Zone Monitored	Total Depth (ft)	Depth of Screen Interval (ft)
URS-1	8/29/2000	100.34	91.19	91.51	Overburden	19.0	7.0-19.0
URS-2	8/29/2000	100.81	91.03	91.46	Overburden	20.0	5.0-15.0
URS-3	8/29/2000	101.38	91.00	91.43	Overburden	20.0	5.0-15.0
WE-3	7/2/1985	101.34	90.58	90.91	Overburden	19.3	6.5-20.0
MW-4	NA	101.01	91.02	91.35	Overburden	21.2	NA
MW-5	NA	102.84	90.12	91.60	Overburden	17.2	NA
GZA-4	NA	100.87	90.51	90.87	Overburden	19.1	NA

Notes:
ft = feet
NA = Not Avaliable
Elevation data presented in table is based on arbritary reference elevation of 100 feet above mean sea level obtained from a stormwater catchbasin near the site in Tanner Street

TABLE 6
SUMMARY OF GROUNDWATER ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Parameter	Solubility [1] (mg/l)	GW-2 Standard (mg/l)	Concentration (mg/l)							Concentration (mg/l)				
			UCL (mg/l)	GZA-4,GZA-4DUP RDL	GZA-4 Sep-00	GZA-4Dup Sep-00	WE-3 RDL	WE-3 Sep-00	MW-4 RDL	MW-4 Sep-00	MW-5 RDL	MW-5 Sep-00	URS-1 RDL	URS-1 Sep-00
Volatile Organic Compound														
1,1-Dichloroethene	400	0.001	100	0.075	**0.16**	**0.1**	0.0015	ND	7.5	ND	0.0015	ND	0.0038	**0.043**
1,1-Dichloroethane	5,500	9.0	100	0.075	1.8 J	1.4 J	0.0015	ND	7.5	**24**	0.0015	ND	0.0038	0.19
1,1,1-Trichloroethane	720	4.0	100	0.05	2.2 J	1.6 J	0.001	0.056	5	**360**	0.001	0.03	0.0025	0.16
Trichloroethene	1,100	0.3	100	0.05	0.062	0.054	0.001	0.07	5	**84**	0.001	0.0011	0.0025	ND
Methylene Chloride	20,000	50.0	100	0.25	0.29 J	UJ	0.005	ND	25	ND	0.005	ND	0.012	ND
Trans-1,2-Dichloroethene	600	20.0	100	0.075	ND	ND	0.0015	ND	7.5	ND	0.0015	ND	0.0038	ND
1,2-Dichloroethane	8,690	0.020	100	0.05	ND	ND	0.001	ND	5	ND	0.001	ND	0.0025	ND
Tetrachloroethene	200	3.0	50	0.05	ND	ND	0.001	0.019	5	**6.7**	0.001	ND	0.0025	ND
Trichlorofluoromethane	1,100	100.0	NP	0.25	UJ	UJ	0.005	UJ	25	UJ	0.005	UJ	0.012	UJ
Toluene	530	6.0	100	0.075	0.69 J	0.47 J	0.0015	ND	7.5	**120**	0.0015	ND	0.0038	ND
Ethylbenzene	150	30.0	100	0.05	ND	ND	0.001	ND	5	ND	0.001	ND	0.0025	ND
Xylenes	200	6.0	100	0.05	0.071 J	0.051 J	0.001	ND	5	ND	0.001	0.001	0.0025	ND
Acetone	1,000,000	50.0	100	0.5	ND	ND	0.01	ND	50	ND	0.01	ND	0.025	ND
Chloroethane	5,700	10	NP	0.1	0.9	0.71	0.002	ND	50	ND	0.002	ND	0.005	ND
cis-1,2-Dichloroethene	3,500	30	100	0.05	1.5 J	1.1 J	0.001	ND	5	11	0.001	ND	0.0025	ND
Vinyl Chloride	2.7	0.002	0.6	0.1	**0.19**	**0.16**	0.002	ND	10	ND	0.002	ND	0.005	ND
2-Butanone	270,000	50.0	100	0.5	ND	ND	0.01	ND	50	ND	0.01	ND	0.0025	ND
All other compounds	-	-	-	-	ND	ND	-	ND	-	ND	-	ND	-	ND

Notes

[1] = Source of Solubility values is Schwille, 1988. *Dense Chlorinated Solvents in Porous and Fractured Media Model Experiments*, Lewis Publishers, Chelsea, Michigan 48118 and The Massachusetts Contingency Plan, 1995.
mg/l = milligrams per liter
J = Qualified as estimated during data validation review.
UJ = Qualified as estimated non detected during data validation review.
UCL = Upper Concentration Limits.
ND = Not detected
NP = Not Published
NA = Not analyzed
RDL = Reported Detection Limits.
Bold Numbers = Concentrations above GW-2 Standards

TABLE 6
SUMMARY OF GROUNDWATER ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Parameter	Solubility [1] (mg/l)	GW-2 Standard (mg/l)	Concentration (mg/l)				
			UCL (mg/l)	URS-2 RDL	URS-2 Sep-00	URS-3 RDL	URS-3 Sep-00
Volatile Organic Compound							
1,1-Dichloroethene	400	0.001	100	0.03	**0.056**	0.0015	ND
1,1-Dichloroethane	5,500	9.0	100	0.03	0.078	0.0015	ND
1,1,1-Trichloroethane	720	4.0	100	0.02	1.1	0.001	0.0022
Trichloroethene	1,100	0.3	100	0.02	**0.53**	0.001	0.0022
Methylene Chloride	20,000	50.0	100	0.1	ND	0.005	ND
Trans-1,2-Dichloroethene	600	20.0	100	0.03	ND	0.0015	ND
1,2-Dichloroethane	8,690	0.020	100	0.02	ND	0.001	ND
Tetrachloroethene	200	3.0	50	0.02	0.038	0.001	ND
Trichlorofluoromethane	1,100	100.0	NP	0.1	UJ	0.005	UJ
Toluene	530	6.0	100	0.03	ND	0.0015	ND
Ethylbenzene	150	30.0	100	0.02	ND	0.001	ND
Xylenes	200	6.0	100	0.02	ND	0.001	ND
Acetone	1,000,000	50.0	100	0.2	ND	0.01	ND
Chloroethane	5,700	10	NP	0.4	ND	0.002	ND
cis-1,2-Dichloroethene	3,500	30	100	0.02	0.11	0.001	ND
Vinyl Chloride	2.7	0.002	0.6	0.04	ND	0.002	ND
2-Butanone	270,000	50.0	100	0.2	ND	0.01	ND
All other compounds	-	-	-	0.2	ND	-	ND

Notes

[1] = Source of Solubility values is Schwille, 1988. *Dense Chlorinated Solvents in Porous and Fractured Media Model Experiments*, Lewis Publishers, Chelsea, Michigan 48118 and The Massachusetts Contingency Plan, 1995.
mg/l = milligrams per liter
J = Qualified as estimated during data validation review.
UJ = Qualified as estimated non detected during data validation review
UCL = Upper Concentration Limits.
ND = Not detected
NP = Not Published
NA = Not analyzed
RDL = Reported Detection Limits.
Bold Numbers = Concentrations above GW-2 Standards

SUMMARY OF HYDRAULIC CONDUCTIVITY DATA
JONES ENVIRONMENTAL SERVICES INC.
LOWELL, MASSACHUSETTS

SLUG TEST ANALYSIS

PROJECT: Jones Environmental Services Inc.
Assumes length of well penetration equals aquifer saturated thickness

METHOD: Bouwer & Rice (1976)

EQUATION: $K = [(r2 * \ln(Re/rw))/2Le] * (1/t) * \ln(h0/ht)$ (eq. 1)

$\ln(Re/rw) = 1/[\{1.1/\ln(Lw/rw)\} + \{(C)/(Le/rw)\}]$ (eq 2)

where:
- K = Saturated Hydraulic Conductivity
- r = Well casing radius including allowance for sandpack porosity
- Re = Effective well radius
- rw = Radius of the screened section, including the sandpack thickness
- Le = Length of screened section of well open to the aquifer
- H = Saturated thickness of aquifer
- Lw = Length of aquifer penetrated by tested well
- A = Dimensionless coefficient
- B = Dimensionless coefficient
- C = Dimensionless coefficient
- h0 = Depth to water at time 0
- ht = Depth to water at time t
- t = Time

WELL NUMBER	WELL CASING RADIUS, r (feet)	WELL AND SANDPACK RADIUS, rw (feet)	AQUIFER SATURATED THICKNESS, H (feet)	LENGTH OF SCREEN, Le (feet)	WELL PENETRATION Lw (feet)	Lw/rw	A Coeff.	B Coeff.	C Coeff.	ln(Re/rw)	r2/2Le	h0 (feet)	ht (feet)	t (sec)	ln(h0/ht) / t
URS-1	0.08	0.34	10.17	10.17	10.17	29.91	2.4	0.5	1.9	2.5825	0.0003	1	0.2	354	0.00455
URS-3	0.08	0.34	10.05	10.05	10.05	29.56	2.4	0.5	1.9	2.5700	0.0003	0.2	0.04	609	0.00264
WE-3	0.08	0.34	8.83	8.83	8.83	25.97	2.3	0.6	1.7	2.4802	0.0004	0.2	0.01	66	0.04539

WELL NUMBER	HYDRAULIC CONDUCTIVITY, K (ft/sec)	(ft/day)	(cm/sec)
URS-1	3.69E-06	0.319	1.13E-04
URS-3	2.16E-06	0.19	6.59E-05
WE-3	4.08E-05	3.52	1.24E-03

METHOD: U.S. DEPT. OF THE NAVY METHOD
(NAVAL FACILITIES ENGINEERING COMMAND, 1974; IN CEDEGREN, 1989)

EQUATION $K = \{[r2/2L(t2-t1)]*[\ln(L/r)*\ln(h1/h2)]\}$ (for $L/r > 8$)

where:
- r = Radius of well casing
- L = Length of screen across the aquifer
- h1 = Water level change at time t1
- h2 = Water level change at time t2
- t1 = Time corresponding to h1
- t2 = Time corresponding to h2

WELL NUMBER	WELL CASING RADIUS, r (feet)	LENGTH OF SCREEN ACROSS AQUIFER, L (feet)	r2/2L	L/r	t1 (sec)	t2 (sec)	h1 (ft)	h2 (ft)	HYDRAULIC CONDUCTIVITY, K (ft/sec)	(ft/day)	(cm/sec)
URS-1	0.083	10.17	0.0003	122.5	0	354	1	0.2	7.40E-06	0.6397	2.26E-04
URS-3	0.083	10.05	0.0003	121.1	0	609	0.2	0.04	4.34E-06	0.3754	1.32E-04
WE-3	0.083	8.83	0.0004	106.4	0	66	0.2	0.01	8.26E-05	7.1397	2.52E-03

TABLE 8
SUMMARY OF SURFACE WATER ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Parameter	Fresh Water Acute [1] (ug/l)	Fresh Water Chronic [1] (ug/l)	Concentration (ug/l)		
			RDL (ug/l)	SW-1 [2] Sep-00	SW-2 [2] Sep-00
Volatile Organic Compound					
1,1-Dichloroethene	NP	NP	1.5	ND	ND
1,1-Dichloroethane	NP	NP	1.5	2.7	ND
1,1,1-Trichloroethane	NP	NP	1.0	4.7	ND
Trichloroethene	45,000	21,900	1.0	4.4	5.4
Methylene Chloride	NP	NP	5.0	ND	ND
Trans-1,2-Dichloroethene	NP	NP	1.5	ND	ND
1,2-Dichloroethane	118,000	20,000	1.0	ND	ND
Tetrachloroethene	5,280	840.0	1.0	1.2	1.4
Trichlorofluoromethane	NP	NP	5.0	UJ	U
Toluene	17,500	NP	1.5	ND	ND
Ethylbenzene	32,000	NP	1.0	ND	ND
Xylenes	NP	NP	1.0	ND	ND
Acetone	NP	NP	10.0	ND	ND
Chloroethane	NP	NP	2.0	ND	ND
cis-1,2-Dichloroethene	NP	NP	1.0	4	2.5
Vinyl Chloride	NP	NP	2.0	ND	ND
2-Butanone	NP	NP	10.0	ND	ND
All other compounds	-	-	-	ND	ND

Notes

[1] = Source of toxicity values is referenced from the MCP 310 CMR Environmental Toxicity Values Table for Fresh Water Acute and Chronic values.

[2] = SW-1 collected down stream of Jones Facility, while SW-2 was collected up stream of the Jones Facility.

ug/l = micrograms per liter
UJ = Qualified as estimated non detected during data validation review.
ND = Not detected
NP = Not Published
NA = Not analyzed
RDL = Reported Detection Limits.

TABLE 9
SUMMARY OF AIR ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

Compound	Detection Limit (ppbv)	Detection Limit (ug/m^3)	SE Corner Oct-00 (ppbv)	SE Corner Oct-00 (ug/m^3)	NW Corner Oct-00 (ppbv)	NW Corner Oct-00 (ug/m^3)	SE Corner Mar-01 (ppbv)	SE Corner Mar-01 (ug/m^3)	NW Corner Mar-01 (ppbv)	NW Corner Mar-01 (ug/m^3)	Outside Yard Mar-01 (ug/m^3)	Outside Yard Mar-01 (ug/m^3)
1,1,1-Trichloroethane	0.88	4.8	28	150	24	140	9.1	51	6.9	38	ND	ND
1,1-Dichloroethane	0.88	3.6	1.7	7.2	1.5	6.3	ND	ND	ND	ND	ND	ND
2-Butanone	3.5	10	5.7	17	7.3	22	ND	ND	ND	ND	ND	ND
Acetone	3.5	8.4	29	71	29	71	13	31	11	26	4.1	10
Benzene	0.88	2.8	2.4	8	2.3	7.4	ND	ND	ND	ND	ND	ND
Ethyl Benzene	0.88	3.9	1.8	7.7	1.8	8.1	ND	ND	ND	ND	ND	ND
Freon	0.78	4.4	ND	ND	ND	ND	ND	ND	ND	ND	0.99	5.7
Methylene chloride	0.88	3.1	5.8	20	5.3	19	ND	ND	ND	ND	ND	ND
m,p-Xylenes	0.88	3.9	6.2	27	6.1	27	1.5	6.6	1.7	7.5	ND	ND
o-Xylene	0.88	3.9	2.2 J	9.8 J	1.8 J	8.1 J	ND	ND	ND	ND	ND	ND
Styrene	0.88	3.8	1.2 J	5.2 J	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	0.88	6	2.5	17	2.2	16	ND	ND	ND	ND	ND	ND
Toluene	0.88	3.4	11	41	10	39	2	7.8	1.9	7.2	ND	ND
Trichloroethene	0.88	4.8	22	120	20	110	4.8	26	3.6	20	ND	ND
All other compounds	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
ppbv = parts per billion volume
uG/m^3= micrograms per cubic meter
ND = Not Detected
J = Qualified as estimated during data validation review

APPENDIX D

METHOD 3 RISK CHARACTERIZATION

METHOD 3 RISK ASSESSMENT
JONES ENVIRONMENTAL SERVICES, INC.
263 HOWARD STREET
LOWELL, MASSACHUSETTS

Prepared for:

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June 21, 2001

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METHOD 3
RISK ASSESSMENT
JONES ENVIRONMENTAL SERVICES, INC.
263 HOWARD STREET
LOWELL, MASSACHUSETTS

1.0 INTRODUCTION

1.1 OBJECTIVE

On behalf of Dames & Moore/URS, a human health risk assessment for the Jones Environmental Services, Inc. facility located at 263 Howard Street in Lowell, Massachusetts was performed in accordance with the Massachusetts Contingency Plan (MCP), 310 CMR 40.0900, which calls for a risk assessment to be completed for all disposal sites for which response actions are required unless response actions have successfully reduced concentrations of chemicals in environmental media to background levels. The purpose of this study was to evaluate whether chemicals found in ground water, soil, indoor air, and surface water during the Phase II Comprehensive Site Assessment pose a significant risk of harm to human health, public welfare or the environment, as defined in the MCP.

1.2 METHODS

This risk characterization was performed in accordance with 310 CMR 40.0900 and in general accordance with the Massachusetts Department of Environmental Protection (MADEP) *Guidance for Disposal Site Risk Characterization — In Support of the Massachusetts Contingency Plan* (MADEP, 1995), *Background Documentation for the Development of the MCP Numerical Standards* (MADEP, 1994) and relevant guidance documents from the U.S. Environmental Protection Agency (USEPA).

Risk was characterized for this site using MADEP Method 3, which applies to sites at which chemicals are present in or will foreseeably migrate to an environmental medium in addition to ground water and soil. This assessment of risk includes a description of the chemicals detected at the Site, their physical and chemical properties, their toxicological characteristics, and an evaluation of the potential human health and environmental risks associated with the presence of these chemicals at the Site.

The report is organized as follows:

- Hazard identification;
- Dose-response information;
- Exposure assessment;
- Risk characterization;
- Uncertainties; and
- Stage I Environmental Assessment.

All tables appear at the end of the text. Concentrations in ground water and surface water are reported in micrograms per liter (µg/l), which is equivalent to parts per billion (ppb) or in milligrams per liter, which is equivalent to parts per million (ppm) and concentrations in soil are reported in milligrams per kilogram (mg/kg), which is equivalent to ppm. Concentrations in air are reported in micrograms per cubic meter (µg/m^3) or in parts per billion volume per volume (ppb v/v). Conversion between the two units uses both the Ideal Gas Law and Dalton's Law of Partial Pressure.

2.0 HAZARD IDENTIFICATION

The hazard identification process includes a review of the existing analytical database for each medium, tabulation of data with regard to detected chemicals, and selection of chemicals of potential concern that were considered further in the risk assessment.

2.1 SITE DEFINITION

The Jones Environmental Services, Inc. property, referred to herein as the Site, is about 30,000 square feet in size and is located at 263 Howard Street in Lowell, Massachusetts, within an area of heavy industrial use. The Site is bordered to the north-east by Howard Street, to the south-east by Tanner Street, and to the north-west by River Meadow Brook. Ground water flows north across the Site toward River Meadow Brook. The Lowell Connector is located west of the brook. A sheet metal shop borders the site to the south-west. Across Howard and Tanner Streets, the Site is bordered to the north-east by a machining and welding shop, to the east by a power plant and to the south-east by a boiler works and machine shop. The Silresim Chemical Corporation Superfund Site is located hydraulically up gradient of the Site approximately 0.1 miles south of the Site. The Site and surrounding area have a long history of industrial development. The Site has been used to treat and temporarily store hazardous material since 1976.

Approximately half of the property is covered by a building, part of which is used as an office/laboratory space and part of which is used as a drum storage area. Most of the outside space to the south is paved with asphalt. A small area on the north-west side of the building is not paved. The property is surrounded by a chain-linked fence.

The Site for this assessment is defined as the Jones Environmental Services, Inc. property and the River Meadows Brook where chemicals have come to be located (see Figure 2, Phase II report, Dames & Moore/URS, 2001).

2.2 REVIEW OF THE ANALYTICAL DATABASE

The following guidelines were used to evaluate ground water, soil, indoor air, and surface water analytical data and to develop a list of chemicals of potential concern. Chemicals reported by the laboratory as estimated concentrations (*i.e.*, flagged with a "J") were considered to be representative of actual concentrations. A concentration of one-half of the detection limit was used to represent the possible presence of a chemical in samples in which the chemical was reported as not detected, unless it had not been positively detected in any samples in that particular medium (MADEP, 1995). Samples reported as non-detect were excluded if one-half the detection limit was greater than the maximum detected value in that medium.

2.2.1 Ground water

Several environmental investigations have been conducted since 1984. Three overburden monitoring wells were installed (GZA-1, GZA-2 and GZA-3) and sampled for volatile organic compounds (VOCs) in December 1984 and July 1985. In July 1985, five additional wells were installed (GZA-4, GZA-5, WE-1, WE-2, and WE-3) and were also sampled for VOCs. Two additional monitoring wells (MW-4 and MW-5) were installed in 1987. Monitoring wells GZA-5, WE-1, WE-2, WE-3, MW-4, and MW-5 were sampled and analyzed for VOCs in 1987. Monitoring wells WE-2 and WE-3 were also sampled and analyzed for VOCs and total metals in March 1994. The results of these historical sampling events are presented in Table 2 of the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001). In general, the results show that VOCs are present in monitoring wells located on the edge of the property up gradient of the potential source areas on the Site. The results also show that the highest concentrations were detected in monitoring well MW-4, which is located in the south-east corner of the building in the vicinity of the former catchbasin/sump (also referred to as AOC #3). VOCs

were also detected in the monitoring wells down gradient of monitoring well MW-4 (GZA-4, GZA-5 and WE-3). The highest concentrations detected down gradient of the catchbasin/sump were detected in monitoring well GZA-4. In 1986, the catchbasin/sump was cleaned. In 1987, additional material was removed from this catchbasin/sump and the sump was closed. Figure 3 in the *MCP Phase II Comprehensive Site Assessment Report* shows the locations of monitoring wells GZA-1 through GZA-5 and WE-1 through WE-3 (Dames & Moore/URS, 2001). Figure 2 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001) shows the locations of monitoring wells MW-4 and MW-5.

In September 2000, Dames & Moore/URS installed three additional monitoring wells (URS-1, URS-2 and URS-3) to replace GZA-3, WE-1 and WE-2, which had been destroyed. Figure 2 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001) shows the locations of the monitoring wells. Monitoring wells GZA-4, WE-3, MW-4, MW-5, URS-1, URS-2, and URS-3 were sampled and analyzed for VOCs by USEPA Method 8260B. The results of this sampling event were considered to represent current ground water conditions. Table 1 summarizes the chemicals detected including frequencies of detection, maximum concentrations, and average concentrations. The results are presented for monitoring wells located up gradient of the former catchbasin/sump (*i.e.*, AOC #3), monitoring well MW-4, which is adjacent to the former catchbasin/sump, and down gradient of the former catchbasin/sump area. The up gradient wells were considered to be monitoring wells located south-west (MW-5), south (URS-1) and south-east (URS-2 and URS-3) of AOC #3.[1] The highest concentrations were detected in monitoring well URS-2, which is located in close proximity to MW-4. The down gradient wells were considered to be GZA-4 and WE-3. Table 2 compares the concentrations of VOCs detected in monitoring well MW-4 and the two down gradient monitoring wells (GZA-4 and WE-3) in the previous sampling events with the concentrations detected in the current sampling event. The

1 Note that the highest concentrations detected in the up gradient monitoring wells were detected in monitoring well URS-2, which is located in close proximity to MW-4. Although URS-2 is hydraulically up gradient of MW-4, the concentrations detected in URS-2 are probably due to impacts from AOC #3. Nevertheless, because the concentrations detected in MW-4 were significantly higher than URS-2, monitoring well URS-2 was considered to be up gradient rather than part of the potential source area.

results suggest that although the concentrations down gradient are improving, the concentrations of 1,1-dichloroethane and trichloroethene and toluene appear to be increasing in the source area.

2.2.2 Soil

In July 1985, Wehran Engineering collected three soil samples from inside the drum storage building. Sample locations are shown in Figure 3 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001). The samples were collected from 1.5 to two feet below the surface and were analyzed for VOCs. Low concentrations of 1,1,1-trichloroethane (<1.0 mg/kg) were detected in two of the samples. Trace concentrations of several other VOCs were also detected. Table 1 in the *MCP Phase II Comprehensive Site Assessment Report* presents a summary of the analytical data (Dames & Moore/URS, 2001). A composite sample was also collected from inside the building and analyzed for polychlorinated biphenyl compounds, pesticides and EP-toxicity metals. Pesticides and polychlorinated biphenyl compounds were not detected and EP-toxicity metals did not exceed regulatory criteria.

In November 1994, six additional soil samples were collected 0.5 to one foot below the surface from inside the building. Seven additional soil samples were collected approximately 0.5 feet below the surface from areas outside the south-west side of the building. Sample locations are shown in Figure 3 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001). The samples were analyzed for VOCs. Low concentrations of trichloroethene (0.057 mg/kg to 0.38 mg/kg) and tetrachloroethene (0.007 mg/kg to 0.045 mg/kg) were detected in some of the samples beneath the building. VOCs were not detected in samples collected from outside the building except for low concentrations of trichloroethene (0.034 mg/kg) that were detected in one sample. Table 1 in the *MCP Phase II Comprehensive Site Assessment Report* presents a summary of the analytical data (Dames & Moore/URS, 2001).

In August 2000, Dames & Moore/URS collected three soil samples on the north side of the building using a hand auger where two releases reportedly occurred (see Figure 3 in the *MCP Phase II Comprehensive Site Assessment Report*, Dames & Moore/URS, 2001). The soil samples

were screened with a photoionization detector. The sample with the highest headspace results, which was collected one foot below the ground surface, was sent for laboratory analysis of VOCs by USEPA Method 8260 and polychlorinated biphenyl compounds by USEPA Method 8082. Several VOCs were detected; 1,1,1-trichloroethane, trichloroethene and tetrachloroethene were detected in the highest concentrations. Table 3 presents the results of this sampling location. Table 3 also shows MADEP leaching-based soil concentrations for GW-2 and GW-3 areas. The soil concentrations are less than the leaching-based concentrations for both GW-2 and GW-3 areas with the exception of the concentrations of 1,1-dichloroethene (0.345 mg/kg) and trichloroethene (45 mg/kg) for GW-2 areas. Because impacts to soil are located in surface soil north of the site building and ground water in this area is flowing away from the building in this area, 1,1-dichloroethene and trichloroethene concentrations in soil are unlikely to result in ground water concentrations that could pose a significant risk to receptors.

2.2.3 Surface Water

Surface water samples have been collected from River Meadows Brook up stream and down stream of the Site in 1984, 1985 and 1987. Results of these sampling events are shown in Table 3 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore, 2001). In general, VOCs have been detected in both the up stream and down stream locations. The concentrations detected in the down stream location decreased in 1987 compared to previous sampling events, which may be due to cleaning and closure of the catchbasin/sump in 1985 and 1987.

In September 2000, Dames & Moore/URS collected up stream (SW-2) and down stream (SW-1) surface water samples from the brook. Sample locations are shown in Figure 6 in the *MCP Phase II Comprehensive Site Assessment Report* (Dames & Moore/URS, 2001). The samples were analyzed for VOCs by USEPA Method 8260. Low concentrations of several VOCs were detected in both locations. The results are shown in Table 4.

2.2.4 Indoor Air

In October 2000, two indoor air samples were collected from the office/laboratory space. The samples were analyzed for VOCs by USEPA Method TO-14. Thirteen VOCs were detected some of which were probably due to normal operations of the facility or to up gradient sources. Nevertheless, in February 2001, a ventilation system was installed in the crawl space below the building to generate a negative air pressure to minimise vapors entering the building (Dames & Moore/URS, 2001). In March 2001, two additional indoor air samples were collected from the office/laboratory space and analyzed for VOCs by USEPA Method TO-14. The results of the two sampling events are shown in Table 5.

2.3 PHYSICAL AND CHEMICAL PROPERTIES OF CHEMICALS OF CONCERN

Solubility is the upper limit of the dissolved concentration of a chemical in water at a specific temperature. Aqueous concentrations in excess of solubility may indicate sorption onto sediments or the presence of a non-aqueous phase liquid. Chemicals with high water solubilities tend to remain dissolved in the water column and do not sorb strongly to soil or sediment or bioconcentrate in the food chain. They are also less likely to volatilize into ambient air and more likely to biodegrade (Howard, 1993). VOCs are more soluble than semi-volatile compounds; thus, VOCs are more likely to be dissolved in ground water and migrate with ground water than the other types of compounds.

Volatilization of a pure chemical is dependent on the vapor pressure of the chemical. The higher the vapor pressure, the more likely a chemical is to exist in a gaseous state. VOCs are generally more volatile than other groups of chemicals such as polycyclic aromatic hydrocarbons, phenolic compounds, polychlorinated biphenyl compounds, phthalates, and metals. Volatilization of a compound from water is dependent on both the vapor pressure and water solubility of the chemical. These properties can be related by dividing the vapor pressure (in atmospheres) by the water solubility (in moles/m^3) to yield an air/water partition coefficient referred to as Henry's Law

Constant. The Henry's Law Constant relates the chemical concentration in the gas phase to its concentration in the water phase and typically indicates how likely a chemical will be to volatilize from water. Chemicals with Henry's Law Constants less than 10^{-7} atm-m^3/mole will volatilize less than water, and as water evaporates the concentration of the chemical will increase. Chemicals with Henry's Law Constants around 10^{-3} atm-m^3/mole will volatilize rapidly. Henry's Law Constants for VOCs indicate that volatilization from ground water or soil into pore spaces in soil is a likely transport mechanism. Thus, migration of VOCs into indoor air is a pathway of potential concern.

The affinity a chemical has for soil is expressed by a contaminant distribution coefficient (k_d), which is defined as the ratio of the concentration of a chemical sorbed to soil to its concentration in water. The higher the k_d, the more likely the chemical is to bind to soil or sediment than to remain in water. Because chemicals readily adsorb to organic matter in soils, to adjust for the fraction of organic carbon, the k_d can be divided by the fraction of organic matter in the soil, which yields the organic carbon partitioning coefficient (k_{oc}). The higher the k_{oc}, the more likely the chemical is to bind to soil or sediment than to remain in water. In general, VOCs do not sorb to soil or sediment strongly.

Log octanol/water partition coefficient (k_{ow}) provides a measure of the degree of chemical partitioning between water and octanol. Generally, the higher the log of k_{ow}, the more likely the chemical is to bind to lipids than to remain in water. Experimental evidence using aquatic species suggests that k_{ow}s correlate well with bioconcentration factors (BCF). BCFs calculated based on k_{ow}s, however, often overestimate true BCFs because the equations assume that metabolism of the chemical does not occur. VOCs generally do not bioconcentrate in organisms or biomagnify in the food chain.

2.4 SOURCE AND ESTIMATED EXTENT OF IMPACT

The source and extent of contamination at the Site is discussed in detail in the Phase II report (Dames & Moore/URS, 2001). Briefly, however, the primary sources of impact at the Site

appear to be the former catchbasin/sump (*i.e.*, AOC #3) and possibly the two reported surface spills near the north side of the building (*i.e.*, near soil sample SS-1). Soil sample results suggest that impacted soil is likely to be limited to the surface primarily in these areas. Following release to the subsurface environment, a fraction of the chemicals presumably migrated downward through the soil, with some portion of the chemicals adsorbed onto soil particles and trapped within soil pores during this downward migration. A fraction of these chemicals most likely dissolved into the ground water. Impacts to ground water appear to be predominantly limited to the area in the vicinity of monitoring well MW-4. Significantly lower concentrations were also detected approximately 100 feet down gradient on the north side of the building (*i.e.*, GZA-4 and WE-3). Low concentrations of several VOCs were also detected in River Meadows Brook.

3.0 DOSE-RESPONSE ASSESSMENT

The dose-response assessment presents data relating potential doses received from exposure to chemicals to potential health effects (response). Information is provided in this section relative to the dose-response relationships for the chemicals of concern, based on available laboratory animal studies and human epidemiology as reported in the USEPA's Integrated Risk Information System (IRIS) database, USEPA's Health Effects Assessment Summary Tables (1992), USEPA's Health Risk Technical Support Center, and the Background Documentation for the Development of the MCP Numerical Standards (MADEP, 1994).

3.1 ASSESSMENT OF NONCARCINOGENIC HEALTH EFFECTS

In accordance with MADEP guidance, chronic oral Reference Doses (RfD) or chronic Reference Concentrations (RfC) were used to evaluate noncarcinogenic effects. An RfD is a health-based criterion used to evaluate noncarcinogenic effects from exposures involving ingestion or dermal contact. Likewise, subchronic RfDs have been developed to estimate noncarcinogenic health effects from subchronic exposures. The MADEP defines a subchronic exposure as an exposure between several days and seven years (MADEP, 1995). An RfC is a health-based criterion used to evaluate noncarcinogenic effects from inhalation exposures. Chronic RfDs and RfCs are estimates of daily exposure doses or concentrations for the human population (including sensitive sub-populations) that are likely to be without an appreciable risk of deleterious effects during a lifetime of exposure (USEPA, 1989a). RfDs and RfCs are presented in Table 6.

3.2 ASSESSMENT OF CARCINOGENIC HEALTH EFFECTS

Carcinogens are considered by MADEP policy to lack a threshold of no adverse effects; this policy implies that any exposure carries some risk. Cancer potency factors, referred to as slope factors (SFs), have been derived to estimate risks resulting from oral and dermal exposures based upon this assumption. A SF is equal to the slope of the dose-response curve and, when multiplied by the dose, provides an estimate of the upper 95 percent confidence interval of the incremental lifetime cancer risk, or probability of cancer occurring above normal background rates. Similarly, inhalation Unit Risks have been developed based on cancer slope factors or derived from inhalation studies to evaluate cancer risks resulting from inhalation exposures. SFs and inhalation Unit Risks for the chemicals of concern are presented in Table 6.

Carcinogens are classified by USEPA using a weight-of-evidence classification system to indicate the degree of confidence between chemical exposure and the likelihood of causing human cancer. Classifications are based primarily on the degree of evidence for cancer to occur based on human and animal studies. USEPA weight-of-evidence categories are: A, known human carcinogen; B1 or B2, probable human carcinogen (B1 indicates that limited human data are available; B2 indicates sufficient data in laboratory animals and inadequate or lack of evidence in humans); C, possible human carcinogen based on limited laboratory animal evidence and inadequate or lack of human data; D, not classifiable based on inadequate or no evidence; and E, no evidence of carcinogenicity to humans.

3.3 TOXICOLOGICAL PROFILES

General information and brief toxicological summaries for the chemicals of concern to human health at the Site are presented below. Where available, information has been derived from the IRIS database, from USEPA Health Effects Assessment Summary Tables (USEPA, 1992), from the MADEP, and from the Agency of Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles.

3.3.1 Benzene

In the past, benzene was widely used as a solvent (ATSDR, 1995). Currently, although much less is used as a solvent, it is still used in paints, rubber cements, adhesives, paint removers, and rubber goods. The majority of benzene is used in the manufacture of other chemicals. Benzene is also present in gasoline and fuel oils.

Benzene is volatile and lipid-soluble and can be absorbed into the body following ingestion, inhalation, and dermal contact. Although evidence is not available for the oral absorption of benzene in humans, the animal data suggest that benzene would be absorbed with high efficiency. Laboratory animal evidence indicates that about 90 percent is absorbed following ingestion. In humans, about 50 percent is absorbed via the lungs. The rate of absorption through skin is much less than that for inhalation; evidence suggests that less than one percent is absorbed. Following absorption, benzene is widely distributed to all tissues. Over half of the absorbed dose is distributed into bone marrow, adipose tissue, and liver. The majority of benzene is metabolized in the liver. Some of the metabolites are reactive metabolites, which are believed to be responsible for most of benzene-induced toxicity. Benzene is also metabolized in the bone marrow, the target organ of benzene-toxicity. Metabolites of benzene are excreted in urine and unchanged benzene is excreted in exhaled air.

The most significant health effects of benzene are hematotoxicity, immunotoxicity and neurotoxicity. Humans have developed bone marrow toxicity following chronic occupational exposure to benzene at concentrations estimated at 150 to 650 ppm. Aplastic anemia that may result from exposure to benzene is also associated with non-lymphocytic leukemia. Laboratory animal evidence also suggests that chronic ingestion of benzene may also cause bone marrow toxicity. Data are not available regarding hematotoxicity following dermal contact. Hematotoxicity is not a significant concern following acute exposures. Alterations in immune function including autoimmunity and allergy have also been observed in benzene-exposed workers following chronic inhalation.

Drowsiness, dizziness, headache, vertigo and loss of consciousness may occur in humans following acute inhalation of high concentrations of benzene. Central nervous system dysfunction has also been reported in workers exposed chronically to low concentrations. Benzene is also irritating to skin and eyes. Benzene has not been shown to cause adverse developmental effects in humans. It has, however, been reported to cause some fetotoxicity such as decreased birth weight in laboratory animals at concentrations that also cause maternal toxicity. Benzene has not been found to be teratogenic. Benzene also has not been found to cause reproductive effects in humans or laboratory animals. An oral RfD has not been established by USEPA; however, MADEP has established an oral RfD equal to 5.0×10^{-3} mg/kg/day and an inhalation RfC equal to 9.0 $\mu g/m^3$.

Sufficient data exists to conclude that benzene is genotoxic. Structural and numerical chromosome aberrations have been found in workers exposed occupationally to benzene. Sufficient evidence also exists that benzene is carcinogenic in humans. Acute myeloid leukemia has been shown to occur in workers with excess benzene exposure. USEPA has classified benzene as a human carcinogen, Group A. Although dose-response data is controversial, USEPA has established an oral carcinogenic potency factor equal to 2.9×10^{-2} $(mg/kg/day)^{-1}$ and an inhalation unit risk equal to 8.3×10^{-6} $(\mu g/m^3)^{-1}$.

3.3.2 Ethylbenzene

Ethylbenzene is used primarily to produce styrene and is used to produce a number of other solvents (ATSDR, 1990). It is also used as a solvent and is a constituent of fuels and asphalt.

Ethylbenzene is rapidly absorbed by inhalation. Up to about 64 percent is absorbed by this route. Human data are unavailable regarding the absorption of ethylbenzene following ingestion, but animal studies indicate that it is also quickly absorbed by ingestion. These experiments indicate that approximately 72 percent to 92 percent is absorbed by ingestion. Skin absorption may be a significant route of uptake of ethylbenzene. Studies in humans indicate that ethylbenzene is absorbed well through the skin. Approximately 40 percent to 50 percent was absorbed through

skin in one study. In humans, about 2 percent of the total amount absorbed following inhalation was distributed to fat. Other studies concerning the distribution of ethylbenzene in humans following inhalation or ingestion are not available. Laboratory animal experiments indicate that ethylbenzene is distributed throughout the body. Metabolism of ethylbenzene is rapid and occurs predominantly in the liver. Quantitative and qualitative differences in the metabolism of ethylbenzene occur between humans and laboratory animals. Ethylbenzene is rapidly excreted primarily as urinary metabolites following inhalation or ingestion.

The primary effect in humans caused by inhalation of ethylbenzene is central nervous system toxicity caused by inhalation of high concentrations. Acute inhalation of high concentrations causes dizziness, ataxia and narcosis. Inhalation of ethylbenzene causes irritation of the respiratory tract in humans and laboratory animals. High concentrations have been shown to cause severe respiratory effects. Hepatic effects have not been reported in humans, but animal studies have demonstrated mild effects on the liver most likely related to adaptive effects rather than toxic effects. Likewise, laboratory animal studies have indicated that inhalation or ingestion of ethylbenzene may cause kidney effects, although these effects have not been observed in humans. In humans, developmental effects have not been reported. In laboratory animals, developmental effects occur only after inhalation of concentrations sufficient to produce maternal toxicity. USEPA has established an oral RfD equal to 1×10^{-1} mg/kg/day and an inhalation RfC equal to 1.0 mg/m^3.

Ethylbenzene is not mutagenic. Ethylbenzene is not associated with an increase in cancer incidence in humans. USEPA has classified ethylbenzene as a Group D carcinogen indicating that there is not evidence that ethylbenzene causes cancer in humans and there is inadequate evidence to suggest that ethylbenzene causes cancer in laboratory animals.

3.3.3 Toluene

The major use of toluene is as a component of gasoline to improve octane ratings (ATSDR, 1994). It is also used in paints, inks, adhesives, cleaning agents, and for chemical extraction. It is used in urethane foams, pharmaceuticals, dyes, and cosmetic nail products.

Epidemiological and laboratory animal data indicate that toluene is rapidly absorbed via inhalation. Although human data are unavailable, laboratory animal data indicate that uptake via ingestion is less rapid. Toluene is also absorbed slowly through human skin. Following inhalation, toluene is distributed to lipoid (brain and fat) and highly vascularized (liver and kidney) tissues. Studies are unavailable concerning distribution following ingestion or dermal exposure. Metabolism of toluene in humans and rats is similar. Metabolism is predominantly via the mixed function oxidase system and other liver enzymes to form the major urinary metabolite, hippuric acid (about 60 to 75 percent). Excretion generally occurs within 12 hours of exposure.

The major effect following exposure to toluene is central nervous system depression. At low concentrations, toluene does not appear to have other systemic effects. At higher concentrations (*e.g.*, chronic exposure to 200 to 800 ppm), irritation of the respiratory tract is possible. The liver and kidneys do not appear to be target organs. The evidence is inconclusive concerning the developmental effects of toluene in humans; however, studies in laboratory animals suggest that inhalation of toluene may be a developmental toxin. USEPA has established an oral RfD equal to 2.0×10^{-1} mg/kg/day based on changes in liver and kidney weights (1994) and an inhalation RfC equal to 4.0×10^{2} $\mu g/m^3$ based on neurological effects (1992).

Evidence generally indicates that toluene is not mutagenic. There is no evidence in humans that toluene is carcinogenic; moreover, laboratory animal bioassays are all negative. USEPA classifies toluene as a Group D carcinogen because human data are unavailable and laboratory animal data are inadequate.

3.3.4 Xylenes

Xylenes are produced as a mixture of three xylene isomers: ortho, meta and para xylene. (ATSDR, 1995). Xylene mixtures are used as industrial solvents and as intermediates in the production of other synthetic products such as polyesters, plasticizers, pharmaceuticals, and insecticides. Xylene isomers are also present in gasoline and fuel oils.

Epidemiological studies indicate that about 50 to 75 percent of inhaled xylene isomers are absorbed. Limited data in humans are available regarding the absorption of xylenes following ingestion. Laboratory animal data suggest, however, that about 87 to 92 percent is absorbed orally. In humans, only about 0.1 to 2 percent of the amount absorbed by inhalation is absorbed following dermal exposure. Most of the absorbed dose is initially associated with serum proteins and is eventually distributed to lipid-rich tissues including the brain, blood, and fat. Uptake also occurs in the liver and kidney. Xylenes are metabolized predominantly by mixed function oxidase enzymes in the liver. Qualitatively, metabolism is similar in humans and laboratory animals. In humans, about 95 percent of absorbed xylenes are metabolized and excreted as urinary metabolites and the remainder is exhaled unchanged.

Occupational studies suggest that acute and chronic inhalation of xylenes may be associated with neurological effects including headache, nausea, dizziness, fatigue, incoordination, confusion, sensitivity to noise, and tremors. Acute exposure to high concentrations of xylenes causes narcosis and anesthesia. Following inhalation, respiratory effects have been observed in humans and laboratory animals. These effects include shortness of breath and irritation of the nose and throat. Nose and throat irritation has been reported at concentrations equal to 20 ppm. Chronic occupational exposure via inhalation has been associated with labored breathing and impaired pulmonary function. Exposure to vapors produces eye irritation. Dermal exposure results in skin irritation. In humans, hepatic effects have not been attributed to xylenes, but laboratory animal experiments indicate that inhalation of high concentrations or ingestion of large doses produces mild hepatic effects, which can be characterized more as adaptive effects rather than toxic effects. Although ingestion of large doses and inhalation of high concentrations have produced mild

kidney damage in laboratory animals, these effects have not been observed in humans. Xylenes have not been shown to produce developmental effects in humans. Laboratory animal evidence also does not indicate that exposure to xylenes causes developmental effects, except when the dose is sufficient to produce maternal toxicity. USEPA has established an oral reference dose equal to 2.0 mg/kg/day (IRIS, 1987). An inhalation RfC is pending in IRIS; MADEP (1994) includes an inhalation RfC equal to 3.0×10^{-1} mg/m^3.

Xylenes have not been shown to be mutagenic. Xylenes have not been shown to be carcinogenic in either humans or laboratory animals. USEPA has classified xylenes as a Group D agent.

3.3.5 Naphthalene and 2-methyl naphthalene

The largest releases of naphthalene into the air result from the combustion of fossil fuels and the use of naphthalene-containing mothballs (ATSDR, 1995). The coal tar industry is the major source of small amounts of naphthalene that are discharged to land. The principal end use for naphthalene was in the production of phthalic anhydride; o-xylene is now the preferred raw material. Other uses include carbamate insecticides, surface-active agents and resins, synthetic tanning agents, moth repellent, and miscellaneous organic chemicals. 2-methyl naphthalene is used in the synthesis of organic chemicals such as insecticides.

Humans can absorb naphthalene by inhalation, ingestion and dermal contact, but the extent of absorption is unknown. Information is not available regarding the absorption of 2-methyl naphthalene. Some laboratory animal studies suggest that most of the absorbed dose of naphthalene is distributed to adipose tissue followed by the kidneys, then the liver and lungs. Other reports suggest that the highest concentration is in the lungs, followed by the liver and heart while little was reported in fat. Fewer reports are available for 2-methyl naphthalene. The data suggest, however, that 2-methyl naphthalene is primarily distributed to the liver. The key metabolites of naphthalenes are the naphthoquinones, which have been shown to cause hemolysis,

and glutathione adducts, which may be involved in pulmonary toxicity, although the lung does not appear to be a target organ. 2-Methyl naphthalene is metabolized both by ring oxidation and oxidation of the methyl group. Excretion of metabolites is predominantly via urine.

The greatest concern regarding exposure to naphthalene is hemolytic anemia. Infants are particularly sensitive to this effect. Secondary to hemolytic anemia, liver and kidney toxicity is often observed following oral, dermal or inhalation exposures. 2-Methyl naphthalene does not appear to cause similar hematological effects. There are also some reports following occupational exposures of lens opacities (*i.e.*, cataracts), but it is still unclear whether these effects are due to naphthalene or to impurities. Naphthalene exposure causes inflammation of the nose and lungs and metaplasia of the nasal cavity in laboratory animals, but these effects have not been reported in humans. Exposure of pregnant humans to high levels of naphthalene may result in developmental effects, however only a limited number of studies have been performed. In these studies, developmental effects have not been observed in laboratory animals. Likewise, data are inconclusive regarding reproductive effects. There is not enough information to assess the relevance of exposure to 2-methyl naphthalene to public health. USEPA established an oral RfD for naphthalene equal to 2.0×10^{-2} mg/kg/day and an inhalation RfC equal to 3.0 $\mu g/m^3$. Based on structure-activity relationships, it was assumed that the oral RfD and inhalation RfC for 2-methyl naphthalene equal to the RfD and RfC of naphthalene.

Data do not indicate that naphthalene or 2-methyl naphthalene are genotoxic or carcinogenic.

3.3.6 Alkyl benzenes

Alkyl benzenes such as tert-butyl benzene and 1,2,4-trimethyl benzene are present in petroleum and coal tar (HSDB; ACGIH, 1991; USEPA, 1997b). These compounds also can be purified and used as solvents, paints and enamels, in textile dyeing and printing, and as intermediates in the synthesis of various other compounds.

Information regarding the toxicity of trimethyl benzenes was gleaned from the Hazardous Substance Database, which is maintained by the National Library of Medicine and the American Conference of Governmental Industrial Hygienists publication entitled Documentation of the Threshold Limit Values and Biological Exposure Indices (1991). Information regarding isopropyl benzene was obtained from USEPA's *Toxicological Review In Support of Summary Information on the Integrated Risk Information System* (IRIS). Because of structural similarities and solvent-like properties, however, the effects of different alkyl benzenes (*e.g.*, toluene, xylenes, 1,2,4-trimethyl benzene, and n-propyl benzene, *etc.*) are likely to be similar to one another.

Isopropyl benzene is absorbed readily via inhalation. Information is not available regarding absorption following ingestion in humans; however, like most solvents it is probably absorbed fairly well. Laboratory animal studies support this assumption. Isopropyl benzene is metabolized efficiently and is excreted primarily via urine. The pharmacokinetic properties of isopropyl benzene are similar to other solvents; thus, it is likely that the other alkyl benzenes are also similar.

All of the alkyl benzenes are irritating to mucous membranes, eyes, nose, throat, and skin following inhalation of high concentrations or dermal contact with concentrated solutions. Like most solvents, ingestion or inhalation causes transient-reversible central nervous system depression. Symptoms include headache, anorexia, muscular weakness, incoordination, nausea, vertigo, mental confusion, and eventually unconsciousness. Acute exposure to high doses via ingestion or inhalation causes symptoms resembling those of general anesthesia. 1,2,4-Trimethylbenzene has been reported to cause asthmatic bronchitis and blood dyscrasias following exposure to high vapor concentrations. Several subchronic studies with isopropyl benzene have been performed in laboratory animals. High concentrations of vapors have resulted in increased kidney, adrenal gland and liver weights. These effects are reversible and are likely to represent an adaptive response rather than a pathological effect with the possible exception of the increase in kidney weights. In male rats, the evidence suggests that this effect is probably attributable to an α-2 microglobulin mechanism (*i.e.*, male rat-specific nephropathy). One study showed some hematological effects, but the alterations were considered to be of minor toxicological significance. Studies in rats and rabbits have not demonstrated reproductive and developmental effects following either ingestion or inhalation of isopropyl benzene. USEPA has not established

oral RfDs or inhalation RfCs for most of these compounds except isopropyl benzene. USEPA established an RfD for isopropyl benzene equal to 0.1 mg/kg/day based on increased kidney weights in female rats and an RfC equal to 0.4 mg/m^3 based on increased kidney and adrenal weights in rats. As indicated above, because of the structural and toxicological similarities of several of the alkyl benzenes to isopropyl benzene, the toxicity factors for isopropyl benzene were used as the toxicity criteria for the alkyl benzenes with similar structures to isopropyl benzene. Likewise, because 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene are similar in structure to xylenes, the toxicity factors for xylenes were used to represent the toxicity of the trimethylbenzenes.

The majority of mutagenicity tests have indicated that isopropyl benzene is not mutagenic. Data are not available to assess the carcinogenicity of alkyl benzenes. Because of their structure-activity relationship to other alkyl benzene that have been sufficiently tested, it is unlikely that these compounds would pose a significant carcinogenic hazard.

3.3.7 1,1-Dichloroethane

1,1-Dichloroethane is used primarily as an intermediate in the synthesis of other organic chemicals (ATSDR, 1990). It is also used as a solvent for plastics, oils and fats; thus, it is a cleaning agent and degreaser. It is also used in varnish and finish removers and as a fumigant and insecticide. At one time, 1-dichloroethane was used as an anesthetic.

1,1-Dichloroethane is well absorbed via inhalation and ingestion, although the rate and extent are not known. Likewise, 1,1-dichloroethane penetrates the skin, but the extent and rate of absorption have not been assessed. Studies are not available to assess the distribution of 1,1-dichloroethane to tissues. Data are limited in humans and laboratory animals concerning the metabolism of 1,1-dichloroethane. In humans, following inhalation about 60 percent was excreted in urine and the rest was excreted unchanged in expired air. In laboratory animals, the majority of 1,1-dichloroethane is excreted unchanged in expired air.

At high concentrations, 1,1-dichloroethane causes central nervous system depression in humans. 1,1-dichloroethane was discontinued as an anesthetic because of cardiac stimulation; however, this effect occurred at doses sufficient to cause anesthesia (*e.g.*, 26,000 ppm). Other health effects have not been reported in humans. In laboratory rodents, following inhalation or ingestion of 1,1-dichloroethane, adverse effects in the liver or kidneys have not been observed. 1,1-dichloroethane has been reported to be slightly fetotoxic but not teratogenic in laboratory animals by inhalation. Fetotoxicity has not been reported in humans. An oral RfD was established for 1,1-dichloroethane equal to 1×10^{-1} mg/kg/day and an inhalation RfC equal to 5×10^{-1} (mg/m^3) (HEAST, 1992). Proposed changes regarding the oral RfD and inhalation RfC are pending.

There are no data indicating that 1,1-dichloroethane is a carcinogen in humans and there is only limited evidence of carcinogenicity in laboratory animals. USEPA has classified 1,1-dichloroethane as a Group C possible human carcinogen. An oral SF has not been established.

3.3.8 1,1-Dichloroethene

1,1-Dichloroethene is used in the production of flexible films for food packaging (e.g., SARAN™ wrap) and flame-retardant coatings and adhesives and in the production of other organic chemicals (USEPA, 1990; ATSDR, 1994).

Laboratory animal studies indicate that 1,1-dichloroethene is readily absorbed by inhalation and ingestion. Although studies are not available regarding dermal exposures, physical and chemical properties indicate that 1,1-dichloroethene will also readily penetrate the skin. Laboratory animal studies show that 1,1-dichloroethene distributes throughout the body but accumulates predominantly in the liver, kidney, and lung. Laboratory animals experiments indicate that 1,1-dichloroethene is extensively metabolized except after large acute doses when a portion of unmetabolized 1,1-dichloroethene is excreted via exhalation. At low dose levels when most of the 1,1-dichloroethene is metabolized, excretion is predominantly via urinary excretion.

In humans, the only known health effects of 1,1-dichloroethene are central nervous system effects, upper respiratory tract irritation and possibly liver damage. Like most chlorinated ethenes, exposure to high concentrations of 1,1-dichloroethene causes anesthetic or narcotic effects in humans and laboratory animals. Preliminary studies suggest that inhalation of 1,1-dichloroethene may cause hepatotoxicity in humans, but the evidence is only qualitative. In laboratory animals, the liver is the major target organ. Inhalation of high concentrations over several months caused liver damage. Liver injury was also shown as a result of long term exposure to high concentrations of 1,1-dichloroethene in drinking water. Inhalation of high concentrations is associated with upper respiratory tract irritation in both humans and laboratory animals. Acute inhalation and ingestion of high concentrations of 1,1-dichloroethene has been shown to cause kidney damage (attributed to the formation of cysteine-S-conjugates that may be metabolized by β-lyase to electrophilic products) in laboratory animals. These effects may be reversible depending on the dose. Kidney effects are rarely observed following long-term exposure except in male mice. 1,1-Dichloroethene has not been shown to cause developmental effects in humans, but it has been shown to be a weak teratogen via inhalation but not ingestion in laboratory animals. USEPA has established an oral RfD equal to 9×10^{-3} (mg/kg/d). An inhalation RfC has not yet been established. MADEP established an inhalation RfC equal to 5×10^{-3} (mg/m^3).

1,1-Dichloroethene has been shown to produce mutations in a number of *in vitro* test systems. 1,1-Dichloroethene has not been shown to be mutagenic in *in vivo* studies with the exception of one weakly positive response in mouse kidney cells. ATSDR concluded that the available data are insufficient to permit an evaluation of the carcinogenic risk of 1,1-dichloroethene in humans. Evidence of carcinogenicity in humans is lacking. Of the fourteen laboratory animal bioassays conducted to date, only one inhalation study provided suggestive evidence of positive carcinogenic effects from 1,1-dichloroethene exposure. The one positive study suggested that 1,1-dichloroethene induced renal tumors in male Swiss mice but not female Swiss mice. It was shown that the dose that induced tumors in the male mice also produced kidney damage. It was suggested that the observed tumors were the result of toxic effects of 1,1-dichloroethene on the kidney rather than by a genetic mechanism. It was further suggested that male Swiss mice are more susceptible to the toxic effects of 1,1-dichloroethene than female Swiss mice, rats and

hamsters. ATSDR concluded that this study was inconclusive since tumors were not observed in the absence of nephrotoxicity. The National Toxicology Program concluded that 1,1-dichloroethene does not have the potential to cause cancer (USEPA, 1990). Moreover, the National Toxicology Program has not included 1,1-dichloroethene in the Sixth Annual Report on Carcinogens, which is a list of chemicals that may reasonably be anticipated to be carcinogens (as cited in ATSDR, 1994). The International Agency for Research on Cancer has classified 1,1-dichloroethene as a Group 3 chemical (*i.e.*, not classifiable as to human carcinogenicity). USEPA has classified 1,1-dichloroethene as a Class C, possible human carcinogen and has established an oral slope factor equal to 6×10^{-1} $(mg/kg/d)^{-1}$, which was based on a study in which there was not a significant increase in tumor incidence, and an inhalation Unit Risk equal to 5×10^{-5} $(\mu g/m^3)^{-1}$ based on the inhalation study in mice that ATSDR concluded was inconclusive.

3.3.9 1,2-Dichloroethene

1,2-Dichloroethene is generally produced as a mixture of two isomers, cis and trans. It is used primarily as a chemical intermediate in the synthesis of chlorinated solvents and compounds (ATSDR, 1994). It is also used as an extraction solvent in the production of dyes, perfumes, lacquer, and thermoplastics.

Dichloroethenes are neutral, low molecular weight, lipid soluble materials; thus they are readily absorbed by any route of administration. Data are not available regarding the distribution of cis or trans-1,2-dichloroethene. Distribution is, however, most likely similar to 1,1-dichloroethene in that the majority of the chemical is distributed to liver, kidney and lung tissues with very little accumulating in fat tissue. Metabolism of cis- and trans-1,2-dichloroethene is a saturable process such that at high concentrations, trans-1,2-dichloroethene is eliminated unchanged via the lung. At low concentrations, 1,2-dichloroethene is readily metabolized; the cis isomer is metabolized at a higher rate than the trans isomer. Studies are not available regarding the excretion of 1,2-dichloroethene.

At high concentrations, 1,2-dichloroethene causes anesthetic and narcotic effects in humans. Evidence is not available to evaluate whether other health effects can be attributed to cis or trans-1,2-dichloroethene in humans. Inhalation and ingestion of cis- or trans-1,2-dichloroethene have been shown to cause some effects on the liver at high concentrations or doses in laboratory animals. Neither cis- nor trans-1,2-dichloroethene has been shown to cause reproductive or developmental effects in humans or laboratory animals. USEPA has established an oral RfD equal to 2×10^{-2} mg/kg/day for trans-1,2-dichloroethene and an oral RfD equal to 1×10^{-2} mg/kg/day for cis-1,2-dichloroethene (HEAST, 1992). An inhalation RfC has not been established by USEPA.

Trans-1,2-dichloroethene has not been shown to be mutagenic. Some evidence indicates that cis-1,2-dichloroethene may be genotoxic. Experimental data do not suggest that either cis- or trans-1,2-dichloroethene is a carcinogen. USEPA has established that cis-1,2-dichloroethene is unclassifiable (Group D) as a human carcinogen. USEPA has not classified trans-1,2-dichloroethene.

3.3.10 Tetrachloroethene

Tetrachloroethene is used primarily as a solvent and a chemical intermediate (ATSDR, 1995). About 53 percent of its use is as a dry-cleaning and textile-processing solvent. About 28 percent is used as a chemical intermediate and about 10 percent is used for vapor-degreasing in metal-cleaning operations. Tetrachloroethene is also used as a general solvent in adhesives, glues, polishes, lubricants, and sealants.

Tetrachloroethene is readily absorbed by humans and laboratory animals via inhalation and ingestion. Absorption is rapid and near complete. In contrast, dermal absorption is poor. Fat is the primary site of tetrachloroethene distribution. Metabolism occurs predominantly in the liver. Metabolic pathways are, however, species-specific, which may account for differences in toxicological effects. For example, rats produce less trichloroacetic acid than mice do. Because

the threshold concentration of trichloroacetic acid necessary to increase peroxisome proliferation is not produced in rats, liver cancers are not observed. In contrast, in mice, enough trichloroacetic acid is produced to stimulate peroxisome proliferation, which leads to liver cancer. Humans produce even less trichloroacetic acid than rats (not one study indicates that the amount of trichloroacetic acid produced in humans is greater than 3 percent of the absorbed dose); thus, liver cancer is unlikely to occur by this mechanism in humans. In addition, the rates of metabolism are species-specific. Mice metabolize tetrachloroethene faster than rats and rats metabolize tetrachloroethene faster than humans do. For example, rats exposed to 10 ppm of tetrachloroethene for 6 hours excreted about 24 percent of the dose as urinary metabolites (and exhaled about 68 percent unchanged). In contrast, mice exposed to 10 ppm excreted about 88 percent as urinary metabolites (and exhaled about 12 percent unchanged). The main excretion pathway in both humans and laboratory animals is through exhalation of unmetabolized tetrachloroethene.

Inhalation of high concentrations of tetrachloroethene in air may cause central nervous system effects such as dizziness, nausea, headaches, and difficulty walking and talking, particularly in poorly ventilated or closed areas. These high concentrations generally occur in occupational environments. Subtle effects on the kidney have been observed in humans occupationally exposed to tetrachloroethene; it is unclear, however, whether these effects are related to adaptive effects or to early kidney disease. Adverse kidney effects including cancer are observed in male rats. It is likely, however, that the effects are due to specific metabolites, which are further metabolized to reactive metabolites by β-lyase in the kidney. Because β-lyase activity is very low in human kidneys, these reactive metabolites are unlikely to be formed in humans. In addition, male rats exposed to tetrachloroethene also accumulate α-2μ-globulin, which has been shown to be responsible for kidney toxicity. Humans do not produce α-2μ-globulin in significant amounts; thus, kidney effects observed in male rats may not be relevant to humans.

Transient liver toxicity has been reported in humans after acute exposures to very high doses. The liver is clearly a target organ in rodents. In rats and mice, liver toxicity correlates well to the production of trichloroacetic acid, which induces liver peroxisome proliferation. Humans are,

however, relatively insensitive to peroxisome proliferators. Laboratory animal studies suggest that tetrachloroethene is not teratogenic but may be fetotoxic at doses that also result in maternal toxicity. Currently, there is not conclusive evidence that tetrachloroethene causes reproductive effects. A chronic oral RfD equal to 1.0×10^{-2} mg/kg/day has been established by USEPA and an inhalation RfC equal to 4.6 mg/m^3 has been established by MADEP (MADEP, 1994).

Current data suggest that positive assays for mutagenicity are due to a metabolite formed in rats that is not produced to a great extent in mice or humans. Evidence is insufficient to conclude that tetrachloroethene is a human carcinogen. Tetrachloroethene has been shown to cause liver cancer in mice but not rats. Numerous studies have demonstrated that the liver cancers in mice are related to peroxisome proliferation. Trichloroacetic acid has been shown to induce peroxisome proliferation in mice. Because trichloroacetic acid has also been shown to be a major metabolite of tetrachloroethene in mice but not rats, differences in metabolism may be the reason why liver cancer has been reported in mice but not rats. Humans produce little trichloroacetic acid and are relatively resistant to peroxisome proliferation.[2] In other words, humans do not respond to the doses that cause significant responses in rats and mice; thus, even if trichloroacetic acid were produced, it is unlikely to cause peroxisome proliferation. Therefore, it is unlikely that tetrachloroethene could increase the risk of liver cancer in humans by this mechanism. A low incidence of kidney tumors has been reported in male rats. The mechanism is unclear but may be related to the formation of a mutagenic metabolite formed by β-lyase from a glutathione conjugate. The metabolite is only formed at high doses after other metabolic pathways are saturated. Because human kidneys have relatively little β-lyase activity, it is unlikely that human kidneys would respond like male rat kidneys. Tetrachloroethene was also shown to cause mononuclear cell leukemia in Fischer-344 rats in one study. The relevance of these cancers to humans is unclear, however, because Fischer-344 rats have a high rate of spontaneous mononuclear cell leukemias and the incidence of these cancers in the control animals in this study was higher than historical values. Nevertheless, the National Toxicology Program considered the incidence to be a true finding. Based on laboratory animal evidence, the USEPA's Science

2 Humans have been exposed to a number of chemicals (*e.g.*, hypolipidemic drugs) that cause peroxisome proliferation in rodents, but little peroxisome proliferation has been observed.

Advisory Board classifies tetrachloroethene as a probable/possible human carcinogen (Group B2/C), but this classification is currently under review. The Science Advisory Board indicated that the evidence was not strong enough to classify tetrachloroethene as a probable human carcinogen, but that it was stronger than most compounds classified as possible carcinogens. The USEPA Health Risk Technical Support Center recommends using an oral slope factor equal to 5.2×10^{-2} $(mg/kg/day)^{-1}$ and an inhalation Unit Risk equal to 5.8×10^{-7} $(\mu g/m^3)^{-1}$.

MADEP has recommended a different Unit Risk value equal to 5.52×10^{-5} $(\mu g/m^3)^{-1}$, which is approximately 100 times more conservative than USEPA's Unit Risk value, primarily based on different assumptions regarding the extent of metabolism in humans compared to the extent of metabolism in humans assumed by USEPA. The extent of metabolism is important because most of the scientific evidence suggests that the ultimate carcinogen in mice is the metabolite trichloroacetic acid (which is excreted in the urine). Thus, the amount of trichloroacetic acid that is produced is important to consider in the derivation of the toxicity factors. In general, it has been shown using laboratory animal and human experimental data that the rate of metabolism of tetrachloroethene in mice is greater than 50 times the metabolic rate in humans and almost five times greater that the metabolic rate in rats. Moreover, not only is the rate of metabolism different between species but the pattern of metabolites is also different. Of the total metabolites produced, the proportion of trichloroacetic acid produced in humans is less than the proportion of trichloroacetic acid produced in mice.

The USEPA developed a Unit Risk using the dose-response data from a mouse liver tumor study and information regarding human metabolism from another study. USEPA based their slope factor (*i.e.*, carcinogenic potency factor, which is the 95 percent upper confidence limit on the linear term in the multistage model fit to tumor incidence) for mice on dose-response data using the metabolized dose. In other words, the dose was not based on the amount of tetrachloroethene administered but on the amount of tetrachloroethene metabolites detected in the urine. To convert this slope factor to a Unit Risk for humans, USEPA reviewed studies concerning the extent humans metabolize tetrachloroethene. In a study by Bolanowska and Golacka (1972, as cited by MADEP ORS), humans exposed to concentrations of tetrachloroethene equal to 50 ppm

(390,000 $\mu g/m^3$) metabolized approximately 0.67 percent to urinary metabolites or a total of 13 mg. Using this rate of metabolism (*i.e.*, 0.67 percent), USEPA estimated the Unit Risk (*i.e.*, the risk associated with 1 $\mu g/m^3$) for humans to be 4.8×10^{-7} $(\mu g/m^3)^{-1}$. The USEPA also calculated Unit Risks using dose-tumor response data from other laboratory animal studies together with data regarding the extent of human metabolism to develop a Unit Risk range from 2.9×10^{-7} $(\mu g/m^3)^{-1}$ to 9.5×10^{-7} $(\mu g/m^3)^{-1}$ with a geometric mean equal to 5.8×10^{-7} $(\mu g/m^3)^{-1}$.

MADEP used a similar approach except that they assumed that humans metabolize 70 percent of the inhaled dose at low exposures rather than 0.67 percent — a difference of about 100 times. MADEP criticizes the USEPA for estimating the extent of human metabolism at low concentrations using a human study in which the doses were five orders of magnitude higher (*i.e.*, 390,000 $\mu g/m^3$ versus 1 $\mu g/m^3$). They state that the proportion of the inhaled dose that is metabolized varies with the dose and that at low enough doses nearly all of the absorbed chemical is metabolized. They further state that if all tissues are assumed to have some metabolizing capacity then it is reasonable to assume that at low airborne concentrations none of the tissues are saturated. Under these conditions, the metabolism in most tissues would be flow limited and 100 percent of the dose would be metabolized.

MADEP apparently assumes either that tetrachloroethene is metabolized and eliminated by zero order kinetics or that tetrachloroethene is metabolized by first order kinetics but the system was saturated at the 50 ppm dose used in the Bolanowska and Golacka, 1972 study.[3] They state that it is likely that the proportion of the inhaled dose, which is metabolized, varies with the dose (which would be zero order kinetics). However, they go on to state that the tissues are not saturated at low doses (presumably they mean the metabolic capacity of these tissues), which implies that the metabolism could be by first order kinetics but that it is saturated at higher levels (such as 50 ppm).

3 First order kinetics is when the rate of elimination of a chemical is proportional to the amount of chemical in the body at that time (i.e., the proportion does not vary). However, at some point as the dose increases, its rate of elimination may decrease, which is referred to as saturation. At this point the rate of elimination switches from first order to zero order kinetics, which is when the amount of elimination is constant and is independent of the dose.

First, elimination of most chemicals is by first order kinetics. Tetrachloroethene has been shown to be eliminated by first order kinetics (ATSDR, 1995; ACGIH, 1991). It has a half-life of approximately 55 hours (there are no half-lives for chemicals exhibiting zero order kinetics) and there are studies that show that excretion of urinary metabolites increases linearly until the metabolic capacity is saturated (Ikeda *et al.*, 1972 as cited in ATSDR, 1995).

Second, MADEP is incorrect in assuming that at 50 ppm (*i.e.*, 390,000 $\mu g/m^3$) the proportion of excreted metabolites is less than at low exposures. In other words, they are incorrect in assuming that at low exposure concentrations nearly all of the absorbed tetrachloroethene would be metabolized (70 percent) but at 50 ppm the metabolic capacity was saturated such that only 0.67 percent of the dose was metabolized. Ikeda and Ohtsuji (1972) (as cited by ACGIH; 1991, IARC, 1995; ASTDR, 1995) reported that saturation does not occur in humans until the air concentrations approach 100 ppm. In another human study, Ohtsuki et al. (1983) (as cited by ACGIH, 1991; ATSDR, 1995; IARC, 1995) reported that urinary metabolites reached saturation at greater than 100 ppm. Still yet another study of dry cleaners showed that urinary metabolism was linearly related to exposure at concentrations up to 112 ppm (Seiji et al., 1989 as cited by ATSDR, 1995). There is no evidence that saturation occurs at concentrations of less than 100 ppm (658,000 $\mu g/m^3$) in humans.

Taken together, the elimination of tetrachloroethene appears to be by first order kinetics and metabolic capacity is not saturated at concentrations less than 100 ppm. This means that the percentage (*i.e.*, proportion) that is metabolized would be the same at a concentration equal to 50 ppm as it would at lower concentrations. In other words, if saturation had not been reached at 50 ppm (Bolanowska and Golacka, 1972) and 0.67 percent of the dose was metabolized, then at any dose less than 50 ppm, only 0.67 percent would be metabolized — not 70 percent. Before saturation is reached, the proportion metabolized would not vary with the dose as MADEP suggests. Therefore, the Unit Risk value established by USEPA is more appropriate for evaluating the carcinogenic risk due to inhalation of tetrachloroethene. Moreover, it should be kept in mind that even the USEPA's Unit Risk value is conservative because it was based on the assumption that 100 percent of the metabolites produced by humans were trichloroacetic acid when in fact

other metabolites are also produced. Furthermore, it should also be kept in mind that humans have not been shown to respond to trichloroacetic acid in the same manner as rodents.

3.3.11 1,1,1-Trichloroethane

1,1,1-Trichloroethane is a solvent used in cold cleaning, vapor degreasing, adhesives, aerosols, electronics, coatings, and lubricants (ATSDR, 1995). It is also used extensively in household products.

Absorption of 1,1,1-trichloroethane via inhalation is almost complete in humans. 1,1,1-Trichloroethane is absorbed orally, but the rate and amount absorbed in both humans and laboratory animals is unknown. 1,1,1-Trichloroethane is also absorbed following skin contact, although the amount absorbed is several orders of magnitude less than exposure via inhalation. After absorption, 1,1,1-trichloroethane is distributed primarily to fat and the liver with smaller amounts distributed to the kidney and brain. Only a small amount of 1,1,1-trichloroethane is metabolized (less than 10 percent) and excreted in urine. The remaining 90 percent is excreted unchanged in exhaled air.

In humans, neurological effects including lightheadedness, loss of coordination, and intoxication are the predominant symptoms following acute inhalation of high concentrations of 1,1,1-trichloroethane. These effects have not been reported following dermal or oral exposures. Respiratory effects following inhalation of high concentrations have been observed. These effects are secondary to central nervous system depression in both humans and laboratory animals. Inhalation of high concentrations of 1,1,1-trichloroethane (greater than 10,000 ppm) causes transient cardiovascular effects in humans. The evidence is not conclusive, but 1,1,1-trichloroethane may cause mild liver injury in humans either by inhalation of high concentrations or ingestion of high doses. Inhalation of 1,1,1-trichloroethane has not been shown to cause kidney damage in humans or laboratory animals. Data are unavailable to assess the effects on kidney function resulting from ingestion of 1,1,1-trichloroethane. Nausea, vomiting and diarrhea

occur in humans after oral or inhalation exposures to high doses or concentrations. 1,1,1-Trichloroethane is mildly irritating to skin and its vapor is irritating to eyes. Developmental effects have not been reported in humans. There are some reports of minor developmental effects in laboratory animal studies following inhalation of high concentrations of 1,1,1-trichloroethane. Reproductive effects have not been reported in humans or laboratory animals. The USEPA has withdrawn the oral RfD (IRIS), but an oral RfD equal to 9×10^{-2} mg/kg/d and an inhalation RfC equal to 1.0 mg/m^3 were previously established (HEAST, 1992).

Scientific evidence indicates that 1,1,1-trichloroethane is not mutagenic. Human epidemiological evidence indicates that 1,1,1-trichloroethane is not a carcinogen. According to laboratory animal data, it does not appear that 1,1,1-trichloroethane presents a risk of cancer in animals. The USEPA classifies 1,1,1-trichloroethane as a Group D carcinogen.

3.3.12 Trichloroethene

Trichloroethene is used primarily as a solvent for greases, oils, fats, waxes, and tars. In the past, about 80 percent of trichloroethene that was produced was used in vapor degreasing of fabricated metal parts, particularly in the automotive and metals industries (ATSDR, 1995). Trichloroethene is also used as a solvent for adhesives, lubricants, paints, paint strippers, and pesticides. Various consumer products also contain trichloroethene (e.g., typewriter correction fluids, spot removers, and cleaning fluids for rugs). Prior to 1977, trichloroethene was used as a general obstetrical anesthetic, as an extractant of caffeine for the production of decaffeinated coffee and as a pet food additive.

In humans, absorption of trichloroethene via inhalation is between 37 and 75 percent of the amount inhaled, while absorption of trichloroethene via ingestion is between 91 and 95 percent. Animal studies indicate that trichloroethene is distributed primarily between blood and fat. Trichloroethene is extensively metabolized (up to 75 percent of the retained dose). In humans, most of the absorbed dose is excreted in the urine and a small amount is excreted through the lungs.

The primary targets of trichloroethene in humans are the liver, kidney and central nervous system. Data concerning the effects of trichloroethene on these organ systems indicate that toxicity occurs primarily after acute exposures to high concentrations. Central nervous system effects, primarily narcotic-like effects, and irritation of mucous membranes are caused by inhalation of trichloroethene. Information regarding liver injury in humans is based on acute exposures to high concentrations of trichloroethene. USEPA has concluded that it is unlikely that chronic exposure to low concentrations of trichloroethene will result in liver injury. Similarly, kidney toxicity has been reported in humans only after acute exposure to high concentrations. The evidence is inconsistent regarding the production of developmental effects in humans and animals. The RfD has been withdrawn from IRIS and oral and inhalation RfDs are pending. The MADEP has, however, established an oral RfD equal to 2×10^{-3} mg/kg/day and an inhalation RfC equal to 1.8×10^{-1} mg/m^3 (MADEP, 1994)

The mutagenic potential of trichloroethene is unclear. The results of both the *in vitro* and *in vivo* studies are inconclusive. Evidence indicates that trichloroethene is a weak to moderate carcinogen in laboratory animals. However, many of the studies had significant problems such as low animal survival and the use of technical grade trichloroethene. In addition, there are differences between low- and high-dose metabolism in animals and differences between species in susceptibility to cancer. The studies suggest that metabolism to a proximate carcinogen does not occur in humans at low doses. Although limited epidemiological data suggest that trichloroethene could cause cancer in humans, these studies have had numerous problems. Therefore, definite conclusions regarding carcinogenic potential of trichloroethene in humans cannot be drawn. Numerous workers have been exposed to trichloroethene and only a small number of persons have experienced chronic effects. Moreover, these studies do not suggest that trichloroethene is a potent carcinogen. Based on laboratory animal evidence, USEPA classifies trichloroethene as a possible/probable human carcinogen (Group C/B2), but this classification is currently under review. USEPA has adopted an oral SF equal to 1.1×10^{-2} (mg/kg/day)$^{-1}$ and an inhalation Unit Risk equal to 1.7×10^{-6} (μg/m^3)$^{-1}$ (USEPA Superfund Health Risk Technical Support Center).

3.3.13 Methylene Chloride

Methylene chloride is used as a solvent in paint strippers, as a metal cleaning solvent in electronics manufacturing, and as a propellant in aerosols in the manufacture of drugs and film coatings (ATSDR, 1989).

The main route of exposure to methylene chloride is inhalation. Approximately 70-75 percent of inhaled methylene chloride is absorbed in humans. Studies concerning the absorption of methylene chloride following ingestion in humans are not available, but studies in laboratory animals suggest that it is easily absorbed via the gastrointestinal tract. In fact, about 98 percent of the applied dose was absorbed within 20 minutes in mice. Likewise, studies concerning dermal absorption in humans are not available, but laboratory animal experiments indicate that methylene chloride is absorbed across the skin. For risk assessment purposes, MADEP has established RAFs for absorption of methylene chloride from ingestion of water, ingestion of soil and dermal contact with soil equal to 100 percent, 100 percent and 10 percent, respectively. Following inhalation, the highest concentrations appear in fat followed by the liver, then the adrenal glands, brain and kidney. Concentrations in the fat decrease rapidly following exposure. Following ingestion, methylene chloride appears in the liver, kidney, lung, brain, fat, muscle, and testes. It is rapidly cleared from each tissue, which suggests that it does not bioaccumulate in any tissues. Following both inhalation and ingestion, methylene chloride is metabolized by mixed function oxidase enzymes and by glutathione transferase. Excretion is primarily via urine and exhaled air.

The central nervous system and the liver are the primary target organs following methylene chloride exposure. Following acute inhalation of high concentrations, methylene chloride causes anesthesia, which subsides once exposure is discontinued. Longer-term exposures may result in headaches, nausea, dizziness, and paresthesia. Ingestion of methylene chloride has not been shown to cause CNS effects. Laboratory animal studies indicate that ingestion or inhalation of high doses of methylene chloride results in liver damage. The liver does not, however, appear to

be a major target organ in humans. Effects on the kidney have not been reported in humans following ingestion or inhalation of methylene chloride. Laboratory animal studies, however, demonstrated that chronic exposure via inhalation may cause kidney effects. Inhalation of high concentrations (100 ppm) of methylene chloride causes irritation of the respiratory tract. Developmental effects do not appear to be a concern following either inhalation or ingestion of methylene chloride. Reproductive effects also have not been shown to occur following exposure to methylene chloride. USEPA has established an oral RfD equal to 6×10^{-2} mg/kg/day and an inhalation RfC equal to 3.0 mg/m^3 (HEAST, 1992).

Some evidence suggests that methylene chloride may be a weak mutagen in mammalian systems. Epidemiological studies have not shown that inhalation or ingestion of methylene chloride causes an increase in the incidence of cancer in humans. Inhalation of high concentrations of methylene chloride has, however, increased the incidence of liver and lung cancer in mice and rats. Studies also provide suggestive evidence that ingestion of methylene chloride causes liver cancer in mice and rats. The USEPA has classified methylene chloride as a Group B2 carcinogen. The oral SF is equal to 7.5×10^{-3} (mg/kg/day)$^{-1}$ and the inhalation unit risk is equal to 4.7×10^{-7} (μg/m^3).

4.0 EXPOSURE ASSESSMENT

An exposure assessment was performed to identify current or reasonably foreseeable exposure scenarios by which chemicals present at the Site may reach potential human receptors in the absence of further remediation at the Site. Potential receptors and exposure pathways were identified, exposure routes were evaluated, exposure point concentrations were estimated, and exposure doses or concentrations were calculated.

4.1 EXPOSURE SCENARIOS

Potential exposure pathways were evaluated for the various media. The following criteria must be met for a complete exposure pathway to exist:

- a source and mechanism to release chemicals into the environment,
- an exposure point at which there is a potential for contact with the contaminated medium by a receptor, and
- an exposure route (*e.g.*, ingestion, inhalation or dermal contact) at the exposure point.

If one of these criteria is not met, then the exposure pathway is not complete. In other words, without any exposure, the risk is zero. Thus, incomplete exposure pathways are eliminated from the assessment. The following sections describe: 1) the soil and ground water categories that are used to evaluate potential exposures to receptors and the potential need for Activity and Use Limitations; 2) the human receptors likely to be present at this Site; 3) the complete exposure pathways by which the receptors may come into contact with impacted media; and 4) the exposure assumptions used to estimate average daily doses or concentrations.

4.1.1 Identification of Site Soil and Ground water Categories

To evaluate potential exposures to receptors at the Site, the ground water and soil categories are identified. Ground water is categorized based on its current and/or future use as drinking water (GW-1), its potential to act as a source of volatile material to indoor air (GW-2), and its potential to discharge material to surface water (GW-3). The ground water categories applicable to the Site are GW-2 and GW-3. Ground water is not a current or future source of drinking water; thus, the Site is not classified GW-1. Since ground water is not a source of tap water, ingestion and direct contact with ground water are unlikely under current or future conditions.

Ground water at the Site is classified as GW-2 because the average annual depth to ground water is less than 15 feet below the ground surface and impacted ground water is located within 30 feet of an existing building. All ground water is also classified as GW-3 because it is assumed that all ground water will eventually discharge to surface water bodies. Ground water flows north across the site toward River Meadow Brook, which is located approximately 30 feet north-west of the Site.

The soil category applicable to the Site under current and future conditions is S-2. To be considered an S-2 category, impacted soil must either be potentially accessible (located between zero and 15 feet below the surface and paved or located between three and 15 feet below the surface and not paved) and used only passively by children if the exposure is frequent or infrequently by children if the exposure is intense and can be used both frequently and intensely by adults. Alternatively, to be considered an S-2 category, impacted soil may be accessible (located between zero and three feet below the surface and not paved) and used only passively and infrequently by children and used only passively by adults if the exposure is frequent or infrequently by adults if the exposure is intense. Impacted soil is located in surface soil in an unpaved area north-west of the office building. Since impacted soil is accessible, the criteria of frequency and intensity of use by children and adults were evaluated. It is unlikely that children will visit this area because the Site is located in an industrial area and is surrounded by a chain linked fence; thus, it is unlikely that children would be present on the Site frequently and it is

unlikely that they would actively disrupt the soil. Although the limited area of impacted soil is also unlikely to be used by employees, it was conservatively assumed that they could routinely walk in the area. It is unlikely, however, that they would actively disturb the soil. In contrast, adults who may be involved in future excavation activities like construction or subsurface utility repair may actively disturb impacted soil. Excavation activities are, however, not expected to be frequent.

4.1.2 Potential Human Receptors

This risk assessment considered exposures to three populations:

- Employees who work at the facility under current and future conditions;
- Trespassers, who could visit the Site under current and future conditions; and
- Potential future workers who may perform subsurface excavation work during future construction at the Site.

4.1.2.1 Employees

Employees working at the facility could be exposed to VOCs that could volatilize from shallow overburden ground water or soil and migrate into indoor air. Although visitors to these commercial buildings could also be exposed to VOCs in indoor air, their exposure is likely to be much less than that of an employee; thus, if risks to employees are within acceptable limits, then risks to visitors or customers would also be within acceptable limits.

It was also assumed that employees could contact impacted surface soil. Exposure routes of concern include incidental ingestion of soil and dermal contact with soil. Inhalation of particulate matter derived from soil was not quantified because it was assumed that volatile compounds are more likely to evaporate into the ambient air rather than remain on particulate matter. Thus, this exposure route would not result in significant incremental risk.

4.1.2.2 Trespassers

Although not very likely, it was assumed that older children could trespass in the area between the office building and River Meadow Brook where impacted soil is located. Exposure routes of concern include incidental ingestion of soil and dermal contact with soil. Inhalation of particulate matter derived from soil was not quantified because it was assumed that volatile compounds are more likely to evaporate into the ambient air rather than remain on particulate matter. Thus, this exposure route would not result in significant incremental risk.

4.1.2.3 Construction Workers

Under future conditions, construction workers could be exposed to impacted soil and ground water if soil were excavated in the future during construction activities. The principal potential exposure routes include dermal contact with soil and incidental ingestion of soil. Inhalation of particulate matter derived from soil was not quantified because it was assumed that volatile compounds are more likely to evaporate into the ambient air rather than remain on particulate matter. Thus, this exposure route would not result in significant incremental risk. Inhalation of VOCs in ambient air during excavation activities was considered but was not evaluated further because wind dispersion and dilution are likely to reduce the concentrations of chemicals in ambient air significantly; thus, it is unlikely that they would pose a significant risk. It is also possible that workers could be exposed to chemicals detected in shallow ground water. These exposures are not typically quantified because they are usually limited to acute exposures (*e.g.*, incidental splashes on the hands and arms or short-term exposures during the repair of a de-watering pump). The concentrations of chemicals detected at most disposal sites are not high

enough to cause acute health effects.[4]

Utility maintenance workers could also be exposed to impacted soil and ground water; however, their exposure is likely to be limited to a day or two. This type of exposure is considered an acute exposure. The chemicals detected at this Site do not cause acute health effects at the concentrations detected. Thus, utility maintenance work is unlikely to result in significant risks to workers. Moreover, if the risks to construction workers are not significant, then risks to utility workers also would not be significant because the exposure period is much shorter for a utility worker compared to a construction worker.

4.1.3 Exposure Assumptions

4.1.3.1 Employees

Employees working at the facility could be exposed to VOCs via inhalation of indoor air, if VOCs migrated from ground water or soil into soil vapor and subsequently into indoor air. To estimate average exposure concentrations, several assumptions were made. The duration of exposure was assumed to be 8 hours per day; the frequency of exposure was assumed to be 250 days per year and the period of exposure was assumed to be 25 years (MADEP, 1995). The averaging period was equal to the exposure duration for exposures to noncarcinogenic chemicals and equal to 75 years for exposures to carcinogenic chemicals (MADEP, 1995).

Employees could also be exposed to chemicals in surface soil. Exposure pathways include ingestion of soil and dermal contact with soil. For exposure to surface soil, the frequency of exposure was assumed to be 129 days per year (5 days per week less 24 days when exposure does not occur due to vacations, weather, *etc.* from April through October) and the period of exposure

4 An acute exposure is defined by the MADEP as an exposure that is instantaneous (*e.g.*, one dose) or lasting up to several days. Most chemicals detected at contaminated sites are not present at high enough concentrations to cause health effects following acute exposures with the exception of a few chemicals such as cyanide. At high concentrations, VOCs can cause transient, reversible effects such as dizziness, giddiness, headache, *etc.*, (*i.e.*, central nervous system depression) following short-term exposure, but the concentrations required to cause these effects are very high compared to the concentrations expected at most sites, including this Site.

was assumed to be for 25 years (MADEP, 1994). It was assumed that adult facility workers weigh 70 kg and ingest 50 mg of soil per day (MADEP, 1995). It was also assumed that they have their forearms, hands, lower legs, and feet exposed during June, July and August and have their forearms and hands exposed during April, May, September, and October. In addition, it was assumed that 80 percent of the adhered material is derived from outdoor soil and that the soil adherence is equal to 0.51 mg/cm^2 (MADEP, 1994; MADEP, 1995).

4.1.3.2 Trespassers

To estimate exposure doses for children (age 7 to 19 years old) who may visit the industrial facility under current and future conditions, several assumptions were made. The duration of exposure was assumed to be two hours per day, the frequency of exposure was assumed to be 62 days per year (2 days per week from April through October) and the period of exposure was assumed to be for 12 years (MADEP, 1996). The averaging period was equal to the exposure duration for exposures to noncarcinogenic chemicals and equal to 75 years for exposures to carcinogenic chemicals (MADEP, 1995). It was assumed that children age 7 to 19 have a time-weighted body weight equal to 42 kg and ingest 50 mg of soil per day (MADEP, 1994; MADEP, 1995). It was also assumed that they have 57 percent of their body exposed to soil during the months of June, July and August (arms, hands, legs, and feet) and 18.6 percent of their body exposed to soil (arms and hands) during the months of April, May, September, and October, that 80 percent of the adhered material is derived from outdoor soil, and that the soil adherence is equal to 0.51 mg/cm^2.

4.1.3.3 Construction Workers

If construction work is performed at the facility, construction workers may be exposed to impacted soil during excavation activities. The frequency and period of exposure of a typical construction project is five days per week for six months, which is approximately 130 days (MADEP, 1995). This exposure is considered to be a subchronic exposure. The averaging period was equal to the exposure duration for exposures to noncarcinogenic chemicals and equal to 75

years for exposures to carcinogenic chemicals (MADEP, 1995). An average body weight of 80 kg was assumed to be the weight of a typical male construction worker (USEPA, 1990a). A soil ingestion rate of 480 mg/day was used to estimate average daily doses from incidental ingestion of soil (USEPA, 1991). For dermal exposures, it was assumed that the upper extremities and head (*i.e.*, 4,370 cm^2) could potentially contact the soil during an exposure event (USEPA, 1990a). A soil adherence factor of 0.51 mg/cm^2 was used (MADEP, 1995).

4.1.3.4 Relative Absorption Factors

For risk assessment purposes, MADEP has established relative absorption factors (RAFs) for absorption of various chemicals from ingestion of water, ingestion of soil and dermal contact with soil (MADEP, 1994). RAFs account for both the absorption efficiency of the chemical via the route (*e.g.*, ingestion, dermal contact) and medium (*e.g.*, water, soil) of exposure at the Site and the absorption efficiency for the route and medium of exposure in the experimental study on which the toxicity information (*e.g.*, RfD, SF) is based. The RAFs used for ingestion and dermal contact of soil are as follows:

Chemical	Ingestion of Soil	Dermal Contact with Soil
tetrachloroethene*	1.0/1.0	0.10/0.10
benzene*	1.0/1.0	0.08/0.08
toluene	1.0	0.12
ethylbenzene	1.0	0.2
xylenes	1.0	0.12
methylene chloride*	1.0/1.0	0.1/0.1
naphthalene	1.0	0.1
trichloroethene*	1.0/1.0	0.10/0.10
1,1,1-trichloroethane	1.0	0.1
acetone	1.0	0.1
1,1-dichloroethene	1.02	0.102
1,1-dichloroethane	1.3	0.13
isopropylbenzene	1.0	0.2
n-propylbenzene	1.0	0.2
1,2,4-trimethylbenzene	1.0	0.12
1,3,5-trimethylbenzene	1.0	0.12
cis-1,2-dichloroethene	1.0	0.1

* For chemicals classified as carcinogenic, RAFs have been developed for both noncarcinogenic exposures and for carcinogenic exposures.

RAFs are not necessary for inhalation exposures because route-of-entry and type of medium are the same for the exposure route and medium at the Site and exposure route and medium of the experimental study.

4.2 EXPOSURE POINT CONCENTRATIONS

Exposure point concentrations are the estimated concentrations in a particular medium at the point of contact. The following sections describe the procedures used to estimate exposure point concentrations for each exposure pathway. In the future, it was assumed that exposure point concentrations would not change significantly.

Exposure point concentrations for indoor air were estimated using the average concentrations of VOCs detected in indoor air during the March 2001 sampling event. Exposure point concentrations for indoor are presented in Table 7.

Exposure point concentrations in soil were estimated using the concentrations detected in the soil sample collected on the north-west side of the office building. This sample was collected from the boring with the highest VOC concentrations detected with a photoionization detector (PID). Exposure point concentrations for exposure to soil are presented in Table 8.

4.3 ESTIMATION OF AVERAGE DAILY EXPOSURES

Equations adapted from MADEP guidance were used to estimate average daily exposure concentrations for inhalation exposures and average daily exposure doses for ingestion of soil and dermal contact with soil (MADEP, 1995). Exposures to chemicals via ingestion and dermal contact are estimated by calculating exposure doses, which are expressed as milligrams of chemical per kilogram of body weight per day. In contrast, exposures to chemicals via inhalation

are estimated by calculating average exposure concentrations. Estimating average exposure concentrations rather than average exposure doses is technically more accurate because compounds that elicit route-of-entry effects where the toxic effect is directly on the lung (*e.g.*, irritants and sensitizers) would be inappropriately evaluated if they were calculated as a systemic dose, and pharmacokinetic differences such as absorption and metabolism do not have to be adjusted as would be necessary to estimate a systemic dose.

Estimated average daily exposure concentrations for inhalation of indoor air were calculated using the following equation:

$$ADE = \frac{C_x \, x \, EF \, x \, ED \, x \, EP \, x \, C_1 \, x \, C_2 \, x \, C_3}{AP}$$

where:

ADE	=	Chronic or lifetime average daily exposure (mg/m^3 or $\mu g/m^3$)
C_x	=	Exposure point concentration (mg/m^3)
EF	=	Exposure frequency (events/year)
ED	=	Exposure duration (hours/event)
EP	=	Exposure period (years)
C_1	=	Conversion factor (days/hr)
C_2	=	Conversion factor (years/day)
C_3	=	Conversion factor ($\mu g/mg$)
AP	=	Averaging period (years)

Estimated average daily exposure doses for incidental ingestion of soil were calculated using the following equation:

$$ADD = \frac{C_x \, x \, IR \, x \, RAF \, x \, EF \, x \, ED \, x \, EP \, x \, C_1}{BW \, x \, AP \, x \, C_2}$$

where:

ADD	=	Chronic or lifetime average daily dose (mg/kg/day)
C_x	=	Exposure point concentration (mg/kg)
IR	=	Ingestion rate (mg/day)
RAF	=	Relative absorption factor (dimensionless)
EF	=	Exposure frequency (events/year)
ED	=	Exposure duration (days/event)
EP	=	Exposure period (years)
C_1	=	Conversion factor (10^{-6} kg/mg)
BW	=	Body weight (kg)
AP	=	Averaging period (years)
C_2	=	Conversion factor (365 days/year)

Estimated average daily exposure doses for dermal contact with soil were calculated using the following equation:

$$ADD = \frac{C_x \, x \, SA \, x \, AF \, x \, RAF \, x \, EF \, x \, ED \, x \, EP \, x \, C_1}{BW \, x \, AP \, x \, C_2}$$

where:

ADD	=	Chronic or lifetime average daily dose (mg/kg/day)
C_x	=	Exposure point concentration (mg/kg)
SA	=	Skin surface area in contact with soil (cm^2/day)
AF	=	Soil adherence factor (mg/cm^2)
RAF	=	Relative absorption factor (unitless)
EF	=	Exposure frequency (events/year)
ED	=	Exposure duration (day/event)
EP	=	Exposure period (years)
C_1	=	Conversion factor (10^{-6} kg/mg)
BW	=	Body weight (kg)
AP	=	Averaging period
C_2	=	Conversion factor (365 days/year)

Under current conditions, employees working in the facility building may be indirectly exposed to chemicals detected in ground water or soil, since a fraction of these chemicals may volatilize and migrate into indoor air. Exposure point concentrations for indoor air were estimated from the concentrations detected in air samples collected within the building (MADEP, 1994). Average daily exposure concentrations were calculated for employees working in the building (Table 9). Employees may also be exposed to chemicals detected in surface soil. Exposure point concentrations were estimated from the concentrations of chemicals detected in the soil sample collected from the north-west side of the building with the highest PID reading. Average daily exposure doses were calculated for incidental ingestion of soil and skin contact with (Tables 10 and 11).

Under current and future conditions, older children could be exposed to chemicals detected in the surface soil on the facility. Exposure point concentrations were estimated from the concentrations of chemicals detected in the soil sample collected from the north-west side of the building with the highest PID reading. Average daily exposure doses were calculated for incidental ingestion of soil and skin contact with (Tables 12 and 13).

Construction workers may be exposed to subsurface soil in the future. Impacted soil is located primarily in surface soil in the limited area on the north-west side of the building. It was assumed that all construction work would take place in this limited area. Exposure point concentrations were estimated from the concentrations of chemicals detected in the soil sample collected from the north-west side of the building with the highest PID reading. Average daily exposure doses were calculated for incidental ingestion of soil and skin contact with (Tables 14 and 15).

5.0 RISK EVALUATION

5.1 METHODS TO EVALUATE NONCARCINOGENIC AND CARCINOGENIC RISKS

A risk characterization evaluates current and reasonably foreseeable future health risks associated with site conditions. Risks associated with a site are characterized by integrating data developed in the Hazard Identification, Dose-Response Assessment and Exposure Assessment. Methodologies for evaluating noncarcinogenic health hazards and carcinogenic risks are presented below.

5.1.1 Estimation of Noncarcinogenic Risk

Noncarcinogenic effects are characterized in terms of a Hazard Index. This method assumes that there is an exposure below which adverse effects are not expected to occur (USEPA, 1989a). The Hazard Index is calculated for each noncarcinogenic constituent of concern by dividing the average daily exposure concentration (ADE) in mg/m^3 by the chemical-specific reference concentration (RfC), also in mg/m^3, as shown in the equation below

$$Hazard\ Index = \frac{ADE}{RfC}$$

or by dividing the average daily exposure dose (ADD) in mg/kg/day by the chemical-specific Reference Dose (RfD), also in mg/kg/day, as shown in the equation below.

$$Hazard\ Index = \frac{ADD}{RfD}$$

The Hazard Indices for each chemical are summed to yield a hazard index for that particular exposure pathway. Then for each receptor, hazard indices for each exposure pathway are summed to yield a total hazard index for the receptor. This hazard index is a screening hazard index. If the screening hazard index exceeds 1.0, then further evaluation is needed to classify chemicals into groups that share similar mechanisms of action. In this case, a separate hazard index is calculated for each group of chemicals that share similar mechanisms of action. If the hazard index for each group is less than 1.0, risks associated with exposure to the chemicals are not considered to be significant.

5.1.2 Estimation of Carcinogenic Risk

The potential for carcinogenic health effects is characterized in terms of an incremental lifetime cancer risk, an estimate of the incremental lifetime probability of an individual developing cancer above background cancer incidence. An incremental lifetime carcinogenic risk is calculated for each chemical in the inhalation pathway by multiplying the lifetime average daily exposure (ADE) in $\mu g/m^3$ by the chemical-specific Unit Risk in $(\mu g/m^3)^{-1}$ as shown in the equation below.

$$Risk = ADE \times Unit\ Risk$$

Likewise, the incremental lifetime cancer risk is calculated for each chemical in the ingestion and dermal exposure pathways by multiplying the lifetime average daily dose (ADD) in mg/kg/day by the chemical-specific cancer Slope Factor (SF) as shown in the equation below.

$$Risk = ADD \times SF$$

For each exposure pathway, the chemical-specific risks are summed together, then the risks for each exposure pathway are summed to yield a total risk for that particular medium. Finally, risks for all media of concern are summed to yield a total site risk for each receptor. A total incremental lifetime carcinogenic risk that does not exceed the acceptable total lifetime carcinogenic risk limit indicates that the exposure is unlikely to produce a significant risk of cancer above normal background rates. In accordance with the MCP, the acceptable lifetime carcinogenic risk limit is equal to 1×10^{-5} (*i.e.*, one in 100,000).

5.2 RISKS TO HUMAN HEALTH

The potential risks to human health were evaluated for each plausible exposure pathway identified in Section 4.0. The intent was to provide reasonable, but conservative, assessment of the degree of risk associated with exposure to the chemicals under current and reasonably foreseeable future conditions.

5.2.1 Employees

Under current and reasonably foreseeable future conditions, employees working at the facility could be exposed to VOCs that could volatilize from ground water or soil into indoor air. Employees could also be exposed to chemicals detected in surface soil. The total chronic hazard index for employees is less than one (0.08) (Table 16). The incremental lifetime carcinogenic risks is less than 1×10^{-5} (3.17×10^{-6}) (Table 17). Thus, conditions at the Site do not pose a significant risk of either noncarcinogenic or carcinogenic health effects to employees.

5.2.2 Trespassers

Under current and reasonably foreseeable future conditions, trespassers could be exposed to chemicals detected in surface soil. Exposure is unlikely, however, because the facility is located in

an industrial area and is surrounded by a chain link fence. Nevertheless, risks were quantified for older children who may trespass within the facility. The total chronic hazard index for these children is less than one (0.02) (Table 18). The incremental lifetime carcinogenic risks is less than 1×10^{-5} (9.15×10^{-8}) (Table 19). Thus, conditions at the Site do not pose a significant risk of either noncarcinogenic or carcinogenic health effects to children who may be exposed to impacted surface soil at the facility.

5.2.3 Construction Workers

Construction workers may be exposed to soil during future excavation activities via incidental ingestion and dermal contact with soil. The total subchronic hazard index is less than 1.0 (0.01) for workers who could be involved in a construction project in this area (Table 20). Table 21 shows that carcinogenic risks are also not significant for construction workers – 2.53×10^{-8} compared to 1×10^{-5}. Thus, conditions at the Site do not pose a significant risk of either noncarcinogenic or carcinogenic health effects to workers involved in construction work on the north-west side of the building.

Utility maintenance work could also occur on the property. In general, these activities take place over a day or two. This exposure is considered an acute exposure. Concentrations of chemicals detected at most disposal sites including this Site are generally not high enough to cause acute health effects. Thus, conditions at the Site do not pose a significant risk of either noncarcinogenic or carcinogenic health effects to workers involved in utility maintenance work.

5.3 RISKS TO SAFETY AND PUBLIC WELFARE

The risks associated with exposure to the chemicals of potential concern at the Site were evaluated in terms of safety, public welfare and the environment. Rusted drums and containers are not present on the Site, danger from fire or explosion from chemicals in the soil or the ground water is not present, and uncontained materials that may be corrosive, reactive or flammable are not present. Thus, conditions at the Site do not pose a risk to safety.

MADEP has developed Upper Concentration Limits (UCLs) for chemicals detected in ground water and soil. UCLs are concentrations established to protect public welfare and the environment from harm that could potentially occur in the future if these concentrations are exceeded (MCP, 1999).

Concentrations of chemicals detected in ground water were compared to UCLs (Table 22). Average concentrations of VOCs detected up gradient of the facility do not exceed their respective UCLs. Concentrations of 1,1,1-trichloroethane and toluene detected in monitoring well MW-4, which is located near the former catchbasin/sump in the south-east side of the building, exceed UCLs. Average concentrations of VOCs detected in two monitoring wells (GZA-4 and WE-3), which are located down gradient of monitoring well MW-4, do not exceed their respective UCLs. Because the concentrations of 1,1,1-trichloroethane and toluene exceed UCLs in the vicinity of monitoring well MW-4, ground water conditions at the Site may pose an unacceptable risk to public welfare and the environment in the future.

Concentrations of chemicals detected in soil on the north-west side of the building were compared to UCLs (Tables 23). The results indicate that concentrations of chemicals detected in soil are below UCLs. Thus, soil conditions at the Site do not pose an unacceptable risk to public welfare and the environment in the future.

6.0 SOURCES OF UNCERTAINTY

Uncertainty is inherent to each stage of the risk characterization process. It is therefore important to identify those uncertainties most critical to the evaluation and to consider their potential impact on the estimation of total site risk because a meaningful risk assessment is a tool for managing anticipated on-site activities. Many kinds of uncertainty enter into the calculation of carcinogenic and noncarcinogenic health risks. Decisions will be made based on a future use scenario, the estimated toxicity of the chemicals of concern, and estimated chemical concentrations in on-site media. Each of these three components is uncertain. First, actual future uses are likely to deviate from current assumptions about who will be on Site, where they will be active, how they will be exposed to the chemical, how long they will be exposed, how repeatedly, and so on. Second, the estimated toxicities are uncertain due to uncertainties in the toxicological data. Third, the chemical concentrations detected in media are uncertain because they are estimated from samples and there are random fluctuations in analytical results due to variations in sampling and analytical procedures. Standard practice in human health risk assessment adopts safety factors to deal with almost every form of uncertainty. The resulting safety factor is so large that levels of risks are certain to be overestimated by orders of magnitude.

A large component of uncertainty arises from the inability to predict future use scenarios. No one can precisely predict the duration or frequency of exposure, the soil ingestion rates, the skin surface area and the body weights of exposed receptors, chemical absorption rates, and the fraction of time spent in the areas of highest chemical concentrations. This creates a level of uncertainty in estimating health risks that can result in either overestimation or underestimation of health risks. One approach to address uncertainty in estimating risks is to use health-protective or conservative assumptions in developing remedial goals. Health-protective assumptions are those that systematically overstate the magnitude of health risks to ensure protection of public health. For example, it was assumed that older children would visit the industrial facility and contact

impacted surface soil two days per week during spring, summer and fall. This frequency of exposure is likely to overestimate a realistic exposure frequency because children are very unlikely to be present in this industrial section of Lowell, the facility is surrounded by a chain link fence and impacted soil is limited to a very small portion of the property. Likewise, it was assumed that employees would have routine contact with the impacted soil in this area; however, it is very unlikely that they would visit this small area between the building and River Meadows Brook. The area is not located in an area of the facility where routine activities occur; it is covered with brush and it is, in general, not a desirable place to spend significant amounts of time. It was also assumed that a six-month construction project would take place at the facility and that exposure to soil would occur only in the limited area where soil is impacted. All of these assumptions are likely to significantly overestimate risks to these receptors.

Traditionally, the concern with uncertainty in risk assessment procedures stems from exposure assessment methods; however, the uncertainty associated with the exposure parameters seldom spans more than one or two orders of magnitude (10- to 100-fold). In contrast, the assumptions used to evaluate the toxicity of chemicals, rather than exposure, may represent the greatest sources of uncertainty. For example, the extrapolation of cancer potency from laboratory animals to humans, which forms the basis for the cancer risk estimates, may be associated with uncertainties ranging from three to five orders of magnitude (1,000- to 100,000-fold) for selected chemicals. Two general assumptions influence the uncertainty associated with toxicity values developed for chemicals: the assumption that cancer risks are linearly related to exposure (*i.e.*, that carcinogenic effects have no thresholds) and the assumption that exposure variables and toxicity constants formulated for lifetime cancer risks are applicable for less than lifetime (subchronic) exposures. In addition, it is assumed that values for different chemicals are additive and that values for chemical surrogates are reasonable. To put this more concretely, the step from observing tumors in rats fed high doses of trichloroethene to estimating potential harm to an adult intermittently exposed to part-per-billion levels of trichloroethene in air is a very long one. To ensure human health and safety, standard practice and regulation require that toxicity values reflect "worst-case" results. For most chemicals, actual results — expected ones, in the statistical sense — are likely to result in three to five orders of magnitude less risk than estimates here.

Exposure point concentrations are uncertain because they are based on laboratory analyses of samples or they are based on mathematical models. Exposure point concentrations are dependent on the quality and nature of the sampling data from the site characterization. Sampling bias to areas where higher concentrations are expected or selection of specific analytical methodologies may affect the representativeness of the data. The true concentrations of these samples are probably different from those reported by the laboratory, because analytical results inherently fluctuate randomly about the true concentration. The true values are likely to be within a factor or two of the reported ones.

In summary, risk is characterized by combining assumptions regarding the level of contamination, the exposure scenario and the toxic potency of the chemical. Since conservative assumptions are used throughout the process, the uncertainties associated with each of these assumptions become multiplicative, which generally results in an overall extremely conservative risk estimate.

7.0 STAGE 1 ENVIRONMENTAL SCREENING

A Stage I Environmental Screening Risk Assessment was conducted for River Meadows Brook, located approximately 30 feet north-west of the facility. It was performed in accordance with Regulation 40.0900 of the MCP. Subpart I of the MCP calls for completion of a Stage I Environmental Screening Risk Assessment for all sites where current and reasonably foreseeable site activities and uses by environmental receptors (*e.g.*, foraging by wildlife and support of plant or wildlife populations) have been identified unless response actions have successfully reduced concentrations of chemicals in environmental media to background levels.

The objective of a Stage I Environmental Screening is to identify whether exposure pathways may require further quantitative assessment (*i.e.*, Stage II Environmental Assessment). Exposure pathways may be eliminated if 1) significant risk is readily apparent (therefore additional assessment would not yield additional useful data); or 2) an exposure pathway is incomplete because environmental receptors would not be exposed (therefore receptors would not be at risk of harmful effects); or 3) an exposure pathway is complete, but does not pose a significant risk.

The general procedures include a review of analytical data indicating contamination of surface water or sediment, an evaluation of the potential for transport of contamination to receptors, identification of environmental receptors, and an evaluation of current or potential future exposure to environmental receptors. If potential current or future exposure is not identified, then a condition of no significant risk exists at the site. If potential exposure is identified, then the site conditions are evaluated to determine whether significant environmental harm is apparent.

Laboratory analytical data indicate that VOCs are present in surface soil on the north-west side of the building. Laboratory analytical data also indicate that low concentrations of VOCs are also

present in surface water. Because potential exposure of terrestrial and aquatic receptors was identified, the potential for harm was evaluated further.

To evaluate whether compounds detected in soil at the Site represent a significant risk to the environment, the size and the quality of the habitat were considered. First, the size of area that is impacted is limited to a small area approximately 2,000 square feet in size. Second, the property is located in an industrial area. Moreover, potential receptors of special concern were not identified at the Site. The Commonwealth of Massachusetts Natural Heritage & Endangered Species Program compiles an Atlas containing maps of Estimated Habitats of Rare Wetlands Wildlife and Certified Vernal Pools, and High Priority Sites of Rare Species Habitats and Exemplary Natural Communities (Massachusetts Division of Fisheries & Wildlife, 2000-2001. The Site is not identified as one of these areas of concern. The Commonwealth of Massachusetts also designates Areas of Critical Environmental Concern to protect and preserve critical areas of environmental significance. The Site is not within an Area of Critical Environmental Concern. Therefore, based on the size and quality of the potential habitat and the types of receptors likely to be present, chemicals present in soil do not present an unacceptable risk to the environment (MADEP, 1995).

Sediment samples were not collected from the brook because the physical properties of VOCs (*i.e.*, high water solubilities and very low k_{oc}s) make it unlikely that VOCs would be present in sediment. Rather it is more likely that they would remain in water unless very high concentrations in excess of their solubilities were present in ground water or surface water. Since the concentrations of these chemicals detected in ground water near the brook and in surface water were well below their solubility limits, the potential for impacts to sediment is very low.

Laboratory analytical data indicate that low concentrations of VOCs are present in surface water. Because potential exposure was identified, the potential for harm was evaluated further. Surface water samples were collected from River Meadows Brook and analyzed for VOCs. One sample was collected up gradient of the facility and one sample was collected adjacent to the facility approximately 30 feet down gradient of monitoring well GZA-4. Low concentrations of 1,1-dichlorotehane, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, and cis-1,2-

dichloroethene were detected in the sample collected adjacent to the facility. Approximately the same concentrations of trichloroethene, tetrachloroethene, and cis-1,2-dichloroethene were also detected in the sample collected up gradient of the facility (Table 4).

To estimate potential effects of concentrations of chemicals detected in surface water, surface water concentrations were compared to water quality benchmarks. The benchmarks were assumed to be concentrations below which an organism could be exposed without producing any adverse effects. If surface water concentrations are less than the water quality benchmark, then the exposure pathway is not considered significant (MADEP, 1995). Water Quality Benchmarks from the following sources were used: Water Quality Criteria or chronic "lowest observable effects levels" (LOELs) published by USEPA (1986a); benchmarks published by Suter and Tsao (1996) for the US Department of Energy; benchmarks developed by MADEP (MCP, 1999); or 30-day "No Effect" Levels, cited in a Quantitative Structure Activity Relationship database developed by USEPA and Montana State University, Institute for Biological and Chemical Process Analysis (QSAR). This database estimates chronic aquatic toxicity (30-day "No Effect" level) for organic compounds using information provided in USEPA's AQUIRE database. The AQUIRE database is a comprehensive compilation of aquatic toxicity test results for both plants and animals.

Acute Water Quality Criteria are calculated by the USEPA based on half the final acute values (which are the fifth percentile of the distribution of 48- to 96-hour LC50s[5]). Chronic Water Quality Criteria are calculated from the geometric mean of at least three LC50/Chronic Value ratios. Benchmarks published by Suter and Tsao include Tier II values, which are benchmarks established with fewer data than are required to establish National Ambient Water Quality Criteria, but are expected to be higher than Ambient Water Quality Criteria in no more than 20% of the cases; Lowest Chronic Values for fish, invertebrates and plants, which are the Chronic Values that are used to calculate the National Chronic Ambient Water Quality Criteria; the Population EC20, which is an estimate of the continuous concentration that would cause a 20% reduction in the recruit abundance of large mouth bass; the EC20 test for fish or daphnids, which

5 LC50s are concentrations that are lethal to 50% of the test animals.

is a benchmark intended to be an index of population production, and the Sensitive Species EC20, which is calculated in the same manner as the National Ambient Water Quality Criteria except the test EC20s are used instead of Chronic Values.

The MADEP developed benchmarks for surface water to establish ground water standards that are intended to provide protection against migration and eventual discharge of contaminants in ground water to surface water (MCP, 1999). The standards were based on National Ambient Water Quality Criteria, an analogous value, or a ceiling concentration. A dilution/attenuation factor was applied to the acceptable surface water criterion to yield a ground water standard. Therefore if the dilution/attenuation factor is removed, then a corresponding acceptable surface water concentration may be calculated.

The following water quality benchmarks were used:

1,2-Dichloroethenes

Available data for fresh water species indicate that acute toxicity for dichloroethenes may occur at concentrations above 11,600 µg/liter (USEPA, 1986a). Chronic data are unavailable. The USEPA has not established a criterion, but has presented a LOEL equal to 11,600 µg/liter. A Tier II Secondary Chronic Value was established, which is equal to 31.2 µg/liter, and the lowest EC20 for fish is estimated to be 5,719 µg/liter. The Lowest Chronic Value for fish is estimated to be 9,538 µg/liter. Analogous values were obtained from a QSAR database. The 30-day chronic "No-effect" level for aquatic species was estimated to be 26,295 µg/liter for both cis- and trans-1,2-dichloroethene. Applying a safety factor of 10 to the acute LOEL to estimate a chronic LOEL, the benchmark for cis-1,2-dichloroethene used in this assessment is 1,160 µg/liter.

Tetrachloroethene

Available data for fresh water species indicate that acute toxicity may occur at concentrations above 5,280 µg/liter and that chronic toxicity may occur at concentrations above 840 µg/liter

(USEPA, 1986a). The USEPA has not established criteria, but has presented an acute LOEL equal to 5,280µg/liter and a chronic LOEL equal to 840 µg/liter. A Tier II Secondary Chronic Value was established, which is equal to 125 µg/liter; the lowest EC20 for fish is 500 µg/liter; the lowest EC20 for daphnids is 510 µg/liter; and a Population EC20 is 50 µg/liter. The Lowest Chronic Values for fish, daphnids and plants are 840 µg/liter, 750 µg/liter and >816,000 µg/liter, respectively. An analogous value was obtained from the QSAR database. The 30-day chronic "No-effect" level for aquatic species was estimated to be 5,878 µg/liter. The benchmark used in this assessment is 840 µg/liter.

1,1,1-Trichloroethane

Available data for fresh water species indicate that acute toxicity may occur at concentrations of trichloroethanes above 18,000 µg/liter (USEPA, 1986a). Chronic data are unavailable. The USEPA has not established a criterion but has presented a LOEL equal to 18,000 µg/liter. A Tier II Secondary Chronic Value was established, which is equal to 62.1 µg/liter; the lowest EC20 for fish was estimated to be 2,457 µg/liter; the lowest EC20 for daphnids is 1,300 µg/liter; and a Population EC20 is equal to 251 µg/liter. The Lowest Chronic Values for fish, daphnids and plants are estimated to be 3,493 µg/liter, 1,770 µg/liter and >669,000 µg/liter, respectively. An analogous value was obtained from the QSAR database. The 30-day chronic "No-effect" level for aquatic species was estimated to be 21,524 µg/liter. Applying a safety factor of 10 to the acute LOEL to estimate a chronic LOEL, the benchmark used in this assessment is 1,800 µg/liter.

Trichloroethene

Available data for fresh water species indicate that acute toxicity may occur at concentrations above 45,000 µg/liter and that chronic toxicity may occur at concentrations above 21,900 µg/liter (USEPA, 1986a). The USEPA has not established criteria, but has presented these concentrations as LOELs. A Tier II Secondary Chronic Value was established, which is equal to 465 µg/liter; the lowest EC20 for fish is 5,758 µg/liter; and a Population EC20 is 232 µg/liter. The lowest Chronic Values for fish and daphnids are estimated to be 14,867 µg/liter and 7257

µg/liter, respectively. An analogous value was obtained from the QSAR database. The 30-day chronic "No-effect" level for aquatic species was estimated to be 13,632 µg/liter. The benchmark used in this assessment is 21,900 µg/liter based on the lowest available fresh water LOEL.

1,1-Dichloroethane

The USEPA has not established acute or chronic water quality criteria for 1,1-dichloroethane. A Tier II Secondary Chronic Value was established, which is equal to 46.6 µg/liter, the lowest EC20 for fish was estimated to be 8219 µg/liter and a Population EC20 is equal to 1585 µg/liter. The Lowest Chronic Value for fish is estimated to be 14,680 µg/liter. An analogous value was obtained from a QSAR database. The 30-day chronic "No-effect" level for aquatic species was estimated to be 112,000 µg/liter. The benchmark for 1,1-dichloroethane used in this assessment is 46.6 µg/liter.

The potential for risks to species exposed to VOCs detected in surface water in the streams was evaluated by comparing the concentrations of VOCs detected to their respective toxicity benchmarks. Table 24 presents the results. Concentrations of VOCs were well below their respective benchmarks, indicating that these concentrations are unlikely to result in adverse impact to receptors potentially exposed to VOCs in River Meadows Brook. Since these exposure pathways do not pose a significant risk, a Stage II Environmental Assessment is not necessary.

8.0 SUMMARY

A Method 3 Risk Assessment was performed to evaluate potential risks to human health and the environment under current and reasonably foreseeable future conditions. The risk assessment was performed in accordance with the MCP (1999) using the MADEP guidance document, *Guidance for Disposal Site Risk Characterization — In Support of the Massachusetts Contingency Plan* (MADEP, 1995), the MADEP document *Background Documentation for the Development of the MCP Numerical Standards* (MADEP, 1994), and, where appropriate, USEPA guidance documents. The detailed evaluation of human health risks was divided into four major sections: hazard identification, dose-response assessment, exposure assessment, and risk characterization. Risks were evaluated with respect to exposure to chemicals detected in soil, ground water, indoor air, and surface water.

The hazard identification section describes the procedures used to identify chemicals of concern. The Site is impacted primarily with VOCs in ground water and in a limited area of surface soil on the north-west side of the facility building. Exposure scenarios were described, exposure concentrations and doses were calculated and risks were evaluated for the following:

- Employees working at the facility, who may be exposed to VOCs that could migrate from ground water into indoor air and to VOCs detected in surface soil on the north-west side of the building;

- Trespassers, who could be exposed to VOCs detected in surface soil on the north-west side of the building; and

- Construction workers, who may be exposed to VOCs detected in surface soil on the north-west side of the building.

Noncarcinogenic health hazards are evaluated by dividing the average daily exposure concentrations or doses by appropriate chemical-specific Reference Concentrations or Doses. Lifetime carcinogenic risks are estimated by multiplying the average daily exposure concentrations

or doses by chemical-specific Inhalation Unit Risks (in the case of inhalation exposures) or Slope Factors (in the case of ingestion or dermal contact).

The primary exposure pathways for employees working at the building are potential inhalation of VOCs in indoor air and direct contact with VOCs detected in soil. Under current and future conditions, a condition of no significant risk exists for employees.

Older children (trespassers) could visit the facility and contact impacted surface soil. The primary exposure pathways for trespassers are ingestion of soil and skin contact with soil. Under current and future conditions, a condition of no significant risk exists for trespassers.

Under future conditions, it was assumed that construction work may be performed on the Site. Risks were evaluated for potential future construction workers who could contact impacted soil during excavation activities. Results show that impacted soil does not pose a significant risk of noncarcinogenic or carcinogenic health effects to construction workers.

The risks associated with exposure to the chemicals of potential concern at the Site were also evaluated in terms of safety, public welfare and the environment. Conditions at the Site do not pose a risk to safety. To evaluate potential future harm to public welfare and the environment, average concentrations or chemicals detected in soil and ground water were compared to UCLs. Concentrations of VOCs detected in soil do not exceed UCLs. Concentrations of 1,1,1-trichloroethane and toluene detected in ground water samples from monitoring well MW-4 exceed their respective UCLs. Monitoring well MW-4 is in the location of the former catchbasin/sump in the south-east portion of the building (i.e., AOC #3). Because concentrations of VOCs in the vicinity of monitoring well MW-4 exceed UCLs, these conditions were considered to pose an unacceptable risk to public welfare and the environment in the future.

In summary, this risk assessment was performed to evaluate current and reasonably foreseeable future risk to human health and the environment. Based on the results of the human health and environmental risk assessment, No Significant Risk exists at this Site. This assessment assumes

that facility will remain a commercial or industrial property. Although a condition of No Significant Risk exists, because concentrations of 1,1,1-trichloroethane and toluene detected in ground water exceed UCLs, conditions at the Site may pose an unacceptable risk to public welfare and the environment in the future. Thus, although No Substantial Hazard exists at this Site, a Permanent Solution cannot currently be achieved.

9.0 LIMITATIONS

Reasonable care was used in performing all the analyses in this report. The analyses were based on information available at the time of the project and on the assumption that the information provided (such as the sampling and analytical data) is accurate and reliable. The analyses assume that the laboratory analytical data were checked for QA/QC requirements. If additional information becomes available after the completion of this report, if the current or anticipated future uses of the property change after the submission of this report, or if the state and federal agencies change their procedures or their estimates of toxicological properties, then the report will need to be reviewed for appropriateness and accuracy in light of the new information.

10.0 REFERENCES

ACGIH. 1991. American Conference of Governmental and Industrial Hygienists. *Documentation of the Threshold limit Values and Biological Exposure Indicies*. Sixth Edition. Cincinnati, Ohio.

Agency for Toxic Substances and Disease Registry 1994. Toxicological Profile for Acetone. PB-95-100095.

Agency for Toxic Substances and Disease Registry 1995. Toxicological Profile for Benzene (Update).

Agency for Toxic Substances and Disease Registry 1990. Toxicological Profile for 1,1-Dichloroethane. PB-91-180539.

Agency for Toxic Substances and Disease Registry 1994. *Toxicological Profile for 1,1-Dichloroethene*. PB-95-100152.

Agency for Toxic Substances and Disease Registry 1994. Toxicological Profile for 1,2-Dichloroethene (Update)

Agency for Toxic Substances and Disease Registry 1990. Toxicological Profile for Ethylbenzene. PB-91-180372.

Agency for Toxic Substances and Disease Registry 1989. Toxicological Profile for Methylene Chloride. PB90-194468.

Agency for Toxic Substances and Disease Registry 1995. Toxicological Profile for Naphthalene (update).

Agency for Toxic Substances and Disease Registry 1995. Draft Toxicological Profile for Tetrachloroethene.

Agency for Toxic Substances and Disease Registry. 1994. Toxicological Profile for Toluene. PB95-100228.

Agency for Toxic Substances and Disease Registry 1995. Toxicological Profile for 1,1,1-Trichloroethane (Update).

Agency for Toxic Substances and Disease Registry 1995. Draft Toxicological Profile for Trichloroethene.

Agency for Toxic Substances and Disease Registry 1995. Toxicological Profile for Xylenes. (Update).

Brubaker, G.R. 1989. *Screening Criteria for In Situ Bioreclamation of Contaminated Aquifers.* Proceedings for Hazardous Wastes and Hazardous Materials, HMCRI, New Orleans, pp. 319-321.

Clayton, G.D. and Clayton, F.E. 1994. *Patty's Industrial Hygiene and Toxicology.* Volume II, 4th Edition. John Wiley & Sons, Inc., New York.

Dames & Moore/URS. 2001. *MCP Phase II Comprehensive Site Assessment Report*, Jones Environmental Services, Inc. 263 Howard Street, Lowell, Massachusetts.

Health Effects Summary Tables (HEAST). 1992. United States Environmental Protection Agency.

Howard, P.H. 1990. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals.* Volumes I and II. Lewis Publishers, Inc., Chelsea, Michigan.

Integrated Risk Information System (IRIS). United States Environmental Protection Agency.

Hazardous Substance Database (HSDB). United States Environmental Protection Agency.

IARC. 1995. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 63 Dry Cleaning, Some Chlorinated Solvents and Other Industrial Chemicals.* International Agency for Research on Cancer. Lyon, France.

Massachusetts Department of Environmental Protection 1992. *User's Guide Risk Assessment Shortform Residential Exposure Scenario*, Version 1.6, Policy #WSC/ORS-142-92.

Massachusetts Department of Environmental Protection 1994. *Background Documentation for the Development of the MCP Numerical Standards*, dated April 1994.

Massachusetts Department of Environmental Protection 1995. *Guidance for Disposal Site Risk Characterization — In Support of the Massachusetts Contingency Plan.*

Massachusetts Department of Environmental Protection 1996. *Draft Commercial/Industrial Shortform.*

Massachusetts Contingency Plan. 1999. 310 CMR 40.0000.

United States Environmental Protection Agency 1986. *Superfund Public Health Evaluation Manual.* Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-86/060.

United States Environmental Protection Agency 1989a. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), Interim Final.* Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002.

United States Environmental Protection Agency 1989b. *Supplemental Risk Assessment Guidance for the Superfund Program, Draft Final.* Region 1. USEPA901/5-89-001.

United States Environmental Protection Agency 1989c. *Interim Methods for Development of Inhalation Reference Doses.* Office of Health and Environmental Assessment, Washington, D.C. EPA/600/8-88/066F.

United States Environmental Protection Agency 1990. *Criteria Document for the Dichloroethenes.* PB91-143396.

United States Environmental Protectiôn Agency 1990a. *Exposure Factors Handbook.* March, 1990.

United States Environmental Protection Agency 1991. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance "Standard Default Exposure Factors".* Interim Final. OSWER Directive: 9285.6-03.

United States Environmental Protection Agency. 1992. Health Risk Technical Support Center.

United States Environmental Protection Agency 1992. Dermal Exposure Assessment: Principles and Applications. Office of Research and Development, Washington, D.C. EPA/600/8-91/011B.

United States Environmental Protection Agency 1993a. *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic hydrocarbons.* Office of Research and Development, Washington, D.C. EPA/600/R-93/089.

United States Environmental Protection Agency 1997a. Exposure Factors Handbook, Volume III. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fc.

United States Environmental Protection Agency 1997b. Toxicological Review of Cumene. In Support of Summary Information on the Integrated Risk Information System. Washington, D.C.

Wehran Engineering. 1985. *Report on Subsurface Investigations at the GeoChem, Inc. Site in Lowell, Massachusetts.* 263 Howard Street, Lowell, Massachusetts.

'11.0 TABLES

TAB.. 1

GROUND WATER ANALYTICAL DATA SUMMARY
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	UP GRADIENT			AOC #3 FORMER CATCHBASIN/SUMP	DOWN GRADIENT		
	FREQUENCY OF DETECTION	MAXIMUM CONCENTRATION (ug/l)	AVERAGE CONCENTRATION (ug/l)	CONCENTRATION[2] (mg/l)	FREQUENCY OF DETECTION	MAXIMUM CONCENTRATION (ug/l)	AVERAGE CONCENTRATION[3] (ug/l)
Volatile organic compounds							
1,1-Dichloroethene	2 / 4	56	25.13	<7,500	1 / 2	160	80.38
1,1-Dichloroethane	2 / 4	190	67.38	24,000	1 / 2	1800	900.38
1,1,1-Trichloroethane	4 / 4	1100	323.05	360,000	2 / 2	2200	1128.00
Trichloroethene	3 / 4	530	133.64	84,000	2 / 2	70	66.00
Methylene Chloride	0 / 4	<5.0		<25,000	1 / 2	290	146.25
1,2-dichloroethane	0 / 4	<1.0		<5,000	0 / 2	<1.0	
Tetrachloroethene	1 / 4	38	10.06	6,700	1 / 2	19	19.00
Toluene	0 / 4	<1.5		120,000	1 / 2	690	345.38
Ethylbenzene	0 / 4	<1.0		<5,000	0 / 2	<1.0	
Xylenes	1 / 4	10	3.19	<5,000	1 / 2	71	35.75
Chloroethane	0 / 4	<2.0		<50,000	1 / 2	900	450.50
cis-1,2-Dichloroethene	1 / 4	110	28.06	11,000	1 / 2	1500	750.25
Vinyl Chloride	0 / 4	<2.0		<5,000	1 / 2	190	95.50

1 Includes samples collected from monitoring wells MW-5, URS-1, URS-2, and URS-3 in September 2000.
2 Includes the sample collected from monitoring well MW-4 in September 2000.
3 Includes samples collected from monitoring wells GZA-4 and WE-3 in September 2000.

TAB

COMPARISON OF PREVIOUS GROUND WATER CONCENTRATIONS TO CURRENT CONDITIONS
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	MW-4 1987 mg/l	MW-4 Sep-00 mg/l	GZA-4 Jul-85 mg/l	GZA-4 Sep-00 mg/l	WE-3 Jul-85 mg/l	WE-3 1987 mg/l	WE-3 Mar-94 mg/l	WE-3 Sep-00 mg/l
Volatile organic compounds								
1,1-Dichloroethene	7.4	ND	ND	0.16	ND	0.002	ND	ND
1,1-Dichloroethane	2.4	24	ND	1.8	ND	0.001	ND	ND
1,1,1-Trichloroethane	490	360	270	2.2	0.04	0.081	0.005	0.056
Trichloroethene	5.9	84	39	0.062	0.02	0.026	ND	0.07
Methylene Chloride	ND	ND	58	0.29	ND	0.013	ND	ND
1,2-Dichloroethane	7.2	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	7.2	6.7	ND	ND	0.01	0.01	ND	0.019
Trichlorofluoromethane	0.5	ND	ND	ND	ND	ND	ND	ND
Toluene	140	120	14	0.69	ND	ND	ND	ND
Ethylbenzene	1.6	ND	ND	ND	ND	ND	ND	ND
Xylenes	7.6	ND	ND	0.071	ND	ND	ND	ND
Chloroethane	NR	ND	NR	0.9	NR	NR	NR	ND
cis-1,2-Dichloroethene	NR	11	NR	1.5	NR	NR	NR	ND
Vinyl Chloride	NR	ND	NR	0.19	NR	NR	NR	ND

ND = Not detected
NR = Not reported

TABLE 3

COMPARISON OF SOIL CONCENTRATIONS TO LEACHING-BASED SOIL CONCENTRATIONS
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

		LEACHING-BASED SOIL CONCENTRATIONS*	
	SS-1 (mg/kg)	GW-2 (mg/kg)	GW-3 (mg/kg)
Volatile organic compounds			
Acetone	0.071	58	58
1,1-Dichloroethene	0.34	0.1	5160
1,1-Dichloroethane	0.15	390	2169
cis-1,2-Dichloroethene	0.038	NA	1673
1,1,1-Trichloroethane	4	678	8472
Trichloroethene	45	23	1544
Tetrachloroethene	2	271	452
Methylene chloride	0.097	1063	1063
Toluene	0.3	518	4314
Ethylbenzene	0.074	3502	467
Xylenes	0.62	497	4142
Isopropylbenzene	0.045	NA	NA
n-Propylbenzene	0.057	NA	NA
1,3,5-Trimethylbenzene	0.069	NA	NA
1,2,4-Trimethylbenzene	0.24	NA	NA
Naphthalene	1	1327	1327
Benzene	0.056	96	335

NA = Non available
* MADEP, 1994.

TABLE 4

SURFACE WATER ANALYTICAL DATA
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	DOWN STREAM SW-1 (ug/l)	UP STREAM SW-2 (ug/l)
Volatile organic compounds		
1,1-Dichloroethene	<1.5	<1.5
1,1-Dichloroethane	2.7	<1.5
1,1,1-Trichloroethane	4.7	<1.0
Trichloroethene	4.4	5.4
Methylene Chloride	<5.0	<5.0
1,2-Dichloroethane	<1.0	<1.0
Tetrachloroethene	1.2	1.4
Trichlorofluoromethane	NA	NA
Toluene	<1.5	<1.5
Ethylbenzene	<1.0	<1.0
Xylenes	<1.0	<1.0
Chloroethane	<2.0	<2.0
cis-1,2-Dichloroethene	4	2.5
Vinyl Chloride	<2.0	<2.0

NA = Not analyzed.
Samples collected in September 2000.

TABLE 5

INDOOR AIR ANALTYICAL DATA SUMMARY
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	SE Corner Oct-00 (ug/m^3)	SE Corner Mar-01 (ug/m^3)	NW Corner Oct-00 (ug/m^3)	NW Corner Mar-01 (ug/m^3)
Volatile organic compounds				
1,1,1-Trichloroethane	150	51	140	38
1,1-Dichloroethane	7.2	<3.6	6.3	<3.6
2-Butanone	17	<10	22	<10
Acetone	71	31	71	26
Benzene	8	<2.8	7.4	<2.8
Ethyl Benzene	7.7	<3.9	8.1	<3.9
Freon	<4.4	<4.4	<4.4	<4.4
Methylene chloride	20	<3.1	19	<3.1
m,p-Xylenes	27	6.6	27	7.5
o-Xylene	9.8	<3.9	8.1	<3.9
Styrene	5.2	<3.8	<3.8	<3.8
Tetrachloroethene	17	<6	16	<6
Toluene	41	7.8	39	7.2
Trichloroethene	120	26	110	20

TABL.. .

HUMAN HEALTH-BASED TOXICITY VALUES
23 HOWARD STREET
LOWELL, MASSACHUSETTS

	Subchronic RfD (mg/kg/day)		Chronic RfD (mg/kg/day)		Target Organ	RfC (mg/m³)		Target Organ	Oral SF (mg/kg/day)$^{-1}$		Inhalation Unit Risk (ug/m³)$^{-1}$		CLASS
Volatile organic compounds													
trichloroethane, 1,1,1-	9.00E-01	b	9.00E-02	b	liver	1.00E+00	b						D
acetone	1.00E+00	b	1.00E-01		liver, kidney	8.00E-01	a						D
xylenes (total)	4.00E+00		2.00E+00		decreased body weight	3.00E-01	b						D
toluene	2.00E+00	b	2.00E-01		liver, kidney	4.00E-01		nervous system					D
trichloroethene	2.00E-02	a	2.00E-03	a	liver	1.80E-01	a		1.10E-02	c	1.70E-06	c	C/B2
1,1-dichloroethene	9.00E-03		9.00E-03		liver	5.00E-03	a		6.00E-01		5.00E-05		C
dichloroethane, 1,1-	1.00E+00	b	1.00E-01	b	kidney	5.00E-01	b	kidney					C
methylene chloride	6.00E-02	b	6.00E-02		liver	3.00E+00	b		7.50E-03		4.70E-07		B2
tetrachloroethene	1.00E-01	b	1.00E-02		liver	4.60E+00	a		5.20E-02	c	5.80E-07	c	C/B2
ethylbenzene	1.00E+00	b	1.00E-01		liver, kidney	1.00E+00		developmental					D
cis-1,2-dichloroethene	1.00E-01		1.00E-02	b	blood	3.50E-02	d						D
isopropyl benzene			1.00E-01		liver, kidney	4.00E-01		kidney					
n-propyl benzene			1.00E-01	e		4.00E-01	e						
1,3,5-trimethylbenzene	4.00E+00	e	2.00E+00	e	blood	3.00E-01	e						
1,2,4-trimethylbenzene	4.00E+00	e	2.00E+00	e		3.00E-01	e	liver					
naphthalene			2.00E-02		decreased body weight	3.00E-03		respiratory tract hyperplasia					
benzene	5.00E-02	a	5.00E-03	a	immune	9.00E-03	a		2.90E-02		8.30E-06		A

NOTES:
All data cited from IRIS unless indicated otherwise
a MADEP 1994
b HEAST 1992 ; 1995.
c Health Risk Technical Support Center, USEPA 1994
d Not available, therefore calculated from RfD
e Based on a structurally-similar compound.
NA = Data unavailable for quantitative risk assessment.
NOEL - No observable effects level.

TABLE 7

EXPOSURE POINT CONCENTRATIONS IN INDOOR AIR
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	EXPOSURE POINT CONCENTRATIONS (ug/m^3)
Volatile organic compounds	
1,1,1-Trichloroethane	44.5
Acetone	28.5
Xylenes	7.05
Toluene	7.5
Trichloroethene	23

TABLE 8

EXPOSURE POINT CONCENTRATIONS IN SOIL
JONES ENVIRONMENTAL, INC.
LOWELL, MASSACHUSETTS

	EXPOSURE POINT CONCENTRATIONS (mg/kg)
Volatile organic compounds	
1,1,1-Trichloroethane	4
Acetone	0.071
Xylenes	0.62
Toluene	0.3
Trichloroethene	45
1,1-Dichloroethene	0.34
1,1-Dichloroethane	0.15
Methylene chloride	0.097
Tetrachloroethene	2
Ethylbenzene	0.074
cis-1,2-Dichloroethene	0.038
Isopropylbenzene	0.045
n-Propylbenzene	0.057
1,3,5-Trimethylbenzene	0.069
1,2,4-Trimethylbenzene	0.24
Naphthalene	1
Benzene	0.056

TABLE 9

AVERAGE DAILY EXPOSURE CONCENTRATIONS - INHALATION OF INDOOR AIR
COMMERCIAL SCENARIO
263 HOWARD STREET
LOWELL, MASSACHUSETTS

	Indoor Air Concentration (ug/m^3)	EF (hr/d)	ED (d/y)	EP (yr)	C_1 (d/hr)	C_2 (yr/d))	AP (yr)	ADE (mg/m^3)	AP (yr)	ADE (ug/m^3)
Volatile organic compounds										
trichloroethane, 1,1,1-	44.50	8	250	25	0.042	0.003	25	1.02E-02		
acetone	28.50	8	250	25	0.042	0.003	25	6.51E-03		
xylenes (total)	7.05	8	250	25	0.042	0.003	25	1.61E-03		
toluene	7.50	8	250	25	0.042	0.003	25	1.71E-03		
trichloroethene	23.00	8	250	25	0.042	0.003	25	5.25E-03	75	1.75E+00

TABLE 10

AVERAGE DAILY EXPOSURE DOSES -- INGESTION OF SOIL
COMMERCIAL SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

CHEMICALS	Exposure Point Concentration (mg/kg)	IR (mg/d)	RAF	EF (d/yr)	EP (yr)	C1 (kg/mg)	BW (kg)	C2 (d/yr)	AP (yr)	ADD (mg/kg/d)	AP (yr)	LADD (mg/kg/d)
Volatile organic compounds												
1,1,1-Trichloroethane	4	50	1.00	129	25	1.00E-06	70	365	25	1.01E-06		
Acetone	0.071	50	1.00	129	25	1.00E-06	70	365	25	1.79E-08		
Xylenes	0.62	50	1.00	129	25	1.00E-06	70	365	25	1.57E-07		
Toluene	0.3	50	1.00	129	25	1.00E-06	70	365	25	7.57E-08		
Trichloroethene	45	50	1.00	129	25	1.00E-06	70	365	25	1.14E-05	75	3.79E-06
1,1-Dichloroethene	0.34	50	1.00	129	25	1.00E-06	70	365	25	8.58E-08		
1,1-Dichloroethane	0.15	50	1.30	129	25	1.00E-06	70	365	25	4.92E-08		
Methylene chloride	0.097	50	1.00	129	25	1.00E-06	70	365	25	2.45E-08	75	8.16E-09
Tetrachloroethene	2	50	1.00	129	25	1.00E-06	70	365	25	5.30E-07	75	1.77E-07
Ethylbenzene	0.074	50	1.00	129	25	1.00E-06	70	365	25	1.87E-08		
cis-1,2-Dichloroethene	0.038	50	1.00	129	25	1.00E-06	70	365	25	9.59E-09		
Isopropylbenzene	0.045	50	1.00	129	25	1.00E-06	70	365	25	1.14E-08		
n-Propylbenzene	0.057	50	1.00	129	25	1.00E-06	70	365	25	1.44E-08		
1,3,5-Trimethylbenzene	0.069	50	1.00	129	25	1.00E-06	70	365	25	1.74E-08		
1,2,4-Trimethylbenzene	0.24	50	1.00	129	25	1.00E-06	70	365	25	6.06E-08		
Naphthalene	1	50	1.00	129	25	1.00E-06	70	365	25	2.52E-07		
Benzene	0.056	50	1.00	129	25	1.00E-06	70	365	25	1.41E-08	75	4.71E-09

TABLE 11

AVERAGE DAILY DOSES -- DERMAL CONTACT WITH SOIL
COMMERCIAL SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

COMPOUNDS	Exposure Point Concentration (mg/kg)	C_1 (kg/mg)	SA (cm^2/d)	AF (mg/cm^2)	Fraction Derived from Soil	RAF	EF (d/yr)	EP (yr)	BW (kg)	C_2 (d/yr)	AP (yr)	ADD (mg/kg/d)	AP (yr)	LADD (mg/kg/d)
Volatile organic compounds														
1,1,1-Trichloroethane	4	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	2.79E-06		
Acetone	0.071	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	4.94E-08		
Xylenes	0.62	1.00E-06	3380	0.51	0.8	0.12	129	25	70	365	25	5.18E-07		
Toluene	0.3	1.00E-06	3380	0.51	0.8	0.12	129	25	70	365	25	2.51E-07		
Trichloroethene	45	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	3.13E-05	75	1.04E-05
1,1-Dichloroethene	0.34	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	2.37E-07		
1,1-Dichloroethane	0.15	1.00E-06	3380	0.51	0.8	0.13	129	25	70	365	25	1.36E-07		
Methylene chloride	0.097	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	6.75E-08	75	2.25E-08
Tetrachloroethene	2	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	1.46E-06	75	4.87E-07
Ethylbenzene	0.074	1.00E-06	3380	0.51	0.8	0.2	129	25	70	365	25	1.03E-07		
cis-1,2-Dichloroethene	0.038	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	2.65E-08		
Isopropylbenzene	0.045	1.00E-06	3380	0.51	0.8	0.2	129	25	70	365	25	6.27E-08		
n-Propylbenzene	0.057	1.00E-06	3380	0.51	0.8	0.2	129	25	70	365	25	7.94E-08		
1,3,5-Trimethylbenzene	0.069	1.00E-06	3380	0.51	0.8	0.12	129	25	70	365	25	5.77E-08		
1,2,4-Trimethylbenzene	0.24	1.00E-06	3380	0.51	0.8	0.12	129	25	70	365	25	2.01E-07		
Naphthalene	1	1.00E-06	3380	0.51	0.8	0.1	129	25	70	365	25	6.96E-07		
Benzene	0.056	1.00E-06	3380	0.51	0.8	0.08	129	25	70	365	25	3.12E-08	75	1.04E-08

TABLE 12

AVERAGE DAILY EXPOSURE DOSES -- INGESTION OF SOIL
TRESPASSER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

CHEMICALS	Exposure Point Concentration (mg/kg)	IR (mg/d)	RAF	EF (d/yr)	EP (yr)	C1 (kg/mg)	BW (kg)	C2 (d/yr)	AP (yr)	ADD (mg/kg/d)	AP (yr)	LADD (mg/kg/d)
Volatile organic compounds												
1,1,1-Trichloroethane	4	50	1.00	62	12	1.00E-06	42	365	12	8.09E-07		
Acetone	0.071	50	1.00	62	12	1.00E-06	42	365	12	1.44E-08		
Xylenes	0.62	50	1.00	62	12	1.00E-06	42	365	12	1.25E-07		
Toluene	0.3	50	1.00	62	12	1.00E-06	42	365	12	6.07E-08		
Trichloroethene	45	50	1.00	62	12	1.00E-06	42	365	12	9.10E-06	75	1.46E-06
1,1-Dichloroethene	0.34	50	1.00	62	12	1.00E-06	42	365	12	6.88E-08		
1,1-Dichloroethane	0.15	50	1.30	62	12	1.00E-06	42	365	12	3.94E-08		
Methylene chloride	0.097	50	1.00	62	12	1.00E-06	42	365	12	1.96E-08	75	3.14E-09
Tetrachloroethene	2	50	1.00	62	12	1.00E-06	42	365	12	4.25E-07	75	6.79E-08
Ethylbenzene	0.074	50	1.00	62	12	1.00E-06	42	365	12	1.50E-08		
cis-1,2-Dichloroethene	0.038	50	1.00	62	12	1.00E-06	42	365	12	7.68E-09		
Isopropylbenzene	0.045	50	1.00	62	12	1.00E-06	42	365	12	9.10E-09		
n-Propylbenzene	0.057	50	1.00	62	12	1.00E-06	42	365	12	1.15E-08		
1,3,5-Trimethylbenzene	0.069	50	1.00	62	12	1.00E-06	42	365	12	1.40E-08		
1,2,4-Trimethylbenzene	0.24	50	1.00	62	12	1.00E-06	42	365	12	4.85E-08		
Naphthalene	1	50	1.00	62	12	1.00E-06	42	365	12	2.02E-07		
Benzene	0.056	50	1.00	62	12	1.00E-06	42	365	12	1.13E-08	75	1.81E-09

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AVERAGE DAILY DOSES -- DERMAL CONTACT WITH SOIL
TRESPASSER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

COMPOUNDS	Exposure Point Concentration (mg/kg)	C_1 (kg/mg)	SA (cm^2/d)	AF (mg/cm^2)	Fraction Derived from Soil	RAF	EF (d/yr)	EP (yr)	BW (kg)	C_2 (d/yr)	AP (yr)	ADD (mg/kg/d)	AP (yr)	LADD (mg/kg/d)
Volatile organic compounds														
1,1,1-Trichloroethane	4	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	2.96E-06		
Acetone	0.071	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	5.26E-08		
Xylenes	0.62	1.00E-06	4488	0.51	0.8	0.12	62	12	42	365	12	5.51E-07		
Toluene	0.3	1.00E-06	4488	0.51	0.8	0.12	62	12	42	365	12	2.67E-07		
Trichloroethene	45	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	3.33E-05	75	5.33E-06
1,1-Dichloroethene	0.34	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	2.52E-07		
1,1-Dichloroethane	0.15	1.00E-06	4488	0.51	0.8	0.13	62	12	42	365	12	1.44E-07		
Methylene chloride	0.097	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	7.18E-08	75	1.15E-08
Tetrachloroethene	2	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	1.56E-06	75	2.49E-07
Ethylbenzene	0.074	1.00E-06	4488	0.51	0.8	0.2	62	12	42	365	12	1.10E-07		
cis-1,2-Dichloroethene	0.038	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	2.81E-08		
Isopropylbenzene	0.045	1.00E-06	4488	0.51	0.8	0.2	62	12	42	365	12	6.67E-08		
n-Propylbenzene	0.057	1.00E-06	4488	0.51	0.8	0.2	62	12	42	365	12	8.44E-08		
1,3,5-Trimethylbenzene	0.069	1.00E-06	4488	0.51	0.8	0.12	62	12	42	365	12	6.13E-08		
1,2,4-Trimethylbenzene	0.24	1.00E-06	4488	0.51	0.8	0.12	62	12	42	365	12	2.13E-07		
Naphthalene	1	1.00E-06	4488	0.51	0.8	0.1	62	12	42	365	12	7.41E-07		
Benzene	0.056	1.00E-06	4488	0.51	0.8	0.08	62	12	42	365	12	3.32E-08	75	5.31E-09

AVERAGE DAILY DOSES--INCIDENTAL INGESTION OF SOIL
FUTURE CONSTRUCTION WORKER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

CHEMICALS	Exposure Point Concentration (mg/kg)	IR (mg/d)	RAF	ED (d/event)	EF (events/d)	EP (d)	C1 (kg/mg)	BW (kg)	AP (d)	ADD (mg/kg/d)	AP (yr)	C2 (d/yr)	LADD (mg/kg/d)
Volatile organic compounds													
1,1,1-Trichloroethane	4	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.71E-05			
Acetone	0.071	480	1.00	1.0	0.71	182	1.00E-06	80	182	3.04E-07			
Xylenes	0.62	480	1.00	1.0	0.71	182	1.00E-06	80	182	2.66E-06			
Toluene	0.3	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.29E-06			
Trichloroethene	45	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.93E-04	75	365	1.28E-06
1,1-Dichloroethene	0.34	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.46E-06			
1,1-Dichloroethane	0.15	480	1.30	1.3	0.71	182	1.00E-06	80	182	1.09E-06			
Methylene chloride	0.097	480	1.00	1.0	0.71	182	1.00E-06	80	182	4.16E-07	75	365	2.76E-09
Tetrachloroethene	2	480	1.00	1.0	0.71	182	1.00E-06	80	182	9.00E-06	75	365	5.98E-08
Ethylbenzene	0.074	480	1.00	1.0	0.71	182	1.00E-06	80	182	3.17E-07			
cis-1,2-Dichloroethene	0.038	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.63E-07			
Isopropylbenzene	0.045	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.93E-07			
n-Propylbenzene	0.057	480	1.00	1.0	0.71	182	1.00E-06	80	182	2.44E-07			
1,3,5-Trimethylbenzene	0.069	480	1.00	1.0	0.71	182	1.00E-06	80	182	2.96E-07			
1,2,4-Trimethylbenzene	0.24	480	1.00	1.0	0.71	182	1.00E-06	80	182	1.03E-06			
Naphthalene	1	480	1.00	1.0	0.71	182	1.00E-06	80	182	4.29E-06			
Benzene	0.056	480	1.00	1.0	0.71	182	1.00E-06	80	182	2.40E-07	75	365	1.60E-09

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AVERAGE DAILY DOSES--DERMAL CONTACT WITH SOIL
FUTURE CONSTRUCTION WORKER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

CHEMICALS	Exposure Point Concentration (mg/kg)	C_1 (kg/mg)	SA (cm^2/d)	AF (mg/cm^2)	RAF	ED (d/event)	EF (events/d)	EP (d)	BW (kg)	AP (d)	ADD (mg/kg/d)	AP (yr)	C_2 (d/yr)	LADD (mg/kg/d)
Volatile organic compounds														
1,1,1-Trichloroethane	4	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	7.96E-06			
Acetone	0.071	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	1.41E-07			
Xylenes	0.62	1.00E-06	4370	0.51	0.12	1	0.71	182	80	182	1.48E-06			
Toluene	0.3	1.00E-06	4370	0.51	0.12	1	0.71	182	80	182	7.16E-07			
Trichloroethene	45	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	8.95E-05	75	365	5.95E-07
1,1-Dichloroethene	0.34	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	6.77E-07			
1,1-Dichloroethane	0.15	1.00E-06	4370	0.51	0.13	1	0.71	182	80	182	3.88E-07			
Methylene chloride	0.097	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	1.93E-07	75	365	1.28E-09
Tetrachloroethene	2	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	4.18E-06	75	365	2.78E-08
Ethylbenzene	0.074	1.00E-06	4370	0.51	0.2	1	0.71	182	80	182	2.95E-07			
cis-1,2-Dichloroethene	0.038	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	7.56E-08			
Isopropylbenzene	0.045	1.00E-06	4370	0.51	0.2	1	0.71	182	80	182	1.79E-07			
n-Propylbenzene	0.057	1.00E-06	4370	0.51	0.2	1	0.71	182	80	182	2.27E-07			
1,3,5-Trimethylbenzene	0.069	1.00E-06	4370	0.51	0.12	1	0.71	182	80	182	1.65E-07			
1,2,4-Trimethylbenzene	0.24	1.00E-06	4370	0.51	0.12	1	0.71	182	80	182	5.73E-07			
Naphthalene	1	1.00E-06	4370	0.51	0.1	1	0.71	182	80	182	1.99E-06			
Benzene	0.056	1.00E-06	4370	0.51	0.08	1	0.71	182	80	182	8.91E-08	75	365	5.93E-10

TABLE 16

CHRONIC HAZARD INDICES
COMMERCIAL SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			INHALATION - VOLATILES			
CHEMICALS	ADD (mg/kg/d)	RfD (mg/kg/d)	HI	ADD (mg/kg/d)	RfD (mg/kg/d)	HI	ADE (mg/m^3)	RfC (mg/m^3)	HI	TOTAL
Volatile organic compounds										
1,1,1-Trichloroethane	1.01E-06	9.00E-02	1.12E-05	2.79E-06	9.00E-02	3.09E-05	1.02E-02	1.00E+00	1.02E-02	1.02E-02
Acetone	1.79E-08	1.00E-01	1.79E-07	4.94E-08	1.00E-01	4.94E-07	6.51E-03	8.00E-01	8.13E-03	8.13E-03
Xylenes	1.57E-07	2.00E+00	7.83E-08	5.18E-07	2.00E+00	2.59E-07	1.61E-03	3.00E-01	5.37E-03	5.37E-03
Toluene	7.57E-08	2.00E-01	3.79E-07	2.51E-07	2.00E-01	1.25E-06	1.71E-03	4.00E-01	4.28E-03	4.28E-03
Trichloroethene	1.14E-05	2.00E-03	5.68E-03	3.13E-05	2.00E-03	1.57E-02	5.25E-03	1.80E-01	2.92E-02	5.05E-02
1,1-Dichloroethene	8.58E-08	9.00E-03	9.54E-06	2.37E-07	9.00E-03	2.63E-05				3.58E-05
1,1-Dichloroethane	4.92E-08	1.00E-01	4.92E-07	1.36E-07	1.00E-01	1.36E-06				1.85E-06
Methylene chloride	2.45E-08	6.00E-02	4.08E-07	6.75E-08	6.00E-02	1.13E-06				1.53E-06
Tetrachloroethene	5.30E-07	1.00E-02	5.30E-05	1.46E-06	1.00E-02	1.46E-04				1.99E-04
Ethylbenzene	1.87E-08	1.00E-01	1.87E-07	1.03E-07	1.00E-01	1.03E-06				1.22E-06
cis-1,2-Dichloroethene	9.59E-09	1.00E-02	9.59E-07	2.65E-08	1.00E-02	2.65E-06				3.61E-06
Isopropylbenzene	1.14E-08	1.00E-01	1.14E-07	6.27E-08	1.00E-01	6.27E-07				7.40E-07
n-Propylbenzene	1.44E-08	1.00E-01	1.44E-07	7.94E-08	1.00E-01	7.94E-07				9.38E-07
1,3,5-Trimethylbenzene	1.74E-08	2.00E+00	8.71E-09	5.77E-08	2.00E+00	2.88E-08				3.75E-08
1,2,4-Trimethylbenzene	6.06E-08	2.00E+00	3.03E-08	2.01E-07	2.00E+00	1.00E-07				1.31E-07
Naphthalene	2.52E-07	2.00E-02	1.26E-05	6.96E-07	2.00E-02	3.48E-05				4.74E-05
Benzene	1.41E-08	5.00E-03	2.83E-06	3.12E-08	5.00E-03	6.24E-06				9.07E-06
Total			**5.77E-03**			**1.59E-02**			**5.71E-02**	**7.88E-02**

TABLE 17

INCREMENTAL LIFETIME CARCINOGENIC RISKS
COMMERCIAL SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			INHALATION - VOLATILES			
CHEMICALS	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	LADE (ug/m^3)	Unit Risk $(ug/m^3)^{-1}$	ILCR	TOTAL
Volatile organic compounds										
1,1,1-Trichloroethane										
Acetone										
Xylenes										
Toluene										
Trichloroethene	3.79E-06	1.10E-02	4.17E-08	1.04E-05	1.10E-02	1.15E-07	1.75E+00	1.70E-06	2.98E-06	3.13E-06
1,1-Dichloroethene										
1,1-Dichloroethane										
Methylene chloride	8.16E-09	7.50E-03	6.12E-11	2.25E-08	7.50E-03	1.69E-10				2.30E-10
Tetrachloroethene	1.77E-07	5.20E-02	9.19E-09	4.87E-07	5.20E-02	2.53E-08				3.45E-08
Ethylbenzene										
cis-1,2-Dichloroethene										
Isopropylbenzene										
n-Propylbenzene										
1,3,5-Trimethylbenzene										
1,2,4-Trimethylbenzene										
Naphthalene										
Benzene	4.71E-09	2.90E-02	1.37E-10	1.04E-08	2.90E-02	3.02E-10				4.38E-10
Total			**5.10E-08**			**1.41E-07**			**2.98E-06**	**3.17E-06**

TAL. _ 18

CHRONIC HAZARD INDICES
TRESPASSER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			
CHEMICALS	ADD (mg/kg/d)	RfD (mg/kg/d)	HI	ADD (mg/kg/d)	RfD (mg/kg/d)	HI	TOTAL
Volatile organic compounds							
1,1,1-Trichloroethane	8.09E-07	9.00E-02	8.99E-06	2.96E-06	9.00E-02	3.29E-05	4.19E-05
Acetone	1.44E-08	1.00E-01	1.44E-07	5.26E-08	1.00E-01	5.26E-07	6.69E-07
Xylenes	1.25E-07	2.00E+00	6.27E-08	5.51E-07	2.00E+00	2.75E-07	3.38E-07
Toluene	6.07E-08	2.00E-01	3.03E-07	2.67E-07	2.00E-01	1.33E-06	1.64E-06
Trichloroethene	9.10E-06	2.00E-03	4.55E-03	3.33E-05	2.00E-03	1.67E-02	2.12E-02
1,1-Dichloroethene	6.88E-08	9.00E-03	7.64E-06	2.52E-07	9.00E-03	2.80E-05	3.56E-05
1,1-Dichloroethane	3.94E-08	1.00E-01	3.94E-07	1.44E-07	1.00E-01	1.44E-06	1.84E-06
Methylene chloride	1.96E-08	6.00E-02	3.27E-07	7.18E-08	6.00E-02	1.20E-06	1.52E-06
Tetrachloroethene	4.25E-07	1.00E-02	4.25E-05	1.56E-06	1.00E-02	1.56E-04	1.98E-04
Ethylbenzene	1.50E-08	1.00E-01	1.50E-07	1.10E-07	1.00E-01	1.10E-06	1.25E-06
cis-1,2-Dichloroethene	7.68E-09	1.00E-02	7.68E-07	2.81E-08	1.00E-02	2.81E-06	3.58E-06
Isopropylbenzene	9.10E-09	1.00E-01	9.10E-08	6.67E-08	1.00E-01	6.67E-07	7.58E-07
n-Propylbenzene	1.15E-08	1.00E-01	1.15E-07	8.44E-08	1.00E-01	8.44E-07	9.60E-07
1,3,5-Trimethylbenzene	1.40E-08	2.00E+00	6.98E-09	6.13E-08	2.00E+00	3.07E-08	3.76E-08
1,2,4-Trimethylbenzene	4.85E-08	2.00E+00	2.43E-08	2.13E-07	2.00E+00	1.07E-07	1.31E-07
Naphthalene	2.02E-07	2.00E-02	1.01E-05	7.41E-07	2.00E-02	3.70E-05	4.71E-05
Benzene	1.13E-08	5.00E-03	2.26E-06	3.32E-08	5.00E-03	6.64E-06	8.90E-06
Total			**4.62E-03**			**1.69E-02**	**2.16E-02**

TAB... 19

INCREMENTAL LIFETIME CARCINOGENIC RISKS
TRESPASSER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			
CHEMICALS	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	TOTAL
Volatile organic compounds							
1,1,1-Trichloroethane							
Acetone							
Xylenes							
Toluene							
Trichloroethene	1.46E-06	1.10E-02	1.60E-08	5.33E-06	1.10E-02	5.87E-08	7.47E-08
1,1-Dichloroethene							
1,1-Dichloroethane							
Methylene chloride	3.14E-09	7.50E-03	2.35E-11	1.15E-08	7.50E-03	8.62E-11	1.10E-10
Tetrachloroethene	6.79E-08	5.20E-02	3.53E-09	2.49E-07	5.20E-02	1.29E-08	1.65E-08
Ethylbenzene							
cis-1,2-Dichloroethene							
Isopropylbenzene							
n-Propylbenzene							
1,3,5-Trimethylbenzene							
1,2,4-Trimethylbenzene							
Naphthalene							
Benzene	1.81E-09	2.90E-02	5.25E-11	5.31E-09	2.90E-02	1.54E-10	2.06E-10
Total			**1.96E-08**			**7.18E-08**	**9.15E-08**

TABLE 20

SUBCHRONIC HAZARD INDICES
FUTURE CONTRUCTION WORKER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			
CHEMICALS	ADD (mg/kg/d)	SubRfD (mg/kg/d)	HI	ADD (mg/kg/d)	SubRfD (mg/kg/d)	HI	TOTAL
Volatile organic compounds							
1,1,1-Trichloroethane	1.71E-05	9.00E-01	1.90E-05	7.96E-06	9.00E-01	8.84E-06	2.79E-05
Acetone	3.04E-07	1.00E+00	3.04E-07	1.41E-07	1.00E+00	1.41E-07	4.46E-07
Xylenes	2.66E-06	4.00E+00	6.64E-07	1.48E-06	4.00E+00	3.70E-07	1.03E-06
Toluene	1.29E-06	2.00E+00	6.43E-07	7.16E-07	2.00E+00	3.58E-07	1.00E-06
Trichloroethene	1.93E-04	2.00E-02	9.64E-03	8.95E-05	2.00E-02	4.48E-03	1.41E-02
1,1-Dichloroethene	1.46E-06	9.00E-03	1.62E-04	6.77E-07	9.00E-03	7.52E-05	2.37E-04
1,1-Dichloroethane	1.09E-06	1.00E+00	1.09E-06	3.88E-07	1.00E+00	3.88E-07	1.47E-06
Methylene chloride	4.16E-07	6.00E-02	6.93E-06	1.93E-07	6.00E-02	3.22E-06	1.01E-05
Tetrachloroethene	9.00E-06	1.00E-01	9.00E-05	4.18E-06	1.00E-01	4.18E-05	1.32E-04
Ethylbenzene	3.17E-07	1.00E+00	3.17E-07	2.95E-07	1.00E+00	2.95E-07	6.12E-07
cis-1,2-Dichloroethene	1.63E-07	1.00E-01	1.63E-06	7.56E-08	1.00E-01	7.56E-07	2.38E-06
Isopropylbenzene	1.93E-07	1.00E-01	1.93E-06	1.79E-07	1.00E-01	1.79E-06	3.72E-06
n-Propylbenzene	2.44E-07	1.00E-01	2.44E-06	2.27E-07	1.00E-01	2.27E-06	4.71E-06
1,3,5-Trimethylbenzene	2.96E-07	4.00E+00	7.39E-08	1.65E-07	4.00E+00	4.12E-08	1.15E-07
1,2,4-Trimethylbenzene	1.03E-06	4.00E+00	2.57E-07	5.73E-07	4.00E+00	1.43E-07	4.00E-07
Naphthalene	4.29E-06	2.00E-02	2.14E-04	1.99E-06	2.00E-02	9.95E-05	3.14E-04
Benzene	2.40E-07	5.00E-02	4.80E-06	8.91E-08	5.00E-02	1.78E-06	6.58E-06
Total			**1.01E-02**			**4.71E-03**	**1.49E-02**

TABLE 21

INCREMENTAL LIFETIME CARCINOGENIC RISKS
FUTURE CONSTRUCTION WORKER SCENARIO
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	INGESTION			DERMAL CONTACT			
CHEMICALS	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	LADD (mg/kg/d)	SF $(mg/kg/d)^{-1}$	ILCR	TOTAL
Volatile organic compounds							
1,1,1-Trichloroethane							
Acetone							
Xylenes							
Toluene							
Trichloroethene	1.28E-06	1.10E-02	1.41E-08	5.95E-07	1.10E-02	6.55E-09	2.07E-08
1,1-Dichloroethene							
1,1-Dichloroethane							
Methylene chloride	2.76E-09	7.50E-03	2.07E-11	1.28E-09	7.50E-03	9.62E-12	3.04E-11
Tetrachloroethene	5.98E-08	5.20E-02	3.11E-09	2.78E-08	5.20E-02	1.44E-09	4.56E-09
Ethylbenzene							
cis-1,2-Dichloroethene							
Isopropylbenzene							
n-Propylbenzene							
1,3,5-Trimethylbenzene							
1,2,4-Trimethylbenzene							
Naphthalene							
Benzene	1.60E-09	2.90E-02	4.63E-11	5.93E-10	2.90E-02	1.72E-11	6.35E-11
Total			**1.73E-08**			**8.02E-09**	**2.53E-08**

TABLE 22

COMPARISON OF GROUND WATER CONCENTRATIONS TO UPPER CONCENTRATION LIMITS
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	UP GRADIENT AVERAGE CONCENTRATION (ug/l)	AOC 3 FORMER CATCHBASIN/SUMP CONCENTRATION (mg/l)	DOWN GRADIENT AVERAGE CONCENTRATION (ug/l)	UCL (ug/l)
Volatile organic compounds				
1,1-Dichloroethene	25.13	<7,500	80.38	100,000
1,1-Dichloroethane	67.38	24,000	900.38	100,000
1,1,1-Trichloroethane	323.05	360,000	1128.00	100,000
Trichloroethene	133.64	84,000	66.00	100,000
Methylene Chloride	<5.0	<25,000	146.25	100,000
1,2-dichloroethane	<1.0	<5,000	<1.0	100,000
Tetrachloroethene	10.06	6,700	19.00	50,000
Toluene	<1.5	120,000	345.38	100,000
Ethylbenzene	<1.0	<5,000	<1.0	100,000
Xylenes	3.19	<5,000	35.75	100,000
Chloroethane*	<2.0	<50,000	450.50	10,000
cis-1,2-Dichloroethene	28.06	11,000	750.25	100,000
Vinyl Chloride	<2.0	<5,000	95.50	100,000

Based on default UCL for ground water (MCP 40.0996).

TABLE 23

COMPARISON OF EXPOSURE POINT CONCENTRATIONS IN SOIL TO UPPER CONCENTRATION LIMITS
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	EXPOSURE POINT CONCENTRATIONS (mg/kg)	UCL (mg/kg)
Volatile organic compounds		
1,1,1-Trichloroethane	4	5,000
Acetone	0.071	10,000
Xylenes	0.62	10,000
Toluene	0.3	10,000
Trichloroethene	45	5,000
1,1-Dichloroethene	0.34	90
1,1-Dichloroethane	0.15	5,000
Methylene chloride	0.097	7,000
Tetrachloroethene	2	1,000
Ethylbenzene	0.074	10,000
cis-1,2-Dichloroethene	0.038	5,000
Isopropylbenzene*	0.045	1,000
n-Propylbenzene*	0.057	1,000
1,3,5-Trimethylbenzene*	0.069	1,000
1,2,4-Trimethylbenzene*	0.24	1,000
Naphthalene	1	10,000
Benzene	0.056	2,000

* Based on default UCL for soil (MCP 40.0996).

TABLE 24

COMPARISON OF SURFACE WATER CONCENTRATIONS TO WATER QUALITY BENCHMARKS
JONES ENVIRONMENTAL SERVICES, INC.
LOWELL, MASSACHUSETTS

	DOWN STREAM SW-1 (ug/l)	UP STREAM SW-2 (ug/l)	WATER QUALITY BENCHMARK (ug/l)
Volatile organic compounds			
1,1-Dichloroethane	2.7	<1.5	46.6
1,1,1-Trichloroethane	4.7	<1.0	1800
Trichloroethene	4.4	5.4	21,900
Tetrachloroethene	1.2	1.4	840
cis-1,2-Dichloroethene	4	2.5	1160

APPENDIX E

ANALYTICAL SUMMARY TABLES

Table 2-1 Volatile Organic Compounds Detected in Groundwater

TABLE 2-1
Volatile Organic Compounds Detected in Groundwater
263 Howard Street
Lowell, Massachusetts
(ug/L)

Sample Identification Number	Date Sampled	Vinyl Chloride	Chloroethane	1,1-Dichloroethene	1,1,2-Trichlorotrifluoroethane	1,1-Dichloroethane	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	Trichloroethene	Toluene	Tetrachloroethene	Total Xylenes	1,2-Dichlorobenzene	Naphthalene
GZA-4	7/8/1985	BRL<20,000	BRL<10,000	BRL<10,000	NA	BRL<10,000	NA	270,000	39,000	14,000	BRL<10,000	BRL<10,000	NA	NA
GZA-4	9/12/2000	190	900	160	NA	1,800	1,500	2,200	62	690	BRL<50	71	BRL<250	NA
GZA-4	4/25/2003	130	510	170	730	2,000	1,500	2,400	52	45	BRL<25	26	30	BRL<25
GZA-4	7/8/2003	26	100	15	BRL<10	290	170	200	56	45	BRL<10	19	BRL<10	BRL<10
GZA-4	10/20/2003	56	120	12	56	420	160	82	33	21	6.0	BRL<10	8.0	BRL<5
GZA-4	1/14/2004	8.0	17	2.0	16	43	29	46	27	3.0	5.0	1.0	8.0	20
GZA-4	4/13/2004	4.0	7.0	0.7	BRL<5	15	16	25	20	BRL<0.5	3.0	1.4	4.0	14
GZA-4	7/19/2004	43	280	5.0	49	230	74	75	29	25	7.0	14	21	26
GZA-4	10/28/2004	36	210	3.0	BRL<25	180	54	81	40	17	6.0	6.0	19	25
GZA-4	3/31/2005	8.4	35	1.9	NA	24	12	32	9.7	4.9	1.8	1.2	4.4	10
URS-2	9/12/2000	BRL<40	BRL<40	56	NA	78	110	1,100	530	BRL<30	38	BRL<40	BRL<100	NA
URS-2	4/25/2003	BRL<5	BRL<5	BRL<5	110	6.0	5.0	300	290	BRL<5	51	BRL<10	BRL<5.0	BRL<5.0
URS-2	7/8/2003	BRL<10	BRL<10	11	BRL<100	BRL<10	BRL<10	370	270	BRL<10	44	BRL<10	BRL<10	BRL<10
URS-2	10/20/2003	BRL<100	BRL<100	BRL<100	BRL<1,000	BRL<100	BRL<100	3,700	1,500	BRL<100	350	BRL<200	BRL<100	BRL<100
URS-2	1/14/2004	BRL<25	BRL<25	30	BRL<250	50	27	1,800	690	BRL<25	170	BRL<50	BRL<25	BRL<25
URS-2	4/13/2004	BRL<10	BRL<10	18	BRL<100	67	42	870	460	BRL<10	86	BRL<10	BRL<10	BRL<10
URS-2	7/19/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	10	2.0	BRL<0.5	1.0	BRL<1.0	BRL<0.5	BRL<0.5
URS-2	10/28/2004	BRL<50	BRL<50	BRL<50	BRL<500	160	BRL<50	4,100	1,500	1,200	750	550	190	BRL<50
URS-2	3/31/2005	BRL<10	BRL<10	BRL<5.0	NA	10	13	320	160	BRL<7.5	47	BRL<10	BRL<25	BRL<25
MW-4	7/1/1987	NA	NA	7,400	NA	2,400	7,200	490,000	5,900	140,000	7,200	7,600	NA	NA
MW-4	9/12/2000	BRL<10,000	BRL<10,000	BRL<7,500	NA	24,000	11,000	360,000	84,000	120,000	6,700	BRL<10,000	BRL<25,000	NA
MW-4	4/25/2003	BRL<2,500	BRL<2500	BRL<2500	28,000	2,900	11,000	120,000	24,000	77,000	6,800	5,000	BRL<2,500	BRL<2,500
MW-4	7/8/2003	BRL<2,500	BRL<2500	BRL<2500	BRL<2,500	BRL<2,500	BRL<2500	38,000	14,000	75,000	7,200	5,600	BRL<2,500	BRL<2,500
MW-4	10/20/2003	BRL<250	BRL<250	BRL<250	BRL<2,500	BRL<250	BRL<250	5,200	1,400	6,800	1,400	1,400	270	BRL<250
MW-4	1/14/2004	BRL<250	BRL<250	BRL<250	BRL<2,500	BRL<250	BRL<250	11,000	1,700	6,300	1,500	1,500	250	BRL<250
MW-4	4/13/2004	BRL<100	BRL<100	BRL<100	3,800	410	BRL<100	7,800	2,100	7,600	1,800	1,700	250	BRL<100
MW-4	7/19/2004	BRL<10	BRL<10	BRL<10	BRL<100	BRL<10	BRL<10	660	180	540	130	271	56	24
MW-4	10/28/2004	BRL<50	BRL<50	BRL<50	BRL<500	160	BRL<50	4,400	1,600	1,200	750	550	190	BRL<50
MW-4	3/31/2005	BRL<400	BRL<400	880	NA	BRL<300	260	13,000	3,500	5,500	910	400	BRL<1,000	BRL<1,000
URS-1	9/12/2000	BRL<5.0	BRL<5.0	43	NA	190	BRL<2.5	160	BRL<2.5	BRL<3.8	BRL<2.5	BRL<5.0	BRL<12	NA
URS-1	4/25/2003	BRL<10	BRL<10	100	BRL<100	260	BRL<10	800	BRL<10	BRL<10	BRL<10	BRL<20	BRL<10	BRL<10
URS-1	7/8/2003	BRL<10	BRL<10	120	BRL<100	290	BRL<10	590	BRL<10	BRL<10	BRL<10	BRL<20	BRL<10	BRL<10
URS-1	10/20/2003	BRL<5	BRL<5	110	BRL<50	300	BRL<5.0	260	BRL<5	BRL<5.0	BRL<5	BRL<10	BRL<5.0	BRL<5.0
URS-1	1/14/2004	BRL<5	BRL<5	120	BRL<50	300	BRL<5.0	310	BRL<5	BRL<5.0	BRL<5	BRL<10	BRL<5.0	BRL<5.0
URS-1	4/13/2004	BRL<10	BRL<10	65	BRL<100	170	BRL<10	670	BRL<10	BRL<10	BRL<10	BRL<10	BRL<10	BRL<10
URS-1	7/19/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	12	0.7	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
URS-1	10/28/2004	BRL<2.5	BRL<2.5	48	BRL<25	120	BRL<2.5	82	BRL<2.5	BRL<2.5	BRL<2.5	BRL<5.0	BRL<2.5	BRL<2.5
URS-1	3/31/2005	BRL<2.5	BRL<2.5	55	NA	160	BRL<1.2	100	BRL<1.2	BRL<1.9	BRL<1.2	BRL<2.4	BRL<6.2	BRL<6.2
MW-5	7/1/1987	NA	NA	160	NA	400	ND	3,200	740	100	ND	ND	NA	NA
MW-5	9/12/2000	BRL<2.0	BRL<2.0	BRL<1.5	NA	BRL<1.5	BRL<1.0	30	1.1	BRL<1.5	BRL<1.0	1.0	BRL<5.0	NA
MW-5	4/25/2003	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	6.0	BRL<0.5	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
MW-5	7/8/2003	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	9.0	1.0	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
MW-5	10/20/2003	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	14	3.0	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
MW-5	1/14/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	3.0	BRL<0.5	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
MW-5	4/13/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	5.0	BRL<0.5	BRL<0.5	BRL<0.5	BRL<0.5	BRL<0.5	BRL<0.5
MW-5	7/19/2004	BRL<1.0	BRL<1	52	BRL<10	120	BRL<1.0	54	BRL<1.0	BRL<1.0	BRL<1.0	BRL<2.0	BRL<1.0	BRL<1.0
MW-5	10/28/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	28	3.0	BRL<0.5	BRL<0.5	BRL<1.0	BRL<0.5	BRL<0.5
MW-5	3/31/2005	BRL<1.0	BRL<1.0	BRL<0.5	NA	BRL<0.75	BRL<0.5	8.0	BRL<0.5	BRL<0.75	BRL<0.5	BRL<1.0	BRL<2.5	BRL<2.5
WE-3	7/8/1985	BRL<10	BRL<5.0	BRL<5.0	NA	BRL<5.0	NA	40	20	BRL<5.0	10	BRL<5.0	NA	NA
WE-3	7/1/1987	NA	NA	2.0	NA	1.0	ND	81	26	ND	10	ND	NA	NA
WE-3	9/12/2000	BRL<2.0	BRL<2.0	BRL<1.5	NA	BRL<1.5	BRL<1.0	56	70	BRL<1.5	19	BRL<2.0	BRL<5.0	NA
WE-3	4/25/2003	BRL<2.5	BRL<2.5	BRL<2.5	BRL<25	6.0	3.0	72	130	BRL<2.5	74	BRL<5.0	BRL<2.5	BRL<2.5
WE-3	7/8/2003	BRL<1.0	BRL<1	BRL<1.0	BRL<1.0	BRL<1.0	BRL<1.0	26	70	BRL<1.0	54	BRL<1.0	BRL<1.0	BRL<2.5
WE-3	10/20/2003	BRL<5	BRL<5	BRL<5	BRL<50	8.0	BRL<5.0	200	170	BRL<5.0	95	BRL<10	BRL<5.0	BRL<5.0
WE-3	1/14/2004	BRL<1.0	BRL<1	1.0	16	6.0	2.0	95	86	BRL<1.0	52	BRL<2.0	BRL<1.0	BRL<1.0
WE-3	4/13/2004	BRL<10	BRL<10	BRL<10	BRL<100	23	BRL<10	470	240	BRL<10	77	BRL<10	BRL<10	BRL<10
WE-3	7/19/2004	BRL<1.0	BRL<1	BRL<1.0	BRL<10	BRL<1	BRL<1.0	71	27	BRL<1.0	19	BRL<2.0	BRL<1.0	BRL<1.0
WE-3	10/28/2004	BRL<2.5	BRL<2.5	BRL<2.5	BRL<25	BRL<2.5	BRL<2.5	130	74	BRL<2.5	41	BRL<5.0	BRL<2.5	BRL<2.5
WE-3	3/31/2005	BRL<2.5	BRL<2.5	4.8	NA	4.1	BRL<1.2	180	81	BRL<1.9	42	BRL<2.4	BRL<6.2	BRL<6.2
URS-3	9/12/2000	BRL<2.0	BRL<2.0	BRL<1.5	NA	BRL<1.5	BRL<1.0	2.2	2.2	BRL<1.5	BRL<1.0	BRL<2.0	BRL<5.0	NA
URS-3	4/25/2003	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	5.0	2.0	BRL<0.5	1.0	BRL<1.0	BRL<0.5	0.6
URS-3	7/8/2003	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	4.0	3.0	BRL<0.5	2.0	BRL<1.0	BRL<0.5	0.6
URS-3	10/20/2003	BRL<0.5	BRL<0.5	BRL<0.5	14	BRL<0.5	BRL<0.5	15	8.0	BRL<0.5	5.0	BRL<1.0	BRL<0.5	BRL<0.5
URS-3	1/14/2004	BRL<0.5	BRL<0.5	BRL<0.5	BRL<5	BRL<0.5	BRL<0.5	17	3.0	BRL<0.5	2.0	BRL<1.0	BRL<0.5	BRL<0.5
URS-3	4/13/2004	BRL<2.5	BRL<2.5	BRL<2.5	BRL<25	BRL<2.5	BRL<2.5	160	9.0	BRL<2.5	3.0	BRL<2.5	BRL<2.5	BRL<2.5
URS-3	7/19/2004	BRL<100	BRL<100	390	BRL<1,000	490	870	7,600	1,500	BRL<100	BRL<100	BRL<200	BRL<100	BRL<100
URS-3	10/28/2004	BRL<0.5	BRL<0.5	BRL<0.5	6.0	BRL<0.5	BRL<0.5	14	2.0	BRL<0.5	1.0	BRL<1.0	BRL<0.5	BRL<0.5
URS-3	3/31/2005	BRL<10	BRL<10	BRL<5.0	NA	BRL<7.5	BRL<5.0	310	21	BRL<7.5	6.7	BRL<10	BRL<25	BRL<25
Method 1 Groundwater Standards (310 CMR 40.0974(2)); June 2003														
GW-2		2.0	NS	1.0	NS	9,000	30,000	4,000	300	6,000	3,000	6,000	10,000	6,000
GW-3		40,000	NS	50,000	NS	50,000	50,000	50,000	20,000	50,000	5,000	50,000	8,000	6,000
Method 3 Upper Concentration Limit (310 CMR 40.0996(7)); June 2003														
UCL		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	50,000	100,000	100,000	60,000

Notes:
ug/L - micrograms per liter.
BRL < 10 Indicates concentration, if any, is below reporting limit for analyte.
NA - sample not analyzed for this analyte.
Bold indicates detection limit or concentration exceeds Method 1 GW-2 Groundwater Standard.
Italic indicates detection limit or concentration exceeds Method 1 GW-3 Groundwater Standard.
Underline indicates concentration exceeds Method 3 UCL.
NS - no standard available.

APPENDIX F

LABORATORY ANALYTICAL DATA PACKAGES

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475
www.groundwateranalytical.com

May 2, 2003

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project: **RM Jones/542.1.1**
Lab ID: **60422**
Received: **04-25-03**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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,

Eric H. Jensen
Operations Manager

EHJ/pcl
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/542.1.1	Delivery:	GWA Courier	Temperature:	1.8'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	60422	Lab Receipt:	04-25-03	Custody Seal(s):	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-1	URS-2	Aqueous	4/25/03 10:45	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245425	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245427	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245428	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-2	URS-3	Aqueous	4/25/03 10:50	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245442	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245443	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245441	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-3	GZA-4	Aqueous	4/25/03 11:00	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245444	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245446	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245445	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-4	WE-3	Aqueous	4/25/03 11:30	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C258893	40 mL VOA Vial	Industrial	BX6003	HCl	R-3173F	11-25-02	01-06-03
C258904	40 mL VOA Vial	Industrial	BX6003	HCl	R-3173F	11-25-02	01-06-03
C245447	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-5	MW-5	Aqueous	4/25/03 11:40	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245429	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245430	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245431	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-6	URS-1	Aqueous	4/25/03 12:50	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245421	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245432	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245420	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

Lab ID	Field ID	Matrix	Sampled	Method	Notes
60422-7	MW-4	Aqueous	4/25/03 13:40	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245422	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245434	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C245433	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Laboratory ID:	60422-01
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	10
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	5
74-87-3	Chloromethane	BRL	ug/L	5
75-01-4	Vinyl Chloride	BRL	ug/L	5
74-83-9	Bromomethane	BRL	ug/L	5
75-00-3	Chloroethane	BRL	ug/L	5
75-69-4	Trichlorofluoromethane	BRL	ug/L	5
60-29-7	Diethyl Ether	BRL	ug/L	20
75-35-4	1,1-Dichloroethene	BRL	ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	110	ug/L	50
67-64-1	Acetone	BRL	ug/L	100
75-15-0	Carbon Disulfide	BRL	ug/L	50
75-09-2	Methylene Chloride	BRL	ug/L	25
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	5
75-34-3	1,1-Dichloroethane	6	ug/L	5
590-20-7	2,2-Dichloropropane	BRL	ug/L	5
156-59-2	*cis*- 1,2-Dichloroethene	5	ug/L	5
78-93-3	2-Butanone (MEK)	BRL	ug/L	50
74-97-5	Bromochloromethane	BRL	ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	50
67-66-3	Chloroform	BRL	ug/L	5
71-55-6	1,1,1-Trichloroethane	300	ug/L	5
56-23-5	Carbon Tetrachloride	BRL	ug/L	5
563-58-6	1,1-Dichloropropene	BRL	ug/L	5
71-43-2	Benzene	BRL	ug/L	5
107-06-2	1,2-Dichloroethane	BRL	ug/L	5
79-01-6	Trichloroethene	290	ug/L	5
78-87-5	1,2-Dichloropropane	BRL	ug/L	5
74-95-3	Dibromomethane	BRL	ug/L	5
75-27-4	Bromodichloromethane	BRL	ug/L	5
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	50
108-88-3	Toluene	BRL	ug/L	5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	5
127-18-4	Tetrachloroethene	51	ug/L	5
142-28-9	1,3-Dichloropropane	BRL	ug/L	5
591-78-6	2-Hexanone	BRL	ug/L	50
124-48-1	Dibromochloromethane	BRL	ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	5
108-90-7	Chlorobenzene	BRL	ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	5
100-41-4	Ethylbenzene	BRL	ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Laboratory ID:	60422-01
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	10
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	5
95-47-6	*ortho*-Xylene	BRL	ug/L	5
100-42-5	Styrene	BRL	ug/L	5
75-25-2	Bromoform	BRL	ug/L	5
98-82-8	Isopropylbenzene	BRL	ug/L	5
108-86-1	Bromobenzene	BRL	ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	5
103-65-1	*n*-Propylbenzene	BRL	ug/L	5
95-49-8	2-Chlorotoluene	BRL	ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	5
106-43-4	4-Chlorotoluene	BRL	ug/L	5
98-06-6	*tert*-Butylbenzene	BRL	ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	5
99-87-6	4-Isopropyltoluene	BRL	ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	5
104-51-8	*n*-Butylbenzene	BRL	ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	5
87-68-3	Hexachlorobutadiene	BRL	ug/L	5
91-20-3	Naphthalene	BRL	ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	101 %	86 - 118 %
1,2-Dichloroethane-d_4	105 %	80 - 120 %
Toluene-d_8	101 %	88 - 110 %
4-Bromofluorobenzene	108 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Laboratory ID:	60422-02
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	1
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	5	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	2	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	1	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	**URS-3**	Laboratory ID:	**60422-02**
Project:	**RM Jones/542.1.1**	QC Batch ID:	**VM5-2514-W**
Client:	**Lightship Engineering**	Sampled:	**04-25-03**
Container:	**40 mL VOA Vial**	Received:	**04-25-03**
Preservation:	**HCl / Cool**	Analyzed:	**05-02-03**
Matrix:	**Aqueous**	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/L	0.5
95-47-6	*ortho*- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*- Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	0.6	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	97 %	86 - 118 %
1,2-Dichloroethane-d_4	103 %	80 - 120 %
Toluene-d_8	100 %	88 - 110 %
4-Bromofluorobenzene	104 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Laboratory ID:	60422-03
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	50
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	25
74-87-3	Chloromethane	BRL	ug/L	25
75-01-4	Vinyl Chloride	130	ug/L	25
74-83-9	Bromomethane	BRL	ug/L	25
75-00-3	Chloroethane	510	ug/L	25
75-69-4	Trichlorofluoromethane	BRL	ug/L	25
60-29-7	Diethyl Ether	BRL	ug/L	100
75-35-4	1,1-Dichloroethene	170	ug/L	25
76-13-1	1,1,2-Trichlorotrifluoroethane	730	ug/L	250
67-64-1	Acetone	BRL	ug/L	500
75-15-0	Carbon Disulfide	BRL	ug/L	250
75-09-2	Methylene Chloride	BRL	ug/L	130
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	25
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	25
75-34-3	1,1-Dichloroethane	2,000	ug/L	25
590-20-7	2,2-Dichloropropane	BRL	ug/L	25
156-59-2	*cis*- 1,2-Dichloroethene	1,500	ug/L	25
78-93-3	2-Butanone (MEK)	BRL	ug/L	250
74-97-5	Bromochloromethane	BRL	ug/L	25
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	250
67-66-3	Chloroform	BRL	ug/L	25
71-55-6	1,1,1-Trichloroethane	2,400	ug/L	25
56-23-5	Carbon Tetrachloride	BRL	ug/L	25
563-58-6	1,1-Dichloropropene	BRL	ug/L	25
71-43-2	Benzene	BRL	ug/L	25
107-06-2	1,2-Dichloroethane	BRL	ug/L	25
79-01-6	Trichloroethene	52	ug/L	25
78-87-5	1,2-Dichloropropane	BRL	ug/L	25
74-95-3	Dibromomethane	BRL	ug/L	25
75-27-4	Bromodichloromethane	BRL	ug/L	25
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	25
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	250
108-88-3	Toluene	45	ug/L	25
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	25
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	25
127-18-4	Tetrachloroethene	BRL	ug/L	25
142-28-9	1,3-Dichloropropane	BRL	ug/L	25
591-78-6	2-Hexanone	BRL	ug/L	250
124-48-1	Dibromochloromethane	BRL	ug/L	25
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	25
108-90-7	Chlorobenzene	BRL	ug/L	25
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	25
100-41-4	Ethylbenzene	BRL	ug/L	25

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Laboratory ID:	60422-03
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	50
		Page:	2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	26	ug/L	25
95-47-6	*ortho*-Xylene	BRL	ug/L	25
100-42-5	Styrene	BRL	ug/L	25
75-25-2	Bromoform	BRL	ug/L	25
98-82-8	Isopropylbenzene	BRL	ug/L	25
108-86-1	Bromobenzene	BRL	ug/L	25
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	25
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	25
103-65-1	*n*-Propylbenzene	BRL	ug/L	25
95-49-8	2-Chlorotoluene	BRL	ug/L	25
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	25
106-43-4	4-Chlorotoluene	BRL	ug/L	25
98-06-6	*tert*-Butylbenzene	BRL	ug/L	25
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	25
135-98-8	*sec*-Butylbenzene	BRL	ug/L	25
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	25
99-87-6	4-Isopropyltoluene	BRL	ug/L	25
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	25
95-50-1	1,2-Dichlorobenzene	30	ug/L	25
104-51-8	*n*-Butylbenzene	BRL	ug/L	25
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	25
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	25
87-68-3	Hexachlorobutadiene	BRL	ug/L	25
91-20-3	Naphthalene	BRL	ug/L	25
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	25

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	88 %	86 - 118 %
1,2-Dichloroethane-d_4	87 %	80 - 120 %
Toluene-d_8	89 %	88 - 110 %
4-Bromofluorobenzene	94 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Laboratory ID:	60422-04
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	5
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	2.5
74-87-3	Chloromethane	BRL	ug/L	2.5
75-01-4	Vinyl Chloride	BRL	ug/L	2.5
74-83-9	Bromomethane	BRL	ug/L	2.5
75-00-3	Chloroethane	BRL	ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	2.5
60-29-7	Diethyl Ether	BRL	ug/L	10
75-35-4	1,1-Dichloroethene	BRL	ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	25
67-64-1	Acetone	BRL	ug/L	50
75-15-0	Carbon Disulfide	BRL	ug/L	25
75-09-2	Methylene Chloride	BRL	ug/L	13
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	2.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	2.5
75-34-3	1,1-Dichloroethane	6	ug/L	2.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	2.5
156-59-2	*cis*- 1,2-Dichloroethene	3	ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	25
74-97-5	Bromochloromethane	BRL	ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	25
67-66-3	Chloroform	BRL	ug/L	2.5
71-55-6	1,1,1-Trichloroethane	72	ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	2.5
71-43-2	Benzene	BRL	ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	2.5
79-01-6	Trichloroethene	130	ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	2.5
74-95-3	Dibromomethane	BRL	ug/L	2.5
75-27-4	Bromodichloromethane	BRL	ug/L	2.5
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	25
108-88-3	Toluene	BRL	ug/L	2.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	2.5
127-18-4	Tetrachloroethene	74	ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	2.5
591-78-6	2-Hexanone	BRL	ug/L	25
124-48-1	Dibromochloromethane	BRL	ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	2.5
108-90-7	Chlorobenzene	BRL	ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	2.5
100-41-4	Ethylbenzene	BRL	ug/L	2.5

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Laboratory ID:	60422-04
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	5
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	2.5
95-47-6	*ortho*-Xylene	BRL	ug/L	2.5
100-42-5	Styrene	BRL	ug/L	2.5
75-25-2	Bromoform	BRL	ug/L	2.5
98-82-8	Isopropylbenzene	BRL	ug/L	2.5
108-86-1	Bromobenzene	BRL	ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	2.5
95-49-8	2-Chlorotoluene	BRL	ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	2.5
106-43-4	4-Chlorotoluene	BRL	ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL	ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	2.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	2.5
91-20-3	Naphthalene	BRL	ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	2.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	94 %	86 - 118 %
1,2-Dichloroethane-d_4	95 %	80 - 120 %
Toluene-d_8	95 %	88 - 110 %
4-Bromofluorobenzene	102 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Laboratory ID:	60422-05
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	1
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	6	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Laboratory ID:	60422-05
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	1
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL	ug/L	0.5
95-47-6	*ortho*- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*- Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	101 %	86 - 118 %
1,2-Dichloroethane-d_4	100 %	80 - 120 %
Toluene-d_8	102 %	88 - 110 %
4-Bromofluorobenzene	106 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-1	Laboratory ID:	60422-06
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	20
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	10
74-87-3	Chloromethane	BRL	ug/L	10
75-01-4	Vinyl Chloride	BRL	ug/L	10
74-83-9	Bromomethane	BRL	ug/L	10
75-00-3	Chloroethane	BRL	ug/L	10
75-69-4	Trichlorofluoromethane	BRL	ug/L	10
60-29-7	Diethyl Ether	BRL	ug/L	40
75-35-4	1,1-Dichloroethene	100	ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	100
67-64-1	Acetone	BRL	ug/L	200
75-15-0	Carbon Disulfide	BRL	ug/L	100
75-09-2	Methylene Chloride	BRL	ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	10
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	10
75-34-3	1,1-Dichloroethane	260	ug/L	10
590-20-7	2,2-Dichloropropane	BRL	ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	10
78-93-3	2-Butanone (MEK)	BRL	ug/L	100
74-97-5	Bromochloromethane	BRL	ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	100
67-66-3	Chloroform	BRL	ug/L	10
71-55-6	1,1,1-Trichloroethane	800	ug/L	10
56-23-5	Carbon Tetrachloride	BRL	ug/L	10
563-58-6	1,1-Dichloropropene	BRL	ug/L	10
71-43-2	Benzene	BRL	ug/L	10
107-06-2	1,2-Dichloroethane	BRL	ug/L	10
79-01-6	Trichloroethene	BRL	ug/L	10
78-87-5	1,2-Dichloropropane	BRL	ug/L	10
74-95-3	Dibromomethane	BRL	ug/L	10
75-27-4	Bromodichloromethane	BRL	ug/L	10
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	100
108-88-3	Toluene	BRL	ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	10
127-18-4	Tetrachloroethene	BRL	ug/L	10
142-28-9	1,3-Dichloropropane	BRL	ug/L	10
591-78-6	2-Hexanone	BRL	ug/L	100
124-48-1	Dibromochloromethane	BRL	ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	10
108-90-7	Chlorobenzene	BRL	ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	10
100-41-4	Ethylbenzene	BRL	ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	URS-1	Laboratory ID:	60422-06
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	20
		Page:	2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL	ug/L	10
95-47-6	*ortho*- Xylene	BRL	ug/L	10
100-42-5	Styrene	BRL	ug/L	10
75-25-2	Bromoform	BRL	ug/L	10
98-82-8	Isopropylbenzene	BRL	ug/L	10
108-86-1	Bromobenzene	BRL	ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	10
103-65-1	*n*-Propylbenzene	BRL	ug/L	10
95-49-8	2-Chlorotoluene	BRL	ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	10
106-43-4	4-Chlorotoluene	BRL	ug/L	10
98-06-6	*tert*- Butylbenzene	BRL	ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	10
135-98-8	*sec*-Butylbenzene	BRL	ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	10
99-87-6	4-Isopropyltoluene	BRL	ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	10
104-51-8	*n*-Butylbenzene	BRL	ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	10
87-68-3	Hexachlorobutadiene	BRL	ug/L	10
91-20-3	Naphthalene	BRL	ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	99 %	86 - 118 %
1,2-Dichloroethane-d_4	101 %	80 - 120 %
Toluene-d_8	98 %	88 - 110 %
4-Bromofluorobenzene	105 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Laboratory ID:	60422-07
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	5000
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	2,500
74-87-3	Chloromethane	BRL	ug/L	2,500
75-01-4	Vinyl Chloride	BRL	ug/L	2,500
74-83-9	Bromomethane	BRL	ug/L	2,500
75-00-3	Chloroethane	BRL	ug/L	2,500
75-69-4	Trichlorofluoromethane	BRL	ug/L	2,500
60-29-7	Diethyl Ether	BRL	ug/L	10,000
75-35-4	1,1-Dichloroethene	BRL	ug/L	2,500
76-13-1	1,1,2-Trichlorotrifluoroethane	28,000	ug/L	25,000
67-64-1	Acetone	BRL	ug/L	50,000
75-15-0	Carbon Disulfide	BRL	ug/L	25,000
75-09-2	Methylene Chloride	BRL	ug/L	13,000
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	2,500
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	2,500
75-34-3	1,1-Dichloroethane	2,900	ug/L	2,500
590-20-7	2,2-Dichloropropane	BRL	ug/L	2,500
156-59-2	*cis*- 1,2-Dichloroethene	11,000	ug/L	2,500
78-93-3	2-Butanone (MEK)	BRL	ug/L	25,000
74-97-5	Bromochloromethane	BRL	ug/L	2,500
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	25,000
67-66-3	Chloroform	BRL	ug/L	2,500
71-55-6	1,1,1-Trichloroethane	120,000	ug/L	2,500
56-23-5	Carbon Tetrachloride	BRL	ug/L	2,500
563-58-6	1,1-Dichloropropene	BRL	ug/L	2,500
71-43-2	Benzene	BRL	ug/L	2,500
107-06-2	1,2-Dichloroethane	BRL	ug/L	2,500
79-01-6	Trichloroethene	24,000	ug/L	2,500
78-87-5	1,2-Dichloropropane	BRL	ug/L	2,500
74-95-3	Dibromomethane	BRL	ug/L	2,500
75-27-4	Bromodichloromethane	BRL	ug/L	2,500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	2,500
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	25,000
108-88-3	Toluene	77,000	ug/L	2,500
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	2,500
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	2,500
127-18-4	Tetrachloroethene	6,800	ug/L	2,500
142-28-9	1,3-Dichloropropane	BRL	ug/L	2,500
591-78-6	2-Hexanone	BRL	ug/L	25,000
124-48-1	Dibromochloromethane	BRL	ug/L	2,500
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	2,500
108-90-7	Chlorobenzene	BRL	ug/L	2,500
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	2,500
100-41-4	Ethylbenzene	BRL	ug/L	2,500

GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Laboratory ID:	60422-07
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2514-W
Client:	Lightship Engineering	Sampled:	04-25-03
Container:	40 mL VOA Vial	Received:	04-25-03
Preservation:	HCl / Cool	Analyzed:	05-02-03
Matrix:	Aqueous	Dilution Factor:	5000
		Page:	2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	5,000	ug/L	2,500
95-47-6	*ortho*- Xylene	BRL	ug/L	2,500
100-42-5	Styrene	BRL	ug/L	2,500
75-25-2	Bromoform	BRL	ug/L	2,500
98-82-8	Isopropylbenzene	BRL	ug/L	2,500
108-86-1	Bromobenzene	BRL	ug/L	2,500
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	2,500
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	2,500
103-65-1	*n*-Propylbenzene	BRL	ug/L	2,500
95-49-8	2-Chlorotoluene	BRL	ug/L	2,500
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	2,500
106-43-4	4-Chlorotoluene	BRL	ug/L	2,500
98-06-6	*tert*- Butylbenzene	BRL	ug/L	2,500
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	2,500
135-98-8	*sec*-Butylbenzene	BRL	ug/L	2,500
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	2,500
99-87-6	4-Isopropyltoluene	BRL	ug/L	2,500
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	2,500
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	2,500
104-51-8	*n*-Butylbenzene	BRL	ug/L	2,500
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	2,500
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	2,500
87-68-3	Hexachlorobutadiene	BRL	ug/L	2,500
91-20-3	Naphthalene	BRL	ug/L	2,500
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	2,500

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	94 %	86 - 118 %
1,2-Dichloroethane-d_4	89 %	80 - 120 %
Toluene-d_8	94 %	88 - 110 %
4-Bromofluorobenzene	101 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

Project Narrative

Project:	RM Jones/542.1.1	Lab ID:	60422
Client:	Lightship Engineering	Received:	04-25-03 18:30

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No discrepancies, changes, or amendments were noted.

B. Method Non-Conformances

The following method non-conformances were noted for this project:

1. Project 60422 was received at a temperature of 1.8'C. This measurement is outside the recommended range of 2-6'C.

GROUNDWATER ANALYTICAL

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Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 071785

Project Name: RM Jones	Firm: Lightship Engineering
Project Number: 5421.1	Address: 3C Cordage Park Circle
Sampler Name: Randall Twiss	City / State / Zip: Plymouth, MA 02360
Project Manager: Jc OB	Telephone: 508-830-5344

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☐ STANDARD (10 Business Days)
- ☒ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☒ Please FAX to: 508 830 3300

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles (☐ TIC Search); Semivolatiles (☐ Acid Only, ☐ Base Only, ☐ TIC Search); Pesticides/PCBs (Extractable, Vol.); Metals (Scan for Water Samples, ☐ Total, ☐ Dissolved); Petroleum Hydrocarbons (Ext. TPH, Vol. TPH); Haz. Waste; General Chemistry; Other

SIMS: 8260 (☐ 524.2 MTBE); 8270 (☐ 525.2); 608 (☐ 508); 601 (☐ 551.1); 624 (☐ 524.2); 8151 (☐ 515.1); 8081 (☐ 508A.1 EDB/DBCP); ☐ Lead and Copper

INFORMS: 624 (☐ 603); 601 (☐ 603 Pine only); 8260 (☐ 608 Pesticides); 8270 (☐ 608 PCBs); 8151 (☐ 615); 8171 (☐ 17 Priority Pollutant)

ACRONYZE: 8260B (☐ MTBE Screen); 8021B (☐ Aromatics); 8021B (☐ Halocarbons); 8270 (☐ 8270 Acids only); 8270C (☐ 8270C Acids only); 8081A Pesticides; 8082 PCBs; 8151A Herbicides; 8011 EDB/DBCP; ☐ 13 RCRA; ☐ 8 RCRA; ☐ RCRA Low Volume; ☐ 17 TAL; ☐ Specify:

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix: GROUNDWATER	DRINKING WATER	WASTEWATER	SOIL	OTHER SOLID	OILS/ORGANIC LIQUID	Type: COMPOSITE	GRAB	Container(s): NUMBER	40mL VOA Vial	60mL/2 oz Glass	125mL/4 oz Amber Jars	250mL/8 oz Glass	500mL/16 oz Glass	1 L/32 oz Amber Glass	250mL/16 oz Plastic	500mL/16 oz Plastic	1 L/32 oz Poly	1 Gal. Ziploc	Preservation: HCl	HNO3	H2SO4	NaOH	Ascorbic Acid	Sodium Bisulfate	ICE	Filtered: YES	NO	LABORATORY NUMBER (Lab Use Only)	ACRONYZE
4/25	10:45	URS-2	X							X	3	X										X						X		X	1	X
4/25	10:50	URS-3	X							X	3	X										X						X		X	2	X
4/25	11:00	GZA-4	X							X	3	X										X						X		X	3	X
4/25	11:30	WE-3	X							X	3	X										X						X		X	4	X
4/25	11:40	MW-5	X							X	3	X										X						X		X	5	X
4/25	12:50	URS-1	X							X	3	X										X						X		X	6	X
4/25	13:40	MW-4	X							X	3	X										X						X		X	7	X

REMARKS / SPECIAL INSTRUCTIONS

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☐ MCP GW-1/S-1	☐ PWS Form
☐ ME	☒ MCP GW-2/S-1	☐ _____
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ _____	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. Each MS, MSD and Sample Duplicate requires an additional sample aliquot.

Project Specific QC Required	Selection of QC Sample
☐ Sample Duplicate	☐ Please use sample:
☐ Matrix Spike	
☐ Matrix Spike Duplicate	

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by Sampler:	Date	Time	Received by:	Receipt Temperature:
Randall Twiss	4/25/03	1430	[signature]	1 3 (☐ Ambient ☐ Refrigerated 2-6°C Recommended)
Relinquished by:	**Date**	**Time**	**Received by:**	**Container Count:**
[signature]	4/25/03	1830	[signature]	
Relinquished by:	**Date**	**Time**	**Received by Laboratory:**	**Shipping/Airbill Number:**

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

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. Perent 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: **VM5-2514-WL**
Matrix: **Aqueous**
Units: **ug/L**

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	5	5	**92 %**	70 - 130 %
71-43-2	Benzene	5	5	**99 %**	70 - 130 %
79-01-6	Trichloroethene	5	5	**104 %**	70 - 130 %
108-88-3	Toluene	5	5	**100 %**	70 - 130 %
108-90-7	Chlorobenzene	5	5	**104 %**	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	**93 %**	86 - 118 %
1,2-Dichloroethane-d_4	**95 %**	80 - 120 %
Toluene-d_8	**96 %**	88 - 110 %
4-Bromofluorobenzene	**100 %**	86 - 115 %

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 upon the historical average recovery plus or minus three standard deviation units.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: EPA Method 8260B
QC Batch ID: VM5-2514-WB
Matrix: Aqueous
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8260B**
QC Batch ID: **VM5-2514-WB**
Matrix: **Aqueous**
Page: **2 of 2**

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL	ug/L	0.5
95-47-6	*ortho*- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*- Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	103 %	86 - 118 %
1,2-Dichloroethane-d_4	105 %	80 - 120 %
Toluene-d_8	105 %	88 - 110 %
4-Bromofluorobenzene	113 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

GROUNDWATER ANALYTICAL

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July 16, 2003

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project:	**RM Jones/542.1.1**
Lab ID:	**62724**
Received:	**07-09-03**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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/pcl
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/542.1.1	Delivery:	GWA Courier	Temperature:	2.1'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	62724	Lab Receipt:	07-09-03	Custody Seal(s):	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-1	URS-2	Aqueous	7/8/03 10:24	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C258957	40 mL VOA Vial	Industrial	BX6003	HCl	R-3173F	11-25-02	01-06-03
C250134	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250135	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-2	URS-3	Aqueous	7/8/03 11:04	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C250136	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250146	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250147	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-3	GZA-4	Aqueous	7/8/03 11:53	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245398	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C250145	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250144	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-4	WE-3	Aqueous	7/8/03 11:31	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C245396	40 mL VOA Vial	Industrial	BX6768	HCl	R-3173F	03-25-03	04-01-03
C250148	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250157	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-5	MW-5	Aqueous	7/8/03 13:10	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C250158	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250159	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250160	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-6	URS-1	Aqueous	7/8/03 13:00	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C250155	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250156	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250149	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
62724-7	MW-4	Aqueous	7/8/03 13:40	EPA 8260B Volatile Organics	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C250143	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250161	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a
C250150	40 mL VOA Vial	Fisher	BX7667	HCl	R-3449B	04-18-03	n/a

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Laboratory ID:	62724-01
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	20
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	10
74-87-3	Chloromethane	BRL	ug/L	10
75-01-4	Vinyl Chloride	BRL	ug/L	10
74-83-9	Bromomethane	BRL	ug/L	10
75-00-3	Chloroethane	BRL	ug/L	10
75-69-4	Trichlorofluoromethane	BRL	ug/L	10
60-29-7	Diethyl Ether	BRL	ug/L	40
75-35-4	1,1-Dichloroethene	11	ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	100
67-64-1	Acetone	BRL	ug/L	200
75-15-0	Carbon Disulfide	BRL	ug/L	100
75-09-2	Methylene Chloride	BRL	ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	10
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	10
75-34-3	1,1-Dichloroethane	BRL	ug/L	10
590-20-7	2,2-Dichloropropane	BRL	ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	10
78-93-3	2-Butanone (MEK)	BRL	ug/L	100
74-97-5	Bromochloromethane	BRL	ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	100
67-66-3	Chloroform	BRL	ug/L	10
71-55-6	1,1,1-Trichloroethane	370	ug/L	10
56-23-5	Carbon Tetrachloride	BRL	ug/L	10
563-58-6	1,1-Dichloropropene	BRL	ug/L	10
71-43-2	Benzene	BRL	ug/L	10
107-06-2	1,2-Dichloroethane	BRL	ug/L	10
79-01-6	Trichloroethene	270	ug/L	10
78-87-5	1,2-Dichloropropane	BRL	ug/L	10
74-95-3	Dibromomethane	BRL	ug/L	10
75-27-4	Bromodichloromethane	BRL	ug/L	10
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	100
108-88-3	Toluene	BRL	ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	10
127-18-4	Tetrachloroethene	44	ug/L	10
142-28-9	1,3-Dichloropropane	BRL	ug/L	10
591-78-6	2-Hexanone	BRL	ug/L	100
124-48-1	Dibromochloromethane	BRL	ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	10
108-90-7	Chlorobenzene	BRL	ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	10
100-41-4	Ethylbenzene	BRL	ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Laboratory ID:	62724-01
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	20
		Page:	2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL	ug/L	10
95-47-6	*ortho*- Xylene	BRL	ug/L	10
100-42-5	Styrene	BRL	ug/L	10
75-25-2	Bromoform	BRL	ug/L	10
98-82-8	Isopropylbenzene	BRL	ug/L	10
108-86-1	Bromobenzene	BRL	ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	10
103-65-1	*n*-Propylbenzene	BRL	ug/L	10
95-49-8	2-Chlorotoluene	BRL	ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	10
106-43-4	4-Chlorotoluene	BRL	ug/L	10
98-06-6	*tert*- Butylbenzene	BRL	ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	10
135-98-8	*sec*-Butylbenzene	BRL	ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	10
99-87-6	4-Isopropyltoluene	BRL	ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	10
104-51-8	*n*-Butylbenzene	BRL	ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	10
87-68-3	Hexachlorobutadiene	BRL	ug/L	10
91-20-3	Naphthalene	BRL	ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	93 %	86 - 118 %
1,2-Dichloroethane-d_4	94 %	80 - 120 %
Toluene-d_8	99 %	88 - 110 %
4-Bromofluorobenzene	105 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Laboratory ID:	62724-02
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	1
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	4	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	3	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	2	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-3	Laboratory ID:	62724-02
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	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/L	0.5
95-47-6	*ortho*- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*- Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	94 %	86 - 118 %
1,2-Dichloroethane-d_4	99 %	80 - 120 %
Toluene-d_8	101 %	88 - 110 %
4-Bromofluorobenzene	104 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Laboratory ID:	62724-03
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	20
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	10
74-87-3	Chloromethane	BRL	ug/L	10
75-01-4	Vinyl Chloride	26	ug/L	10
74-83-9	Bromomethane	BRL	ug/L	10
75-00-3	Chloroethane	100	ug/L	10
75-69-4	Trichlorofluoromethane	BRL	ug/L	10
60-29-7	Diethyl Ether	BRL	ug/L	40
75-35-4	1,1-Dichloroethene	15	ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	100
67-64-1	Acetone	520	ug/L	200
75-15-0	Carbon Disulfide	BRL	ug/L	100
75-09-2	Methylene Chloride	BRL	ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	10
75-34-3	1,1-Dichloroethane	290	ug/L	10
590-20-7	2,2-Dichloropropane	BRL	ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	170	ug/L	10
78-93-3	2-Butanone (MEK)	BRL	ug/L	100
74-97-5	Bromochloromethane	BRL	ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	100
67-66-3	Chloroform	BRL	ug/L	10
71-55-6	1,1,1-Trichloroethane	200	ug/L	10
56-23-5	Carbon Tetrachloride	BRL	ug/L	10
563-58-6	1,1-Dichloropropene	BRL	ug/L	10
71-43-2	Benzene	BRL	ug/L	10
107-06-2	1,2-Dichloroethane	BRL	ug/L	10
79-01-6	Trichloroethene	56	ug/L	10
78-87-5	1,2-Dichloropropane	BRL	ug/L	10
74-95-3	Dibromomethane	BRL	ug/L	10
75-27-4	Bromodichloromethane	BRL	ug/L	10
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	100
108-88-3	Toluene	45	ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	10
127-18-4	Tetrachloroethene	BRL	ug/L	10
142-28-9	1,3-Dichloropropane	BRL	ug/L	10
591-78-6	2-Hexanone	BRL	ug/L	100
124-48-1	Dibromochloromethane	BRL	ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	10
108-90-7	Chlorobenzene	BRL	ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	10
100-41-4	Ethylbenzene	BRL	ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Laboratory ID:	62724-03
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	20
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	19	ug/L	10
95-47-6	*ortho*- Xylene	BRL	ug/L	10
100-42-5	Styrene	BRL	ug/L	10
75-25-2	Bromoform	BRL	ug/L	10
98-82-8	Isopropylbenzene	BRL	ug/L	10
108-86-1	Bromobenzene	BRL	ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	10
103-65-1	*n*-Propylbenzene	BRL	ug/L	10
95-49-8	2-Chlorotoluene	BRL	ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	10
106-43-4	4-Chlorotoluene	BRL	ug/L	10
98-06-6	*tert*- Butylbenzene	BRL	ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	10
135-98-8	*sec*-Butylbenzene	BRL	ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	10
99-87-6	4-Isopropyltoluene	BRL	ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	10
104-51-8	*n*-Butylbenzene	BRL	ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	10
87-68-3	Hexachlorobutadiene	BRL	ug/L	10
91-20-3	Naphthalene	BRL	ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	94 %	86 - 118 %
1,2-Dichloroethane-d_4	96 %	80 - 120 %
Toluene-d_8	99 %	88 - 110 %
4-Bromofluorobenzene	104 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Laboratory ID:	62724-04
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	2
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	1
74-87-3	Chloromethane	BRL	ug/L	1
75-01-4	Vinyl Chloride	BRL	ug/L	1
74-83-9	Bromomethane	BRL	ug/L	1
75-00-3	Chloroethane	BRL	ug/L	1
75-69-4	Trichlorofluoromethane	BRL	ug/L	1
60-29-7	Diethyl Ether	BRL	ug/L	4
75-35-4	1,1-Dichloroethene	BRL	ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	10
67-64-1	Acetone	BRL	ug/L	20
75-15-0	Carbon Disulfide	BRL	ug/L	10
75-09-2	Methylene Chloride	BRL	ug/L	5
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	1
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	1
75-34-3	1,1-Dichloroethane	BRL	ug/L	1
590-20-7	2,2-Dichloropropane	BRL	ug/L	1
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	1
78-93-3	2-Butanone (MEK)	BRL	ug/L	10
74-97-5	Bromochloromethane	BRL	ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	10
67-66-3	Chloroform	BRL	ug/L	1
71-55-6	1,1,1-Trichloroethane	26	ug/L	1
56-23-5	Carbon Tetrachloride	BRL	ug/L	1
563-58-6	1,1-Dichloropropene	BRL	ug/L	1
71-43-2	Benzene	BRL	ug/L	1
107-06-2	1,2-Dichloroethane	BRL	ug/L	1
79-01-6	Trichloroethene	70	ug/L	1
78-87-5	1,2-Dichloropropane	BRL	ug/L	1
74-95-3	Dibromomethane	BRL	ug/L	1
75-27-4	Bromodichloromethane	BRL	ug/L	1
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	10
108-88-3	Toluene	BRL	ug/L	1
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	1
127-18-4	Tetrachloroethene	54	ug/L	1
142-28-9	1,3-Dichloropropane	BRL	ug/L	1
591-78-6	2-Hexanone	BRL	ug/L	10
124-48-1	Dibromochloromethane	BRL	ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	1
108-90-7	Chlorobenzene	BRL	ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	1
100-41-4	Ethylbenzene	BRL	ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Laboratory ID:	62724-04
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	2
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	1
95-47-6	*ortho*-Xylene	BRL	ug/L	1
100-42-5	Styrene	BRL	ug/L	1
75-25-2	Bromoform	BRL	ug/L	1
98-82-8	Isopropylbenzene	BRL	ug/L	1
108-86-1	Bromobenzene	BRL	ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	1
103-65-1	*n*-Propylbenzene	BRL	ug/L	1
95-49-8	2-Chlorotoluene	BRL	ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	1
106-43-4	4-Chlorotoluene	BRL	ug/L	1
98-06-6	*tert*-Butylbenzene	BRL	ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	1
135-98-8	*sec*-Butylbenzene	BRL	ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	1
99-87-6	4-Isopropyltoluene	BRL	ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	1
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	1
104-51-8	*n*-Butylbenzene	BRL	ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	1
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	1
87-68-3	Hexachlorobutadiene	BRL	ug/L	1
91-20-3	Naphthalene	BRL	ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	1

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	93 %	86 - 118 %
1,2-Dichloroethane-d_4	96 %	80 - 120 %
Toluene-d_8	100 %	88 - 110 %
4-Bromofluorobenzene	105 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Laboratory ID:	62724-05
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	1
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	9	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	1	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Laboratory ID:	62724-05
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	1
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CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	0.5
95-47-6	*ortho*-Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	tert-Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	96 %	86 - 118 %
1,2-Dichloroethane-d_4	98 %	80 - 120 %
Toluene-d_8	101 %	88 - 110 %
4-Bromofluorobenzene	103 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-1	Laboratory ID:	62724-06
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	20
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CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	10
74-87-3	Chloromethane	BRL	ug/L	10
75-01-4	Vinyl Chloride	BRL	ug/L	10
74-83-9	Bromomethane	BRL	ug/L	10
75-00-3	Chloroethane	BRL	ug/L	10
75-69-4	Trichlorofluoromethane	BRL	ug/L	10
60-29-7	Diethyl Ether	BRL	ug/L	40
75-35-4	1,1-Dichloroethene	120	ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	100
67-64-1	Acetone	BRL	ug/L	200
75-15-0	Carbon Disulfide	BRL	ug/L	100
75-09-2	Methylene Chloride	BRL	ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	10
75-34-3	1,1-Dichloroethane	290	ug/L	10
590-20-7	2,2-Dichloropropane	BRL	ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	10
78-93-3	2-Butanone (MEK)	BRL	ug/L	100
74-97-5	Bromochloromethane	BRL	ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	100
67-66-3	Chloroform	BRL	ug/L	10
71-55-6	1,1,1-Trichloroethane	590	ug/L	10
56-23-5	Carbon Tetrachloride	BRL	ug/L	10
563-58-6	1,1-Dichloropropene	BRL	ug/L	10
71-43-2	Benzene	BRL	ug/L	10
107-06-2	1,2-Dichloroethane	BRL	ug/L	10
79-01-6	Trichloroethene	BRL	ug/L	10
78-87-5	1,2-Dichloropropane	BRL	ug/L	10
74-95-3	Dibromomethane	BRL	ug/L	10
75-27-4	Bromodichloromethane	BRL	ug/L	10
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	100
108-88-3	Toluene	BRL	ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	10
127-18-4	Tetrachloroethene	BRL	ug/L	10
142-28-9	1,3-Dichloropropane	BRL	ug/L	10
591-78-6	2-Hexanone	BRL	ug/L	100
124-48-1	Dibromochloromethane	BRL	ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	10
108-90-7	Chlorobenzene	BRL	ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	10
100-41-4	Ethylbenzene	BRL	ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	**URS-1**	Laboratory ID:	**62724-06**
Project:	**RM Jones/542.1.1**	QC Batch ID:	**VM5-2589-W**
Client:	**Lightship Engineering**	Sampled:	**07-08-03**
Container:	**40 mL VOA Vial**	Received:	**07-09-03**
Preservation:	**HCl / Cool**	Analyzed:	**07-11-03**
Matrix:	**Aqueous**	Dilution Factor:	**20**
		Page:	**2 of 2**

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	10
95-47-6	*ortho*-Xylene	BRL	ug/L	10
100-42-5	Styrene	BRL	ug/L	10
75-25-2	Bromoform	BRL	ug/L	10
98-82-8	Isopropylbenzene	BRL	ug/L	10
108-86-1	Bromobenzene	BRL	ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	10
103-65-1	*n*-Propylbenzene	BRL	ug/L	10
95-49-8	2-Chlorotoluene	BRL	ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	10
106-43-4	4-Chlorotoluene	BRL	ug/L	10
98-06-6	*tert*-Butylbenzene	BRL	ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	10
135-98-8	*sec*-Butylbenzene	BRL	ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	10
99-87-6	4-Isopropyltoluene	BRL	ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	10
104-51-8	*n*-Butylbenzene	BRL	ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	10
87-68-3	Hexachlorobutadiene	BRL	ug/L	10
91-20-3	Naphthalene	BRL	ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	**96 %**	86 - 118 %
1,2-Dichloroethane-d_4	**95 %**	80 - 120 %
Toluene-d_8	**104 %**	88 - 110 %
4-Bromofluorobenzene	**107 %**	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Laboratory ID:	62724-07
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	5,000
		Page:	1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	2,500
74-87-3	Chloromethane	BRL	ug/L	2,500
75-01-4	Vinyl Chloride	BRL	ug/L	2,500
74-83-9	Bromomethane	BRL	ug/L	2,500
75-00-3	Chloroethane	BRL	ug/L	2,500
75-69-4	Trichlorofluoromethane	BRL	ug/L	2,500
60-29-7	Diethyl Ether	BRL	ug/L	10,000
75-35-4	1,1-Dichloroethene	BRL	ug/L	2,500
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	25,000
67-64-1	Acetone	BRL	ug/L	50,000
75-15-0	Carbon Disulfide	BRL	ug/L	25,000
75-09-2	Methylene Chloride	BRL	ug/L	13,000
156-60-5	*trans*- 1,2-Dichloroethene	BRL	ug/L	2,500
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL	ug/L	2,500
75-34-3	1,1-Dichloroethane	BRL	ug/L	2,500
590-20-7	2,2-Dichloropropane	BRL	ug/L	2,500
156-59-2	*cis*- 1,2-Dichloroethene	BRL	ug/L	2,500
78-93-3	2-Butanone (MEK)	BRL	ug/L	25,000
74-97-5	Bromochloromethane	BRL	ug/L	2,500
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	25,000
67-66-3	Chloroform	BRL	ug/L	2,500
71-55-6	1,1,1-Trichloroethane	**38,000**	ug/L	2,500
56-23-5	Carbon Tetrachloride	BRL	ug/L	2,500
563-58-6	1,1-Dichloropropene	BRL	ug/L	2,500
71-43-2	Benzene	BRL	ug/L	2,500
107-06-2	1,2-Dichloroethane	BRL	ug/L	2,500
79-01-6	Trichloroethene	**14,000**	ug/L	2,500
78-87-5	1,2-Dichloropropane	BRL	ug/L	2,500
74-95-3	Dibromomethane	BRL	ug/L	2,500
75-27-4	Bromodichloromethane	BRL	ug/L	2,500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL	ug/L	2,500
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	25,000
108-88-3	Toluene	**75,000**	ug/L	2,500
10061-02-6	*trans*- 1,3-Dichloropropene	BRL	ug/L	2,500
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	2,500
127-18-4	Tetrachloroethene	**7,200**	ug/L	2,500
142-28-9	1,3-Dichloropropane	BRL	ug/L	2,500
591-78-6	2-Hexanone	BRL	ug/L	25,000
124-48-1	Dibromochloromethane	BRL	ug/L	2,500
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	2,500
108-90-7	Chlorobenzene	BRL	ug/L	2,500
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	2,500
100-41-4	Ethylbenzene	BRL	ug/L	2,500

GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Laboratory ID:	62724-07
Project:	RM Jones/542.1.1	QC Batch ID:	VM5-2589-W
Client:	Lightship Engineering	Sampled:	07-08-03
Container:	40 mL VOA Vial	Received:	07-09-03
Preservation:	HCl / Cool	Analyzed:	07-11-03
Matrix:	Aqueous	Dilution Factor:	5,000
		Page:	2 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	5,600	ug/L	2,500
95-47-6	*ortho*- Xylene	BRL	ug/L	2,500
100-42-5	Styrene	BRL	ug/L	2,500
75-25-2	Bromoform	BRL	ug/L	2,500
98-82-8	Isopropylbenzene	BRL	ug/L	2,500
108-86-1	Bromobenzene	BRL	ug/L	2,500
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	2,500
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	2,500
103-65-1	*n*-Propylbenzene	BRL	ug/L	2,500
95-49-8	2-Chlorotoluene	BRL	ug/L	2,500
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	2,500
106-43-4	4-Chlorotoluene	BRL	ug/L	2,500
98-06-6	*tert*- Butylbenzene	BRL	ug/L	2,500
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	2,500
135-98-8	*sec*-Butylbenzene	BRL	ug/L	2,500
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	2,500
99-87-6	4-Isopropyltoluene	BRL	ug/L	2,500
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	2,500
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	2,500
104-51-8	*n*-Butylbenzene	BRL	ug/L	2,500
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	2,500
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	2,500
87-68-3	Hexachlorobutadiene	BRL	ug/L	2,500
91-20-3	Naphthalene	BRL	ug/L	2,500
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	2,500

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	93 %	86 - 118 %
1,2-Dichloroethane-d_4	94 %	80 - 120 %
Toluene-d_8	99 %	88 - 110 %
4-Bromofluorobenzene	105 %	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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

Project Narrative

Project:	RM Jones/542.1.1	Lab ID:	62724
Client:	Lightship Engineering	Received:	07-09-03 19:20

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No discrepancies, changes, or amendments were noted.

B. Method Non-Conformances

The following method non-conformances were noted for this project:

1. No method non-conformances were noted.

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 074722

Project Name: RM Jones	Firm: Lightship Engineering
Project Number: 542.1.1	Address: 36 Cordage Park Circle
Sampler Name: Randall Twiss	City / State / Zip: Plymouth, MA 02360
Project Manager: Joe O'Brien	Telephone: 508 830 3344

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [ ] STANDARD (10 Business Days)
- [X] PRIORITY (5 Business Days)
- [ ] RUSH (RAN: ____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: ____
- [X] Please FAX to: 508 830 3360

BILLING

- [ ] Purchase Order No. ____
- [ ] Third Party Billing: ____
- [ ] GWA Quote: ____

ANALYSIS REQUEST

Sampling Date	Sampling Time	SAMPLE IDENTIFICATION	Matrix: Groundwater	Matrix: Drinking Water	Matrix: Wastewater	Matrix: Soil	Matrix: Other Solid	Matrix: Oil/Organic Liquid	Type: Composite	Type: Grab	Container(s): 40ml VOA Vial	Container(s): 60ml Glass	Container(s): 120ml Glass	Container(s): 250ml Glass	Container(s): 500ml Glass	Container(s): 1L Glass	Preservation: HCl	Preservation: HNO3	Preservation: H2SO4	Preservation: NaOH	Preservation: Methanol	Preservation: Sodium Bisulfate	Preservation: Ice	Filtered: Yes	Filtered: No	LABORATORY NUMBER (Lab Use Only) 62724	Volatiles	Semivolatiles	Pesticides/PCBs Extractable	Pesticides/PCBs Volatile	Metals	Petroleum Hydrocarbons Ext. TPH	Petroleum Hydrocarbons Vol. TPH	Other Wet Chem	General Chemistry	Other
7/8	10:24	URS-2	X							X	3	X					X						X		X	1		X									
	11:04	URS-3	X							X	3	X					X						X		X	2		X									
	11:53	GZA-4	X							X	3	X					X						X		X	3		X									
	11:31	WE-3	X							X	3	X					X						X		X	4		X									
	13:16	MW-5	X							X	3	X					X						X		X	5		X									
	13:00	URS-1	X							X	3	X					X						X		X	6		X									
↓	13:46	MW-4	X							X	3	X					X						X		X	7		X									

REMARKS / SPECIAL INSTRUCTIONS

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
[ ] CT	[ ] MCP GW-1/S-1	[ ] PWS Form
[ ] ME	[X] MCP GW-2/S-1	[ ] ____
[X] MA	[ ] NY STARS	[ ] ____
[ ] NH	[ ] Drinking Water	
[ ] NY	[ ] Wastewater	
[ ] RI	[ ] Waste Disposal	
[ ] VT	[ ] Dredge Material	
[ ] ____	[ ] ____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. Each MS, MSD and Sample Duplicate requires an additional sample aliquot.

Project Specific QC Required	Selection of QC Sample
[ ] Sample Duplicate	[ ] Please use sample:
[ ] Matrix Spike	
[ ] Matrix Spike Duplicate	

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by Sampler	Date	Time	Received by	Receipt Temperature
Randall Twiss	7/9/07	1155	[signature]	2.1
Relinquished by	**Date**	**Time**	**Received by:**	**Container Count**
[signature]	7/9/07	1520	[signature]	21
Relinquished by:	**Date**	**Time**	**Received by Laboratory**	**Shipping/Airbill Number:**

Method of Shipment: [ ] GWA Courier [ ] Express Mail [ ] Federal Express [ ] UPS [ ] Hand [ ] ____

Custody Seal Number

GROUNDWATER ANALYTICAL

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. Perent 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
Method Blank

Category: EPA Method 8260B
QC Batch ID: VM5-2589-WB
Matrix: Aqueous
Page: 1 of 2

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
590-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	*cis*-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8260B**
QC Batch ID: **VM5-2589-WB**
Matrix: **Aqueous**
Page: **2 of 2**

CAS Number	Analyte	Concentration	Units	Reporting Limit
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	0.5
95-47-6	*ortho*-Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	**96 %**	86 - 118 %
1,2-Dichloroethane-d_4	**96 %**	80 - 120 %
Toluene-d_8	**100 %**	88 - 110 %
4-Bromofluorobenzene	**103 %**	86 - 115 %

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. Analysis performed utilizing 25mL sample purge volume.

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.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

GROUNDWATER ANALYTICAL

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October 27, 2003

RECEIVED
OCT 28 2003

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project: **RM Jones/542.1**
Lab ID: **66018**
Received: **10-20-03**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **RM Jones/542.1**
Client: **Lightship Engineering**
Lab ID: **66018**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **10-20-03**

Temperature: **5.3'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-1	URS-2		Aqueous	10/20/03 11:52	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379686	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379685	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379684	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-2	URS-3		Aqueous	10/20/03 11:59	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379682	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379683	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379681	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-3	GZA-4		Aqueous	10/20/03 12:57	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379716	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379711	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379710	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-4	WE-3		Aqueous	10/20/03 12:51	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379723	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379722	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379717	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-5	MW-5		Aqueous	10/20/03 13:53	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379715	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379712	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379709	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-6	URS-1		Aqueous	10/20/03 14:10	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379707	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379706	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379705	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

Lab ID	Field ID		Matrix	Sampled	Method			Notes
66018-7	MW-4		Aqueous	10/20/03 14:40	EPA 8260B Volatile Organics with Oxygenates			
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C379713	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379714	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	
C379708	40 mL VOA Vial	Industrial	BX9762	HCl	R-3761B	10-10-03	10-15-03	

GROUNDWATER ANALYTICAL

Data Certification

Project:	RM Jones/542.1	Lab ID:	66018
Client:	Lightship Engineering	Received:	10-20-03 18:10

MA DEP Compendium of Analytical Methods

Project Location:	n/a	MA DEP RTN:	n/a

This Form provides certifications for the following data set:

EPA 8260B: 66018-01,-02,-03,-04,-05,-06,-07

Sample Matrices:	Groundwater (X)	Soil/Sediment ( )	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used	8260B (X)	8151A ( )	8330 ( )	6010B ( )	7470A/1A ( )
	8270C ( )	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
As specified in MA DEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1. List Release Tracking Number (RTN), if known.
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method
3. S - SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes

All No answers are addressed in the attached Project Narrative.

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

Signature:	Jonathan R. Sanford	Position:	President
Printed Name:	Jonathan R. Sanford	Date:	10-27-03

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-01	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 11:52	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 00:23	Dilution Factor:	200
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	100
74-87-3	Chloromethane	BRL		ug/L	100
75-01-4	Vinyl Chloride	BRL		ug/L	100
74-83-9	Bromomethane	BRL		ug/L	100
75-00-3	Chloroethane	BRL		ug/L	100
75-69-4	Trichlorofluoromethane	BRL		ug/L	100
60-29-7	Diethyl Ether	BRL		ug/L	400
75-35-4	1,1-Dichloroethene	BRL		ug/L	100
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	1,000
67-64-1	Acetone	BRL		ug/L	2,000
75-15-0	Carbon Disulfide	BRL		ug/L	1,000
75-09-2	Methylene Chloride	BRL		ug/L	500
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	100
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	100
75-34-3	1,1-Dichloroethane	BRL		ug/L	100
594-20-7	2,2-Dichloropropane	BRL		ug/L	100
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	100
78-93-3	2-Butanone (MEK)	BRL		ug/L	1,000
74-97-5	Bromochloromethane	BRL		ug/L	100
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	1,000
67-66-3	Chloroform	BRL		ug/L	100
71-55-6	1,1,1-Trichloroethane	3,700		ug/L	100
56-23-5	Carbon Tetrachloride	BRL		ug/L	100
563-58-6	1,1-Dichloropropene	BRL		ug/L	100
71-43-2	Benzene	BRL		ug/L	100
107-06-2	1,2-Dichloroethane	BRL		ug/L	100
79-01-6	Trichloroethene	1,500		ug/L	100
78-87-5	1,2-Dichloropropane	BRL		ug/L	100
74-95-3	Dibromomethane	BRL		ug/L	100
75-27-4	Bromodichloromethane	BRL		ug/L	100
123-91-1	1,4-Dioxane	BRL		ug/L	100,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	100
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	1,000
108-88-3	Toluene	BRL		ug/L	100
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	100
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	100
127-18-4	Tetrachloroethene	350		ug/L	100
142-28-9	1,3-Dichloropropane	BRL		ug/L	100
591-78-6	2-Hexanone	BRL		ug/L	1,000
124-48-1	Dibromochloromethane	BRL		ug/L	100
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	100
108-90-7	Chlorobenzene	BRL		ug/L	100
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	100
100-41-4	Ethylbenzene	BRL		ug/L	100
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	100
95-47-6	*ortho*- Xylene	BRL		ug/L	100

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-01	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 11:52	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 00:23	Dilution Factor:	200
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	100
75-25-2	Bromoform	BRL		ug/L	100
98-82-8	Isopropylbenzene	BRL		ug/L	100
108-86-1	Bromobenzene	BRL		ug/L	100
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	100
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	100
103-65-1	*n*-Propylbenzene	BRL		ug/L	100
95-49-8	2-Chlorotoluene	BRL		ug/L	100
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	100
106-43-4	4-Chlorotoluene	BRL		ug/L	100
98-06-6	*tert*-Butylbenzene	BRL		ug/L	100
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	100
135-98-8	*sec*-Butylbenzene	BRL		ug/L	100
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	100
99-87-6	4-Isopropyltoluene	BRL		ug/L	100
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	100
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	100
104-51-8	*n*-Butylbenzene	BRL		ug/L	100
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	100
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	100
87-68-3	Hexachlorobutadiene	BRL		ug/L	100
91-20-3	Naphthalene	BRL		ug/L	100
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	100
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	4,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	100
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	100
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	100

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	8.9	89 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.6	86 %	70 - 130 %
Toluene-d_8	10	9.8	98 %	70 - 130 %
4-Bromofluorobenzene	10	11	106 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-02	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 11:59	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 01:02	Dilution Factor:	1
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	14		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	15		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	8		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	5		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-02	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 11:59	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 01:02	Dilution Factor:	1
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9	90 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.5	95 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	11	109 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-03	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 12:57	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 03:36	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	56		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	120		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	12		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	56		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	420		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*-1,2-Dichloroethene	160		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	82		ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	33		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	21		ug/L	5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	6		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	BRL		ug/L	5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	5
95-47-6	*ortho*-Xylene	BRL		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-03	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 12:57	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 03:36	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	8		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.2	92 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.9	89 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	11	112 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-04	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 12:51	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 04:15	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	BRL		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	BRL		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	BRL		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	**8**		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	**200**		ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	**170**		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	BRL		ug/L	5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	**95**		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	BRL		ug/L	5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	5
95-47-6	*ortho*- Xylene	BRL		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-04	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 12:51	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 04:15	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.1	91 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.1	91 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	11	110 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-05	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 13:53	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 01:40	Dilution Factor:	1
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	14		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	3		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-05	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 13:53	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 01:40	Dilution Factor:	1
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	8.8	88 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9	90 %	70 - 130 %
Toluene-d_8	10	9.8	98 %	70 - 130 %
4-Bromofluorobenzene	10	11	110 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-06	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 14:10	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 02:58	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	BRL		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	BRL		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	110		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	300		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	260		ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	BRL		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	BRL		ug/L	5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	BRL		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	BRL		ug/L	5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	5
95-47-6	*ortho*-Xylene	BRL		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-06	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 14:10	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 02:58	Dilution Factor:	10
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.2	92 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.9	89 %	70 - 130 %
Toluene-d_8	10	10	101 %	70 - 130 %
4-Bromofluorobenzene	10	11	113 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-07	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 14:40	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 02:19	Dilution Factor:	500
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	250
74-87-3	Chloromethane	BRL		ug/L	250
75-01-4	Vinyl Chloride	BRL		ug/L	250
74-83-9	Bromomethane	BRL		ug/L	250
75-00-3	Chloroethane	BRL		ug/L	250
75-69-4	Trichlorofluoromethane	BRL		ug/L	250
60-29-7	Diethyl Ether	BRL		ug/L	1,000
75-35-4	1,1-Dichloroethene	BRL		ug/L	250
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	2,500
67-64-1	Acetone	BRL		ug/L	5,000
75-15-0	Carbon Disulfide	BRL		ug/L	2,500
75-09-2	Methylene Chloride	BRL		ug/L	1,300
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	250
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	250
75-34-3	1,1-Dichloroethane	BRL		ug/L	250
594-20-7	2,2-Dichloropropane	BRL		ug/L	250
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	250
78-93-3	2-Butanone (MEK)	BRL		ug/L	2,500
74-97-5	Bromochloromethane	BRL		ug/L	250
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	2,500
67-66-3	Chloroform	BRL		ug/L	250
71-55-6	1,1,1-Trichloroethane	**5,200**		ug/L	250
56-23-5	Carbon Tetrachloride	BRL		ug/L	250
563-58-6	1,1-Dichloropropene	BRL		ug/L	250
71-43-2	Benzene	BRL		ug/L	250
107-06-2	1,2-Dichloroethane	BRL		ug/L	250
79-01-6	Trichloroethene	**1,400**		ug/L	250
78-87-5	1,2-Dichloropropane	BRL		ug/L	250
74-95-3	Dibromomethane	BRL		ug/L	250
75-27-4	Bromodichloromethane	BRL		ug/L	250
123-91-1	1,4-Dioxane	BRL		ug/L	250,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	2,500
108-88-3	Toluene	**6,800**		ug/L	250
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	250
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	250
127-18-4	Tetrachloroethene	**1,400**		ug/L	250
142-28-9	1,3-Dichloropropane	BRL		ug/L	250
591-78-6	2-Hexanone	BRL		ug/L	2,500
124-48-1	Dibromochloromethane	BRL		ug/L	250
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	250
108-90-7	Chlorobenzene	BRL		ug/L	250
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	250
100-41-4	Ethylbenzene	**360**		ug/L	250
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	**1,400**		ug/L	250
95-47-6	*ortho*-Xylene	**340**		ug/L	250

GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	66018-07	QC Batch ID:	VM5-2672-W
Sampled:	10-20-03 14:40	Instrument ID:	MS-5 HP 6890
Received:	10-20-03 18:10	Sample Volume:	25 mL
Analyzed:	10-24-03 02:19	Dilution Factor:	500
Analyst:	CMM		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	250
75-25-2	Bromoform	BRL		ug/L	250
98-82-8	Isopropylbenzene	BRL		ug/L	250
108-86-1	Bromobenzene	BRL		ug/L	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	250
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	250
103-65-1	*n*-Propylbenzene	BRL		ug/L	250
95-49-8	2-Chlorotoluene	BRL		ug/L	250
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	250
106-43-4	4-Chlorotoluene	BRL		ug/L	250
98-06-6	*tert*-Butylbenzene	BRL		ug/L	250
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	250
135-98-8	*sec*-Butylbenzene	BRL		ug/L	250
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	250
99-87-6	4-Isopropyltoluene	BRL		ug/L	250
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	250
95-50-1	1,2-Dichlorobenzene	270		ug/L	250
104-51-8	*n*-Butylbenzene	BRL		ug/L	250
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	250
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	250
87-68-3	Hexachlorobutadiene	BRL		ug/L	250
91-20-3	Naphthalene	BRL		ug/L	250
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	250
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	10,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	250
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	250
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	250

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	8.8	88 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.4	84 %	70 - 130 %
Toluene-d_8	10	9.7	97 %	70 - 130 %
4-Bromofluorobenzene	10	11	107 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**RM Jones/542.1**	Lab ID:	**66018**
Client:	**Lightship Engineering**	Received:	**10-20-03 18:10**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. No method modifications, non-conformances or analytical issues were noted.

GROUNDWATER ANALYTICAL

228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 080953

Project Name: RM Jones	Firm: Lightship Engineering
Project Number: 542.1	Address: 36 Cordage Park Circle
Sampler Name: Randall Twiss	City / State / Zip: Plymouth, MA 02360
Project Manager: Joe O'Brien	Telephone: 508 830 3344

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☐ STANDARD (10 Business Days)
- ☒ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☒ Please FAX to: 508 830 3360

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix: GROUNDWATER	DRINKING WATER	WASTEWATER	SOIL	OTHER SOLID	OILORGANIC LIQUID	Type: COMPOSITE	GRAB	Container(s): NUMBER	40mL VOA Vial	60mL/2 oz Glass	125mL/4 oz Amber Glass	250mL/8 oz Glass	500mL/16 oz Glass	1L/32 oz Amber Glass	250mL/8 oz Plastic	500mL/16 oz Plastic	1L/32 oz Plastic	125mL Sterile	Preservation: HCl	HNO3	H2SO4	NaOH	Methanol	Sodium Bisulfate	ICE	Filtered: YES	NO	LABORATORY NUMBER (Lab Use Only) 080018	RCRA/21E	OPTIONS: TIC Search	SDWA	NPDES	Volatiles	Semivolatiles	Pest/Herb/PCBs Extractable	Pest/Herb/PCBs Vol.	Metals	Petroleum Hydrocarbons Ext. TPH	Petroleum Hydrocarbons Vol. TPH	Haz. Waste	General Chemistry	Other
10/20	11:52	URS-2	X							X	3	X										X					X		X	1	X															
	11:59	URS-3	X							X	3	X										X					X		X	2	X															
	12:57	GZA-4	X							X	3	X										X					X		X	3	X															
	12:57	WE-3	X							X	3	X										X					X		X	4	X															
	13:53	~~WE-5~~ MW-5	X							X	3	X										X					X		X	5	X															
	14:10	URS-1	X							X	3	X										X					X		X	6	X															
↓	14:40	MW-4	X							X	3	X										X					X		X	7	X															

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by Sampler: Randall Twiss	Date 10/20	Time 1500	Received by: [signature]	Receipt Temperature: 5.3 ☐ Refrigerated ☒ 4°C Recommended
Relinquished by: [signature]	Date 10/20/03	Time 1710	Received by: M. Mac Reid	Container Count: 21
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Ha...

Custody Seal Number: ...

GROUNDWATER ANALYTICAL

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. Perent 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, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2672-WL	Analyzed:	10-23-03 19:32
Matrix:	Aqueous	Analyst:	CMM
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-71-8	Dichlorodifluoromethane	25	24	**95 %**	70 - 130 %
74-87-3	Chloromethane	25	25	**99 %**	70 - 130 %
75-01-4	Vinyl Chloride	25	27	**110 %**	70 - 130 %
74-83-9	Bromomethane	25	28	**111 %**	70 - 130 %
75-00-3	Chloroethane	25	27	**109 %**	70 - 130 %
75-69-4	Trichlorofluoromethane	25	30	**120 %**	70 - 130 %
60-29-7	Diethyl Ether	50	47	**94 %**	70 - 130 %
75-35-4	1,1-Dichloroethene	25	25	**100 %**	70 - 130 %
76-13-1	1,1,2-Trichlorotrifluoroethane	50	63	**125 %**	70 - 130 %
67-64-1	Acetone	50	45	**91 %**	70 - 130 %
75-15-0	Carbon Disulfide	50	48	**97 %**	70 - 130 %
75-09-2	Methylene Chloride	25	22	**89 %**	70 - 130 %
156-60-5	*trans*- 1,2-Dichloroethene	25	24	**98 %**	70 - 130 %
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	25	24	**94 %**	70 - 130 %
75-34-3	1,1-Dichloroethane	25	25	**98 %**	70 - 130 %
594-20-7	2,2-Dichloropropane	25	29	**114 %**	70 - 130 %
156-59-2	*cis*- 1,2-Dichloroethene	25	26	**103 %**	70 - 130 %
78-93-3	2-Butanone (MEK)	50	45	**90 %**	70 - 130 %
74-97-5	Bromochloromethane	25	25	**98 %**	70 - 130 %
109-99-9	Tetrahydrofuran (THF)	50	48	**97 %**	70 - 130 %
67-66-3	Chloroform	25	25	**100 %**	70 - 130 %
71-55-6	1,1,1-Trichloroethane	25	26	**103 %**	70 - 130 %
56-23-5	Carbon Tetrachloride	25	26	**105 %**	70 - 130 %
563-58-6	1,1-Dichloropropene	25	26	**106 %**	70 - 130 %
71-43-2	Benzene	25	26	**103 %**	70 - 130 %
107-06-2	1,2-Dichloroethane	25	23	**91 %**	70 - 130 %
79-01-6	Trichloroethene	25	27	**107 %**	70 - 130 %
78-87-5	1,2-Dichloropropane	25	25	**101 %**	70 - 130 %
74-95-3	Dibromomethane	25	24	**95 %**	70 - 130 %
75-27-4	Bromodichloromethane	25	25	**99 %**	70 - 130 %
123-91-1	1,4-Dioxane	500	490	**97 %**	70 - 130 %
10061-01-5	*cis*- 1,3-Dichloropropene	25	25	**102 %**	70 - 130 %
108-10-1	4-Methyl-2-Pentanone (MIBK)	50	43	**85 %**	70 - 130 %
108-88-3	Toluene	25	26	**103 %**	70 - 130 %
10061-02-6	*trans*- 1,3-Dichloropropene	25	25	**98 %**	70 - 130 %
79-00-5	1,1,2-Trichloroethane	25	26	**103 %**	70 - 130 %
127-18-4	Tetrachloroethene	25	29	**116 %**	70 - 130 %
142-28-9	1,3-Dichloropropane	25	25	**100 %**	70 - 130 %
591-78-6	2-Hexanone	50	49	**98 %**	70 - 130 %
124-48-1	Dibromochloromethane	25	26	**102 %**	70 - 130 %
106-93-4	1,2-Dibromoethane (EDB)	25	26	**102 %**	70 - 130 %
108-90-7	Chlorobenzene	25	26	**105 %**	70 - 130 %
630-20-6	1,1,1,2-Tetrachloroethane	25	27	**106 %**	70 - 130 %
100-41-4	Ethylbenzene	25	28	**112 %**	70 - 130 %
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	50	56	**112 %**	70 - 130 %
95-47-6	*ortho*- Xylene	25	27	**110 %**	70 - 130 %
100-42-5	Styrene	25	27	**108 %**	70 - 130 %
75-25-2	Bromoform	25	23	**94 %**	70 - 130 %
98-82-8	Isopropylbenzene	25	28	**111 %**	70 - 130 %

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2672-WL	Analyzed:	10-23-03 19:32
Matrix:	Aqueous	Analyst:	CMM
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-86-1	Bromobenzene	25	26	**103 %**	70 - 130 %
79-34-5	1,1,2,2-Tetrachloroethane	25	25	**100 %**	70 - 130 %
96-18-4	1,2,3-Trichloropropane	25	24	**94 %**	70 - 130 %
103-65-1	*n*-Propylbenzene	25	28	**112 %**	70 - 130 %
95-49-8	2-Chlorotoluene	25	28	**111 %**	70 - 130 %
108-67-8	1,3,5-Trimethylbenzene	25	28	**113 %**	70 - 130 %
106-43-4	4-Chlorotoluene	25	27	**106 %**	70 - 130 %
98-06-6	*tert*-Butylbenzene	25	29	**115 %**	70 - 130 %
95-63-6	1,2,4-Trimethylbenzene	25	28	**114 %**	70 - 130 %
135-98-8	*sec*-Butylbenzene	25	29	**115 %**	70 - 130 %
541-73-1	1,3-Dichlorobenzene	25	26	**104 %**	70 - 130 %
99-87-6	4-Isopropyltoluene	25	29	**116 %**	70 - 130 %
106-46-7	1,4-Dichlorobenzene	25	26	**104 %**	70 - 130 %
95-50-1	1,2-Dichlorobenzene	25	25	**100 %**	70 - 130 %
104-51-8	*n*-Butylbenzene	25	29	**117 %**	70 - 130 %
96-12-8	1,2-Dibromo-3-chloropropane	25	23	**94 %**	70 - 130 %
120-82-1	1,2,4-Trichlorobenzene	25	27	**106 %**	70 - 130 %
87-68-3	Hexachlorobutadiene	25	30	**118 %**	70 - 130 %
91-20-3	Naphthalene	25	25	**100 %**	70 - 130 %
87-61-6	1,2,3-Trichlorobenzene	25	27	**106 %**	70 - 130 %
75-65-0	*tert*-Butyl Alcohol (TBA)	500	450	**89 %**	70 - 130 %
108-20-3	Di-isopropyl Ether (DIPE)	25	25	**98 %**	70 - 130 %
637-92-3	Ethyl tert-butyl Ether (ETBE)	25	25	**99 %**	70 - 130 %
994-05-8	*tert*-Amyl Methyl Ether (TAME)	25	22	**88 %**	70 - 130 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.3	**93 %**	70 - 130 %
1,2-Dichlorobenzene-d_4	10	9.2	**92 %**	70 - 130 %
Toluene-d_8	10	10	**100 %**	70 - 130 %
4-Bromofluorobenzene	10	10	**101 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: EPA Method 8260B
QC Batch ID: VM5-2672-WB
Matrix: Aqueous

Instrument ID: MS-5 HP 6890
Analyzed: 10-23-03 20:11
Analyst: CMM

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

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GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2672-WB	Analyzed:	10-23-03 20:11
Matrix:	Aqueous	Analyst:	CMM

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.2	92 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9	90 %	70 - 130 %
Toluene-d_8	10	9.8	98 %	70 - 130 %
4-Bromofluorobenzene	10	11	108 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
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www.groundwateranalytical.com

January 23, 2004

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project: **RM Jones/524.1**
Lab ID: **68830**
Received: **01-16-04**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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,

Eric H. Jensen
Operations Manager

EHJ/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/524.1	Delivery:	GWA Courier	Temperature:	6'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	68830	Lab Receipt:	01-16-04	Custody Seal(s):	n/a

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-1	URS-2		Aqueous	1/14/04 11:20	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397625	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397637	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397613	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-2	URS-3		Aqueous	1/14/04 11:10	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397662	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397661	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397638	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-3	GZA-4		Aqueous	1/14/04 13:10	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397615	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397624	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397603	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-4	WE-3		Aqueous	1/14/04 12:50	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397626	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397614	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397602	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-5	MW-5		Aqueous	1/14/04 13:50	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397639	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397636	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397627	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-6	URS-1		Aqueous	1/14/04 14:10	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397660	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397612	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397605	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-7	MW-4		Aqueous	1/14/04 14:30	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397616	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397640	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		
C397628	40 mL VOA Vial	Industrial	BX10333	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
68830-8	Trip Blank		Aqueous	1/14/04 0:00	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C368554	40 mL VOA Vial	Industrial	BX10324	HCl	R-3722D	11-24-03	n/a		
C368553	40 mL VOA Vial	Industrial	BX10324	HCl	R-3722D	11-24-03	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project:	RM Jones/524.1	Lab ID:	68830
Client:	Lightship Engineering	Received:	01-16-04 17:40

MA DEP Compendium of Analytical Methods

Project Location:	n/a	MA DEP RTN:	n/a

This Form provides certifications for the following data set:

EPA 8260B: 68830-01,-02,-03,-04,-05,-06,-07,-08

Sample Matrices:	Groundwater	(X)	Soil/Sediment	( )	Drinking Water	( )	Other	( )			
MCP SW-846 Methods Used	8260B	(X)	8151A	( )	8330	( )	6010B	( )	7470A/1A	( )	
	8270C	( )	8081A	( )	VPH	( )	6020	( )	9012A[2]	( )	
	8082	( )	8021B	( )	EPH	( )	7000 S[3]	( )	Other	( )	
Reported to MA DEP Compendium of Analytical Methods (Check all that apply)	1. Underlined text in the table of RTN, if begun 2. Soluble cyanide results are reported to 9014 unless EPA Physiologically Available Cyanide (PAC) Method 3. S - Solids results are wet weight, unless individual method calls for dry weight										

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	No
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes

All No answers are addressed in the attached Project Narrative.

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

Signature:		Position:	Operations Manager
Printed Name:	Eric H. Jensen	Date:	01-23-04

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-01	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 11:20	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 10:48	Dilution Factor:	50
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	25
74-87-3	Chloromethane	BRL		ug/L	25
75-01-4	Vinyl Chloride	BRL		ug/L	25
74-83-9	Bromomethane	BRL		ug/L	25
75-00-3	Chloroethane	BRL		ug/L	25
75-69-4	Trichlorofluoromethane	BRL		ug/L	25
60-29-7	Diethyl Ether	BRL		ug/L	100
75-35-4	1,1-Dichloroethene	30		ug/L	25
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	250
67-64-1	Acetone	BRL		ug/L	500
75-15-0	Carbon Disulfide	BRL		ug/L	250
75-09-2	Methylene Chloride	BRL		ug/L	130
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	25
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	25
75-34-3	1,1-Dichloroethane	50		ug/L	25
594-20-7	2,2-Dichloropropane	BRL		ug/L	25
156-59-2	*cis*- 1,2-Dichloroethene	27		ug/L	25
78-93-3	2-Butanone (MEK)	BRL		ug/L	250
74-97-5	Bromochloromethane	BRL		ug/L	25
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	250
67-66-3	Chloroform	BRL		ug/L	25
71-55-6	1,1,1-Trichloroethane	1,800		ug/L	25
56-23-5	Carbon Tetrachloride	BRL		ug/L	25
563-58-6	1,1-Dichloropropene	BRL		ug/L	25
71-43-2	Benzene	BRL		ug/L	25
107-06-2	1,2-Dichloroethane	BRL		ug/L	25
79-01-6	Trichloroethene	690		ug/L	25
78-87-5	1,2-Dichloropropane	BRL		ug/L	25
74-95-3	Dibromomethane	BRL		ug/L	25
75-27-4	Bromodichloromethane	BRL		ug/L	25
123-91-1	1,4-Dioxane	BRL		ug/L	25,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	25
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	250
108-88-3	Toluene	BRL		ug/L	25
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	25
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	25
127-18-4	Tetrachloroethene	170		ug/L	25
142-28-9	1,3-Dichloropropane	BRL		ug/L	25
591-78-6	2-Hexanone	BRL		ug/L	250
124-48-1	Dibromochloromethane	BRL		ug/L	25
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	25
108-90-7	Chlorobenzene	BRL		ug/L	25
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	25
100-41-4	Ethylbenzene	BRL		ug/L	25
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	25
95-47-6	*ortho*- Xylene	BRL		ug/L	25

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-01	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 11:20	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 10:48	Dilution Factor:	50
Analyst:	LMG		

CAS Number	Analyte	Concentration	Units	Reporting Limit
100-42-5	Styrene	BRL	ug/L	25
75-25-2	Bromoform	BRL	ug/L	25
98-82-8	Isopropylbenzene	BRL	ug/L	25
108-86-1	Bromobenzene	BRL	ug/L	25
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	25
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	25
103-65-1	*n*-Propylbenzene	BRL	ug/L	25
95-49-8	2-Chlorotoluene	BRL	ug/L	25
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	25
106-43-4	4-Chlorotoluene	BRL	ug/L	25
98-06-6	*tert*-Butylbenzene	BRL	ug/L	25
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	25
135-98-8	*sec*-Butylbenzene	BRL	ug/L	25
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	25
99-87-6	4-Isopropyltoluene	BRL	ug/L	25
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	25
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	25
104-51-8	*n*-Butylbenzene	BRL	ug/L	25
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	25
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	25
87-68-3	Hexachlorobutadiene	BRL	ug/L	25
91-20-3	Naphthalene	BRL	ug/L	25
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	25
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL	ug/L	1,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL	ug/L	25
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL	ug/L	25
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL	ug/L	25

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.9	99 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	100 %	70 - 130 %
Toluene-d_8	10	10	102 %	70 - 130 %
4-Bromofluorobenzene	10	11	113 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-02	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 11:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 13:30	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	2		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	17		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	3		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	2		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-02	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 11:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 13:30	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.7	97 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.8	98 %	70 - 130 %
Toluene-d_8	10	10	100 %	70 - 130 %
4-Bromofluorobenzene	10	11	112 %	70 - 130 %

Method Reference: *Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).* Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-03	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 13:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 15:33	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	1
74-87-3	Chloromethane	BRL		ug/L	1
75-01-4	Vinyl Chloride	8		ug/L	1
74-83-9	Bromomethane	BRL		ug/L	1
75-00-3	Chloroethane	17		ug/L	1
75-69-4	Trichlorofluoromethane	BRL		ug/L	1
60-29-7	Diethyl Ether	BRL		ug/L	4
75-35-4	1,1-Dichloroethene	2		ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	16		ug/L	10
67-64-1	Acetone	BRL		ug/L	20
75-15-0	Carbon Disulfide	BRL		ug/L	10
75-09-2	Methylene Chloride	BRL		ug/L	5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	1
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	1
75-34-3	1,1-Dichloroethane	43		ug/L	1
594-20-7	2,2-Dichloropropane	BRL		ug/L	1
156-59-2	*cis*- 1,2-Dichloroethene	29		ug/L	1
78-93-3	2-Butanone (MEK)	BRL		ug/L	10
74-97-5	Bromochloromethane	BRL		ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	10
67-66-3	Chloroform	BRL		ug/L	1
71-55-6	1,1,1-Trichloroethane	46		ug/L	1
56-23-5	Carbon Tetrachloride	BRL		ug/L	1
563-58-6	1,1-Dichloropropene	BRL		ug/L	1
71-43-2	Benzene	BRL		ug/L	1
107-06-2	1,2-Dichloroethane	BRL		ug/L	1
79-01-6	Trichloroethene	27		ug/L	1
78-87-5	1,2-Dichloropropane	BRL		ug/L	1
74-95-3	Dibromomethane	BRL		ug/L	1
75-27-4	Bromodichloromethane	BRL		ug/L	1
123-91-1	1,4-Dioxane	BRL		ug/L	1,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	10
108-88-3	Toluene	3		ug/L	1
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	1
127-18-4	Tetrachloroethene	5		ug/L	1
142-28-9	1,3-Dichloropropane	BRL		ug/L	1
591-78-6	2-Hexanone	BRL		ug/L	10
124-48-1	Dibromochloromethane	BRL		ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	1
108-90-7	Chlorobenzene	BRL		ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	1
100-41-4	Ethylbenzene	1		ug/L	1
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	1		ug/L	1
95-47-6	*ortho*- Xylene	1		ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-03	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 13:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 15:33	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	1
75-25-2	Bromoform	BRL		ug/L	1
98-82-8	Isopropylbenzene	BRL		ug/L	1
108-86-1	Bromobenzene	BRL		ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	1
103-65-1	*n*-Propylbenzene	BRL		ug/L	1
95-49-8	2-Chlorotoluene	BRL		ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	1
106-43-4	4-Chlorotoluene	BRL		ug/L	1
98-06-6	*tert*-Butylbenzene	BRL		ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	1
135-98-8	*sec*-Butylbenzene	BRL		ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	1
99-87-6	4-Isopropyltoluene	BRL		ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	1
95-50-1	1,2-Dichlorobenzene	8		ug/L	1
104-51-8	*n*-Butylbenzene	BRL		ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	1
120-82-1	1,2,4-Trichlorobenzene	2		ug/L	1
87-68-3	Hexachlorobutadiene	BRL		ug/L	1
91-20-3	Naphthalene	20		ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	1
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	40
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	1
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	1
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.7	97 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.6	96 %	70 - 130 %
Toluene-d_8	10	10	100 %	70 - 130 %
4-Bromofluorobenzene	10	11	106 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-04	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 12:50	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 16:14	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	1
74-87-3	Chloromethane	BRL		ug/L	1
75-01-4	Vinyl Chloride	BRL		ug/L	1
74-83-9	Bromomethane	BRL		ug/L	1
75-00-3	Chloroethane	BRL		ug/L	1
75-69-4	Trichlorofluoromethane	BRL		ug/L	1
60-29-7	Diethyl Ether	BRL		ug/L	4
75-35-4	1,1-Dichloroethene	1		ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	16		ug/L	10
67-64-1	Acetone	BRL		ug/L	20
75-15-0	Carbon Disulfide	BRL		ug/L	10
75-09-2	Methylene Chloride	BRL		ug/L	5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	1
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	1
75-34-3	1,1-Dichloroethane	6		ug/L	1
594-20-7	2,2-Dichloropropane	BRL		ug/L	1
156-59-2	*cis*-1,2-Dichloroethene	2		ug/L	1
78-93-3	2-Butanone (MEK)	BRL		ug/L	10
74-97-5	Bromochloromethane	BRL		ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	10
67-66-3	Chloroform	BRL		ug/L	1
71-55-6	1,1,1-Trichloroethane	95		ug/L	1
56-23-5	Carbon Tetrachloride	BRL		ug/L	1
563-58-6	1,1-Dichloropropene	BRL		ug/L	1
71-43-2	Benzene	BRL		ug/L	1
107-06-2	1,2-Dichloroethane	BRL		ug/L	1
79-01-6	Trichloroethene	86		ug/L	1
78-87-5	1,2-Dichloropropane	BRL		ug/L	1
74-95-3	Dibromomethane	BRL		ug/L	1
75-27-4	Bromodichloromethane	BRL		ug/L	1
123-91-1	1,4-Dioxane	BRL		ug/L	1,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	10
108-88-3	Toluene	BRL		ug/L	1
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	1
127-18-4	Tetrachloroethene	52		ug/L	1
142-28-9	1,3-Dichloropropane	BRL		ug/L	1
591-78-6	2-Hexanone	BRL		ug/L	10
124-48-1	Dibromochloromethane	BRL		ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	1
108-90-7	Chlorobenzene	BRL		ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	1
100-41-4	Ethylbenzene	BRL		ug/L	1
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	1
95-47-6	*ortho*-Xylene	BRL		ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-04	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 12:50	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 16:14	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	1
75-25-2	Bromoform	BRL		ug/L	1
98-82-8	Isopropylbenzene	BRL		ug/L	1
108-86-1	Bromobenzene	BRL		ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	1
103-65-1	*n*-Propylbenzene	BRL		ug/L	1
95-49-8	2-Chlorotoluene	BRL		ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	1
106-43-4	4-Chlorotoluene	BRL		ug/L	1
98-06-6	*tert*-Butylbenzene	BRL		ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	1
135-98-8	*sec*-Butylbenzene	BRL		ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	1
99-87-6	4-Isopropyltoluene	BRL		ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	1
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	1
104-51-8	n-Butylbenzene	BRL		ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	1
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	1
87-68-3	Hexachlorobutadiene	BRL		ug/L	1
91-20-3	Naphthalene	BRL		ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	1
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	40
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	1
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	1
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.8	98 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	102 %	70 - 130 %
Toluene-d_8	10	10	100 %	70 - 130 %
4-Bromofluorobenzene	10	11	113 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-05	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 13:50	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 14:11	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl tert-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	3		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	0.5
95-47-6	*ortho*-Xylene	BRL		ug/L	0.5

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GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-05	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 13:50	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 14:11	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Units	Reporting Limit
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL	ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL	ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL	ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL	ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	101 %	70 - 130 %
1,2-Dichloroethane-d_4	10	11	106 %	70 - 130 %
Toluene-d_8	10	10	104 %	70 - 130 %
4-Bromofluorobenzene	10	11	113 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-06	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 14:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 20:18	Dilution Factor:	10
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	BRL		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	BRL		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	120		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	300		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	310		ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	BRL		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	BRL		ug/L	5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	BRL		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	BRL		ug/L	5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	5
95-47-6	*ortho*-Xylene	BRL		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-06	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 14:10	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 20:18	Dilution Factor:	10
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.8	**98 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**101 %**	70 - 130 %
Toluene-d_8	10	10	**102 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**112 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-07	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 14:30	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 14:52	Dilution Factor:	500
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	250
74-87-3	Chloromethane	BRL		ug/L	250
75-01-4	Vinyl Chloride	BRL		ug/L	250
74-83-9	Bromomethane	BRL		ug/L	250
75-00-3	Chloroethane	BRL		ug/L	250
75-69-4	Trichlorofluoromethane	BRL		ug/L	250
60-29-7	Diethyl Ether	BRL		ug/L	1,000
75-35-4	1,1-Dichloroethene	BRL		ug/L	250
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	2,500
67-64-1	Acetone	BRL		ug/L	5,000
75-15-0	Carbon Disulfide	BRL		ug/L	2,500
75-09-2	Methylene Chloride	BRL		ug/L	1,300
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	250
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	250
75-34-3	1,1-Dichloroethane	BRL		ug/L	250
594-20-7	2,2-Dichloropropane	BRL		ug/L	250
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	250
78-93-3	2-Butanone (MEK)	BRL		ug/L	2,500
74-97-5	Bromochloromethane	BRL		ug/L	250
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	2,500
67-66-3	Chloroform	BRL		ug/L	250
71-55-6	1,1,1-Trichloroethane	11,000		ug/L	250
56-23-5	Carbon Tetrachloride	BRL		ug/L	250
563-58-6	1,1-Dichloropropene	BRL		ug/L	250
71-43-2	Benzene	BRL		ug/L	250
107-06-2	1,2-Dichloroethane	BRL		ug/L	250
79-01-6	Trichloroethene	1,700		ug/L	250
78-87-5	1,2-Dichloropropane	BRL		ug/L	250
74-95-3	Dibromomethane	BRL		ug/L	250
75-27-4	Bromodichloromethane	BRL		ug/L	250
123-91-1	1,4-Dioxane	BRL		ug/L	250,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	2,500
108-88-3	Toluene	6,300		ug/L	250
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	250
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	250
127-18-4	Tetrachloroethene	1,500		ug/L	250
142-28-9	1,3-Dichloropropane	BRL		ug/L	250
591-78-6	2-Hexanone	BRL		ug/L	2,500
124-48-1	Dibromochloromethane	BRL		ug/L	250
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	250
108-90-7	Chlorobenzene	BRL		ug/L	250
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	250
100-41-4	Ethylbenzene	300		ug/L	250
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	1,500		ug/L	250
95-47-6	*ortho*-Xylene	310		ug/L	250

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GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-07	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 14:30	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 14:52	Dilution Factor:	500
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	250
75-25-2	Bromoform	BRL		ug/L	250
98-82-8	Isopropylbenzene	BRL		ug/L	250
108-86-1	Bromobenzene	BRL		ug/L	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	250
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	250
103-65-1	*n*-Propylbenzene	BRL		ug/L	250
95-49-8	2-Chlorotoluene	BRL		ug/L	250
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	250
106-43-4	4-Chlorotoluene	BRL		ug/L	250
98-06-6	*tert*-Butylbenzene	BRL		ug/L	250
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	250
135-98-8	*sec*-Butylbenzene	BRL		ug/L	250
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	250
99-87-6	4-Isopropyltoluene	BRL		ug/L	250
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	250
95-50-1	1,2-Dichlorobenzene	250		ug/L	250
104-51-8	*n*-Butylbenzene	BRL		ug/L	250
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	250
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	250
87-68-3	Hexachlorobutadiene	BRL		ug/L	250
91-20-3	Naphthalene	BRL		ug/L	250
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	250
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	10,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	250
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	250
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	250

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.6	96 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.8	98 %	70 - 130 %
Toluene-d_8	10	11	105 %	70 - 130 %
4-Bromofluorobenzene	10	11	112 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	Trip Blank	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-08	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 00:00	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 12:49	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL	ug/L	0.5
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL	ug/L	0.5
60-29-7	Diethyl Ether	BRL	ug/L	2
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL	ug/L	5
67-64-1	Acetone	BRL	ug/L	10
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL	ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
74-97-5	Bromochloromethane	BRL	ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
74-95-3	Dibromomethane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
123-91-1	1,4-Dioxane	BRL	ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL	ug/L	0.5
95-47-6	*ortho*-Xylene	BRL	ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	Trip Blank	Matrix:	Aqueous
Project:	RM Jones/524.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	68830-08	QC Batch ID:	VM4-2802-W
Sampled:	01-14-04 00:00	Instrument ID:	MS-4 HP 6890
Received:	01-16-04 17:40	Sample Volume:	25 mL
Analyzed:	01-20-04 12:49	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Recovered	Recovery	QC Limits
Dibromofluoromethane	10	10	100 %	70 - 130 %
1,2-Dichloroethane-d_4	10	11	106 %	70 - 130 %
Toluene-d_8	10	10	104 %	70 - 130 %
4-Bromofluorobenzene	10	12	116 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Project Narrative

Project:	RM Jones/524.1	Lab ID:	68830
Client:	Lightship Engineering	Received:	01-16-04 17:40

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 8260B Non-conformance: Samples 68830-01 through -08. Laboratory control sample (LCS) analyte 1,4-Dioxane was above recommended recovery limits for QC batch VM4-2802-W.
2. EPA 8260B Note: Samples 68830-01, -03, -04, -06, and -07. Sample were diluted prior to analysis. Dilution was required to keep all target analytes within calibration.

ROUNDWATER ANALYTICAL

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Buzzards Bay, MA 02532
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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 084487

ect Name: J Jones	Firm: Lighthouse Engineering
ect Number: 542.1	Address: 36 Cordage Park Circle
pler Name: ndall Twiss	City / State / Zip: Plymouth, MA 02360
ect Manager: e O'Brien	Telephone: 508 830 3344

TRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☐ STANDARD (10 Business Days)
- ☒ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
  - ☐ Please Email to: _____
  - ☒ Please FAX to: 508 830 3360

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

pling TIME	SAMPLE IDENTIFICATION	Matrix: GROUNDWATER	Matrix: DRINKING WATER	Matrix: WASTEWATER	Matrix: SOIL	Matrix: OTHER SOLID	Matrix: OIL/ORGANIC LIQUID	Type: COMPOSITE	Type: GRAB	Container(s)	Preservation: HCl	Preservation: HNO_3	Preservation: H_2SO_4	Preservation: NaOH	Preservation: Methanol	Preservation: Sodium Bisulfite	Preserved: ICE	Preserved: YES	Preserved: NO	LABORATORY NUMBER (Lab Use Only) 108830	Volatiles	Semivolatiles	Pesticides/PCBs	Herbicides	Petroleum Hydrocarbons	Haz. Waste	General Chemistry	Other
11:20	URS-2	X							X	3 X							X	X	X	1	X							
11:10	URS-3	X							X	3 X							X	X	X	2	X							
13:10	GZA-4	X							X	3 X							X	X	X	3	X							
12:50	WE-3	X							X	3 X							X	X	X	4	X							
13:50	MW-5	X							X	3 X							X	X	X	5	X							
14:10	URS-1	X							X	3 X							X	X	X	6	X							
14:30	MW-4	X							X	3 X							X	X	X	7	X							
	Trip Blank							X	X	2 X							X	X	X	8	X							

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples, Trip blanks are also required. If VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. Each MS, MSD and Sample Duplicate requires an additional sample aliquot.

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by Sampler: Randall Twiss	Date / Time: 1/16/04 / 1100	Received by: [signature]	Receipt Temperature: 6 (☐ Refrigerated 2-4°C Recommended)
Relinquished by: [signature]	Date / Time: 1/16/04 / 1140	Received by:	Container Count:
Relinquished by:	Date / Time:	Received by Laboratory: [signature]	Shipping/Airbill Number:
Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____			Custody Seal Number:

GROUNDWATER ANALYTICAL

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. Perent 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, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2802-WL	Analyzed:	01-20-04 09:02
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-71-8	Dichlorodifluoromethane	10	9.7	97 %	70 - 130 %
74-87-3	Chloromethane	10	10	101 %	70 - 130 %
75-01-4	Vinyl Chloride	10	12	118 %	70 - 130 %
74-83-9	Bromomethane	10	11	109 %	70 - 130 %
75-00-3	Chloroethane	10	11	106 %	70 - 130 %
75-69-4	Trichlorofluoromethane	10	12	115 %	70 - 130 %
60-29-7	Diethyl Ether	20	20	102 %	70 - 130 %
75-35-4	1,1-Dichloroethene	10	8.2	82 %	70 - 130 %
76-13-1	1,1,2-Trichlorotrifluoroethane	20	23	115 %	70 - 130 %
67-64-1	Acetone	20	20	101 %	70 - 130 %
75-15-0	Carbon Disulfide	20	19	95 %	70 - 130 %
75-09-2	Methylene Chloride	10	8.0	80 %	70 - 130 %
156-60-5	*trans*- 1,2-Dichloroethene	10	8.9	89 %	70 - 130 %
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	10	10	102 %	70 - 130 %
75-34-3	1,1-Dichloroethane	10	9.0	90 %	70 - 130 %
594-20-7	2,2-Dichloropropane	10	10	104 %	70 - 130 %
156-59-2	*cis*- 1,2-Dichloroethene	10	9.5	95 %	70 - 130 %
78-93-3	2-Butanone (MEK)	20	19	96 %	70 - 130 %
74-97-5	Bromochloromethane	10	9.2	92 %	70 - 130 %
109-99-9	Tetrahydrofuran (THF)	20	17	84 %	70 - 130 %
67-66-3	Chloroform	10	9.0	90 %	70 - 130 %
71-55-6	1,1,1-Trichloroethane	10	9.1	91 %	70 - 130 %
56-23-5	Carbon Tetrachloride	10	8.9	89 %	70 - 130 %
563-58-6	1,1-Dichloropropene	10	9.1	91 %	70 - 130 %
71-43-2	Benzene	10	9.0	90 %	70 - 130 %
107-06-2	1,2-Dichloroethane	10	8.9	89 %	70 - 130 %
79-01-6	Trichloroethene	10	8.9	89 %	70 - 130 %
78-87-5	1,2-Dichloropropane	10	9.0	90 %	70 - 130 %
74-95-3	Dibromomethane	10	9.1	91 %	70 - 130 %
75-27-4	Bromodichloromethane	10	9.2	92 %	70 - 130 %
123-91-1	1,4-Dioxane	200	460	232 % q	70 - 130 %
10061-01-5	*cis*- 1,3-Dichloropropene	10	8.3	83 %	70 - 130 %
108-10-1	4-Methyl-2-Pentanone (MIBK)	20	18	88 %	70 - 130 %
108-88-3	Toluene	10	9.1	91 %	70 - 130 %
10061-02-6	*trans*- 1,3-Dichloropropene	10	8.5	85 %	70 - 130 %
79-00-5	1,1,2-Trichloroethane	10	9.4	94 %	70 - 130 %
127-18-4	Tetrachloroethene	10	9.8	98 %	70 - 130 %
142-28-9	1,3-Dichloropropane	10	9.6	96 %	70 - 130 %
591-78-6	2-Hexanone	20	19	94 %	70 - 130 %
124-48-1	Dibromochloromethane	10	9.6	96 %	70 - 130 %
106-93-4	1,2-Dibromoethane (EDB)	10	9.7	97 %	70 - 130 %
108-90-7	Chlorobenzene	10	9.4	94 %	70 - 130 %
630-20-6	1,1,1,2-Tetrachloroethane	10	9.6	96 %	70 - 130 %
100-41-4	Ethylbenzene	10	10	100 %	70 - 130 %
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	20	20	99 %	70 - 130 %
95-47-6	*ortho*- Xylene	10	9.9	99 %	70 - 130 %
100-42-5	Styrene	10	9.7	97 %	70 - 130 %
75-25-2	Bromoform	10	10	100 %	70 - 130 %
98-82-8	Isopropylbenzene	10	11	105 %	70 - 130 %

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2802-WL	Analyzed:	01-20-04 09:02
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-86-1	Bromobenzene	10	10	104 %	70 - 130 %
79-34-5	1,1,2,2-Tetrachloroethane	10	10	101 %	70 - 130 %
96-18-4	1,2,3-Trichloropropane	10	10	102 %	70 - 130 %
103-65-1	*n*-Propylbenzene	10	11	105 %	70 - 130 %
95-49-8	2-Chlorotoluene	10	10	103 %	70 - 130 %
108-67-8	1,3,5-Trimethylbenzene	10	11	107 %	70 - 130 %
106-43-4	4-Chlorotoluene	10	10	103 %	70 - 130 %
98-06-6	*tert*-Butylbenzene	10	11	106 %	70 - 130 %
95-63-6	1,2,4-Trimethylbenzene	10	11	109 %	70 - 130 %
135-98-8	*sec*-Butylbenzene	10	10	104 %	70 - 130 %
541-73-1	1,3-Dichlorobenzene	10	9.8	98 %	70 - 130 %
99-87-6	4-Isopropyltoluene	10	11	106 %	70 - 130 %
106-46-7	1,4-Dichlorobenzene	10	9.9	99 %	70 - 130 %
95-50-1	1,2-Dichlorobenzene	10	10	100 %	70 - 130 %
104-51-8	*n*-Butylbenzene	10	11	105 %	70 - 130 %
96-12-8	1,2-Dibromo-3-chloropropane	10	10	101 %	70 - 130 %
120-82-1	1,2,4-Trichlorobenzene	10	11	110 %	70 - 130 %
87-68-3	Hexachlorobutadiene	10	13	125 %	70 - 130 %
91-20-3	Naphthalene	10	9.6	96 %	70 - 130 %
87-61-6	1,2,3-Trichlorobenzene	10	10	103 %	70 - 130 %
75-65-0	*tert*-Butyl Alcohol (TBA)	200	200	99 %	70 - 130 %
108-20-3	Di-isopropyl Ether (DIPE)	10	9.8	98 %	70 - 130 %
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	10	11	107 %	70 - 130 %
994-05-8	*tert*-Amyl Methyl Ether (TAME)	10	8.9	89 %	70 - 130 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	103 %	70 - 130 %
1,2-Dichloroethane-d_4	10	11	109 %	70 - 130 %
Toluene-d_8	10	11	105 %	70 - 130 %
4-Bromofluorobenzene	10	11	113 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Recovery outside recommended limits.

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GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2802-WB	Analyzed:	01-20-04 09:55
Matrix:	Aqueous	Analyst:	LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2802-WB	Analyzed:	01-20-04 09:55
Matrix:	Aqueous	Analyst:	LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compounds	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.9	99 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	101 %	70 - 130 %
Toluene-d_8	10	10	102 %	70 - 130 %
4-Bromofluorobenzene	10	11	112 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53121

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

April 26, 2004

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

RECEIVED
APR 29 2004

LABORATORY REPORT

Project:	**RM Jones/542**
Lab ID:	**71513**
Received:	**04-14-04**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/542	Delivery:	GWA Courier	Temperature:	3.5'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	71513	Lab Receipt:	04-14-04	Custody Seal(s):	n/a

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-1	URS-3		Aqueous	4/13/04 11:40	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C497714	40 mL VOA Vial	Proline	BX11813	HCl	R-3857D	03-24-04	n/a		
C443932	40 mL VOA Vial	Proline	BX11838	HCl	R-3857D	03-24-04	n/a		
C443920	40 mL VOA Vial	Proline	BX11838	HCl	R-3857D	03-24-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-2	URS-2		Aqueous	4/13/04 11:55	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C497722	40 mL VOA Vial	Proline	BX11813	HCl	R-3857D	03-24-04	n/a		
C443908	40 mL VOA Vial	Proline	BX11838	HCl	R-3857D	03-24-04	n/a		
C443896	40 mL VOA Vial	Proline	BX11838	HCl	R-3857D	03-24-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-3	GZA-4		Aqueous	4/13/04 12:20	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C443979	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		
C443978	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		
C443967	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-4	WE-3		Aqueous	4/13/04 12:25	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C474994	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		
C443991	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		
C443990	40 mL VOA Vial	Proline	BX11840	HCl	R-3857D	03-23-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-5	MW-5		Aqueous	4/13/04 12:55	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397802	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397790	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397778	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-6	VRS-1		Aqueous	4/13/04 13:05	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397742	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397766	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397754	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
71513-7	MW-4		Aqueous	4/13/04 13:45	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C397801	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397789	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		
C397777	40 mL VOA Vial	Industrial	BX10332	HCl	R-3722D	11-24-03	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project:	RM Jones/542	Lab ID:	71513
Client:	Lightship Engineering	Received:	04-14-04 17:15

MA DEP Compendium of Analytical Methods

Project Location:	n/a	MA DEP RTN:	n/a

This Form provides certifications for the following data set:

EPA 8260B: 71513-01,-02,-03,-04,-05,-06,-07

Sample Matrices:	Groundwater (X)	Soil/Sediment ( )	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used	8260B (X)	8151A ( )	8330 ( )	6010B ( )	7470A/1A ( )
	8270C ( )	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
As specified in MA DEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1. List Release Tracking Number (RTN), if known.
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method
3. S - SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	No
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes

All No answers are addressed in the attached Project Narrative.

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

Signature:	Jonathan Sanford	Position:	President
Printed Name:	Jonathan R. Sanford	Date:	04-26-04

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-01	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 11:40	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 14:56	Dilution Factor:	5
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	2.5
74-87-3	Chloromethane	BRL		ug/L	2.5
75-01-4	Vinyl Chloride	BRL		ug/L	2.5
74-83-9	Bromomethane	BRL		ug/L	2.5
75-00-3	Chloroethane	BRL		ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	2.5
60-29-7	Diethyl Ether	BRL		ug/L	10
75-35-4	1,1-Dichloroethene	BRL		ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	25
67-64-1	Acetone	BRL		ug/L	50
75-15-0	Carbon Disulfide	BRL		ug/L	25
75-09-2	Methylene Chloride	BRL		ug/L	13
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	2.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	13		ug/L	2.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	2.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	2.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	25
74-97-5	Bromochloromethane	BRL		ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	25
67-66-3	Chloroform	BRL		ug/L	2.5
71-55-6	1,1,1-Trichloroethane	160		ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	2.5
71-43-2	Benzene	BRL		ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	2.5
79-01-6	Trichloroethene	9		ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	2.5
74-95-3	Dibromomethane	BRL		ug/L	2.5
75-27-4	Bromodichloromethane	BRL		ug/L	2.5
123-91-1	1,4-Dioxane	BRL		ug/L	2500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	25
108-88-3	Toluene	BRL		ug/L	2.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	2.5
127-18-4	Tetrachloroethene	3		ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	2.5
591-78-6	2-Hexanone	BRL		ug/L	25
124-48-1	Dibromochloromethane	BRL		ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	2.5
108-90-7	Chlorobenzene	BRL		ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	2.5
100-41-4	Ethylbenzene	BRL		ug/L	2.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	2.5
95-47-6	*ortho*- Xylene	BRL		ug/L	2.5

GROUNDWATER ANALYTICAL

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

Field ID:	**URS-3**	Matrix:	**Aqueous**
Project:	**RM Jones/542**	Container:	**40 mL VOA Vial**
Client:	**Lightship Engineering**	Preservation:	**HCl/Cool**
Laboratory ID:	**71513-01**	QC Batch ID:	**VM4-2878-W**
Sampled:	**04-13-04 11:40**	Instrument ID:	**MS-4 HP 6890**
Received:	**04-14-04 17:15**	Sample Volume:	**25 mL**
Analyzed:	**04-23-04 14:56**	Dilution Factor:	**5**
Analyst:	**LMG**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	2.5
75-25-2	Bromoform	BRL		ug/L	2.5
98-82-8	Isopropylbenzene	BRL		ug/L	2.5
108-86-1	Bromobenzene	BRL		ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	2.5
95-49-8	2-Chlorotoluene	BRL		ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	2.5
106-43-4	4-Chlorotoluene	BRL		ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	2.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	2.5
91-20-3	Naphthalene	BRL		ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	2.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	100
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	2.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	2.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	2.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	**105 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	8.5	**85 %**	70 - 130 %
Toluene-d_8	10	9.1	**91 %**	70 - 130 %
4-Bromofluorobenzene	10	10	**101 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-02	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 11:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 16:17	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	10
74-87-3	Chloromethane	BRL		ug/L	10
75-01-4	Vinyl Chloride	BRL		ug/L	10
74-83-9	Bromomethane	BRL		ug/L	10
75-00-3	Chloroethane	BRL		ug/L	10
75-69-4	Trichlorofluoromethane	BRL		ug/L	10
60-29-7	Diethyl Ether	BRL		ug/L	40
75-35-4	1,1-Dichloroethene	18		ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	100
67-64-1	Acetone	BRL		ug/L	200
75-15-0	Carbon Disulfide	BRL		ug/L	100
75-09-2	Methylene Chloride	BRL		ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	10
75-34-3	1,1-Dichloroethane	67		ug/L	10
594-20-7	2,2-Dichloropropane	BRL		ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	42		ug/L	10
78-93-3	2-Butanone (MEK)	BRL		ug/L	100
74-97-5	Bromochloromethane	BRL		ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	100
67-66-3	Chloroform	BRL		ug/L	10
71-55-6	1,1,1-Trichloroethane	1,100	e	ug/L	10
56-23-5	Carbon Tetrachloride	BRL		ug/L	10
563-58-6	1,1-Dichloropropene	BRL		ug/L	10
71-43-2	Benzene	BRL		ug/L	10
107-06-2	1,2-Dichloroethane	BRL		ug/L	10
79-01-6	Trichloroethene	460		ug/L	10
78-87-5	1,2-Dichloropropane	BRL		ug/L	10
74-95-3	Dibromomethane	BRL		ug/L	10
75-27-4	Bromodichloromethane	BRL		ug/L	10
123-91-1	1,4-Dioxane	BRL		ug/L	10,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	100
108-88-3	Toluene	BRL		ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	10
127-18-4	Tetrachloroethene	86		ug/L	10
142-28-9	1,3-Dichloropropane	BRL		ug/L	10
591-78-6	2-Hexanone	BRL		ug/L	100
124-48-1	Dibromochloromethane	BRL		ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	10
108-90-7	Chlorobenzene	BRL		ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	10
100-41-4	Ethylbenzene	BRL		ug/L	10
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	10
95-47-6	*ortho*- Xylene	BRL		ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-02	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 11:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 16:17	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	10
75-25-2	Bromoform	BRL		ug/L	10
98-82-8	Isopropylbenzene	BRL		ug/L	10
108-86-1	Bromobenzene	BRL		ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	10
103-65-1	*n*-Propylbenzene	BRL		ug/L	10
95-49-8	2-Chlorotoluene	BRL		ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	10
106-43-4	4-Chlorotoluene	BRL		ug/L	10
98-06-6	*tert*-Butylbenzene	BRL		ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	10
135-98-8	*sec*-Butylbenzene	BRL		ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	10
99-87-6	4-Isopropyltoluene	BRL		ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	10
104-51-8	*n*-Butylbenzene	BRL		ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	10
87-68-3	Hexachlorobutadiene	BRL		ug/L	10
91-20-3	Naphthalene	BRL		ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	10
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	400
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	10
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	10
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	10

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	109 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.8	88 %	70 - 130 %
Toluene-d_8	10	9.3	93 %	70 - 130 %
4-Bromofluorobenzene	10	11	105 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

e Indicates concentration exceeded calibration range for the analyte.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-02RA1	QC Batch ID:	VM4-2881-W
Sampled:	04-13-04 11:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-26-04 11:12	Dilution Factor:	50
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	25
74-87-3	Chloromethane	BRL		ug/L	25
75-01-4	Vinyl Chloride	BRL		ug/L	25
74-83-9	Bromomethane	BRL		ug/L	25
75-00-3	Chloroethane	BRL		ug/L	25
75-69-4	Trichlorofluoromethane	BRL		ug/L	25
60-29-7	Diethyl Ether	BRL		ug/L	100
75-35-4	1,1-Dichloroethene	BRL		ug/L	25
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	250
67-64-1	Acetone	BRL		ug/L	500
75-15-0	Carbon Disulfide	BRL		ug/L	250
75-09-2	Methylene Chloride	BRL		ug/L	130
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	25
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	25
75-34-3	1,1-Dichloroethane	51		ug/L	25
594-20-7	2,2-Dichloropropane	BRL		ug/L	25
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	25
78-93-3	2-Butanone (MEK)	BRL		ug/L	250
74-97-5	Bromochloromethane	BRL		ug/L	25
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	250
67-66-3	Chloroform	BRL		ug/L	25
71-55-6	1,1,1-Trichloroethane	870		ug/L	25
56-23-5	Carbon Tetrachloride	BRL		ug/L	25
563-58-6	1,1-Dichloropropene	BRL		ug/L	25
71-43-2	Benzene	BRL		ug/L	25
107-06-2	1,2-Dichloroethane	BRL		ug/L	25
79-01-6	Trichloroethene	350		ug/L	25
78-87-5	1,2-Dichloropropane	BRL		ug/L	25
74-95-3	Dibromomethane	BRL		ug/L	25
75-27-4	Bromodichloromethane	BRL		ug/L	25
123-91-1	1,4-Dioxane	BRL		ug/L	25,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	25
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	250
108-88-3	Toluene	BRL		ug/L	25
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	25
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	25
127-18-4	Tetrachloroethene	73		ug/L	25
142-28-9	1,3-Dichloropropane	BRL		ug/L	25
591-78-6	2-Hexanone	BRL		ug/L	250
124-48-1	Dibromochloromethane	BRL		ug/L	25
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	25
108-90-7	Chlorobenzene	BRL		ug/L	25
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	25
100-41-4	Ethylbenzene	BRL		ug/L	25
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	25
95-47-6	*ortho*- Xylene	BRL		ug/L	25

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-02RA1	QC Batch ID:	VM4-2881-W
Sampled:	04-13-04 11:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-26-04 11:12	Dilution Factor:	50
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	25
75-25-2	Bromoform	BRL		ug/L	25
98-82-8	Isopropylbenzene	BRL		ug/L	25
108-86-1	Bromobenzene	BRL		ug/L	25
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	25
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	25
103-65-1	*n*-Propylbenzene	BRL		ug/L	25
95-49-8	2-Chlorotoluene	BRL		ug/L	25
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	25
106-43-4	4-Chlorotoluene	BRL		ug/L	25
98-06-6	*tert*-Butylbenzene	BRL		ug/L	25
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	25
135-98-8	*sec*-Butylbenzene	BRL		ug/L	25
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	25
99-87-6	4-Isopropyltoluene	BRL		ug/L	25
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	25
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	25
104-51-8	*n*-Butylbenzene	BRL		ug/L	25
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	25
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	25
87-68-3	Hexachlorobutadiene	BRL		ug/L	25
91-20-3	Naphthalene	BRL		ug/L	25
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	25
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	1,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	25
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	25
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	25

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.4	94 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.3	83 %	70 - 130 %
Toluene-d_8	10	8.2	82 %	70 - 130 %
4-Bromofluorobenzene	10	9.2	92 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-03	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:20	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 12:55	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	4		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	7		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	0.7		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	0.5		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	15		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	16		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	1		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	25		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	20		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	3		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	0.7		ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	0.8		ug/L	0.5
95-47-6	*ortho*-Xylene	0.6		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-03	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:20	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 12:55	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	4		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	2		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	14		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	110 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.0	90 %	70 - 130 %
Toluene-d_8	10	9.5	95 %	70 - 130 %
4-Bromofluorobenzene	10	10	104 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-04	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:25	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 15:37	Dilution Factor:	10
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	BRL		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	BRL		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	BRL		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	**29**		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*-1,2-Dichloroethene	**19**		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	**580**	e	ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	**300**		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	BRL		ug/L	5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	**92**		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	BRL		ug/L	5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	5
95-47-6	*ortho*-Xylene	BRL		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-04	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:25	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 15:37	Dilution Factor:	10
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	**117 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	9.4	**94 %**	70 - 130 %
Toluene-d_8	10	10	**102 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**114 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

e Indicates concentration exceeded calibration range for the analyte.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-04RA1	QC Batch ID:	VM4-2881-W
Sampled:	04-13-04 12:25	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-26-04 13:14	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	10
74-87-3	Chloromethane	BRL		ug/L	10
75-01-4	Vinyl Chloride	BRL		ug/L	10
74-83-9	Bromomethane	BRL		ug/L	10
75-00-3	Chloroethane	BRL		ug/L	10
75-69-4	Trichlorofluoromethane	BRL		ug/L	10
60-29-7	Diethyl Ether	BRL		ug/L	40
75-35-4	1,1-Dichloroethene	BRL		ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	100
67-64-1	Acetone	BRL		ug/L	200
75-15-0	Carbon Disulfide	BRL		ug/L	100
75-09-2	Methylene Chloride	BRL		ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	10
75-34-3	1,1-Dichloroethane	**23**		ug/L	10
594-20-7	2,2-Dichloropropane	BRL		ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	10
78-93-3	2-Butanone (MEK)	BRL		ug/L	100
74-97-5	Bromochloromethane	BRL		ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	100
67-66-3	Chloroform	BRL		ug/L	10
71-55-6	1,1,1-Trichloroethane	**470**		ug/L	10
56-23-5	Carbon Tetrachloride	BRL		ug/L	10
563-58-6	1,1-Dichloropropene	BRL		ug/L	10
71-43-2	Benzene	BRL		ug/L	10
107-06-2	1,2-Dichloroethane	BRL		ug/L	10
79-01-6	Trichloroethene	**240**		ug/L	10
78-87-5	1,2-Dichloropropane	BRL		ug/L	10
74-95-3	Dibromomethane	BRL		ug/L	10
75-27-4	Bromodichloromethane	BRL		ug/L	10
123-91-1	1,4-Dioxane	BRL		ug/L	10,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	100
108-88-3	Toluene	BRL		ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	10
127-18-4	Tetrachloroethene	**77**		ug/L	10
142-28-9	1,3-Dichloropropane	BRL		ug/L	10
591-78-6	2-Hexanone	BRL		ug/L	100
124-48-1	Dibromochloromethane	BRL		ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	10
108-90-7	Chlorobenzene	BRL		ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	10
100-41-4	Ethylbenzene	BRL		ug/L	10
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	10
95-47-6	*ortho*- Xylene	BRL		ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-04RA1	QC Batch ID:	VM4-2881-W
Sampled:	04-13-04 12:25	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-26-04 13:14	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	10
75-25-2	Bromoform	BRL		ug/L	10
98-82-8	Isopropylbenzene	BRL		ug/L	10
108-86-1	Bromobenzene	BRL		ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	10
103-65-1	*n*-Propylbenzene	BRL		ug/L	10
95-49-8	2-Chlorotoluene	BRL		ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	10
106-43-4	4-Chlorotoluene	BRL		ug/L	10
98-06-6	*tert*-Butylbenzene	BRL		ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	10
135-98-8	*sec*-Butylbenzene	BRL		ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	10
99-87-6	4-Isopropyltoluene	BRL		ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	10
104-51-8	*n*-Butylbenzene	BRL		ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	10
87-68-3	Hexachlorobutadiene	BRL		ug/L	10
91-20-3	Naphthalene	BRL		ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	10
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	400
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	10
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	10
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	10

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.1	91 %	70 - 130 %
1,2-Dichloroethane-d_4	10	7.8	78 %	70 - 130 %
Toluene-d_8	10	7.9	79 %	70 - 130 %
4-Bromofluorobenzene	10	8.9	89 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-05	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 13:35	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	5		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	0.5
95-47-6	*ortho*-Xylene	BRL		ug/L	0.5

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GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-05	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 12:55	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 13:35	Dilution Factor:	1
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	110 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.1	91 %	70 - 130 %
Toluene-d_8	10	9.5	95 %	70 - 130 %
4-Bromofluorobenzene	10	10	105 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	VRS-1	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-06	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 13:05	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 16:58	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	10
74-87-3	Chloromethane	BRL		ug/L	10
75-01-4	Vinyl Chloride	BRL		ug/L	10
74-83-9	Bromomethane	BRL		ug/L	10
75-00-3	Chloroethane	BRL		ug/L	10
75-69-4	Trichlorofluoromethane	BRL		ug/L	10
60-29-7	Diethyl Ether	BRL		ug/L	40
75-35-4	1,1-Dichloroethene	65		ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	100
67-64-1	Acetone	BRL		ug/L	200
75-15-0	Carbon Disulfide	BRL		ug/L	100
75-09-2	Methylene Chloride	BRL		ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	10
75-34-3	1,1-Dichloroethane	170		ug/L	10
594-20-7	2,2-Dichloropropane	BRL		ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	10
78-93-3	2-Butanone (MEK)	BRL		ug/L	100
74-97-5	Bromochloromethane	BRL		ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	100
67-66-3	Chloroform	BRL		ug/L	10
71-55-6	1,1,1-Trichloroethane	670		ug/L	10
56-23-5	Carbon Tetrachloride	BRL		ug/L	10
563-58-6	1,1-Dichloropropene	BRL		ug/L	10
71-43-2	Benzene	BRL		ug/L	10
107-06-2	1,2-Dichloroethane	BRL		ug/L	10
79-01-6	Trichloroethene	BRL		ug/L	10
78-87-5	1,2-Dichloropropane	BRL		ug/L	10
74-95-3	Dibromomethane	BRL		ug/L	10
75-27-4	Bromodichloromethane	BRL		ug/L	10
123-91-1	1,4-Dioxane	BRL		ug/L	10,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	100
108-88-3	Toluene	BRL		ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	10
127-18-4	Tetrachloroethene	BRL		ug/L	10
142-28-9	1,3-Dichloropropane	BRL		ug/L	10
591-78-6	2-Hexanone	BRL		ug/L	100
124-48-1	Dibromochloromethane	BRL		ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	10
108-90-7	Chlorobenzene	BRL		ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	10
100-41-4	Ethylbenzene	BRL		ug/L	10
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	10
95-47-6	*ortho*- Xylene	BRL		ug/L	10

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GROUNDWATER ANALYTICAL

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

Field ID:	VRS-1	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-06	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 13:05	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 16:58	Dilution Factor:	20
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	10
75-25-2	Bromoform	BRL		ug/L	10
98-82-8	Isopropylbenzene	BRL		ug/L	10
108-86-1	Bromobenzene	BRL		ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	10
103-65-1	*n*-Propylbenzene	BRL		ug/L	10
95-49-8	2-Chlorotoluene	BRL		ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	10
106-43-4	4-Chlorotoluene	BRL		ug/L	10
98-06-6	*tert*-Butylbenzene	BRL		ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	10
135-98-8	*sec*-Butylbenzene	BRL		ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	10
99-87-6	4-Isopropyltoluene	BRL		ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	10
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	10
104-51-8	*n*-Butylbenzene	BRL		ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	10
87-68-3	Hexachlorobutadiene	BRL		ug/L	10
91-20-3	Naphthalene	BRL		ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	10
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	400
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	10
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	10
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	10

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	107 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.7	87 %	70 - 130 %
Toluene-d_8	10	9.3	93 %	70 - 130 %
4-Bromofluorobenzene	10	10	102 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-07	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 13:45	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 14:16	Dilution Factor:	200
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	100
74-87-3	Chloromethane	BRL		ug/L	100
75-01-4	Vinyl Chloride	BRL		ug/L	100
74-83-9	Bromomethane	BRL		ug/L	100
75-00-3	Chloroethane	BRL		ug/L	100
75-69-4	Trichlorofluoromethane	BRL		ug/L	100
60-29-7	Diethyl Ether	BRL		ug/L	400
75-35-4	1,1-Dichloroethene	BRL		ug/L	100
76-13-1	1,1,2-Trichlorotrifluoroethane	3,800		ug/L	1,000
67-64-1	Acetone	BRL		ug/L	2,000
75-15-0	Carbon Disulfide	BRL		ug/L	1,000
75-09-2	Methylene Chloride	BRL		ug/L	500
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	100
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	100
75-34-3	1,1-Dichloroethane	410		ug/L	100
594-20-7	2,2-Dichloropropane	BRL		ug/L	100
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	100
78-93-3	2-Butanone (MEK)	BRL		ug/L	1,000
74-97-5	Bromochloromethane	BRL		ug/L	100
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	1,000
67-66-3	Chloroform	BRL		ug/L	100
71-55-6	1,1,1-Trichloroethane	7,800		ug/L	100
56-23-5	Carbon Tetrachloride	BRL		ug/L	100
563-58-6	1,1-Dichloropropene	BRL		ug/L	100
71-43-2	Benzene	BRL		ug/L	100
107-06-2	1,2-Dichloroethane	BRL		ug/L	100
79-01-6	Trichloroethene	2,100		ug/L	100
78-87-5	1,2-Dichloropropane	BRL		ug/L	100
74-95-3	Dibromomethane	BRL		ug/L	100
75-27-4	Bromodichloromethane	BRL		ug/L	100
123-91-1	1,4-Dioxane	BRL		ug/L	100,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	100
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	1,000
108-88-3	Toluene	7,600		ug/L	100
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	100
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	100
127-18-4	Tetrachloroethene	1,800		ug/L	100
142-28-9	1,3-Dichloropropane	BRL		ug/L	100
591-78-6	2-Hexanone	BRL		ug/L	1,000
124-48-1	Dibromochloromethane	BRL		ug/L	100
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	100
108-90-7	Chlorobenzene	BRL		ug/L	100
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	100
100-41-4	Ethylbenzene	330		ug/L	100
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	1,300		ug/L	100
95-47-6	*ortho*- Xylene	400		ug/L	100

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GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	71513-07	QC Batch ID:	VM4-2878-W
Sampled:	04-13-04 13:45	Instrument ID:	MS-4 HP 6890
Received:	04-14-04 17:15	Sample Volume:	25 mL
Analyzed:	04-23-04 14:16	Dilution Factor:	200
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	100
75-25-2	Bromoform	BRL		ug/L	100
98-82-8	Isopropylbenzene	BRL		ug/L	100
108-86-1	Bromobenzene	BRL		ug/L	100
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	100
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	100
103-65-1	*n*-Propylbenzene	BRL		ug/L	100
95-49-8	2-Chlorotoluene	BRL		ug/L	100
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	100
106-43-4	4-Chlorotoluene	BRL		ug/L	100
98-06-6	*tert*-Butylbenzene	BRL		ug/L	100
95-63-6	1,2,4-Trimethylbenzene	**140**		ug/L	100
135-98-8	*sec*-Butylbenzene	BRL		ug/L	100
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	100
99-87-6	4-Isopropyltoluene	BRL		ug/L	100
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	100
95-50-1	1,2-Dichlorobenzene	**250**		ug/L	100
104-51-8	*n*-Butylbenzene	BRL		ug/L	100
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	100
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	100
87-68-3	Hexachlorobutadiene	BRL		ug/L	100
91-20-3	Naphthalene	BRL		ug/L	100
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	100
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	4,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	100
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	100
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	100

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	**110 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	9.1	**91 %**	70 - 130 %
Toluene-d_8	10	9.6	**96 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**105 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Project Narrative

Project:	RM Jones/542	Lab ID:	71513
Client:	Lightship Engineering	Received:	04-14-04 17:15

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 8260B Non-conformance: Samples 71513-01 through -07. Laboratory control sample (LCS) analyte 1,2,3-Trichlorobenzene was above recommended recovery limits for QC batch VM4-2878-W.
2. EPA 8260B Note: Samples 71513-01, -06, and -07. Sample were diluted prior to analysis. Dilution was required to keep all target analytes within calibration.
3. EPA 8260B Non-conformance: Samples 71513-02, -04. Reported results for selected analyte(s) exceeded the high standard of the associated calibration curve. Results are estimated.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

Nº 089460

Project Name: RM Jones	Firm: Lightship Engineering
Project Number: 542	Address: 36 Cordage Park Circle, Ste. 312 Plymouth, MA 02362
Sampler Name: R. Decker	City / State / Zip:
Project Manager: Joe O'Brien	Telephone: (508)-830-3344

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☐ STANDARD (10 Business Days)
- ☒ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- ____________) (Rush requires Rush Authorization Number)
- ☐ Please Email to:
- ☐ Please FAX to: 508-830-3360

BILLING

- ☒ Purchase Order No.: 542
- ☐ Third Party Billing:
- ☐ GWA Quote:

ANALYSIS REQUEST

Volatiles / Semivolatiles / Pest/Herb/PCBs / Metals / Petroleum Hydrocarbons / Haz. Waste / General Chemistry / Other

Date	Time	Sample Identification	Matrix: Groundwater	Type: Grab	Containers: Number (40mL VOA Vial)	Preservation: HCl	Filtered: No	Laboratory Number (Lab Use Only) 7153	Analysis
1/13/04	1140	URS-3	X	X	3	X	X	1	8260B
1/13/04	1155	URS-2	X	X	3	X	X	2	8260B
1/13/04	1220	LZA-4	X	X	3	X	X	3	8260B
1/13/04	1225	WE-3	X	X	3	X	X	4	8260B
1/13/04	1255	MW-5	X	X	3	X	X	5	8260B
1/13/04	1305	VRS-1	X	X	3	X	X	6	8260B
1/13/04	1345	MW-4	X	X	3	X	X	7	8260B

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☒ YES ☐ NO MCP Data Certification is required.

☒ YES ☐ NO MCP minimum Field QC requirements have been met for this project. *(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)*

☐ YES ☒ NO MCP Drinking Water samples required. *(Requires collection of contingent duplicate samples. Trip blanks are also required if VOA samples collected)*

Signature: [signature]

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐	☐	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample:

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time	Received by	
Relinquished by Sampler: [signature]	1/14/04	1015	[signature]	Receipt Temperature: ☒ Ice ☐ Refrigerated 2-6°C Recommended 3.5°C
Relinquished by:			Received by:	Container Count: 21
Relinquished by: [signature]	1/14/04	1715	Received by Laboratory: [signature]	Shipping/Airbill Number:
Method of Shipment: ☒ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐				Custody Seal Number:

GROUNDWATER ANALYTICAL

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. Perent 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, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2878-WL	Analyzed:	04-23-04 05:45
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-71-8	Dichlorodifluoromethane	10	8.6	**86 %**	70 - 130 %
74-87-3	Chloromethane	10	8	**80 %**	70 - 130 %
75-01-4	Vinyl Chloride	10	8.8	**88 %**	70 - 130 %
74-83-9	Bromomethane	10	8.6	**86 %**	70 - 130 %
75-00-3	Chloroethane	10	8.6	**86 %**	70 - 130 %
75-69-4	Trichlorofluoromethane	10	9.7	**97 %**	70 - 130 %
60-29-7	Diethyl Ether	20	20	**100 %**	70 - 130 %
75-35-4	1,1-Dichloroethene	10	8.8	**88 %**	70 - 130 %
76-13-1	1,1,2-Trichlorotrifluoroethane	20	24	**118 %**	70 - 130 %
67-64-1	Acetone	20	24	**119 %**	70 - 130 %
75-15-0	Carbon Disulfide	20	20	**99 %**	70 - 130 %
75-09-2	Methylene Chloride	10	9.2	**92 %**	70 - 130 %
156-60-5	*trans*- 1,2-Dichloroethene	10	12	**118 %**	70 - 130 %
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	10	13	**128 %**	70 - 130 %
75-34-3	1,1-Dichloroethane	10	9.8	**98 %**	70 - 130 %
594-20-7	2,2-Dichloropropane	10	11	**107 %**	70 - 130 %
156-59-2	*cis*- 1,2-Dichloroethene	10	12	**118 %**	70 - 130 %
78-93-3	2-Butanone (MEK)	20	23	**116 %**	70 - 130 %
74-97-5	Bromochloromethane	10	11	**113 %**	70 - 130 %
109-99-9	Tetrahydrofuran (THF)	20	25	**126 %**	70 - 130 %
67-66-3	Chloroform	10	11	**111 %**	70 - 130 %
71-55-6	1,1,1-Trichloroethane	10	9.6	**96 %**	70 - 130 %
56-23-5	Carbon Tetrachloride	10	9.5	**95 %**	70 - 130 %
563-58-6	1,1-Dichloropropene	10	9.7	**97 %**	70 - 130 %
71-43-2	Benzene	10	9.3	**93 %**	70 - 130 %
107-06-2	1,2-Dichloroethane	10	9.2	**92 %**	70 - 130 %
79-01-6	Trichloroethene	10	9.5	**95 %**	70 - 130 %
78-87-5	1,2-Dichloropropane	10	9.4	**94 %**	70 - 130 %
74-95-3	Dibromomethane	10	9.3	**93 %**	70 - 130 %
75-27-4	Bromodichloromethane	10	9.5	**95 %**	70 - 130 %
123-91-1	1,4-Dioxane	200	140	**72 %**	70 - 130 %
10061-01-5	*cis*- 1,3-Dichloropropene	10	9.8	**98 %**	70 - 130 %
108-10-1	4-Methyl-2-Pentanone (MIBK)	20	22	**111 %**	70 - 130 %
108-88-3	Toluene	10	9.2	**92 %**	70 - 130 %
10061-02-6	*trans*- 1,3-Dichloropropene	10	9.2	**92 %**	70 - 130 %
79-00-5	1,1,2-Trichloroethane	10	9.3	**93 %**	70 - 130 %
127-18-4	Tetrachloroethene	10	9.6	**96 %**	70 - 130 %
142-28-9	1,3-Dichloropropane	10	8.9	**89 %**	70 - 130 %
591-78-6	2-Hexanone	20	21	**106 %**	70 - 130 %
124-48-1	Dibromochloromethane	10	9.5	**95 %**	70 - 130 %
106-93-4	1,2-Dibromoethane (EDB)	10	9.3	**93 %**	70 - 130 %
108-90-7	Chlorobenzene	10	8.9	**89 %**	70 - 130 %
630-20-6	1,1,1,2-Tetrachloroethane	10	9.3	**93 %**	70 - 130 %
100-41-4	Ethylbenzene	10	9.4	**94 %**	70 - 130 %
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	20	19	**93 %**	70 - 130 %
95-47-6	*ortho*- Xylene	10	9.2	**92 %**	70 - 130 %
100-42-5	Styrene	10	9.4	**94 %**	70 - 130 %
75-25-2	Bromoform	10	10	**101 %**	70 - 130 %
98-82-8	Isopropylbenzene	10	9.6	**96 %**	70 - 130 %

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2878-WL	Analyzed:	04-23-04 05:45
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-86-1	Bromobenzene	10	9.1	91 %	70 - 130 %
79-34-5	1,1,2,2-Tetrachloroethane	10	9.3	93 %	70 - 130 %
96-18-4	1,2,3-Trichloropropane	10	9.4	94 %	70 - 130 %
103-65-1	*n*-Propylbenzene	10	9.5	95 %	70 - 130 %
95-49-8	2-Chlorotoluene	10	9.1	91 %	70 - 130 %
108-67-8	1,3,5-Trimethylbenzene	10	9.7	97 %	70 - 130 %
106-43-4	4-Chlorotoluene	10	9.1	91 %	70 - 130 %
98-06-6	*tert*-Butylbenzene	10	9.6	96 %	70 - 130 %
95-63-6	1,2,4-Trimethylbenzene	10	9.8	98 %	70 - 130 %
135-98-8	*sec*-Butylbenzene	10	9.5	95 %	70 - 130 %
541-73-1	1,3-Dichlorobenzene	10	9	90 %	70 - 130 %
99-87-6	4-Isopropyltoluene	10	9.6	96 %	70 - 130 %
106-46-7	1,4-Dichlorobenzene	10	9.1	91 %	70 - 130 %
95-50-1	1,2-Dichlorobenzene	10	9.3	93 %	70 - 130 %
104-51-8	*n*-Butylbenzene	10	9.8	98 %	70 - 130 %
96-12-8	1,2-Dibromo-3-chloropropane	10	12	120 %	70 - 130 %
120-82-1	1,2,4-Trichlorobenzene	10	11	113 %	70 - 130 %
87-68-3	Hexachlorobutadiene	10	12	118 %	70 - 130 %
91-20-3	Naphthalene	10	12	121 %	70 - 130 %
87-61-6	1,2,3-Trichlorobenzene	10	13	134 % q	70 - 130 %
75-65-0	*tert*-Butyl Alcohol (TBA)	200	200	101 %	70 - 130 %
108-20-3	Di-isopropyl Ether (DIPE)	10	12	124 %	70 - 130 %
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	10	11	107 %	70 - 130 %
994-05-8	*tert*-Amyl Methyl Ether (TAME)	10	10	101 %	70 - 130 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	105 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.1	91 %	70 - 130 %
Toluene-d_8	10	9.4	94 %	70 - 130 %
4-Bromofluorobenzene	10	9.9	99 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Recovery outside recommended limits.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: EPA Method 8260B
QC Batch ID: VM4-2878-WB
Matrix: Aqueous

Instrument ID: MS-4 HP 6890
Analyzed: 04-23-04 06:37
Analyst: LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2878-WB	Analyzed:	04-23-04 06:37
Matrix:	Aqueous	Analyst:	LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	107 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.8	88 %	70 - 130 %
Toluene-d_8	10	9.2	92 %	70 - 130 %
4-Bromofluorobenzene	10	10	102 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2881-WL	Analyzed:	04-26-04 08:46
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-71-8	Dichlorodifluoromethane	5	4	**80 %**	70 - 130 %
74-87-3	Chloromethane	5	3.6	**73 %**	70 - 130 %
75-01-4	Vinyl Chloride	5	4.1	**82 %**	70 - 130 %
74-83-9	Bromomethane	5	4.4	**87 %**	70 - 130 %
75-00-3	Chloroethane	5	4.4	**89 %**	70 - 130 %
75-69-4	Trichlorofluoromethane	5	4.7	**93 %**	70 - 130 %
60-29-7	Diethyl Ether	10	8.4	**84 %**	70 - 130 %
75-35-4	1,1-Dichloroethene	5	4.4	**88 %**	70 - 130 %
76-13-1	1,1,2-Trichlorotrifluoroethane	10	9.6	**96 %**	70 - 130 %
67-64-1	Acetone	10	9.6	**96 %**	70 - 130 %
75-15-0	Carbon Disulfide	10	7.5	**75 %**	70 - 130 %
75-09-2	Methylene Chloride	5	4.5	**90 %**	70 - 130 %
156-60-5	*trans*-1,2-Dichloroethene	5	5.7	**114 %**	70 - 130 %
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	5	5.4	**109 %**	70 - 130 %
75-34-3	1,1-Dichloroethane	5	4.9	**98 %**	70 - 130 %
594-20-7	2,2-Dichloropropane	5	5.3	**105 %**	70 - 130 %
156-59-2	*cis*-1,2-Dichloroethene	5	5.7	**114 %**	70 - 130 %
78-93-3	2-Butanone (MEK)	10	11	**110 %**	70 - 130 %
74-97-5	Bromochloromethane	5	5.7	**114 %**	70 - 130 %
109-99-9	Tetrahydrofuran (THF)	10	10	**102 %**	70 - 130 %
67-66-3	Chloroform	5	5.3	**106 %**	70 - 130 %
71-55-6	1,1,1-Trichloroethane	5	4.8	**95 %**	70 - 130 %
56-23-5	Carbon Tetrachloride	5	4.7	**94 %**	70 - 130 %
563-58-6	1,1-Dichloropropene	5	4.7	**94 %**	70 - 130 %
71-43-2	Benzene	5	4.7	**93 %**	70 - 130 %
107-06-2	1,2-Dichloroethane	5	4.5	**90 %**	70 - 130 %
79-01-6	Trichloroethene	5	4.7	**94 %**	70 - 130 %
78-87-5	1,2-Dichloropropane	5	4.6	**93 %**	70 - 130 %
74-95-3	Dibromomethane	5	4.5	**90 %**	70 - 130 %
75-27-4	Bromodichloromethane	5	4.6	**92 %**	70 - 130 %
123-91-1	1,4-Dioxane	100	97	**97 %**	70 - 130 %
10061-01-5	*cis*-1,3-Dichloropropene	5	4.7	**94 %**	70 - 130 %
108-10-1	4-Methyl-2-Pentanone (MIBK)	10	9.1	**91 %**	70 - 130 %
108-88-3	Toluene	5	4.7	**93 %**	70 - 130 %
10061-02-6	*trans*-1,3-Dichloropropene	5	4.9	**98 %**	70 - 130 %
79-00-5	1,1,2-Trichloroethane	5	5.1	**101 %**	70 - 130 %
127-18-4	Tetrachloroethene	5	5.4	**107 %**	70 - 130 %
142-28-9	1,3-Dichloropropane	5	5	**100 %**	70 - 130 %
591-78-6	2-Hexanone	10	9.9	**99 %**	70 - 130 %
124-48-1	Dibromochloromethane	5	5.1	**103 %**	70 - 130 %
106-93-4	1,2-Dibromoethane (EDB)	5	5	**100 %**	70 - 130 %
108-90-7	Chlorobenzene	5	5	**100 %**	70 - 130 %
630-20-6	1,1,1,2-Tetrachloroethane	5	5.1	**102 %**	70 - 130 %
100-41-4	Ethylbenzene	5	5.3	**106 %**	70 - 130 %
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	10	11	**106 %**	70 - 130 %
95-47-6	*ortho*-Xylene	5	5.2	**103 %**	70 - 130 %
100-42-5	Styrene	5	5.2	**103 %**	70 - 130 %
75-25-2	Bromoform	5	5.4	**109 %**	70 - 130 %
98-82-8	Isopropylbenzene	5	5.3	**107 %**	70 - 130 %

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2881-WL	Analyzed:	04-26-04 08:46
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-86-1	Bromobenzene	5	5.1	101 %	70 - 130 %
79-34-5	1,1,2,2-Tetrachloroethane	5	5.2	103 %	70 - 130 %
96-18-4	1,2,3-Trichloropropane	5	5.1	103 %	70 - 130 %
103-65-1	*n*-Propylbenzene	5	5.3	106 %	70 - 130 %
95-49-8	2-Chlorotoluene	5	5.2	103 %	70 - 130 %
108-67-8	1,3,5-Trimethylbenzene	5	5.4	107 %	70 - 130 %
106-43-4	4-Chlorotoluene	5	5.1	102 %	70 - 130 %
98-06-6	*tert*-Butylbenzene	5	5.3	106 %	70 - 130 %
95-63-6	1,2,4-Trimethylbenzene	5	5.5	109 %	70 - 130 %
135-98-8	*sec*-Butylbenzene	5	5.3	105 %	70 - 130 %
541-73-1	1,3-Dichlorobenzene	5	5.1	101 %	70 - 130 %
99-87-6	4-Isopropyltoluene	5	5.4	107 %	70 - 130 %
106-46-7	1,4-Dichlorobenzene	5	5.1	102 %	70 - 130 %
95-50-1	1,2-Dichlorobenzene	5	5.2	104 %	70 - 130 %
104-51-8	*n*-Butylbenzene	5	5.3	106 %	70 - 130 %
96-12-8	1,2-Dibromo-3-chloropropane	5	5.9	119 %	70 - 130 %
120-82-1	1,2,4-Trichlorobenzene	5	6	120 %	70 - 130 %
87-68-3	Hexachlorobutadiene	5	6.2	123 %	70 - 130 %
91-20-3	Naphthalene	5	6	120 %	70 - 130 %
87-61-6	1,2,3-Trichlorobenzene	5	6.7	134 % q	70 - 130 %
75-65-0	*tert*-Butyl Alcohol (TBA)	100	100	104 %	70 - 130 %
108-20-3	Di-isopropyl Ether (DIPE)	5	5.7	115 %	70 - 130 %
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	5	5.2	104 %	70 - 130 %
994-05-8	*tert*-Amyl Methyl Ether (TAME)	5	5	101 %	70 - 130 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.2	92 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.4	84 %	70 - 130 %
Toluene-d_8	10	8.2	82 %	70 - 130 %
4-Bromofluorobenzene	10	8.7	87 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Recovery outside recommended limits.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8260B**
QC Batch ID: **VM4-2881-WB**
Matrix: **Aqueous**

Instrument ID: **MS-4 HP 6890**
Analyzed: **04-26-04 09:39**
Analyst: **LMG**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-2881-WB	Analyzed:	04-26-04 09:39
Matrix:	Aqueous	Analyst:	LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	9.6	96 %	70 - 130 %
1,2-Dichloroethane-d_4	10	8.6	86 %	70 - 130 %
Toluene-d_8	10	8.3	83 %	70 - 130 %
4-Bromofluorobenzene	10	9.3	93 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

August 3, 2004

RECEIVED
AUG - 5 2004

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project: **RM Jones/542.1.1**
Lab ID: **74914**
Received: **07-20-04**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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,

Eric H. Jensen
Operations Manager

EHJ/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/542.1.1	Delivery:	Hand	Temperature:	3.8'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	74914	Lab Receipt:	07-20-04	Custody Seal(s):	n/a

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-1	LE-WE-3		Aqueous	7/19/04 11:15	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419491	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419479	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419467	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-2	LE-GZA-4		Aqueous	7/19/04 11:30	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419492	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419480	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419468	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-3	LE-URS-3		Aqueous	7/19/04 12:00	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419461	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419460	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419448	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-4	LE-URS-2		Aqueous	7/19/04 12:15	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419490	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419478	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419466	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-5	LE-URS-1		Aqueous	7/19/04 13:45	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419477	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419489	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419465	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-6	LE-MW-4		Aqueous	7/19/04 14:35	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419449	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419437	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419436	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-7	LE-MW-5		Aqueous	7/19/04 13:15	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419488	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419476	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419462	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
74914-8	Trip Blank		Aqueous	7/19/04 0:00	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C419464	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		
C419450	40 mL VOA Vial	Proline	BX12433	HCl	R-3901E	04-29-04	n/a		

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-01	QC Batch ID:	VM5-2919-W
Sampled:	07-19-04 11:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-01-04 18:27	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	1
74-87-3	Chloromethane	BRL		ug/L	1
75-01-4	Vinyl Chloride	BRL		ug/L	1
74-83-9	Bromomethane	BRL		ug/L	1
75-00-3	Chloroethane	BRL		ug/L	1
75-69-4	Trichlorofluoromethane	BRL		ug/L	1
60-29-7	Diethyl Ether	BRL		ug/L	4
75-35-4	1,1-Dichloroethene	BRL		ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	10
67-64-1	Acetone	BRL		ug/L	20
75-15-0	Carbon Disulfide	BRL		ug/L	10
75-09-2	Methylene Chloride	BRL		ug/L	5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	1
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	1
75-34-3	1,1-Dichloroethane	BRL		ug/L	1
594-20-7	2,2-Dichloropropane	BRL		ug/L	1
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	1
78-93-3	2-Butanone (MEK)	BRL		ug/L	10
74-97-5	Bromochloromethane	BRL		ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	10
67-66-3	Chloroform	BRL		ug/L	1
71-55-6	1,1,1-Trichloroethane	71		ug/L	1
56-23-5	Carbon Tetrachloride	BRL		ug/L	1
563-58-6	1,1-Dichloropropene	BRL		ug/L	1
71-43-2	Benzene	BRL		ug/L	1
107-06-2	1,2-Dichloroethane	BRL		ug/L	1
79-01-6	Trichloroethene	27		ug/L	1
78-87-5	1,2-Dichloropropane	BRL		ug/L	1
74-95-3	Dibromomethane	BRL		ug/L	1
75-27-4	Bromodichloromethane	BRL		ug/L	1
123-91-1	1,4-Dioxane	BRL		ug/L	1,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	10
108-88-3	Toluene	BRL		ug/L	1
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	1
127-18-4	Tetrachloroethene	19		ug/L	1
142-28-9	1,3-Dichloropropane	BRL		ug/L	1
591-78-6	2-Hexanone	BRL		ug/L	10
124-48-1	Dibromochloromethane	BRL		ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	1
108-90-7	Chlorobenzene	BRL		ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	1
100-41-4	Ethylbenzene	BRL		ug/L	1
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	1
95-47-6	*ortho*- Xylene	BRL		ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	LE-WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-01	QC Batch ID:	VM5-2919-W
Sampled:	07-19-04 11:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-01-04 18:27	Dilution Factor:	2
Analyst:	LMG		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	1
75-25-2	Bromoform	BRL		ug/L	1
98-82-8	Isopropylbenzene	BRL		ug/L	1
108-86-1	Bromobenzene	BRL		ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	1
103-65-1	*n*-Propylbenzene	BRL		ug/L	1
95-49-8	2-Chlorotoluene	BRL		ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	1
106-43-4	4-Chlorotoluene	BRL		ug/L	1
98-06-6	*tert*-Butylbenzene	BRL		ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	1
135-98-8	*sec*-Butylbenzene	BRL		ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	1
99-87-6	4-Isopropyltoluene	BRL		ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	1
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	1
104-51-8	*n*-Butylbenzene	BRL		ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	1
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	1
87-68-3	Hexachlorobutadiene	BRL		ug/L	1
91-20-3	Naphthalene	BRL		ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	1
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	40
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	1
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	1
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	106 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	101 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	11	108 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-02	QC Batch ID:	VM5-2919-W
Sampled:	07-19-04 11:30	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:46	Dilution Factor:	10
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	1
74-87-3	Chloromethane	BRL		ug/L	1
75-01-4	Vinyl Chloride	43		ug/L	1
74-83-9	Bromomethane	BRL		ug/L	1
75-00-3	Chloroethane	260	e	ug/L	1
75-69-4	Trichlorofluoromethane	BRL		ug/L	1
60-29-7	Diethyl Ether	BRL		ug/L	4
75-35-4	1,1-Dichloroethene	5		ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	49		ug/L	10
67-64-1	Acetone	BRL		ug/L	20
75-15-0	Carbon Disulfide	BRL		ug/L	10
75-09-2	Methylene Chloride	BRL		ug/L	5
156-60-5	*trans*- 1,2-Dichloroethene	3		ug/L	1
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	1
75-34-3	1,1-Dichloroethane	210	e	ug/L	1
594-20-7	2,2-Dichloropropane	BRL		ug/L	1
156-59-2	*cis*- 1,2-Dichloroethene	74		ug/L	1
78-93-3	2-Butanone (MEK)	BRL		ug/L	10
74-97-5	Bromochloromethane	BRL		ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	10
67-66-3	Chloroform	BRL		ug/L	1
71-55-6	1,1,1-Trichloroethane	75		ug/L	1
56-23-5	Carbon Tetrachloride	BRL		ug/L	1
563-58-6	1,1-Dichloropropene	BRL		ug/L	1
71-43-2	Benzene	BRL		ug/L	1
107-06-2	1,2-Dichloroethane	2		ug/L	1
79-01-6	Trichloroethene	29		ug/L	1
78-87-5	1,2-Dichloropropane	BRL		ug/L	1
74-95-3	Dibromomethane	BRL		ug/L	1
75-27-4	Bromodichloromethane	BRL		ug/L	1
123-91-1	1,4-Dioxane	BRL		ug/L	1000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	10
108-88-3	Toluene	25		ug/L	1
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	1
127-18-4	Tetrachloroethene	7		ug/L	1
142-28-9	1,3-Dichloropropane	BRL		ug/L	1
591-78-6	2-Hexanone	BRL		ug/L	10
124-48-1	Dibromochloromethane	BRL		ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	1
108-90-7	Chlorobenzene	BRL		ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	1
100-41-4	Ethylbenzene	9		ug/L	1
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	5		ug/L	1
95-47-6	*ortho*- Xylene	9		ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	LE-GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-02	QC Batch ID:	VM5-2919-W
Sampled:	07-19-04 11:30	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:46	Dilution Factor:	10
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	1
75-25-2	Bromoform	BRL		ug/L	1
98-82-8	Isopropylbenzene	BRL		ug/L	1
108-86-1	Bromobenzene	BRL		ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	1
103-65-1	*n*-Propylbenzene	BRL		ug/L	1
95-49-8	2-Chlorotoluene	BRL		ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	1
106-43-4	4-Chlorotoluene	BRL		ug/L	1
98-06-6	*tert*-Butylbenzene	BRL		ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	1
135-98-8	*sec*-Butylbenzene	BRL		ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	1
99-87-6	4-Isopropyltoluene	BRL		ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	1
95-50-1	1,2-Dichlorobenzene	21		ug/L	1
104-51-8	*n*-Butylbenzene	BRL		ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	1
120-82-1	1,2,4-Trichlorobenzene	3		ug/L	1
87-68-3	Hexachlorobutadiene	BRL		ug/L	1
91-20-3	Naphthalene	26		ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	1
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	40
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	1
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	1
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	104 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	102 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	10	103 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

e Indicates concentration exceeded calibration range for the analyte.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-02RA1	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 11:30	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:46	Dilution Factor:	10
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	5
74-87-3	Chloromethane	BRL		ug/L	5
75-01-4	Vinyl Chloride	44		ug/L	5
74-83-9	Bromomethane	BRL		ug/L	5
75-00-3	Chloroethane	280		ug/L	5
75-69-4	Trichlorofluoromethane	BRL		ug/L	5
60-29-7	Diethyl Ether	BRL		ug/L	20
75-35-4	1,1-Dichloroethene	5		ug/L	5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	50
67-64-1	Acetone	BRL		ug/L	100
75-15-0	Carbon Disulfide	BRL		ug/L	50
75-09-2	Methylene Chloride	BRL		ug/L	25
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	5
75-34-3	1,1-Dichloroethane	230		ug/L	5
594-20-7	2,2-Dichloropropane	BRL		ug/L	5
156-59-2	*cis*- 1,2-Dichloroethene	78		ug/L	5
78-93-3	2-Butanone (MEK)	BRL		ug/L	50
74-97-5	Bromochloromethane	BRL		ug/L	5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	50
67-66-3	Chloroform	BRL		ug/L	5
71-55-6	1,1,1-Trichloroethane	81		ug/L	5
56-23-5	Carbon Tetrachloride	BRL		ug/L	5
563-58-6	1,1-Dichloropropene	BRL		ug/L	5
71-43-2	Benzene	BRL		ug/L	5
107-06-2	1,2-Dichloroethane	BRL		ug/L	5
79-01-6	Trichloroethene	30		ug/L	5
78-87-5	1,2-Dichloropropane	BRL		ug/L	5
74-95-3	Dibromomethane	BRL		ug/L	5
75-27-4	Bromodichloromethane	BRL		ug/L	5
123-91-1	1,4-Dioxane	BRL		ug/L	5000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	50
108-88-3	Toluene	25		ug/L	5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	5
127-18-4	Tetrachloroethene	7		ug/L	5
142-28-9	1,3-Dichloropropane	BRL		ug/L	5
591-78-6	2-Hexanone	BRL		ug/L	50
124-48-1	Dibromochloromethane	BRL		ug/L	5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	5
108-90-7	Chlorobenzene	BRL		ug/L	5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	5
100-41-4	Ethylbenzene	9		ug/L	5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	5
95-47-6	*ortho*- Xylene	8		ug/L	5

GROUNDWATER ANALYTICAL

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

Field ID:	LE-GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-02RA1	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 11:30	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:46	Dilution Factor:	10
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	5
75-25-2	Bromoform	BRL		ug/L	5
98-82-8	Isopropylbenzene	BRL		ug/L	5
108-86-1	Bromobenzene	BRL		ug/L	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	5
103-65-1	*n*-Propylbenzene	BRL		ug/L	5
95-49-8	2-Chlorotoluene	BRL		ug/L	5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	5
106-43-4	4-Chlorotoluene	BRL		ug/L	5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
99-87-6	4-Isopropyltoluene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	21		ug/L	5
104-51-8	*n*-Butylbenzene	BRL		ug/L	5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
91-20-3	Naphthalene	19		ug/L	5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	200
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	108 %	70 - 130 %
1,2-Dichloroethane-d_4	10	11	106 %	70 - 130 %
Toluene-d_8	10	10	102 %	70 - 130 %
4-Bromofluorobenzene	10	11	107 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-03	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 12:00	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 11:11	Dilution Factor:	200
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	100
74-87-3	Chloromethane	BRL		ug/L	100
75-01-4	Vinyl Chloride	BRL		ug/L	100
74-83-9	Bromomethane	BRL		ug/L	100
75-00-3	Chloroethane	BRL		ug/L	100
75-69-4	Trichlorofluoromethane	BRL		ug/L	100
60-29-7	Diethyl Ether	BRL		ug/L	400
75-35-4	1,1-Dichloroethene	390		ug/L	100
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	1,000
67-64-1	Acetone	BRL		ug/L	2,000
75-15-0	Carbon Disulfide	BRL		ug/L	1,000
75-09-2	Methylene Chloride	BRL		ug/L	500
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	100
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	100
75-34-3	1,1-Dichloroethane	490		ug/L	100
594-20-7	2,2-Dichloropropane	BRL		ug/L	100
156-59-2	*cis*- 1,2-Dichloroethene	870		ug/L	100
78-93-3	2-Butanone (MEK)	BRL		ug/L	1,000
74-97-5	Bromochloromethane	BRL		ug/L	100
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	1,000
67-66-3	Chloroform	BRL		ug/L	100
71-55-6	1,1,1-Trichloroethane	7,600		ug/L	100
56-23-5	Carbon Tetrachloride	BRL		ug/L	100
563-58-6	1,1-Dichloropropene	BRL		ug/L	100
71-43-2	Benzene	BRL		ug/L	100
107-06-2	1,2-Dichloroethane	BRL		ug/L	100
79-01-6	Trichloroethene	1,500		ug/L	100
78-87-5	1,2-Dichloropropane	BRL		ug/L	100
74-95-3	Dibromomethane	BRL		ug/L	100
75-27-4	Bromodichloromethane	BRL		ug/L	100
123-91-1	1,4-Dioxane	BRL		ug/L	100,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	100
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	1,000
108-88-3	Toluene	BRL		ug/L	100
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	100
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	100
127-18-4	Tetrachloroethene	BRL		ug/L	100
142-28-9	1,3-Dichloropropane	BRL		ug/L	100
591-78-6	2-Hexanone	BRL		ug/L	1,000
124-48-1	Dibromochloromethane	BRL		ug/L	100
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	100
108-90-7	Chlorobenzene	BRL		ug/L	100
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	100
100-41-4	Ethylbenzene	BRL		ug/L	100
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	100
95-47-6	*ortho*- Xylene	BRL		ug/L	100

GROUNDWATER ANALYTICAL

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

Field ID:	LE-URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-03	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 12:00	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 11:11	Dilution Factor:	200
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	100
75-25-2	Bromoform	BRL		ug/L	100
98-82-8	Isopropylbenzene	BRL		ug/L	100
108-86-1	Bromobenzene	BRL		ug/L	100
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	100
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	100
103-65-1	*n*-Propylbenzene	BRL		ug/L	100
95-49-8	2-Chlorotoluene	BRL		ug/L	100
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	100
106-43-4	4-Chlorotoluene	BRL		ug/L	100
98-06-6	*tert*-Butylbenzene	BRL		ug/L	100
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	100
135-98-8	*sec*-Butylbenzene	BRL		ug/L	100
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	100
99-87-6	4-Isopropyltoluene	BRL		ug/L	100
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	100
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	100
104-51-8	*n*-Butylbenzene	BRL		ug/L	100
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	100
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	100
87-68-3	Hexachlorobutadiene	BRL		ug/L	100
91-20-3	Naphthalene	BRL		ug/L	100
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	100
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	4,000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	100
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	100
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	100

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	**105 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**103 %**	70 - 130 %
Toluene-d_8	10	10	**101 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**108 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-04	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 12:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 13:09	Dilution Factor:	1
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	2		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	10		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	2		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	1		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	LE-URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-04	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 12:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 13:09	Dilution Factor:	1
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	**104 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**103 %**	70 - 130 %
Toluene-d_8	10	10	**100 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**108 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-05	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 13:45	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 13:48	Dilution Factor:	1
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	12		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	0.7		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	LE-URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-05	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 13:45	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 13:48	Dilution Factor:	1
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	104 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	102 %	70 - 130 %
Toluene-d_8	10	10	101 %	70 - 130 %
4-Bromofluorobenzene	10	11	106 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-06	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 14:35	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 17:04	Dilution Factor:	20
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	10
74-87-3	Chloromethane	BRL		ug/L	10
75-01-4	Vinyl Chloride	BRL		ug/L	10
74-83-9	Bromomethane	BRL		ug/L	10
75-00-3	Chloroethane	BRL		ug/L	10
75-69-4	Trichlorofluoromethane	BRL		ug/L	10
60-29-7	Diethyl Ether	BRL		ug/L	40
75-35-4	1,1-Dichloroethene	BRL		ug/L	10
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	100
67-64-1	Acetone	BRL		ug/L	200
75-15-0	Carbon Disulfide	BRL		ug/L	100
75-09-2	Methylene Chloride	BRL		ug/L	50
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	10
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	10
75-34-3	1,1-Dichloroethane	BRL		ug/L	10
594-20-7	2,2-Dichloropropane	BRL		ug/L	10
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	10
78-93-3	2-Butanone (MEK)	BRL		ug/L	100
74-97-5	Bromochloromethane	BRL		ug/L	10
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	100
67-66-3	Chloroform	BRL		ug/L	10
71-55-6	1,1,1-Trichloroethane	**660**		ug/L	10
56-23-5	Carbon Tetrachloride	BRL		ug/L	10
563-58-6	1,1-Dichloropropene	BRL		ug/L	10
71-43-2	Benzene	BRL		ug/L	10
107-06-2	1,2-Dichloroethane	BRL		ug/L	10
79-01-6	Trichloroethene	**180**		ug/L	10
78-87-5	1,2-Dichloropropane	BRL		ug/L	10
74-95-3	Dibromomethane	BRL		ug/L	10
75-27-4	Bromodichloromethane	BRL		ug/L	10
123-91-1	1,4-Dioxane	BRL		ug/L	10,000
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	10
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	100
108-88-3	Toluene	**540**		ug/L	10
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	10
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	10
127-18-4	Tetrachloroethene	**130**		ug/L	10
142-28-9	1,3-Dichloropropane	BRL		ug/L	10
591-78-6	2-Hexanone	BRL		ug/L	100
124-48-1	Dibromochloromethane	BRL		ug/L	10
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	10
108-90-7	Chlorobenzene	BRL		ug/L	10
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	10
100-41-4	Ethylbenzene	**52**		ug/L	10
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	**200**		ug/L	10
95-47-6	*ortho*- Xylene	**71**		ug/L	10

GROUNDWATER ANALYTICAL

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

Field ID:	LE-MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-06	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 14:35	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 17:04	Dilution Factor:	20
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	10
75-25-2	Bromoform	BRL		ug/L	10
98-82-8	Isopropylbenzene	BRL		ug/L	10
108-86-1	Bromobenzene	BRL		ug/L	10
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	10
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	10
103-65-1	*n*-Propylbenzene	BRL		ug/L	10
95-49-8	2-Chlorotoluene	BRL		ug/L	10
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	10
106-43-4	4-Chlorotoluene	BRL		ug/L	10
98-06-6	*tert*-Butylbenzene	BRL		ug/L	10
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	10
135-98-8	*sec*-Butylbenzene	BRL		ug/L	10
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	10
99-87-6	4-Isopropyltoluene	BRL		ug/L	10
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	10
95-50-1	1,2-Dichlorobenzene	56		ug/L	10
104-51-8	*n*-Butylbenzene	BRL		ug/L	10
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	10
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	10
87-68-3	Hexachlorobutadiene	BRL		ug/L	10
91-20-3	Naphthalene	24		ug/L	10
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	10
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	400
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	10
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	10
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	10

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	106 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	105 %	70 - 130 %
Toluene-d_8	10	9.9	99 %	70 - 130 %
4-Bromofluorobenzene	10	11	107 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-07	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 13:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:06	Dilution Factor:	2
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	1
74-87-3	Chloromethane	BRL		ug/L	1
75-01-4	Vinyl Chloride	BRL		ug/L	1
74-83-9	Bromomethane	BRL		ug/L	1
75-00-3	Chloroethane	BRL		ug/L	1
75-69-4	Trichlorofluoromethane	BRL		ug/L	1
60-29-7	Diethyl Ether	BRL		ug/L	4
75-35-4	1,1-Dichloroethene	52		ug/L	1
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	10
67-64-1	Acetone	BRL		ug/L	20
75-15-0	Carbon Disulfide	BRL		ug/L	10
75-09-2	Methylene Chloride	BRL		ug/L	5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	1
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	10		ug/L	1
75-34-3	1,1-Dichloroethane	120	e	ug/L	1
594-20-7	2,2-Dichloropropane	BRL		ug/L	1
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	1
78-93-3	2-Butanone (MEK)	BRL		ug/L	10
74-97-5	Bromochloromethane	BRL		ug/L	1
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	10
67-66-3	Chloroform	BRL		ug/L	1
71-55-6	1,1,1-Trichloroethane	54		ug/L	1
56-23-5	Carbon Tetrachloride	BRL		ug/L	1
563-58-6	1,1-Dichloropropene	BRL		ug/L	1
71-43-2	Benzene	BRL		ug/L	1
107-06-2	1,2-Dichloroethane	BRL		ug/L	1
79-01-6	Trichloroethene	BRL		ug/L	1
78-87-5	1,2-Dichloropropane	BRL		ug/L	1
74-95-3	Dibromomethane	BRL		ug/L	1
75-27-4	Bromodichloromethane	BRL		ug/L	1
123-91-1	1,4-Dioxane	BRL		ug/L	1,000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	1
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	10
108-88-3	Toluene	BRL		ug/L	1
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	1
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	1
127-18-4	Tetrachloroethene	BRL		ug/L	1
142-28-9	1,3-Dichloropropane	BRL		ug/L	1
591-78-6	2-Hexanone	BRL		ug/L	10
124-48-1	Dibromochloromethane	BRL		ug/L	1
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	1
108-90-7	Chlorobenzene	BRL		ug/L	1
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	1
100-41-4	Ethylbenzene	BRL		ug/L	1
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	1
95-47-6	*ortho*-Xylene	BRL		ug/L	1

GROUNDWATER ANALYTICAL

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

Field ID:	LE-MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-07	QC Batch ID:	VM5-2920-W
Sampled:	07-19-04 13:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-02-04 15:06	Dilution Factor:	2
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	1
75-25-2	Bromoform	BRL		ug/L	1
98-82-8	Isopropylbenzene	BRL		ug/L	1
108-86-1	Bromobenzene	BRL		ug/L	1
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	1
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	1
103-65-1	*n*-Propylbenzene	BRL		ug/L	1
95-49-8	2-Chlorotoluene	BRL		ug/L	1
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	1
106-43-4	4-Chlorotoluene	BRL		ug/L	1
98-06-6	*tert*-Butylbenzene	BRL		ug/L	1
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	1
135-98-8	*sec*-Butylbenzene	BRL		ug/L	1
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	1
99-87-6	4-Isopropyltoluene	BRL		ug/L	1
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	1
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	1
104-51-8	*n*-Butylbenzene	BRL		ug/L	1
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	1
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	1
87-68-3	Hexachlorobutadiene	BRL		ug/L	1
91-20-3	Naphthalene	BRL		ug/L	1
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	1
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	40
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	1
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	1
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	106 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	102 %	70 - 130 %
Toluene-d_8	10	10	101 %	70 - 130 %
4-Bromofluorobenzene	10	11	105 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

e Indicates concentration exceeded calibration range for the analyte.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	LE-MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-07RA1	QC Batch ID:	VM5-2922-W
Sampled:	07-19-04 13:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-04-04 05:38	Dilution Factor:	5
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	2.5
74-87-3	Chloromethane	BRL		ug/L	2.5
75-01-4	Vinyl Chloride	BRL		ug/L	2.5
74-83-9	Bromomethane	BRL		ug/L	2.5
75-00-3	Chloroethane	BRL		ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	2.5
60-29-7	Diethyl Ether	BRL		ug/L	10
75-35-4	1,1-Dichloroethene	51		ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	25
67-64-1	Acetone	BRL		ug/L	50
75-15-0	Carbon Disulfide	BRL		ug/L	25
75-09-2	Methylene Chloride	BRL		ug/L	13
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	2.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	9		ug/L	2.5
75-34-3	1,1-Dichloroethane	120		ug/L	2.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	2.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	25
74-97-5	Bromochloromethane	BRL		ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	25
67-66-3	Chloroform	BRL		ug/L	2.5
71-55-6	1,1,1-Trichloroethane	52		ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	2.5
71-43-2	Benzene	BRL		ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	2.5
79-01-6	Trichloroethene	BRL		ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	2.5
74-95-3	Dibromomethane	BRL		ug/L	2.5
75-27-4	Bromodichloromethane	BRL		ug/L	2.5
123-91-1	1,4-Dioxane	BRL		ug/L	2,500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	25
108-88-3	Toluene	BRL		ug/L	2.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	2.5
127-18-4	Tetrachloroethene	BRL		ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	2.5
591-78-6	2-Hexanone	BRL		ug/L	25
124-48-1	Dibromochloromethane	BRL		ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	2.5
108-90-7	Chlorobenzene	BRL		ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	2.5
100-41-4	Ethylbenzene	BRL		ug/L	2.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	2.5
95-47-6	*ortho*- Xylene	BRL		ug/L	2.5

GROUNDWATER ANALYTICAL

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

Field ID:	LE-MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	74914-07RA1	QC Batch ID:	VM5-2922-W
Sampled:	07-19-04 13:15	Instrument ID:	MS-5 HP 6890
Received:	07-20-04 17:30	Sample Volume:	25 mL
Analyzed:	08-04-04 05:38	Dilution Factor:	5
Analyst:	MJB		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	2.5
75-25-2	Bromoform	BRL		ug/L	2.5
98-82-8	Isopropylbenzene	BRL		ug/L	2.5
108-86-1	Bromobenzene	BRL		ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	2.5
95-49-8	2-Chlorotoluene	BRL		ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	2.5
106-43-4	4-Chlorotoluene	BRL		ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	2.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	2.5
91-20-3	Naphthalene	BRL		ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	2.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	100
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	2.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	2.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	2.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	101 %	70 - 130 %
1,2-Dichloroethane-d_4	10	9.8	98 %	70 - 130 %
Toluene-d_8	10	9.8	98 %	70 - 130 %
4-Bromofluorobenzene	10	11	108 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	**Trip Blank**	Matrix:	**Aqueous**
Project:	**RM Jones/542.1.1**	Container:	**40 mL VOA Vial**
Client:	**Lightship Engineering**	Preservation:	**HCl/Cool**
Laboratory ID:	**74914-08**	QC Batch ID:	**VM5-2920-W**
Sampled:	**07-19-04 00:00**	Instrument ID:	**MS-5 HP 6890**
Received:	**07-20-04 17:30**	Sample Volume:	**25 mL**
Analyzed:	**08-02-04 10:31**	Dilution Factor:	**1**
Analyst:	**MJB**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	**Trip Blank**	Matrix:	**Aqueous**
Project:	**RM Jones/542.1.1**	Container:	**40 mL VOA Vial**
Client:	**Lightship Engineering**	Preservation:	**HCl/Cool**
Laboratory ID:	**74914-08**	QC Batch ID:	**VM5-2920-W**
Sampled:	**07-19-04 00:00**	Instrument ID:	**MS-5 HP 6890**
Received:	**07-20-04 17:30**	Sample Volume:	**25 mL**
Analyzed:	**08-02-04 10:31**	Dilution Factor:	**1**
Analyst:	**MJB**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	**106 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**102 %**	70 - 130 %
Toluene-d_8	10	10	**100 %**	70 - 130 %
4-Bromofluorobenzene	10	10	**104 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**RM Jones/542.1.1**	Lab ID:	**74914**
Client:	**Lightship Engineering**	Received:	**07-20-04 17:30**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 8260B Non-conformance: Sample 74914-07. Laboratory control sample (LCS) analyte 1,4-Dioxane was above recommended recovery limits for QC batch VM5-2922-W.
2. EPA 8260B Non-conformance: Sample 74914-07RA1. Sample was re-analyzed outside of the recommended holding time at a greater dilution.
3. EPA 8260B Non-conformance: Samples 74914-01 and -02. Laboratory control sample (LCS) analytes 1,4-Dioxane, 2,2-Dichloropropane, Hexachlorobutadiene were above recommended recovery limits for QC batch VM5-2919-W.
4. EPA 8260B Non-conformance: Samples 74914-02 through -06, -08. Laboratory control sample (LCS) analyte 1,4-Dioxane was above recommended recovery limits for QC batch VM5-2920-W.
5. EPA 8260B Note: Sample 74914-01. Sample was diluted prior to analysis. Dilution was required to keep all target analytes within calibration.
6. EPA 8260B Note: Samples 74914–01, -02, -03, -06 and -07. Sample were diluted prior to analysis. Dilution was required to keep all target analytes within calibration.
7. EPA 8260B Non-conformance: Samples 74914-02,-07. Samples had selected analytes exceeding the high standard of the associated calibration curve. Results are estimated.

GROUNDWATER ANALYTICAL
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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 081500

Project Name: Rm Jones	Firm: Lightship Engineering
Project Number: 542.1.1	Address: 36 Cordage Park
Sampler Name: Randall Twiss	City / State / Zip: Plymouth, MA 02360
Project Manager: Joe O'Brien	Telephone: 508 830 3344

TURNAROUND

- ☒ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- ____________) (Rush requires Rush Authorization Number)
- ☐ Please Email to: ____________
- ☒ Please FAX to: 508 830 3360

BILLING

- ☐ Purchase Order No.: ____________
- ☐ Third Party Billing: ____________
- ☐ GWA Quote: ____________

INSTRUCTIONS: Use separate line for each container (except replicates).

ANALYSIS REQUEST

Sampling Date	Time	Sample Identification	Matrix: Groundwater	Type: Grab	Container(s): Number	Preservation: HCl	Preservation: Ice	Filtered: No	Laboratory Number (Lab Use Only)	8260B
7/9/04	11:15	LE-WE-3	X	X	3	X	X	X	74914	X
	11:30	LE-GZA-4	↓	↓	↓	↓	↓	↓		↓
	12:00	LE-URS-3	↓	↓	↓	↓	↓	↓		↓
	12:15	LE-URS-2	↓	↓	↓	↓	↓	↓		↓
	13:45	LE-URS-1	↓	↓	↓	↓	↓	↓		↓
	14:45	LE-MW-4	↓	↓	↓	↓	↓	↓		↓
	13:15	LE-MW-5	↓	↓	↓	↓	↓	↓		↓
↓		LE Trip Blank		↓	2	↓	↓	↓		↓

REMARKS / SPECIAL INSTRUCTIONS

DEP MCP Data Enhancement Affirmation

- YES ☐ NO MCP Data Certification is required.
- YES ☐ NO MCP minimum Field QC requirements have been met for this project. (Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)
- YES ☐ NO MCP Drinking Water samples required. (Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: ____________

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ ______
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ ______	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required: ☐ Sample Duplicate ☐ Matrix Spike ☐ Matrix Spike Duplicate

Selection of QC Sample: ☐ Please use sample: ____________

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by	Date	Time	Received by	
Relinquished by Sampler: Randall Twiss	7/9/04		Received by:	Receipt Temperature: 5.8 ☐ Ice ☐ Refrigerated 2-6°C Recommended
Relinquished by:			Received by:	Container Count:
Relinquished by:	7/29	1730	Received by Laboratory: [signature]	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ ____________

Custody Seal Number:

GROUNDWATER ANALYTICAL

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. Perent 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	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2919-WL	Analyzed:	08-01-04 09:01
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-71-8	Dichlorodifluoromethane	5	5.3	105 %	70 - 130 %
74-87-3	Chloromethane	5	5.8	116 %	70 - 130 %
75-01-4	Vinyl Chloride	5	5.6	111 %	70 - 130 %
74-83-9	Bromomethane	5	5.9	118 %	70 - 130 %
75-00-3	Chloroethane	5	6.1	122 %	70 - 130 %
75-69-4	Trichlorofluoromethane	5	6.1	121 %	70 - 130 %
60-29-7	Diethyl Ether	10	9.3	93 %	70 - 130 %
75-35-4	1,1-Dichloroethene	5	5.9	118 %	70 - 130 %
76-13-1	1,1,2-Trichlorotrifluoroethane	10	12	123 %	70 - 130 %
67-64-1	Acetone	10	12	118 %	70 - 130 %
75-15-0	Carbon Disulfide	10	10	105 %	70 - 130 %
75-09-2	Methylene Chloride	5	5.2	104 %	70 - 130 %
156-60-5	*trans*- 1,2-Dichloroethene	5	5.3	106 %	70 - 130 %
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	5	5.5	110 %	70 - 130 %
75-34-3	1,1-Dichloroethane	5	5.5	110 %	70 - 130 %
594-20-7	2,2-Dichloropropane	5	6.6	132 % q	70 - 130 %
156-59-2	*cis*- 1,2-Dichloroethene	5	5.5	109 %	70 - 130 %
78-93-3	2-Butanone (MEK)	10	9.7	97 %	70 - 130 %
74-97-5	Bromochloromethane	5	5.3	107 %	70 - 130 %
109-99-9	Tetrahydrofuran (THF)	10	9.5	95 %	70 - 130 %
67-66-3	Chloroform	5	5.5	109 %	70 - 130 %
71-55-6	1,1,1-Trichloroethane	5	5.7	114 %	70 - 130 %
56-23-5	Carbon Tetrachloride	5	5.6	112 %	70 - 130 %
563-58-6	1,1-Dichloropropene	5	5.5	111 %	70 - 130 %
71-43-2	Benzene	5	5.2	103 %	70 - 130 %
107-06-2	1,2-Dichloroethane	5	5.3	106 %	70 - 130 %
79-01-6	Trichloroethene	5	5.3	106 %	70 - 130 %
78-87-5	1,2-Dichloropropane	5	5.2	104 %	70 - 130 %
74-95-3	Dibromomethane	5	5.2	105 %	70 - 130 %
75-27-4	Bromodichloromethane	5	5.2	104 %	70 - 130 %
123-91-1	1,4-Dioxane	100	230	229 % q	70 - 130 %
10061-01-5	*cis*- 1,3-Dichloropropene	5	5.2	105 %	70 - 130 %
108-10-1	4-Methyl-2-Pentanone (MIBK)	10	9.8	98 %	70 - 130 %
108-88-3	Toluene	5	5.1	103 %	70 - 130 %
10061-02-6	*trans*- 1,3-Dichloropropene	5	4.8	95 %	70 - 130 %
79-00-5	1,1,2-Trichloroethane	5	5.3	106 %	70 - 130 %
127-18-4	Tetrachloroethene	5	5.6	111 %	70 - 130 %
142-28-9	1,3-Dichloropropane	5	5.5	109 %	70 - 130 %
591-78-6	2-Hexanone	10	10	103 %	70 - 130 %
124-48-1	Dibromochloromethane	5	5	100 %	70 - 130 %
106-93-4	1,2-Dibromoethane (EDB)	5	5.2	104 %	70 - 130 %
108-90-7	Chlorobenzene	5	5.2	105 %	70 - 130 %
630-20-6	1,1,1,2-Tetrachloroethane	5	5.3	105 %	70 - 130 %
100-41-4	Ethylbenzene	5	5.5	109 %	70 - 130 %
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	10	11	108 %	70 - 130 %
95-47-6	*ortho*- Xylene	5	5.5	110 %	70 - 130 %
100-42-5	Styrene	5	5.4	108 %	70 - 130 %
75-25-2	Bromoform	5	5	100 %	70 - 130 %
98-82-8	Isopropylbenzene	5	5.3	105 %	70 - 130 %

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2919-WL	Analyzed:	08-01-04 09:01
Matrix:	Aqueous	Analyst:	LMG
Units:	ug/L		

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
108-86-1	Bromobenzene	5	5.3	106 %	70 - 130 %
79-34-5	1,1,2,2-Tetrachloroethane	5	5.9	118 %	70 - 130 %
96-18-4	1,2,3-Trichloropropane	5	5.6	111 %	70 - 130 %
103-65-1	*n*-Propylbenzene	5	5.6	113 %	70 - 130 %
95-49-8	2-Chlorotoluene	5	5.5	110 %	70 - 130 %
108-67-8	1,3,5-Trimethylbenzene	5	5.3	105 %	70 - 130 %
106-43-4	4-Chlorotoluene	5	5.5	109 %	70 - 130 %
98-06-6	*tert*-Butylbenzene	5	5.5	110 %	70 - 130 %
95-63-6	1,2,4-Trimethylbenzene	5	5.6	112 %	70 - 130 %
135-98-8	*sec*-Butylbenzene	5	5.8	115 %	70 - 130 %
541-73-1	1,3-Dichlorobenzene	5	5.7	114 %	70 - 130 %
99-87-6	4-Isopropyltoluene	5	5.7	114 %	70 - 130 %
106-46-7	1,4-Dichlorobenzene	5	5.7	114 %	70 - 130 %
95-50-1	1,2-Dichlorobenzene	5	5.6	112 %	70 - 130 %
104-51-8	*n*-Butylbenzene	5	6.1	122 %	70 - 130 %
96-12-8	1,2-Dibromo-3-chloropropane	5	6	121 %	70 - 130 %
120-82-1	1,2,4-Trichlorobenzene	5	6.1	123 %	70 - 130 %
87-68-3	Hexachlorobutadiene	5	6.6	132 % q	70 - 130 %
91-20-3	Naphthalene	5	6	120 %	70 - 130 %
87-61-6	1,2,3-Trichlorobenzene	5	6.6	132 % q	70 - 130 %
75-65-0	*tert*-Butyl Alcohol (TBA)	100	120	119 %	70 - 130 %
108-20-3	Di-isopropyl Ether (DIPE)	5	5.4	109 %	70 - 130 %
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	5	5.1	103 %	70 - 130 %
994-05-8	*tert*-Amyl Methyl Ether (TAME)	5	5.3	105 %	70 - 130 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	100 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	103 %	70 - 130 %
Toluene-d_8	10	9.8	98 %	70 - 130 %
4-Bromofluorobenzene	10	10	101 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Recovery outside recommended limits.

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GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2919-WB	Analyzed:	08-01-04 09:41
Matrix:	Aqueous	Analyst:	LMG

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	**EPA Method 8260B**	Instrument ID:	**MS-5 HP 6890**
QC Batch ID:	**VM5-2919-WB**	Analyzed:	**08-01-04 09:41**
Matrix:	**Aqueous**	Analyst:	**LMG**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	**103 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**102 %**	70 - 130 %
Toluene-d_8	10	9.9	**99 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**109 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2920-WL	Analyzed:	08-02-04 07:50	Analyzed:	08-02-04 08:46
Matrix:	Aqueous	Analyst:	MJB	Analyst:	MJB
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
75-71-8	Dichlorodifluoromethane	5	5.3	106 %	5	5.9	117 %	9 %	70 - 130 %	25%
74-87-3	Chloromethane	5	5.7	113 %	5	6.1	122 %	8 %	70 - 130 %	25%
75-01-4	Vinyl Chloride	5	5.1	102 %	5	5.6	112 %	10 %	70 - 130 %	25%
74-83-9	Bromomethane	5	5.6	112 %	5	5.9	118 %	5 %	70 - 130 %	25%
75-00-3	Chloroethane	5	5.6	112 %	5	6	119 %	6 %	70 - 130 %	25%
75-69-4	Trichlorofluoromethane	5	5.6	113 %	5	6.1	123 %	9 %	70 - 130 %	25%
60-29-7	Diethyl Ether	10	8.9	89 %	10	9.3	93 %	4 %	70 - 130 %	25%
75-35-4	1,1-Dichloroethene	5	5.4	107 %	5	5.7	114 %	6 %	70 - 130 %	25%
76-13-1	1,1,2-Trichlorotrifluoroethane	10	12	117 %	10	13	127 %	9 %	70 - 130 %	25%
67-64-1	Acetone	10	11	107 %	10	12	116 %	8 %	70 - 130 %	25%
75-15-0	Carbon Disulfide	10	9.7	97 %	10	10	105 %	8 %	70 - 130 %	25%
75-09-2	Methylene Chloride	5	4.9	97 %	5	5	100 %	3 %	70 - 130 %	25%
156-60-5	*trans*-1,2-Dichloroethene	5	4.9	98 %	5	5.1	103 %	5 %	70 - 130 %	25%
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	5	5.3	105 %	5	5.4	108 %	3 %	70 - 130 %	25%
75-34-3	1,1-Dichloroethane	5	5	100 %	5	5.3	106 %	5 %	70 - 130 %	25%
594-20-7	2,2-Dichloropropane	5	6.2	123 %	5	6.5	130 %	5 %	70 - 130 %	25%
156-59-2	*cis*-1,2-Dichloroethene	5	5	101 %	5	5.3	106 %	5 %	70 - 130 %	25%
78-93-3	2-Butanone (MEK)	10	8.5	85 %	10	9	90 %	6 %	70 - 130 %	25%
74-97-5	Bromochloromethane	5	4.8	96 %	5	5.1	102 %	6 %	70 - 130 %	25%
109-99-9	Tetrahydrofuran (THF)	10	9	90 %	10	9.4	94 %	4 %	70 - 130 %	25%
67-66-3	Chloroform	5	5	100 %	5	5.2	104 %	4 %	70 - 130 %	25%
71-55-6	1,1,1-Trichloroethane	5	5.2	103 %	5	5.6	111 %	8 %	70 - 130 %	25%
56-23-5	Carbon Tetrachloride	5	5.2	104 %	5	5.6	111 %	7 %	70 - 130 %	25%
563-58-6	1,1-Dichloropropene	5	5.1	101 %	5	5.4	108 %	7 %	70 - 130 %	25%
71-43-2	Benzene	5	4.8	96 %	5	4.9	98 %	2 %	70 - 130 %	25%
107-06-2	1,2-Dichloroethane	5	5	100 %	5	5.1	102 %	2 %	70 - 130 %	25%
79-01-6	Trichloroethene	5	4.8	95 %	5	5	101 %	6 %	70 - 130 %	25%
78-87-5	1,2-Dichloropropane	5	4.9	99 %	5	5.1	101 %	3 %	70 - 130 %	25%
74-95-3	Dibromomethane	5	5	100 %	5	5.2	103 %	3 %	70 - 130 %	25%
75-27-4	Bromodichloromethane	5	5	99 %	5	5.2	104 %	4 %	70 - 130 %	25%
123-91-1	1,4-Dioxane	100	230	230 % q	100	230	231 % q	0 %	70 - 130 %	25%
10061-01-5	*cis*-1,3-Dichloropropene	5	4.8	96 %	5	4.9	99 %	2 %	70 - 130 %	25%
108-10-1	4-Methyl-2-Pentanone (MIBK)	10	9.3	93 %	10	9.6	96 %	3 %	70 - 130 %	25%
108-88-3	Toluene	5	4.7	95 %	5	5	99 %	5 %	70 - 130 %	25%
10061-02-6	*trans*-1,3-Dichloropropene	5	4.7	94 %	5	4.7	94 %	0 %	70 - 130 %	25%
79-00-5	1,1,2-Trichloroethane	5	5.2	103 %	5	5.2	104 %	1 %	70 - 130 %	25%
127-18-4	Tetrachloroethene	5	5.1	102 %	5	5.3	105 %	3 %	70 - 130 %	25%
142-28-9	1,3-Dichloropropane	5	5.1	102 %	5	5.2	103 %	2 %	70 - 130 %	25%
591-78-6	2-Hexanone	10	9.6	96 %	10	10	101 %	5 %	70 - 130 %	25%
124-48-1	Dibromochloromethane	5	4.8	96 %	5	4.9	97 %	1 %	70 - 130 %	25%
106-93-4	1,2-Dibromoethane (EDB)	5	5	100 %	5	5	101 %	1 %	70 - 130 %	25%
108-90-7	Chlorobenzene	5	4.9	98 %	5	5	101 %	2 %	70 - 130 %	25%
630-20-6	1,1,1,2-Tetrachloroethane	5	5	99 %	5	5.1	101 %	2 %	70 - 130 %	25%
100-41-4	Ethylbenzene	5	5.1	102 %	5	5.2	104 %	3 %	70 - 130 %	25%
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	10	10	103 %	10	11	105 %	2 %	70 - 130 %	25%
95-47-6	*ortho*-Xylene	5	5.1	103 %	5	5.2	105 %	2 %	70 - 130 %	25%
100-42-5	Styrene	5	5	100 %	5	5.2	103 %	3 %	70 - 130 %	25%
75-25-2	Bromoform	5	4.7	95 %	5	4.9	97 %	2 %	70 - 130 %	25%
98-82-8	Isopropylbenzene	5	4.7	95 %	5	4.9	98 %	3 %	70 - 130 %	25%

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2920-WL	Analyzed:	08-02-04 07:50	Analyzed:	08-02-04 08:46
Matrix:	Aqueous	Analyst:	MJB	Analyst:	MJB
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
108-86-1	Bromobenzene	5	4.8	96 %	5	5	99 %	3 %	70 - 130 %	25%
79-34-5	1,1,2,2-Tetrachloroethane	5	5.7	114 %	5	5.6	111 %	2 %	70 - 130 %	25%
96-18-4	1,2,3-Trichloropropane	5	5	100 %	5	5.3	105 %	5 %	70 - 130 %	25%
103-65-1	*n*-Propylbenzene	5	5.1	101 %	5	5.2	104 %	3 %	70 - 130 %	25%
95-49-8	2-Chlorotoluene	5	4.9	99 %	5	5.1	101 %	3 %	70 - 130 %	25%
108-67-8	1,3,5-Trimethylbenzene	5	4.7	95 %	5	4.9	98 %	3 %	70 - 130 %	25%
106-43-4	4-Chlorotoluene	5	4.9	98 %	5	5	101 %	3 %	70 - 130 %	25%
98-06-6	*tert*-Butylbenzene	5	5	100 %	5	5.2	104 %	4 %	70 - 130 %	25%
95-63-6	1,2,4-Trimethylbenzene	5	5.1	101 %	5	5.2	105 %	4 %	70 - 130 %	25%
135-98-8	*sec*-Butylbenzene	5	5.3	105 %	5	5.4	108 %	3 %	70 - 130 %	25%
541-73-1	1,3-Dichlorobenzene	5	5.2	104 %	5	5.3	106 %	2 %	70 - 130 %	25%
99-87-6	4-Isopropyltoluene	5	5.2	104 %	5	5.5	110 %	5 %	70 - 130 %	25%
106-46-7	1,4-Dichlorobenzene	5	5.3	105 %	5	5.3	107 %	2 %	70 - 130 %	25%
95-50-1	1,2-Dichlorobenzene	5	5.1	103 %	5	5.3	105 %	2 %	70 - 130 %	25%
104-51-8	*n*-Butylbenzene	5	5.6	112 %	5	5.8	117 %	4 %	70 - 130 %	25%
96-12-8	1,2-Dibromo-3-chloropropane	5	5.8	115 %	5	5.8	116 %	1 %	70 - 130 %	25%
120-82-1	1,2,4-Trichlorobenzene	5	5.8	116 %	5	5.9	118 %	2 %	70 - 130 %	25%
87-68-3	Hexachlorobutadiene	5	6	119 %	5	6.3	126 %	5 %	70 - 130 %	25%
91-20-3	Naphthalene	5	5.6	113 %	5	5.7	114 %	1 %	70 - 130 %	25%
87-61-6	1,2,3-Trichlorobenzene	5	6.1	121 %	5	6.2	123 %	2 %	70 - 130 %	25%
75-65-0	*tert*-Butyl Alcohol (TBA)	100	110	114 %	100	120	120 %	5 %	70 - 130 %	25%
108-20-3	Di-isopropyl Ether (DIPE)	5	5.3	105 %	5	5.4	108 %	3 %	70 - 130 %	25%
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	5	5	99 %	5	5.1	102 %	3 %	70 - 130 %	25%
994-05-8	*tert*-Amyl Methyl Ether (TAME)	5	5.1	101 %	5	5.3	105 %	4 %	70 - 130 %	25%

QC Surrogate Compound	Spiked	Measured	Recovery	Spiked	Measured	Recovery		QC Limits
Dibromofluoromethane	10	10	102 %	10	10	104 %		70 - 130 %
1,2-Dichlorobenzene-d_4	10	10	101 %	10	10	103 %		70 - 130 %
Toluene-d_8	10	9.9	99 %	10	10	100 %		70 - 130 %
4-Bromofluorobenzene	10	10	101 %	10	9.9	99 %		70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Surrogate recovery outside recommended limits.

Groundwater Analytical, Inc., P.O. Box 1200, 228 Main Street, Buzzards Bay, MA 02532

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8260B**
QC Batch ID: **VM5-2920-WB**
Matrix: **Aqueous**

Instrument ID: **MS-5 HP 6890**
Analyzed: **08-02-04 09:38**
Analyst: **MJB**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	**EPA Method 8260B**	Instrument ID:	**MS-5 HP 6890**
QC Batch ID:	**VM5-2920-WB**	Analyzed:	**08-02-04 09:38**
Matrix:	**Aqueous**	Analyst:	**MJB**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	11	**105 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	10	**102 %**	70 - 130 %
Toluene-d_8	10	9.9	**99 %**	70 - 130 %
4-Bromofluorobenzene	10	11	**105 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2922-WL	Analyzed:	08-03-04 18:26	Analyzed:	08-03-04 19:20
Matrix:	Aqueous	Analyst:	MJB	Analyst:	MJB
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
75-71-8	Dichlorodifluoromethane	5	6.1	122 %	5	6.1	122 %	0 %	70 - 130 %	25%
74-87-3	Chloromethane	5	5.9	117 %	5	6	120 %	3 %	70 - 130 %	25%
75-01-4	Vinyl Chloride	5	5.7	115 %	5	5.7	114 %	1 %	70 - 130 %	25%
74-83-9	Bromomethane	5	6.1	122 %	5	5.9	118 %	3 %	70 - 130 %	25%
75-00-3	Chloroethane	5	6.2	123 %	5	6	120 %	2 %	70 - 130 %	25%
75-69-4	Trichlorofluoromethane	5	6.3	125 %	5	6.4	127 %	2 %	70 - 130 %	25%
60-29-7	Diethyl Ether	10	8.6	86 %	10	8.4	84 %	2 %	70 - 130 %	25%
75-35-4	1,1-Dichloroethene	5	5.6	112 %	5	5.6	111 %	1 %	70 - 130 %	25%
76-13-1	1,1,2-Trichlorotrifluoroethane	10	12	119 %	10	12	117 %	1 %	70 - 130 %	25%
67-64-1	Acetone	10	11	110 %	10	11	110 %	0 %	70 - 130 %	25%
75-15-0	Carbon Disulfide	10	9.4	94 %	10	9.4	94 %	1 %	70 - 130 %	25%
75-09-2	Methylene Chloride	5	5	99 %	5	4.7	94 %	5 %	70 - 130 %	25%
156-60-5	*trans*-1,2-Dichloroethene	5	5	99 %	5	5	100 %	1 %	70 - 130 %	25%
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	5	5.1	101 %	5	4.9	98 %	3 %	70 - 130 %	25%
75-34-3	1,1-Dichloroethane	5	5.1	101 %	5	5.1	102 %	1 %	70 - 130 %	25%
594-20-7	2,2-Dichloropropane	5	5.9	117 %	5	5.7	114 %	3 %	70 - 130 %	25%
156-59-2	*cis*-1,2-Dichloroethene	5	5.1	102 %	5	5.1	103 %	0 %	70 - 130 %	25%
78-93-3	2-Butanone (MEK)	10	8.4	84 %	10	8.5	85 %	1 %	70 - 130 %	25%
74-97-5	Bromochloromethane	5	4.9	97 %	5	4.9	97 %	0 %	70 - 130 %	25%
109-99-9	Tetrahydrofuran (THF)	10	8.7	87 %	10	8.4	84 %	3 %	70 - 130 %	25%
67-66-3	Chloroform	5	5.1	101 %	5	5	101 %	0 %	70 - 130 %	25%
71-55-6	1,1,1-Trichloroethane	5	5.4	108 %	5	5.4	107 %	1 %	70 - 130 %	25%
56-23-5	Carbon Tetrachloride	5	5.4	107 %	5	5.4	108 %	0 %	70 - 130 %	25%
563-58-6	1,1-Dichloropropene	5	5.1	102 %	5	5.2	104 %	2 %	70 - 130 %	25%
71-43-2	Benzene	5	4.7	95 %	5	4.8	96 %	2 %	70 - 130 %	25%
107-06-2	1,2-Dichloroethane	5	5	100 %	5	4.9	98 %	3 %	70 - 130 %	25%
79-01-6	Trichloroethene	5	5.1	101 %	5	5.2	103 %	2 %	70 - 130 %	25%
78-87-5	1,2-Dichloropropane	5	4.9	97 %	5	4.8	96 %	1 %	70 - 130 %	25%
74-95-3	Dibromomethane	5	4.9	97 %	5	4.8	96 %	1 %	70 - 130 %	25%
75-27-4	Bromodichloromethane	5	4.9	97 %	5	4.9	98 %	1 %	70 - 130 %	25%
123-91-1	1,4-Dioxane	100	220	224 % q	100	220	224 % q	0 %	70 - 130 %	25%
10061-01-5	*cis*-1,3-Dichloropropene	5	4.8	95 %	5	4.7	94 %	1 %	70 - 130 %	25%
108-10-1	4-Methyl-2-Pentanone (MIBK)	10	8.8	88 %	10	8.6	86 %	3 %	70 - 130 %	25%
108-88-3	Toluene	5	4.8	95 %	5	4.8	96 %	0 %	70 - 130 %	25%
10061-02-6	*trans*-1,3-Dichloropropene	5	4.7	94 %	5	4.6	92 %	2 %	70 - 130 %	25%
79-00-5	1,1,2-Trichloroethane	5	5.3	106 %	5	5	101 %	5 %	70 - 130 %	25%
127-18-4	Tetrachloroethene	5	5.5	110 %	5	5.5	110 %	0 %	70 - 130 %	25%
142-28-9	1,3-Dichloropropane	5	5.1	103 %	5	5.1	103 %	0 %	70 - 130 %	25%
591-78-6	2-Hexanone	10	9.5	95 %	10	9.5	95 %	1 %	70 - 130 %	25%
124-48-1	Dibromochloromethane	5	4.9	99 %	5	4.8	96 %	3 %	70 - 130 %	25%
106-93-4	1,2-Dibromoethane (EDB)	5	5.3	105 %	5	5	99 %	6 %	70 - 130 %	25%
108-90-7	Chlorobenzene	5	5.2	103 %	5	5.1	102 %	2 %	70 - 130 %	25%
630-20-6	1,1,1,2-Tetrachloroethane	5	5.2	104 %	5	5.1	102 %	2 %	70 - 130 %	25%
100-41-4	Ethylbenzene	5	5.4	109 %	5	5.3	107 %	2 %	70 - 130 %	25%
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	10	11	112 %	10	11	109 %	3 %	70 - 130 %	25%
95-47-6	*ortho*-Xylene	5	5.5	111 %	5	5.3	106 %	4 %	70 - 130 %	25%
100-42-5	Styrene	5	5.3	105 %	5	5.2	103 %	2 %	70 - 130 %	25%
75-25-2	Bromoform	5	4.8	97 %	5	4.7	94 %	3 %	70 - 130 %	25%
98-82-8	Isopropylbenzene	5	5	100 %	5	5.2	104 %	3 %	70 - 130 %	25%

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2922-WL	Analyzed:	08-03-04 18:26	Analyzed:	08-03-04 19:20
Matrix:	Aqueous	Analyst:	MJB	Analyst:	MJB
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
108-86-1	Bromobenzene	5	5.1	102 %	5	5.3	106 %	4 %	70 - 130 %	25%
79-34-5	1,1,2,2-Tetrachloroethane	5	5.5	109 %	5	5.3	107 %	2 %	70 - 130 %	25%
96-18-4	1,2,3-Trichloropropane	5	5.4	107 %	5	5.2	103 %	4 %	70 - 130 %	25%
103-65-1	*n*-Propylbenzene	5	5.3	106 %	5	5.5	111 %	4 %	70 - 130 %	25%
95-49-8	2-Chlorotoluene	5	5.1	103 %	5	5.3	107 %	4 %	70 - 130 %	25%
108-67-8	1,3,5-Trimethylbenzene	5	5	100 %	5	5.2	104 %	3 %	70 - 130 %	25%
106-43-4	4-Chlorotoluene	5	5	101 %	5	5.3	106 %	5 %	70 - 130 %	25%
98-06-6	*tert*-Butylbenzene	5	5.2	105 %	5	5.4	107 %	3 %	70 - 130 %	25%
95-63-6	1,2,4-Trimethylbenzene	5	5.3	107 %	5	5.5	110 %	3 %	70 - 130 %	25%
135-98-8	*sec*-Butylbenzene	5	5.4	108 %	5	5.7	114 %	5 %	70 - 130 %	25%
541-73-1	1,3-Dichlorobenzene	5	5.4	108 %	5	5.5	110 %	2 %	70 - 130 %	25%
99-87-6	4-Isopropyltoluene	5	5.5	109 %	5	5.7	114 %	4 %	70 - 130 %	25%
106-46-7	1,4-Dichlorobenzene	5	5.4	107 %	5	5.5	110 %	3 %	70 - 130 %	25%
95-50-1	1,2-Dichlorobenzene	5	5.2	104 %	5	5.4	109 %	4 %	70 - 130 %	25%
104-51-8	*n*-Butylbenzene	5	5.8	115 %	5	5.9	119 %	3 %	70 - 130 %	25%
96-12-8	1,2-Dibromo-3-chloropropane	5	5.6	113 %	5	6	120 %	6 %	70 - 130 %	25%
120-82-1	1,2,4-Trichlorobenzene	5	5.8	115 %	5	5.9	118 %	3 %	70 - 130 %	25%
87-68-3	Hexachlorobutadiene	5	6.3	125 %	5	6.4	128 %	2 %	70 - 130 %	25%
91-20-3	Naphthalene	5	5.7	113 %	5	5.6	113 %	1 %	70 - 130 %	25%
87-61-6	1,2,3-Trichlorobenzene	5	6.2	124 %	5	6.3	126 %	2 %	70 - 130 %	25%
75-65-0	*tert*-Butyl Alcohol (TBA)	100	110	112 %	100	110	106 %	5 %	70 - 130 %	25%
108-20-3	Di-isopropyl Ether (DIPE)	5	5.2	103 %	5	5.1	102 %	2 %	70 - 130 %	25%
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	5	4.9	99 %	5	4.8	96 %	3 %	70 - 130 %	25%
994-05-8	*tert*-Amyl Methyl Ether (TAME)	5	5	100 %	5	4.9	98 %	2 %	70 - 130 %	25%

QC Surrogate Compound	Spiked	Measured	Recovery	Spiked	Measured	Recovery		QC Limits
Dibromofluoromethane	10	10	100 %	10	9.7	97 %		70 - 130 %
1,2-Dichlorobenzene-d_4	10	10	101 %	10	9.7	97 %		70 - 130 %
Toluene-d_8	10	9.8	98 %	10	9.6	96 %		70 - 130 %
4-Bromofluorobenzene	10	10	101 %	10	10	103 %		70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Surrogate recovery outside recommended limits.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2922-WB	Analyzed:	08-03-04 20:12
Matrix:	Aqueous	Analyst:	MJB

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-5 HP 6890
QC Batch ID:	VM5-2922-WB	Analyzed:	08-03-04 20:12
Matrix:	Aqueous	Analyst:	MJB

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	tert-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	10	101 %	70 - 130 %
1,2-Dichloroethane-d_4	10	10	100 %	70 - 130 %
Toluene-d_8	10	9.7	97 %	70 - 130 %
4-Bromofluorobenzene	10	11	107 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

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FAX (508) 759-4475
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November 8, 2004

Mr. Joe O'Brien
Lightship Engineering
36 Cordage Park Circle
Plymouth, MA 02360

LABORATORY REPORT

Project: **RM Jones/542.1.1**
Lab ID: **78016**
Received: **10-29-04**

Dear Joe:

Enclosed are the analytical results for the above referenced project. The project was processed for Priority turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

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,

Eric H. Jensen
Operations Manager

EHJ/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	RM Jones/542.1.1	Delivery:	GWA Courier	Temperature:	2.6'C
Client:	Lightship Engineering	Airbill:	n/a	Chain of Custody:	Present
Lab ID:	78016	Lab Receipt:	10-29-04	Custody Seal(s):	n/a

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-1	URS-3		Aqueous	10/28/04 9:00	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C491449	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491454	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491453	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-2	URS-2		Aqueous	10/28/04 10:45	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C409998	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C409997	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C409991	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-3	GZA-4		Aqueous	10/28/04 9:45	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C491450	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491458	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491448	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-4	WE-3		Aqueous	10/28/04 11:30	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C409995	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C491459	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491451	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-5	URS-1		Aqueous	10/28/04 12:30	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C409992	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C407886	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C409994	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-6	MW-4		Aqueous	10/28/04 13:00	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C407885	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C409993	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C491456	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-7	MW-5		Aqueous	10/28/04 13:15	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C407887	40 mL VOA Vial	Proline	BX13694	HCl	R-4031C	07-15-04	n/a		
C491436	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		
C491457	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
78016-8	Trip Blank		Aqueous	10/28/04 13:15	EPA 8260B Volatile Organics with Oxygenates				
Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C491438	40 mL VOA Vial	Proline	BX13737	HCl	R-4031C	07-14-04	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project:	RM Jones/542.1.1	Lab ID:	78016
Client:	Lightship Engineering	Received:	10-29-04 18:25

MA DEP Compendium of Analytical Methods

Project Location:	n/a	MA DEP RTN:	n/a

This Form provides certifications for the following data set:

EPA 8260B: 78016-01,-02,-03,-04,-05,-06,-07,-08

Sample Matrices:	Groundwater (X)	Soil/Sediment ( )	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used As specified in MA DEP Compendium of Analytical Methods. Check all that apply	8260B (X)	8151A ( )	8330 ( )	6010B ( )	7470A/1A ( )
	8270C ( )	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1. Dil Release Tracking Number [illegible], if known.
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method.
3. S - SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	No
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes

All No answers are addressed in the attached Project Narrative.

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

Signature:		Position:	Operations Manager
Printed Name:	Eric H. Jensen	Date:	11-08-04

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-01	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 09:00	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 14:21	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	6		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	2		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	14		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	2		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	1		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	URS-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-01	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 09:00	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 14:21	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	119 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	120 %	70 - 130 %
Toluene-d_8	10	12	123 %	70 - 130 %
4-Bromofluorobenzene	10	12	123 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-02	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 10:45	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 15:41	Dilution Factor:	100
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	50
74-87-3	Chloromethane	BRL		ug/L	50
75-01-4	Vinyl Chloride	BRL		ug/L	50
74-83-9	Bromomethane	BRL		ug/L	50
75-00-3	Chloroethane	BRL		ug/L	50
75-69-4	Trichlorofluoromethane	BRL		ug/L	50
60-29-7	Diethyl Ether	BRL		ug/L	200
75-35-4	1,1-Dichloroethene	BRL		ug/L	50
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	500
67-64-1	Acetone	BRL		ug/L	1000
75-15-0	Carbon Disulfide	BRL		ug/L	500
75-09-2	Methylene Chloride	BRL		ug/L	250
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	50
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	50
75-34-3	1,1-Dichloroethane	160		ug/L	50
594-20-7	2,2-Dichloropropane	BRL		ug/L	50
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	50
78-93-3	2-Butanone (MEK)	BRL		ug/L	500
74-97-5	Bromochloromethane	BRL		ug/L	50
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	500
67-66-3	Chloroform	BRL		ug/L	50
71-55-6	1,1,1-Trichloroethane	4,100		ug/L	50
56-23-5	Carbon Tetrachloride	BRL		ug/L	50
563-58-6	1,1-Dichloropropene	BRL		ug/L	50
71-43-2	Benzene	BRL		ug/L	50
107-06-2	1,2-Dichloroethane	BRL		ug/L	50
79-01-6	Trichloroethene	1,500		ug/L	50
78-87-5	1,2-Dichloropropane	BRL		ug/L	50
74-95-3	Dibromomethane	BRL		ug/L	50
75-27-4	Bromodichloromethane	BRL		ug/L	50
123-91-1	1,4-Dioxane	BRL		ug/L	50000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	50
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	500
108-88-3	Toluene	1,200		ug/L	50
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	50
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	50
127-18-4	Tetrachloroethene	750		ug/L	50
142-28-9	1,3-Dichloropropane	BRL		ug/L	50
591-78-6	2-Hexanone	BRL		ug/L	500
124-48-1	Dibromochloromethane	BRL		ug/L	50
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	50
108-90-7	Chlorobenzene	BRL		ug/L	50
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	50
100-41-4	Ethylbenzene	140		ug/L	50
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	550		ug/L	50
95-47-6	*ortho*-Xylene	190		ug/L	50

GROUNDWATER ANALYTICAL

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

Field ID:	URS-2	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-02	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 10:45	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 15:41	Dilution Factor:	100
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	50
75-25-2	Bromoform	BRL		ug/L	50
98-82-8	Isopropylbenzene	BRL		ug/L	50
108-86-1	Bromobenzene	BRL		ug/L	50
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	50
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	50
103-65-1	*n*-Propylbenzene	BRL		ug/L	50
95-49-8	2-Chlorotoluene	BRL		ug/L	50
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	50
106-43-4	4-Chlorotoluene	BRL		ug/L	50
98-06-6	*tert*-Butylbenzene	BRL		ug/L	50
95-63-6	1,2,4-Trimethylbenzene	80		ug/L	50
135-98-8	*sec*-Butylbenzene	BRL		ug/L	50
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	50
99-87-6	4-Isopropyltoluene	BRL		ug/L	50
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	50
95-50-1	1,2-Dichlorobenzene	190		ug/L	50
104-51-8	*n*-Butylbenzene	BRL		ug/L	50
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	50
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	50
87-68-3	Hexachlorobutadiene	BRL		ug/L	50
91-20-3	Naphthalene	BRL		ug/L	50
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	50
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	2000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	50
637-92-3	Ethyl tert- butyl Ether (ETBE)	BRL		ug/L	50
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	50

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	119 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	118 %	70 - 130 %
Toluene-d_8	10	12	123 %	70 - 130 %
4-Bromofluorobenzene	10	12	122 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-03	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 09:45	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 16:21	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	2.5
74-87-3	Chloromethane	BRL		ug/L	2.5
75-01-4	Vinyl Chloride	36		ug/L	2.5
74-83-9	Bromomethane	BRL		ug/L	2.5
75-00-3	Chloroethane	210		ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	2.5
60-29-7	Diethyl Ether	BRL		ug/L	10
75-35-4	1,1-Dichloroethene	3		ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	25
67-64-1	Acetone	BRL		ug/L	50
75-15-0	Carbon Disulfide	BRL		ug/L	25
75-09-2	Methylene Chloride	BRL		ug/L	13
156-60-5	*trans*-1,2-Dichloroethene	3		ug/L	2.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	2.5
75-34-3	1,1-Dichloroethane	180		ug/L	2.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	2.5
156-59-2	*cis*-1,2-Dichloroethene	54		ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	25
74-97-5	Bromochloromethane	BRL		ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	25
67-66-3	Chloroform	BRL		ug/L	2.5
71-55-6	1,1,1-Trichloroethane	81		ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	2.5
71-43-2	Benzene	BRL		ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	2.5
79-01-6	Trichloroethene	40		ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	2.5
74-95-3	Dibromomethane	BRL		ug/L	2.5
75-27-4	Bromodichloromethane	BRL		ug/L	2.5
123-91-1	1,4-Dioxane	BRL		ug/L	2500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	25
108-88-3	Toluene	17		ug/L	2.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	2.5
127-18-4	Tetrachloroethene	6		ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	2.5
591-78-6	2-Hexanone	BRL		ug/L	25
124-48-1	Dibromochloromethane	BRL		ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	2.5
108-90-7	Chlorobenzene	BRL		ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	2.5
100-41-4	Ethylbenzene	7		ug/L	2.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	2.5
95-47-6	*ortho*-Xylene	6		ug/L	2.5

GROUNDWATER ANALYTICAL

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

Field ID:	GZA-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-03	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 09:45	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 16:21	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	2.5
75-25-2	Bromoform	BRL		ug/L	2.5
98-82-8	Isopropylbenzene	BRL		ug/L	2.5
108-86-1	Bromobenzene	BRL		ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	2.5
95-49-8	2-Chlorotoluene	BRL		ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	2.5
106-43-4	4-Chlorotoluene	BRL		ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	2.5
95-50-1	1,2-Dichlorobenzene	19		ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	3		ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	2.5
91-20-3	Naphthalene	25		ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	2.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	100
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	2.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	2.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	2.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	121 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	116 %	70 - 130 %
Toluene-d_8	10	12	122 %	70 - 130 %
4-Bromofluorobenzene	10	12	122 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-04	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 11:30	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 17:01	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	2.5
74-87-3	Chloromethane	BRL		ug/L	2.5
75-01-4	Vinyl Chloride	BRL		ug/L	2.5
74-83-9	Bromomethane	BRL		ug/L	2.5
75-00-3	Chloroethane	BRL		ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	2.5
60-29-7	Diethyl Ether	BRL		ug/L	10
75-35-4	1,1-Dichloroethene	BRL		ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	25
67-64-1	Acetone	BRL		ug/L	50
75-15-0	Carbon Disulfide	BRL		ug/L	25
75-09-2	Methylene Chloride	BRL		ug/L	13
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	2.5
1634-04-4	Methyl tert-butyl Ether (MTBE)	BRL		ug/L	2.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	2.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	2.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	25
74-97-5	Bromochloromethane	BRL		ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	25
67-66-3	Chloroform	BRL		ug/L	2.5
71-55-6	1,1,1-Trichloroethane	130		ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	2.5
71-43-2	Benzene	BRL		ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	2.5
79-01-6	Trichloroethene	74		ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	2.5
74-95-3	Dibromomethane	BRL		ug/L	2.5
75-27-4	Bromodichloromethane	BRL		ug/L	2.5
123-91-1	1,4-Dioxane	BRL		ug/L	2500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	25
108-88-3	Toluene	BRL		ug/L	2.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	2.5
127-18-4	Tetrachloroethene	41		ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	2.5
591-78-6	2-Hexanone	BRL		ug/L	25
124-48-1	Dibromochloromethane	BRL		ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	2.5
108-90-7	Chlorobenzene	BRL		ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	2.5
100-41-4	Ethylbenzene	BRL		ug/L	2.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	2.5
95-47-6	*ortho*-Xylene	BRL		ug/L	2.5

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GROUNDWATER ANALYTICAL

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

Field ID:	WE-3	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-04	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 11:30	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 17:01	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	2.5
75-25-2	Bromoform	BRL		ug/L	2.5
98-82-8	Isopropylbenzene	BRL		ug/L	2.5
108-86-1	Bromobenzene	BRL		ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	2.5
95-49-8	2-Chlorotoluene	BRL		ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	2.5
106-43-4	4-Chlorotoluene	BRL		ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	2.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	2.5
91-20-3	Naphthalene	BRL		ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	2.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	100
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	2.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	2.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	2.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	121 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	121 %	70 - 130 %
Toluene-d_8	10	12	123 %	70 - 130 %
4-Bromofluorobenzene	10	12	120 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-05	QC Batch ID:	VM4-3041-W
Sampled:	10-28-04 12:30	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-06-04 13:35	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	2.5
74-87-3	Chloromethane	BRL		ug/L	2.5
75-01-4	Vinyl Chloride	BRL		ug/L	2.5
74-83-9	Bromomethane	BRL		ug/L	2.5
75-00-3	Chloroethane	BRL		ug/L	2.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	2.5
60-29-7	Diethyl Ether	BRL		ug/L	10
75-35-4	1,1-Dichloroethene	48		ug/L	2.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	25
67-64-1	Acetone	BRL		ug/L	50
75-15-0	Carbon Disulfide	BRL		ug/L	25
75-09-2	Methylene Chloride	BRL		ug/L	13
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	2.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	13		ug/L	2.5
75-34-3	1,1-Dichloroethane	120		ug/L	2.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	2.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	2.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	25
74-97-5	Bromochloromethane	BRL		ug/L	2.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	25
67-66-3	Chloroform	BRL		ug/L	2.5
71-55-6	1,1,1-Trichloroethane	82		ug/L	2.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	2.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	2.5
71-43-2	Benzene	BRL		ug/L	2.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	2.5
79-01-6	Trichloroethene	BRL		ug/L	2.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	2.5
74-95-3	Dibromomethane	BRL		ug/L	2.5
75-27-4	Bromodichloromethane	BRL		ug/L	2.5
123-91-1	1,4-Dioxane	BRL		ug/L	2500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	2.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	25
108-88-3	Toluene	BRL		ug/L	2.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	2.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	2.5
127-18-4	Tetrachloroethene	BRL		ug/L	2.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	2.5
591-78-6	2-Hexanone	BRL		ug/L	25
124-48-1	Dibromochloromethane	BRL		ug/L	2.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	2.5
108-90-7	Chlorobenzene	BRL		ug/L	2.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	2.5
100-41-4	Ethylbenzene	BRL		ug/L	2.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	2.5
95-47-6	*ortho*-Xylene	BRL		ug/L	2.5

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GROUNDWATER ANALYTICAL

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

Field ID:	URS-1	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-05	QC Batch ID:	VM4-3041-W
Sampled:	10-28-04 12:30	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-06-04 13:35	Dilution Factor:	5
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	2.5
75-25-2	Bromoform	BRL		ug/L	2.5
98-82-8	Isopropylbenzene	BRL		ug/L	2.5
108-86-1	Bromobenzene	BRL		ug/L	2.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	2.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	2.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	2.5
95-49-8	2-Chlorotoluene	BRL		ug/L	2.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	2.5
106-43-4	4-Chlorotoluene	BRL		ug/L	2.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	2.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	2.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	2.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	2.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	2.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	2.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	2.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	2.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	2.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	2.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	2.5
91-20-3	Naphthalene	BRL		ug/L	2.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	2.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	100
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	2.5
637-92-3	Ethyl tert-butyl Ether (ETBE)	BRL		ug/L	2.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	2.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	121 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	124 %	70 - 130 %
Toluene-d_8	10	12	123 %	70 - 130 %
4-Bromofluorobenzene	10	12	118 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-06	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:00	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 18:21	Dilution Factor:	100
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	50
74-87-3	Chloromethane	BRL		ug/L	50
75-01-4	Vinyl Chloride	BRL		ug/L	50
74-83-9	Bromomethane	BRL		ug/L	50
75-00-3	Chloroethane	BRL		ug/L	50
75-69-4	Trichlorofluoromethane	BRL		ug/L	50
60-29-7	Diethyl Ether	BRL		ug/L	200
75-35-4	1,1-Dichloroethene	BRL		ug/L	50
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	500
67-64-1	Acetone	BRL		ug/L	1000
75-15-0	Carbon Disulfide	BRL		ug/L	500
75-09-2	Methylene Chloride	BRL		ug/L	250
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	50
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	50
75-34-3	1,1-Dichloroethane	160		ug/L	50
594-20-7	2,2-Dichloropropane	BRL		ug/L	50
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	50
78-93-3	2-Butanone (MEK)	BRL		ug/L	500
74-97-5	Bromochloromethane	BRL		ug/L	50
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	500
67-66-3	Chloroform	BRL		ug/L	50
71-55-6	1,1,1-Trichloroethane	4,400		ug/L	50
56-23-5	Carbon Tetrachloride	BRL		ug/L	50
563-58-6	1,1-Dichloropropene	BRL		ug/L	50
71-43-2	Benzene	BRL		ug/L	50
107-06-2	1,2-Dichloroethane	BRL		ug/L	50
79-01-6	Trichloroethene	1,600		ug/L	50
78-87-5	1,2-Dichloropropane	BRL		ug/L	50
74-95-3	Dibromomethane	BRL		ug/L	50
75-27-4	Bromodichloromethane	BRL		ug/L	50
123-91-1	1,4-Dioxane	BRL		ug/L	50000
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	50
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	500
108-88-3	Toluene	1,200		ug/L	50
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	50
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	50
127-18-4	Tetrachloroethene	750		ug/L	50
142-28-9	1,3-Dichloropropane	BRL		ug/L	50
591-78-6	2-Hexanone	BRL		ug/L	500
124-48-1	Dibromochloromethane	BRL		ug/L	50
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	50
108-90-7	Chlorobenzene	BRL		ug/L	50
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	50
100-41-4	Ethylbenzene	140		ug/L	50
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	550		ug/L	50
95-47-6	*ortho*-Xylene	180		ug/L	50

GROUNDWATER ANALYTICAL

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

Field ID:	MW-4	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-06	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:00	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 18:21	Dilution Factor:	100
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	50
75-25-2	Bromoform	BRL		ug/L	50
98-82-8	Isopropylbenzene	BRL		ug/L	50
108-86-1	Bromobenzene	BRL		ug/L	50
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	50
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	50
103-65-1	*n*-Propylbenzene	BRL		ug/L	50
95-49-8	2-Chlorotoluene	BRL		ug/L	50
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	50
106-43-4	4-Chlorotoluene	BRL		ug/L	50
98-06-6	*tert*-Butylbenzene	BRL		ug/L	50
95-63-6	1,2,4-Trimethylbenzene	74		ug/L	50
135-98-8	*sec*-Butylbenzene	BRL		ug/L	50
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	50
99-87-6	4-Isopropyltoluene	BRL		ug/L	50
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	50
95-50-1	1,2-Dichlorobenzene	190		ug/L	50
104-51-8	*n*-Butylbenzene	BRL		ug/L	50
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	50
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	50
87-68-3	Hexachlorobutadiene	BRL		ug/L	50
91-20-3	Naphthalene	BRL		ug/L	50
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	50
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	2000
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	50
637-92-3	Ethyl tert-butyl Ether (ETBE)	BRL		ug/L	50
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	50

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	121 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	119 %	70 - 130 %
Toluene-d_8	10	12	125 %	70 - 130 %
4-Bromofluorobenzene	10	12	121 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-07	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:15	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 19:01	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	28		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	3		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	0.5
95-47-6	*ortho*-Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	MW-5	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-07	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:15	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 19:01	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Units	Reporting Limit
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
98-82-8	Isopropylbenzene	BRL	ug/L	0.5
108-86-1	Bromobenzene	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL	ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL	ug/L	0.5
95-49-8	2-Chlorotoluene	BRL	ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL	ug/L	0.5
106-43-4	4-Chlorotoluene	BRL	ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL	ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL	ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL	ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL	ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL	ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL	ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL	ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL	ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL	ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL	ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL	ug/L	0.5
91-20-3	Naphthalene	BRL	ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL	ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL	ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL	ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL	ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL	ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	122 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	122 %	70 - 130 %
Toluene-d_8	10	12	122 %	70 - 130 %
4-Bromofluorobenzene	10	12	120 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8260B
Volatile Organics by GC/MS

Field ID:	Trip Blank	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-08	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:15	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 20:21	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	0.7		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

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

Field ID:	Trip Blank	Matrix:	Aqueous
Project:	RM Jones/542.1.1	Container:	40 mL VOA Vial
Client:	Lightship Engineering	Preservation:	HCl/Cool
Laboratory ID:	78016-08	QC Batch ID:	VM4-3040-W
Sampled:	10-28-04 13:15	Instrument ID:	MS-4 HP 6890
Received:	10-29-04 18:25	Sample Volume:	25 mL
Analyzed:	11-05-04 20:21	Dilution Factor:	1
Analyst:	KMC		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	120 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	125 %	70 - 130 %
Toluene-d_8	10	12	123 %	70 - 130 %
4-Bromofluorobenzene	10	12	118 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Project Narrative

Project:	RM Jones/542.1.1	Lab ID:	78016
Client:	Lightship Engineering	Received:	10-29-04 18:25

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 8260B Non-conformance: Sample 78016-05. Laboratory control sample (LCS) analytes Acetone, Tert-butyl alcohol and1,4-Dioxane were above recommended recovery limits for QC batch VM4-3041-W.
2. EPA 8260B Note: Sample 78016-05. Sample was diluted prior to analysis. Dilution was required to keep all target analytes within calibration.
3. EPA 8260B Note: Samples 78016-02, -03, -04, and -06. Sample were diluted prior to analysis. Dilution was required to keep all target analytes within calibration.

GROUNDWATER ANALYTICAL

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 088731

Project Name: AM Jones	Firm: Lightship Engineering
Project Number: 542.1	Address: 36 Cordage Park Circle Suite 310
Sampler Name: Nathan Stigh	City / State / Zip: Plymouth, MA 02360
Project Manager: Joe Olenzo	Telephone: 508 830 3344

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☐ STANDARD (10 Business Days)
- ☒ PRIORITY (5 Business Days)
- ☒ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☒ Please Email to: Joe@Lightship Engineering
- ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: 542.1.1
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
10/29/04	0920	WAS-3	3	✓	3 ✓	✓	✓	1
"	1045	WAS-2	1		1	1	1	2
"	0945	GSA-4	1		1	1	1	3
"	1100	WPA-3	1		1	1	1	4
"	1230	WAS-1	1		1	1	1	5
"	1300	MW-4	1		1	1	1	6
"	1515	MW-5	1		1	1	1	7
"	1515	Trip Blank	1		1	1	1	8

Matrix: DRINKING WATER, Effluent, WASTEWATER, SOIL, OTHER SOLID, SEDIMENT/SOIL, AQUEOUS LIQUID
Container(s): 40mL VOA Vial, 60mL or 8 oz Glass, 120mL or 4 oz Amber Glass, 250mL or 8 oz Glass, 500mL or 16 oz Glass, 1 L/32 oz Amber Glass, 250mL or 8 oz Plastic, 500mL or 16 oz Plastic, 1 L/32 oz Plastic, 120mL Sterile
Preservation: HCl, HNO3, H2SO4, NaOH, NaHSO4, Sodium Bisulfite, ICE, NaS2O3, EDA
Filtered: YES, NO

Analysis requested: Volatiles (TPH Search); Semivolatiles (Total Petroleum Hydrocarbons); Pesticides/PCBs; Metals (Specify for Water Samples); Additional Information (TPH, TRH); Misc. Wet Chemistry; General Chemistry

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☒ YES ☐ NO MCP Data Certification is required.

☐ YES ☒ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☒ NO MCP Drinking Water samples required.
Separate collection of contingent duplicate samples in water are also required, if VOA samples collected

Signature: [signature]

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. Each MS, MSD and Sample Duplicate requires an additional sample aliquot.

Project Specific QC Required	Selection of QC Sample
☐ Sample Duplicate	☐ Please use sample:
☐ Matrix Spike	_____
☐ Matrix Spike Duplicate	

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by Sampler:	Date	Time	Received by:	Receipt Temperature:
[signature]	10/29/04	10:35	Alan Maddigan	☐ Ice ☐ Refrigerated 2-4°C Recommended 2.
Relinquished by:	**Date**	**Time**	**Received by:**	**Container Count:**
Alan Maddigan	10/29/04	6:25	[signature]	22
Relinquished by:	**Date**	**Time**	**Received by Laboratory:**	**Shipping/Airbill Number:**

Method of Shipment: ☒ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

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 Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3041-WL	Analyzed:	11-06-04 11:02	Analyzed:	11-06-04 11:42
Matrix:	Aqueous	Analyst:	KMC	Analyst:	KMC
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
75-71-8	Dichlorodifluoromethane	10	13	126 %	10	10	104 %	20 %	70 - 130 %	25%
74-87-3	Chloromethane	10	12	119 %	10	10	105 %	13 %	70 - 130 %	25%
75-01-4	Vinyl Chloride	10	11	108 %	10	9.7	97 %	10 %	70 - 130 %	25%
74-83-9	Bromomethane	10	11	105 %	10	10	105 %	0 %	70 - 130 %	25%
75-00-3	Chloroethane	10	11	111 %	10	11	107 %	4 %	70 - 130 %	25%
75-69-4	Trichlorofluoromethane	10	11	113 %	10	9	90 %	22 %	70 - 130 %	25%
60-29-7	Diethyl Ether	20	25	124 %	20	22	108 %	14 %	70 - 130 %	25%
75-35-4	1,1-Dichloroethene	10	11	114 %	10	9.3	93 %	20 %	70 - 130 %	25%
76-13-1	1,1,2-Trichlorotrifluoroethane	20	25	123 %	20	19	97 %	24 %	70 - 130 %	25%
67-64-1	Acetone	20	29	143 % q	20	20	102 %	34 % q	70 - 130 %	25%
75-15-0	Carbon Disulfide	20	20	100 %	20	16	79 %	23 %	70 - 130 %	25%
75-09-2	Methylene Chloride	10	11	108 %	10	8.9	89 %	19 %	70 - 130 %	25%
156-60-5	*trans*-1,2-Dichloroethene	10	11	105 %	10	9.7	97 %	8 %	70 - 130 %	25%
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	10	13	129 %	10	12	121 %	6 %	70 - 130 %	25%
75-34-3	1,1-Dichloroethane	10	10	105 %	10	9.9	99 %	5 %	70 - 130 %	25%
594-20-7	2,2-Dichloropropane	10	12	116 %	10	10	105 %	10 %	70 - 130 %	25%
156-59-2	*cis*-1,2-Dichloroethene	10	11	108 %	10	10	103 %	5 %	70 - 130 %	25%
78-93-3	2-Butanone (MEK)	20	25	125 %	20	22	110 %	13 %	70 - 130 %	25%
74-97-5	Bromochloromethane	10	11	112 %	10	11	108 %	3 %	70 - 130 %	25%
109-99-9	Tetrahydrofuran (THF)	20	24	122 %	20	23	115 %	6 %	70 - 130 %	25%
67-66-3	Chloroform	10	10	102 %	10	9.7	97 %	6 %	70 - 130 %	25%
71-55-6	1,1,1-Trichloroethane	10	11	106 %	10	9.7	97 %	9 %	70 - 130 %	25%
56-23-5	Carbon Tetrachloride	10	10	104 %	10	9.6	96 %	8 %	70 - 130 %	25%
563-58-6	1,1-Dichloropropene	10	11	114 %	10	10	104 %	9 %	70 - 130 %	25%
71-43-2	Benzene	10	11	107 %	10	10	100 %	7 %	70 - 130 %	25%
107-06-2	1,2-Dichloroethane	10	11	111 %	10	11	108 %	3 %	70 - 130 %	25%
79-01-6	Trichloroethene	10	11	107 %	10	10	101 %	6 %	70 - 130 %	25%
78-87-5	1,2-Dichloropropane	10	11	110 %	10	11	106 %	4 %	70 - 130 %	25%
74-95-3	Dibromomethane	10	11	114 %	10	11	113 %	1 %	70 - 130 %	25%
75-27-4	Bromodichloromethane	10	11	107 %	10	10	103 %	4 %	70 - 130 %	25%
123-91-1	1,4-Dioxane	200	270	137 % q	200	230	113 %	19 %	70 - 130 %	25%
10061-01-5	*cis*-1,3-Dichloropropene	10	10	103 %	10	10	101 %	1 %	70 - 130 %	25%
108-10-1	4-Methyl-2-Pentanone (MIBK)	20	24	120 %	20	23	114 %	5 %	70 - 130 %	25%
108-88-3	Toluene	10	10	105 %	10	9.9	99 %	6 %	70 - 130 %	25%
10061-02-6	*trans*-1,3-Dichloropropene	10	10	101 %	10	9.8	98 %	3 %	70 - 130 %	25%
79-00-5	1,1,2-Trichloroethane	10	11	113 %	10	11	110 %	3 %	70 - 130 %	25%
127-18-4	Tetrachloroethene	10	11	106 %	10	9.5	95 %	12 %	70 - 130 %	25%
142-28-9	1,3-Dichloropropane	10	12	119 %	10	11	115 %	4 %	70 - 130 %	25%
591-78-6	2-Hexanone	20	25	125 %	20	24	122 %	3 %	70 - 130 %	25%
124-48-1	Dibromochloromethane	10	11	111 %	10	11	108 %	3 %	70 - 130 %	25%
106-93-4	1,2-Dibromoethane (EDB)	10	12	118 %	10	11	115 %	3 %	70 - 130 %	25%
108-90-7	Chlorobenzene	10	10	100 %	10	9.5	95 %	5 %	70 - 130 %	25%
630-20-6	1,1,1,2-Tetrachloroethane	10	11	106 %	10	10	101 %	4 %	70 - 130 %	25%
100-41-4	Ethylbenzene	10	11	108 %	10	10	101 %	7 %	70 - 130 %	25%
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	20	21	104 %	20	20	98 %	6 %	70 - 130 %	25%
95-47-6	*ortho*-Xylene	10	10	105 %	10	9.7	97 %	8 %	70 - 130 %	25%
100-42-5	Styrene	10	11	112 %	10	11	108 %	3 %	70 - 130 %	25%
75-25-2	Bromoform	10	12	116 %	10	12	117 %	1 %	70 - 130 %	25%
98-82-8	Isopropylbenzene	10	10	101 %	10	9.4	94 %	7 %	70 - 130 %	25%

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3041-WL	Analyzed:	11-06-04 11:02	Analyzed:	11-06-04 11:42
Matrix:	Aqueous	Analyst:	KMC	Analyst:	KMC
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Recov.	RPD
108-86-1	Bromobenzene	10	10	104 %	10	10	103 %	1 %	70 - 130 %	25%
79-34-5	1,1,2,2-Tetrachloroethane	10	11	109 %	10	11	106 %	3 %	70 - 130 %	25%
96-18-4	1,2,3-Trichloropropane	10	12	118 %	10	11	115 %	2 %	70 - 130 %	25%
103-65-1	*n*-Propylbenzene	10	11	106 %	10	9.9	99 %	6 %	70 - 130 %	25%
95-49-8	2-Chlorotoluene	10	10	100 %	10	9.5	95 %	5 %	70 - 130 %	25%
108-67-8	1,3,5-Trimethylbenzene	10	11	105 %	10	9.9	99 %	6 %	70 - 130 %	25%
106-43-4	4-Chlorotoluene	10	9.9	99 %	10	9.6	96 %	3 %	70 - 130 %	25%
98-06-6	*tert*-Butylbenzene	10	10	104 %	10	9.7	97 %	7 %	70 - 130 %	25%
95-63-6	1,2,4-Trimethylbenzene	10	10	104 %	10	9.9	99 %	5 %	70 - 130 %	25%
135-98-8	*sec*-Butylbenzene	10	10	102 %	10	9.4	94 %	8 %	70 - 130 %	25%
541-73-1	1,3-Dichlorobenzene	10	9.9	99 %	10	9.6	96 %	4 %	70 - 130 %	25%
99-87-6	4-Isopropyltoluene	10	10	104 %	10	9.5	95 %	8 %	70 - 130 %	25%
106-46-7	1,4-Dichlorobenzene	10	10	100 %	10	9.6	96 %	4 %	70 - 130 %	25%
95-50-1	1,2-Dichlorobenzene	10	10	102 %	10	9.8	98 %	4 %	70 - 130 %	25%
104-51-8	*n*-Butylbenzene	10	11	105 %	10	9.8	98 %	8 %	70 - 130 %	25%
96-12-8	1,2-Dibromo-3-chloropropane	10	11	112 %	10	10	104 %	7 %	70 - 130 %	25%
120-82-1	1,2,4-Trichlorobenzene	10	12	118 %	10	11	106 %	11 %	70 - 130 %	25%
87-68-3	Hexachlorobutadiene	10	11	106 %	10	9.4	94 %	12 %	70 - 130 %	25%
91-20-3	Naphthalene	10	12	124 %	10	11	110 %	12 %	70 - 130 %	25%
87-61-6	1,2,3-Trichlorobenzene	10	12	122 %	10	11	109 %	12 %	70 - 130 %	25%
75-65-0	*tert*-Butyl Alcohol (TBA)	200	340	171 % q	200	230	116 %	38 % q	70 - 130 %	25%
108-20-3	Di-isopropyl Ether (DIPE)	10	11	114 %	10	11	109 %	4 %	70 - 130 %	25%
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	10	12	120 %	10	11	114 %	5 %	70 - 130 %	25%
994-05-8	*tert*-Amyl Methyl Ether (TAME)	10	11	111 %	10	11	106 %	5 %	70 - 130 %	25%

QC Surrogate Compound	Spiked	Measured	Recovery	Spiked	Measured	Recovery		QC Limits
Dibromofluoromethane	10	12	116 %	10	12	117 %		70 - 130 %
1,2-Dichloroethane-d_4	10	12	123 %	10	13	128 %		70 - 130 %
Toluene-d_8	10	13	125 %	10	12	125 %		70 - 130 %
4-Bromofluorobenzene	10	11	115 %	10	12	118 %		70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

q Recovery outside recommended limits.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3041-WB	Analyzed:	11-06-04 12:42
Matrix:	Aqueous	Analyst:	KMC

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*-1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl *tert*-butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*-1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*-1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*-1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	BRL		ug/L	0.5
95-47-6	*ortho*-Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3041-WB	Analyzed:	11-06-04 12:42
Matrix:	Aqueous	Analyst:	KMC

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	*n*-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	*tert*-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	*sec*-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	*n*-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	*tert*-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl *tert*-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	*tert*-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	**120 %**	70 - 130 %
1,2-Dichloroethane-d_4	10	12	**119 %**	70 - 130 %
Toluene-d_8	10	12	**123 %**	70 - 130 %
4-Bromofluorobenzene	10	12	**118 %**	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3040-WL	Analyzed:	11-05-04 09:16	Analyzed:	11-05-04 10:32
Matrix:	Aqueous	Analyst:	KMC	Analyst:	KMC
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Recovered	Recovery	Spiked	Recovered	Recovery	RPD	Spike	RPD
75-71-8	Dichlorodifluoromethane	10	9.5	95 %	10	12	115 %	19 %	70 - 130 %	25%
74-87-3	Chloromethane	10	10	103 %	10	12	117 %	13 %	70 - 130 %	25%
75-01-4	Vinyl Chloride	10	9.8	98 %	10	11	114 %	15 %	70 - 130 %	25%
74-83-9	Bromomethane	10	11	109 %	10	11	109 %	0 %	70 - 130 %	25%
75-00-3	Chloroethane	10	11	110 %	10	11	114 %	4 %	70 - 130 %	25%
75-69-4	Trichlorofluoromethane	10	8.9	89 %	10	10	100 %	12 %	70 - 130 %	25%
60-29-7	Diethyl Ether	20	22	111 %	20	22	109 %	2 %	70 - 130 %	25%
75-35-4	1,1-Dichloroethene	10	10	102 %	10	11	114 %	11 %	70 - 130 %	25%
76-13-1	1,1,2-Trichlorotrifluoroethane	20	18	90 %	20	20	99 %	10 %	70 - 130 %	25%
67-64-1	Acetone	20	24	119 %	20	23	115 %	4 %	70 - 130 %	25%
75-15-0	Carbon Disulfide	20	17	84 %	20	19	93 %	10 %	70 - 130 %	25%
75-09-2	Methylene Chloride	10	9.7	97 %	10	10	101 %	4 %	70 - 130 %	25%
156-60-5	*trans*-1,2-Dichloroethene	10	9.6	96 %	10	10	102 %	6 %	70 - 130 %	25%
1634-04-4	Methyl tert-butyl Ether (MTBE)	10	12	118 %	10	12	115 %	2 %	70 - 130 %	25%
75-34-3	1,1-Dichloroethane	10	10	101 %	10	11	107 %	6 %	70 - 130 %	25%
594-20-7	2,2-Dichloropropane	10	11	105 %	10	11	113 %	7 %	70 - 130 %	25%
156-59-2	*cis*-1,2-Dichloroethene	10	10	100 %	10	10	103 %	3 %	70 - 130 %	25%
78-93-3	2-Butanone (MEK)	20	22	108 %	20	20	102 %	6 %	70 - 130 %	25%
74-97-5	Bromochloromethane	10	10	102 %	10	10	103 %	1 %	70 - 130 %	25%
109-99-9	Tetrahydrofuran (THF)	20	24	122 %	20	23	116 %	5 %	70 - 130 %	25%
67-66-3	Chloroform	10	9.4	94 %	10	10	100 %	6 %	70 - 130 %	25%
71-55-6	1,1,1-Trichloroethane	10	9.5	95 %	10	11	106 %	11 %	70 - 130 %	25%
56-23-5	Carbon Tetrachloride	10	9.3	93 %	10	10	104 %	12 %	70 - 130 %	25%
563-58-6	1,1-Dichloropropene	10	11	109 %	10	12	117 %	8 %	70 - 130 %	25%
71-43-2	Benzene	10	10	102 %	10	11	107 %	4 %	70 - 130 %	25%
107-06-2	1,2-Dichloroethane	10	11	106 %	10	11	106 %	0 %	70 - 130 %	25%
79-01-6	Trichloroethene	10	9.7	97 %	10	10	104 %	7 %	70 - 130 %	25%
78-87-5	1,2-Dichloropropane	10	11	110 %	10	11	114 %	4 %	70 - 130 %	25%
74-95-3	Dibromomethane	10	11	107 %	10	11	110 %	3 %	70 - 130 %	25%
75-27-4	Bromodichloromethane	10	9.8	98 %	10	10	104 %	6 %	70 - 130 %	25%
123-91-1	1,4-Dioxane	200	190	97 %	200	240	120 %	21 %	70 - 130 %	25%
10061-01-5	*cis*-1,3-Dichloropropene	10	10	101 %	10	10	105 %	4 %	70 - 130 %	25%
108-10-1	4-Methyl-2-Pentanone (MIBK)	20	23	115 %	20	22	110 %	4 %	70 - 130 %	25%
108-88-3	Toluene	10	10	100 %	10	10	105 %	5 %	70 - 130 %	25%
10061-02-6	*trans*-1,3-Dichloropropene	10	9.6	96 %	10	9.7	97 %	1 %	70 - 130 %	25%
79-00-5	1,1,2-Trichloroethane	10	10	104 %	10	10	104 %	0 %	70 - 130 %	25%
127-18-4	Tetrachloroethene	10	9.4	94 %	10	10	101 %	7 %	70 - 130 %	25%
142-28-9	1,3-Dichloropropane	10	11	110 %	10	11	110 %	0 %	70 - 130 %	25%
591-78-6	2-Hexanone	20	24	118 %	20	23	115 %	2 %	70 - 130 %	25%
124-48-1	Dibromochloromethane	10	9.8	98 %	10	10	103 %	5 %	70 - 130 %	25%
106-93-4	1,2-Dibromoethane (EDB)	10	11	107 %	10	11	107 %	0 %	70 - 130 %	25%
108-90-7	Chlorobenzene	10	9.1	91 %	10	9.6	96 %	5 %	70 - 130 %	25%
630-20-6	1,1,1,2-Tetrachloroethane	10	9.5	95 %	10	10	101 %	5 %	70 - 130 %	25%
100-41-4	Ethylbenzene	10	10	101 %	10	11	106 %	6 %	70 - 130 %	25%
108-38-3/106-42-3	*meta*-Xylene and *para*-Xylene	20	19	96 %	20	20	101 %	5 %	70 - 130 %	25%
95-47-6	*ortho*-Xylene	10	9.4	94 %	10	9.9	99 %	6 %	70 - 130 %	25%
100-42-5	Styrene	10	10	104 %	10	11	108 %	4 %	70 - 130 %	25%
75-25-2	Bromoform	10	9.8	98 %	10	10	103 %	4 %	70 - 130 %	25%
98-82-8	Isopropylbenzene	10	10	100 %	10	10	104 %	4 %	70 - 130 %	25%

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Samples

		LCS		LCSD	
Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3040-WL	Analyzed:	11-05-04 09:16	Analyzed:	11-05-04 10:32
Matrix:	Aqueous	Analyst:	KMC	Analyst:	KMC
Units:	ug/L				

CAS Number	Analyte	LCS			LCS Duplicate				QC Limits	
		Spiked	Measured	Recovery	Spiked	Measured	Recovery	RPD	Spike	RPD
108-86-1	Bromobenzene	10	10	100 %	10	10	105 %	4 %	70 - 130 %	25%
79-34-5	1,1,2,2-Tetrachloroethane	10	11	109 %	10	11	107 %	2 %	70 - 130 %	25%
96-18-4	1,2,3-Trichloropropane	10	11	108 %	10	11	107 %	1 %	70 - 130 %	25%
103-65-1	*n*-Propylbenzene	10	10	104 %	10	11	109 %	5 %	70 - 130 %	25%
95-49-8	2-Chlorotoluene	10	9.7	97 %	10	10	101 %	4 %	70 - 130 %	25%
108-67-8	1,3,5-Trimethylbenzene	10	10	102 %	10	11	108 %	5 %	70 - 130 %	25%
106-43-4	4-Chlorotoluene	10	9.5	95 %	10	9.9	99 %	4 %	70 - 130 %	25%
98-06-6	tert-Butylbenzene	10	10	101 %	10	11	107 %	6 %	70 - 130 %	25%
95-63-6	1,2,4-Trimethylbenzene	10	10	101 %	10	11	107 %	6 %	70 - 130 %	25%
135-98-8	sec-Butylbenzene	10	9.8	98 %	10	11	105 %	7 %	70 - 130 %	25%
541-73-1	1,3-Dichlorobenzene	10	9.4	94 %	10	9.8	98 %	5 %	70 - 130 %	25%
99-87-6	4-Isopropyltoluene	10	9.8	98 %	10	10	105 %	7 %	70 - 130 %	25%
106-46-7	1,4-Dichlorobenzene	10	9.4	94 %	10	9.7	97 %	3 %	70 - 130 %	25%
95-50-1	1,2-Dichlorobenzene	10	9.6	96 %	10	9.9	99 %	3 %	70 - 130 %	25%
104-51-8	*n*-Butylbenzene	10	10	102 %	10	11	109 %	7 %	70 - 130 %	25%
96-12-8	1,2-Dibromo-3-chloropropane	10	10	105 %	10	11	106 %	2 %	70 - 130 %	25%
120-82-1	1,2,4-Trichlorobenzene	10	11	112 %	10	11	109 %	2 %	70 - 130 %	25%
87-68-3	Hexachlorobutadiene	10	10	101 %	10	11	105 %	4 %	70 - 130 %	25%
91-20-3	Naphthalene	10	12	116 %	10	11	109 %	6 %	70 - 130 %	25%
87-61-6	1,2,3-Trichlorobenzene	10	11	112 %	10	11	109 %	3 %	70 - 130 %	25%
75-65-0	tert-Butyl Alcohol (TBA)	200	260	129 %	200	220	109 %	17 %	70 - 130 %	25%
108-20-3	Di-isopropyl Ether (DIPE)	10	11	114 %	10	12	116 %	2 %	70 - 130 %	25%
637-92-3	Ethyl tert-butyl Ether (ETBE)	10	11	113 %	10	12	115 %	1 %	70 - 130 %	25%
994-05-8	tert-Amyl Methyl Ether (TAME)	10	10	103 %	10	10	104 %	0 %	70 - 130 %	25%

QC Surrogate Compound	Spiked	Measured	Recovery	Spiked	Measured	Recovery		QC Limits
Dibromofluoromethane	10	12	115 %	10	12	115 %		70 - 130 %
1,2-Dichloroethane-d_4	10	12	121 %	10	12	117 %		70 - 130 %
Toluene-d_8	10	13	127 %	10	13	127 %		70 - 130 %
4-Bromofluorobenzene	10	12	119 %	10	12	119 %		70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample preparation performed by EPA Method 5030B.

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.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3040-WB	Analyzed:	11-05-04 11:27
Matrix:	Aqueous	Analyst:	KMC

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
75-71-8	Dichlorodifluoromethane	BRL		ug/L	0.5
74-87-3	Chloromethane	BRL		ug/L	0.5
75-01-4	Vinyl Chloride	BRL		ug/L	0.5
74-83-9	Bromomethane	BRL		ug/L	0.5
75-00-3	Chloroethane	BRL		ug/L	0.5
75-69-4	Trichlorofluoromethane	BRL		ug/L	0.5
60-29-7	Diethyl Ether	BRL		ug/L	2
75-35-4	1,1-Dichloroethene	BRL		ug/L	0.5
76-13-1	1,1,2-Trichlorotrifluoroethane	BRL		ug/L	5
67-64-1	Acetone	BRL		ug/L	10
75-15-0	Carbon Disulfide	BRL		ug/L	5
75-09-2	Methylene Chloride	BRL		ug/L	2.5
156-60-5	*trans*- 1,2-Dichloroethene	BRL		ug/L	0.5
1634-04-4	Methyl tert- butyl Ether (MTBE)	BRL		ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL		ug/L	0.5
594-20-7	2,2-Dichloropropane	BRL		ug/L	0.5
156-59-2	*cis*- 1,2-Dichloroethene	BRL		ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL		ug/L	5
74-97-5	Bromochloromethane	BRL		ug/L	0.5
109-99-9	Tetrahydrofuran (THF)	BRL		ug/L	5
67-66-3	Chloroform	BRL		ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL		ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL		ug/L	0.5
563-58-6	1,1-Dichloropropene	BRL		ug/L	0.5
71-43-2	Benzene	BRL		ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL		ug/L	0.5
79-01-6	Trichloroethene	BRL		ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL		ug/L	0.5
74-95-3	Dibromomethane	BRL		ug/L	0.5
75-27-4	Bromodichloromethane	BRL		ug/L	0.5
123-91-1	1,4-Dioxane	BRL		ug/L	500
10061-01-5	*cis*- 1,3-Dichloropropene	BRL		ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL		ug/L	5
108-88-3	Toluene	BRL		ug/L	0.5
10061-02-6	*trans*- 1,3-Dichloropropene	BRL		ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL		ug/L	0.5
127-18-4	Tetrachloroethene	BRL		ug/L	0.5
142-28-9	1,3-Dichloropropane	BRL		ug/L	0.5
591-78-6	2-Hexanone	BRL		ug/L	5
124-48-1	Dibromochloromethane	BRL		ug/L	0.5
106-93-4	1,2-Dibromoethane (EDB)	BRL		ug/L	0.5
108-90-7	Chlorobenzene	BRL		ug/L	0.5
630-20-6	1,1,1,2-Tetrachloroethane	BRL		ug/L	0.5
100-41-4	Ethylbenzene	BRL		ug/L	0.5
108-38-3/106-42-3	*meta*- Xylene and *para*- Xylene	BRL		ug/L	0.5
95-47-6	*ortho*- Xylene	BRL		ug/L	0.5
100-42-5	Styrene	BRL		ug/L	0.5
75-25-2	Bromoform	BRL		ug/L	0.5
98-82-8	Isopropylbenzene	BRL		ug/L	0.5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8260B	Instrument ID:	MS-4 HP 6890
QC Batch ID:	VM4-3040-WB	Analyzed:	11-05-04 11:27
Matrix:	Aqueous	Analyst:	KMC

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
108-86-1	Bromobenzene	BRL		ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL		ug/L	0.5
96-18-4	1,2,3-Trichloropropane	BRL		ug/L	0.5
103-65-1	n-Propylbenzene	BRL		ug/L	0.5
95-49-8	2-Chlorotoluene	BRL		ug/L	0.5
108-67-8	1,3,5-Trimethylbenzene	BRL		ug/L	0.5
106-43-4	4-Chlorotoluene	BRL		ug/L	0.5
98-06-6	tert-Butylbenzene	BRL		ug/L	0.5
95-63-6	1,2,4-Trimethylbenzene	BRL		ug/L	0.5
135-98-8	sec-Butylbenzene	BRL		ug/L	0.5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	0.5
99-87-6	4-Isopropyltoluene	BRL		ug/L	0.5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	0.5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	0.5
104-51-8	n-Butylbenzene	BRL		ug/L	0.5
96-12-8	1,2-Dibromo-3-chloropropane	BRL		ug/L	0.5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	0.5
87-68-3	Hexachlorobutadiene	BRL		ug/L	0.5
91-20-3	Naphthalene	BRL		ug/L	0.5
87-61-6	1,2,3-Trichlorobenzene	BRL		ug/L	0.5
75-65-0	tert-Butyl Alcohol (TBA)	BRL		ug/L	20
108-20-3	Di-isopropyl Ether (DIPE)	BRL		ug/L	0.5
637-92-3	Ethyl tert-butyl Ether (ETBE)	BRL		ug/L	0.5
994-05-8	tert-Amyl Methyl Ether (TAME)	BRL		ug/L	0.5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Dibromofluoromethane	10	12	117 %	70 - 130 %
1,2-Dichloroethane-d_4	10	12	117 %	70 - 130 %
Toluene-d_8	10	12	122 %	70 - 130 %
4-Bromofluorobenzene	10	12	119 %	70 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample preparation performed by EPA Method 5030B.

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 size and dilution.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: Lightship Engineering

Address: 36 Cordage Park Circle
Suite 312
Plymouth, MA 02360

Attn: Mr. Joe O'Brien

Project Number: 542.1.1

Site: RM JONES

Laboratory Job Number: L0503335

Date Received: 01-APR-2005

Date Reported: 07-APR-2005

Delivery Method: Alpha

The following questions pertain only to MCP Analytical Methods

An affirmative response to questions A,B,C & D is required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with those described on their Chain-of-Custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in section 2.0 of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. **VPH and EPH methods only:** Was the VPH or EPH method run without significant modifications, as specified in Section 11.3? NA

A response to questions E and F is required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified method(s) achieved? NO

F. Were results for all analyte-list compounds/elements for the specified method(s) reported? YES

Any answers of NO to the above questions are addressed in the case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those 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: James Todaro
This document electronically signed

ALPHA ANALYTICAL LABORATORIES

Laboratory Job Number: L0503335
Date Reported: 07-APR-2005

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0503335-01	LE MW-5	LOWELL, MA
L0503335-02	LE WE-3	LOWELL, MA
L0503335-03	LE MW-4	LOWELL, MA
L0503335-04	GZA-4	LOWELL, MA
L0503335-05	URS-3	LOWELL, MA
L0503335-06	URS-1	LOWELL, MA
L0503335-07	URS-2	LOWELL, MA

ALPHA ANALYTICAL LABORATORIES
NARRATIVE REPORT

Laboratory Job Number: L0503335

Volatile Organics

The following have elevated limits of detection due to the dilutions required by the elevated concentrations of target compounds in the samples:

L0503335-02, -06 (2.5X)

L0503335-03 (400X)

L0503335-05, -07 (10X)

In reference to question E:

The WG198134-2 LCSD has low % recoveries for 4-methyl-2-pentanone and 2-hexanone.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-01
LE MW-5
Sample Matrix: WATER

Date Collected: 31-MAR-2005 13:30
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 11:24	TT
Methylene chloride	ND	ug/l	5.0				
1,1-Dichloroethane	ND	ug/l	0.75				
Chloroform	ND	ug/l	0.75				
Carbon tetrachloride	ND	ug/l	0.50				
1,2-Dichloropropane	ND	ug/l	1.8				
Dibromochloromethane	ND	ug/l	0.50				
1,1,2-Trichloroethane	ND	ug/l	0.75				
Tetrachloroethene	ND	ug/l	0.50				
Chlorobenzene	ND	ug/l	0.50				
Trichlorofluoromethane	ND	ug/l	2.5				
1,2-Dichloroethane	ND	ug/l	0.50				
1,1,1-Trichloroethane	8.0	ug/l	0.50				
Bromodichloromethane	ND	ug/l	0.50				
trans-1,3-Dichloropropene	ND	ug/l	0.50				
cis-1,3-Dichloropropene	ND	ug/l	0.50				
1,1-Dichloropropene	ND	ug/l	2.5				
Bromoform	ND	ug/l	2.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50				
Benzene	ND	ug/l	0.50				
Toluene	ND	ug/l	0.75				
Ethylbenzene	ND	ug/l	0.50				
Chloromethane	ND	ug/l	2.5				
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	ND	ug/l	1.0				
Chloroethane	ND	ug/l	1.0				
1,1-Dichloroethene	ND	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-01
LE MW-5

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 11:24	TT
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	123.	%	70-130
Toluene-d8	97.0	%	70-130
4-Bromofluorobenzene	108.	%	70-130
Dibromofluoromethane	107.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-02
LE WE-3
Sample Matrix: WATER

Date Collected: 31-MAR-2005 12:02
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 12:00	TT
Methylene chloride	ND	ug/l	12.				
1,1-Dichloroethane	4.1	ug/l	1.9				
Chloroform	ND	ug/l	1.9				
Carbon tetrachloride	ND	ug/l	1.2				
1,2-Dichloropropane	ND	ug/l	4.4				
Dibromochloromethane	ND	ug/l	1.2				
1,1,2-Trichloroethane	ND	ug/l	1.9				
Tetrachloroethene	42.	ug/l	1.2				
Chlorobenzene	ND	ug/l	1.2				
Trichlorofluoromethane	ND	ug/l	6.2				
1,2-Dichloroethane	ND	ug/l	1.2				
1,1,1-Trichloroethane	180	ug/l	1.2				
Bromodichloromethane	ND	ug/l	1.2				
trans-1,3-Dichloropropene	ND	ug/l	1.2				
cis-1,3-Dichloropropene	ND	ug/l	1.2				
1,1-Dichloropropene	ND	ug/l	6.2				
Bromoform	ND	ug/l	5.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	1.2				
Benzene	ND	ug/l	1.2				
Toluene	ND	ug/l	1.9				
Ethylbenzene	ND	ug/l	1.2				
Chloromethane	ND	ug/l	6.2				
Bromomethane	ND	ug/l	2.5				
Vinyl chloride	ND	ug/l	2.5				
Chloroethane	ND	ug/l	2.5				
1,1-Dichloroethene	4.8	ug/l	1.2				
trans-1,2-Dichloroethene	ND	ug/l	1.9				
Trichloroethene	81.	ug/l	1.2				
1,2-Dichlorobenzene	ND	ug/l	6.2				
1,3-Dichlorobenzene	ND	ug/l	6.2				
1,4-Dichlorobenzene	ND	ug/l	6.2				
Methyl tert butyl ether	ND	ug/l	2.5				
p/m-Xylene	ND	ug/l	1.2				
o-Xylene	ND	ug/l	1.2				
cis-1,2-Dichloroethene	ND	ug/l	1.2				
Dibromomethane	ND	ug/l	12.				
1,2,3-Trichloropropane	ND	ug/l	12.				
Styrene	ND	ug/l	1.2				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-02
LE WE-3

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 12:00	TT
Dichlorodifluoromethane	ND	ug/l	12.				
Acetone	ND	ug/l	12.				
Carbon disulfide	ND	ug/l	12.				
2-Butanone	ND	ug/l	12.				
4-Methyl-2-pentanone	ND	ug/l	12.				
2-Hexanone	ND	ug/l	12.				
Bromochloromethane	ND	ug/l	6.2				
Tetrahydrofuran	ND	ug/l	25.				
2,2-Dichloropropane	ND	ug/l	6.2				
1,2-Dibromoethane	ND	ug/l	5.0				
1,3-Dichloropropane	ND	ug/l	6.2				
1,1,1,2-Tetrachloroethane	ND	ug/l	1.2				
Bromobenzene	ND	ug/l	6.2				
n-Butylbenzene	ND	ug/l	1.2				
sec-Butylbenzene	ND	ug/l	1.2				
tert-Butylbenzene	ND	ug/l	6.2				
o-Chlorotoluene	ND	ug/l	6.2				
p-Chlorotoluene	ND	ug/l	6.2				
1,2-Dibromo-3-chloropropane	ND	ug/l	6.2				
Hexachlorobutadiene	ND	ug/l	2.5				
Isopropylbenzene	ND	ug/l	1.2				
p-Isopropyltoluene	ND	ug/l	1.2				
Naphthalene	ND	ug/l	6.2				
n-Propylbenzene	ND	ug/l	1.2				
1,2,3-Trichlorobenzene	ND	ug/l	6.2				
1,2,4-Trichlorobenzene	ND	ug/l	6.2				
1,3,5-Trimethylbenzene	ND	ug/l	6.2				
1,2,4-Trimethylbenzene	ND	ug/l	6.2				
Ethyl ether	ND	ug/l	6.2				
Isopropyl Ether	ND	ug/l	5.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	5.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	5.0				
1,4-Dioxane	ND	ug/l	620				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	130.	%	70-130
Toluene-d8	96.0	%	70-130
4-Bromofluorobenzene	107.	%	70-130
Dibromofluoromethane	111.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-03
LE MW-4
Sample Matrix: WATER

Date Collected: 31-MAR-2005 13:35
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 12:36	TT
Methylene chloride	ND	ug/l	2000				
1,1-Dichloroethane	ND	ug/l	300				
Chloroform	ND	ug/l	300				
Carbon tetrachloride	ND	ug/l	200				
1,2-Dichloropropane	ND	ug/l	700				
Dibromochloromethane	ND	ug/l	200				
1,1,2-Trichloroethane	ND	ug/l	300				
Tetrachloroethene	910	ug/l	200				
Chlorobenzene	ND	ug/l	200				
Trichlorofluoromethane	ND	ug/l	1000				
1,2-Dichloroethane	ND	ug/l	200				
1,1,1-Trichloroethane	13000	ug/l	200				
Bromodichloromethane	ND	ug/l	200				
trans-1,3-Dichloropropene	ND	ug/l	200				
cis-1,3-Dichloropropene	ND	ug/l	200				
1,1-Dichloropropene	ND	ug/l	1000				
Bromoform	ND	ug/l	800				
1,1,2,2-Tetrachloroethane	ND	ug/l	200				
Benzene	ND	ug/l	200				
Toluene	5500	ug/l	300				
Ethylbenzene	ND	ug/l	200				
Chloromethane	ND	ug/l	1000				
Bromomethane	ND	ug/l	400				
Vinyl chloride	ND	ug/l	400				
Chloroethane	ND	ug/l	400				
1,1-Dichloroethene	880	ug/l	200				
trans-1,2-Dichloroethene	ND	ug/l	300				
Trichloroethene	3500	ug/l	200				
1,2-Dichlorobenzene	ND	ug/l	1000				
1,3-Dichlorobenzene	ND	ug/l	1000				
1,4-Dichlorobenzene	ND	ug/l	1000				
Methyl tert butyl ether	ND	ug/l	400				
p/m-Xylene	400	ug/l	200				
o-Xylene	ND	ug/l	200				
cis-1,2-Dichloroethene	260	ug/l	200				
Dibromomethane	ND	ug/l	2000				
1,2,3-Trichloropropane	ND	ug/l	2000				
Styrene	ND	ug/l	200				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-03
LE MW-4

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 12:36	TT
Dichlorodifluoromethane	ND	ug/l	2000				
Acetone	ND	ug/l	2000				
Carbon disulfide	ND	ug/l	2000				
2-Butanone	ND	ug/l	2000				
4-Methyl-2-pentanone	ND	ug/l	2000				
2-Hexanone	ND	ug/l	2000				
Bromochloromethane	ND	ug/l	1000				
Tetrahydrofuran	ND	ug/l	4000				
2,2-Dichloropropane	ND	ug/l	1000				
1,2-Dibromoethane	ND	ug/l	800				
1,3-Dichloropropane	ND	ug/l	1000				
1,1,1,2-Tetrachloroethane	ND	ug/l	200				
Bromobenzene	ND	ug/l	1000				
n-Butylbenzene	ND	ug/l	200				
sec-Butylbenzene	ND	ug/l	200				
tert-Butylbenzene	ND	ug/l	1000				
o-Chlorotoluene	ND	ug/l	1000				
p-Chlorotoluene	ND	ug/l	1000				
1,2-Dibromo-3-chloropropane	ND	ug/l	1000				
Hexachlorobutadiene	ND	ug/l	400				
Isopropylbenzene	ND	ug/l	200				
p-Isopropyltoluene	ND	ug/l	200				
Naphthalene	ND	ug/l	1000				
n-Propylbenzene	ND	ug/l	200				
1,2,3-Trichlorobenzene	ND	ug/l	1000				
1,2,4-Trichlorobenzene	ND	ug/l	1000				
1,3,5-Trimethylbenzene	ND	ug/l	1000				
1,2,4-Trimethylbenzene	ND	ug/l	1000				
Ethyl ether	ND	ug/l	1000				
Isopropyl Ether	ND	ug/l	800				
Ethyl-Tert-Butyl-Ether	ND	ug/l	800				
Tertiary-Amyl Methyl Ether	ND	ug/l	800				
1,4-Dioxane	ND	ug/l	100000				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	121.	%	70-130
Toluene-d8	91.0	%	70-130
4-Bromofluorobenzene	106.	%	70-130
Dibromofluoromethane	105.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-04
GZA-4
Sample Matrix: WATER

Date Collected: 31-MAR-2005 11:38
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 13:12	TT
Methylene chloride	ND	ug/l	5.0				
1,1-Dichloroethane	24.	ug/l	0.75				
Chloroform	ND	ug/l	0.75				
Carbon tetrachloride	ND	ug/l	0.50				
1,2-Dichloropropane	ND	ug/l	1.8				
Dibromochloromethane	ND	ug/l	0.50				
1,1,2-Trichloroethane	ND	ug/l	0.75				
Tetrachloroethene	1.8	ug/l	0.50				
Chlorobenzene	ND	ug/l	0.50				
Trichlorofluoromethane	ND	ug/l	2.5				
1,2-Dichloroethane	ND	ug/l	0.50				
1,1,1-Trichloroethane	32.	ug/l	0.50				
Bromodichloromethane	ND	ug/l	0.50				
trans-1,3-Dichloropropene	ND	ug/l	0.50				
cis-1,3-Dichloropropene	ND	ug/l	0.50				
1,1-Dichloropropene	ND	ug/l	2.5				
Bromoform	ND	ug/l	2.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50				
Benzene	ND	ug/l	0.50				
Toluene	4.9	ug/l	0.75				
Ethylbenzene	1.0	ug/l	0.50				
Chloromethane	ND	ug/l	2.5				
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	8.4	ug/l	1.0				
Chloroethane	35.	ug/l	1.0				
1,1-Dichloroethene	1.9	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	9.7	ug/l	0.50				
1,2-Dichlorobenzene	4.4	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	1.2	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	12.	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-04
GZA-4

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 13:12	TT
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	10.	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	119.	%	70-130
Toluene-d8	97.0	%	70-130
4-Bromofluorobenzene	107.	%	70-130
Dibromofluoromethane	111.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-05
URS-3
Sample Matrix: WATER

Date Collected: 31-MAR-2005 12:05
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 13:49	TT
Methylene chloride	ND	ug/l	50.				
1,1-Dichloroethane	ND	ug/l	7.5				
Chloroform	ND	ug/l	7.5				
Carbon tetrachloride	ND	ug/l	5.0				
1,2-Dichloropropane	ND	ug/l	18.				
Dibromochloromethane	ND	ug/l	5.0				
1,1,2-Trichloroethane	ND	ug/l	7.5				
Tetrachloroethene	6.7	ug/l	5.0				
Chlorobenzene	ND	ug/l	5.0				
Trichlorofluoromethane	ND	ug/l	25.				
1,2-Dichloroethane	ND	ug/l	5.0				
1,1,1-Trichloroethane	310	ug/l	5.0				
Bromodichloromethane	ND	ug/l	5.0				
trans-1,3-Dichloropropene	ND	ug/l	5.0				
cis-1,3-Dichloropropene	ND	ug/l	5.0				
1,1-Dichloropropene	ND	ug/l	25.				
Bromoform	ND	ug/l	20.				
1,1,2,2-Tetrachloroethane	ND	ug/l	5.0				
Benzene	ND	ug/l	5.0				
Toluene	ND	ug/l	7.5				
Ethylbenzene	ND	ug/l	5.0				
Chloromethane	ND	ug/l	25.				
Bromomethane	ND	ug/l	10.				
Vinyl chloride	ND	ug/l	10.				
Chloroethane	ND	ug/l	10.				
1,1-Dichloroethene	ND	ug/l	5.0				
trans-1,2-Dichloroethene	ND	ug/l	7.5				
Trichloroethene	21.	ug/l	5.0				
1,2-Dichlorobenzene	ND	ug/l	25.				
1,3-Dichlorobenzene	ND	ug/l	25.				
1,4-Dichlorobenzene	ND	ug/l	25.				
Methyl tert butyl ether	ND	ug/l	10.				
p/m-Xylene	ND	ug/l	5.0				
o-Xylene	ND	ug/l	5.0				
cis-1,2-Dichloroethene	ND	ug/l	5.0				
Dibromomethane	ND	ug/l	50.				
1,2,3-Trichloropropane	ND	ug/l	50.				
Styrene	ND	ug/l	5.0				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-05
URS-3

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 13:49	TT
Dichlorodifluoromethane	ND	ug/l	50.				
Acetone	ND	ug/l	50.				
Carbon disulfide	ND	ug/l	50.				
2-Butanone	ND	ug/l	50.				
4-Methyl-2-pentanone	ND	ug/l	50.				
2-Hexanone	ND	ug/l	50.				
Bromochloromethane	ND	ug/l	25.				
Tetrahydrofuran	ND	ug/l	100				
2,2-Dichloropropane	ND	ug/l	25.				
1,2-Dibromoethane	ND	ug/l	20.				
1,3-Dichloropropane	ND	ug/l	25.				
1,1,1,2-Tetrachloroethane	ND	ug/l	5.0				
Bromobenzene	ND	ug/l	25.				
n-Butylbenzene	ND	ug/l	5.0				
sec-Butylbenzene	ND	ug/l	5.0				
tert-Butylbenzene	ND	ug/l	25.				
o-Chlorotoluene	ND	ug/l	25.				
p-Chlorotoluene	ND	ug/l	25.				
1,2-Dibromo-3-chloropropane	ND	ug/l	25.				
Hexachlorobutadiene	ND	ug/l	10.				
Isopropylbenzene	ND	ug/l	5.0				
p-Isopropyltoluene	ND	ug/l	5.0				
Naphthalene	ND	ug/l	25.				
n-Propylbenzene	ND	ug/l	5.0				
1,2,3-Trichlorobenzene	ND	ug/l	25.				
1,2,4-Trichlorobenzene	ND	ug/l	25.				
1,3,5-Trimethylbenzene	ND	ug/l	25.				
1,2,4-Trimethylbenzene	ND	ug/l	25.				
Ethyl ether	ND	ug/l	25.				
Isopropyl Ether	ND	ug/l	20.				
Ethyl-Tert-Butyl-Ether	ND	ug/l	20.				
Tertiary-Amyl Methyl Ether	ND	ug/l	20.				
1,4-Dioxane	ND	ug/l	2500				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	121.	%	70-130
Toluene-d8	99.0	%	70-130
4-Bromofluorobenzene	106.	%	70-130
Dibromofluoromethane	105.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-06
URS-1
Sample Matrix: WATER

Date Collected: 31-MAR-2005 13:00
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 16:37	TT
Methylene chloride	ND	ug/l	12.				
1,1-Dichloroethane	160	ug/l	1.9				
Chloroform	ND	ug/l	1.9				
Carbon tetrachloride	ND	ug/l	1.2				
1,2-Dichloropropane	ND	ug/l	4.4				
Dibromochloromethane	ND	ug/l	1.2				
1,1,2-Trichloroethane	ND	ug/l	1.9				
Tetrachloroethene	ND	ug/l	1.2				
Chlorobenzene	ND	ug/l	1.2				
Trichlorofluoromethane	ND	ug/l	6.2				
1,2-Dichloroethane	ND	ug/l	1.2				
1,1,1-Trichloroethane	100	ug/l	1.2				
Bromodichloromethane	ND	ug/l	1.2				
trans-1,3-Dichloropropene	ND	ug/l	1.2				
cis-1,3-Dichloropropene	ND	ug/l	1.2				
1,1-Dichloropropene	ND	ug/l	6.2				
Bromoform	ND	ug/l	5.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	1.2				
Benzene	ND	ug/l	1.2				
Toluene	ND	ug/l	1.9				
Ethylbenzene	ND	ug/l	1.2				
Chloromethane	ND	ug/l	6.2				
Bromomethane	ND	ug/l	2.5				
Vinyl chloride	ND	ug/l	2.5				
Chloroethane	ND	ug/l	2.5				
1,1-Dichloroethene	55.	ug/l	1.2				
trans-1,2-Dichloroethene	ND	ug/l	1.9				
Trichloroethene	ND	ug/l	1.2				
1,2-Dichlorobenzene	ND	ug/l	6.2				
1,3-Dichlorobenzene	ND	ug/l	6.2				
1,4-Dichlorobenzene	ND	ug/l	6.2				
Methyl tert butyl ether	17.	ug/l	2.5				
p/m-Xylene	ND	ug/l	1.2				
o-Xylene	ND	ug/l	1.2				
cis-1,2-Dichloroethene	ND	ug/l	1.2				
Dibromomethane	ND	ug/l	12.				
1,2,3-Trichloropropane	ND	ug/l	12.				
Styrene	ND	ug/l	1.2				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-06
URS-1

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 16:37	TT
Dichlorodifluoromethane	ND	ug/l	12.				
Acetone	ND	ug/l	12.				
Carbon disulfide	ND	ug/l	12.				
2-Butanone	ND	ug/l	12.				
4-Methyl-2-pentanone	ND	ug/l	12.				
2-Hexanone	ND	ug/l	12.				
Bromochloromethane	ND	ug/l	6.2				
Tetrahydrofuran	ND	ug/l	25.				
2,2-Dichloropropane	ND	ug/l	6.2				
1,2-Dibromoethane	ND	ug/l	5.0				
1,3-Dichloropropane	ND	ug/l	6.2				
1,1,1,2-Tetrachloroethane	ND	ug/l	1.2				
Bromobenzene	ND	ug/l	6.2				
n-Butylbenzene	ND	ug/l	1.2				
sec-Butylbenzene	ND	ug/l	1.2				
tert-Butylbenzene	ND	ug/l	6.2				
o-Chlorotoluene	ND	ug/l	6.2				
p-Chlorotoluene	ND	ug/l	6.2				
1,2-Dibromo-3-chloropropane	ND	ug/l	6.2				
Hexachlorobutadiene	ND	ug/l	2.5				
Isopropylbenzene	ND	ug/l	1.2				
p-Isopropyltoluene	ND	ug/l	1.2				
Naphthalene	ND	ug/l	6.2				
n-Propylbenzene	ND	ug/l	1.2				
1,2,3-Trichlorobenzene	ND	ug/l	6.2				
1,2,4-Trichlorobenzene	ND	ug/l	6.2				
1,3,5-Trimethylbenzene	ND	ug/l	6.2				
1,2,4-Trimethylbenzene	ND	ug/l	6.2				
Ethyl ether	ND	ug/l	6.2				
Isopropyl Ether	ND	ug/l	5.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	5.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	5.0				
1,4-Dioxane	ND	ug/l	620				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	124.	%	70-130
Toluene-d8	99.0	%	70-130
4-Bromofluorobenzene	103.	%	70-130
Dibromofluoromethane	111.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0503335-07
URS-2
Sample Matrix: WATER

Date Collected: 31-MAR-2005 12:45
Date Received : 01-APR-2005
Date Reported : 07-APR-2005

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 3-Vial

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B				60 8260B		0405 17:13	TT
Methylene chloride	ND	ug/l	50.				
1,1-Dichloroethane	10.	ug/l	7.5				
Chloroform	ND	ug/l	7.5				
Carbon tetrachloride	ND	ug/l	5.0				
1,2-Dichloropropane	ND	ug/l	18.				
Dibromochloromethane	ND	ug/l	5.0				
1,1,2-Trichloroethane	ND	ug/l	7.5				
Tetrachloroethene	47.	ug/l	5.0				
Chlorobenzene	ND	ug/l	5.0				
Trichlorofluoromethane	ND	ug/l	25.				
1,2-Dichloroethane	ND	ug/l	5.0				
1,1,1-Trichloroethane	320	ug/l	5.0				
Bromodichloromethane	ND	ug/l	5.0				
trans-1,3-Dichloropropene	ND	ug/l	5.0				
cis-1,3-Dichloropropene	ND	ug/l	5.0				
1,1-Dichloropropene	ND	ug/l	25.				
Bromoform	ND	ug/l	20.				
1,1,2,2-Tetrachloroethane	ND	ug/l	5.0				
Benzene	ND	ug/l	5.0				
Toluene	ND	ug/l	7.5				
Ethylbenzene	ND	ug/l	5.0				
Chloromethane	ND	ug/l	25.				
Bromomethane	ND	ug/l	10.				
Vinyl chloride	ND	ug/l	10.				
Chloroethane	ND	ug/l	10.				
1,1-Dichloroethene	ND	ug/l	5.0				
trans-1,2-Dichloroethene	ND	ug/l	7.5				
Trichloroethene	160	ug/l	5.0				
1,2-Dichlorobenzene	ND	ug/l	25.				
1,3-Dichlorobenzene	ND	ug/l	25.				
1,4-Dichlorobenzene	ND	ug/l	25.				
Methyl tert butyl ether	ND	ug/l	10.				
p/m-Xylene	ND	ug/l	5.0				
o-Xylene	ND	ug/l	5.0				
cis-1,2-Dichloroethene	13.	ug/l	5.0				
Dibromomethane	ND	ug/l	50.				
1,2,3-Trichloropropane	ND	ug/l	50.				
Styrene	ND	ug/l	5.0				

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

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0503335-07
URS-2

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				60 8260B		0405 17:13	TT
Dichlorodifluoromethane	ND	ug/l	50.				
Acetone	ND	ug/l	50.				
Carbon disulfide	ND	ug/l	50.				
2-Butanone	ND	ug/l	50.				
4-Methyl-2-pentanone	ND	ug/l	50.				
2-Hexanone	ND	ug/l	50.				
Bromochloromethane	ND	ug/l	25.				
Tetrahydrofuran	ND	ug/l	100				
2,2-Dichloropropane	ND	ug/l	25.				
1,2-Dibromoethane	ND	ug/l	20.				
1,3-Dichloropropane	ND	ug/l	25.				
1,1,1,2-Tetrachloroethane	ND	ug/l	5.0				
Bromobenzene	ND	ug/l	25.				
n-Butylbenzene	ND	ug/l	5.0				
sec-Butylbenzene	ND	ug/l	5.0				
tert-Butylbenzene	ND	ug/l	25.				
o-Chlorotoluene	ND	ug/l	25.				
p-Chlorotoluene	ND	ug/l	25.				
1,2-Dibromo-3-chloropropane	ND	ug/l	25.				
Hexachlorobutadiene	ND	ug/l	10.				
Isopropylbenzene	ND	ug/l	5.0				
p-Isopropyltoluene	ND	ug/l	5.0				
Naphthalene	ND	ug/l	25.				
n-Propylbenzene	ND	ug/l	5.0				
1,2,3-Trichlorobenzene	ND	ug/l	25.				
1,2,4-Trichlorobenzene	ND	ug/l	25.				
1,3,5-Trimethylbenzene	ND	ug/l	25.				
1,2,4-Trimethylbenzene	ND	ug/l	25.				
Ethyl ether	ND	ug/l	25.				
Isopropyl Ether	ND	ug/l	20.				
Ethyl-Tert-Butyl-Ether	ND	ug/l	20.				
Tertiary-Amyl Methyl Ether	ND	ug/l	20.				
1,4-Dioxane	ND	ug/l	2500				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	128.	%	70-130
Toluene-d8	99.0	%	70-130
4-Bromofluorobenzene	105.	%	70-130
Dibromofluoromethane	115.	%	70-130

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

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH LCS/LCSD ANALYSIS

Laboratory Job Number: L0503335

Parameter	LCS %	LCSD %	RPD	RPD Limit	QC Limits
Volatile Organics by MCP 8260B for sample(s) 01-05 (WG198048-1, WG198048-2)					
Methylene chloride	98	101	3	25	70-130
1,1-Dichloroethane	109	104	5	25	70-130
Chloroform	103	101	2	25	70-130
Carbon tetrachloride	106	100	6	25	70-130
1,2-Dichloropropane	102	98	4	25	70-130
Dibromochloromethane	104	102	2	25	70-130
1,1,2-Trichloroethane	105	107	2	25	70-130
Tetrachloroethene	105	99	6	25	70-130
Chlorobenzene	100	99	1	25	70-130
Trichlorofluoromethane	125	117	7	25	70-130
1,2-Dichloroethane	115	110	4	25	70-130
1,1,1-Trichloroethane	112	105	6	25	70-130
Bromodichloromethane	112	103	8	25	70-130
trans-1,3-Dichloropropene	99	96	3	25	70-130
cis-1,3-Dichloropropene	93	93	0	25	70-130
1,1-Dichloropropene	98	89	10	25	70-130
Bromoform	98	97	1	50	70-130
1,1,2,2-Tetrachloroethane	98	98	0	25	70-130
Benzene	106	101	5	25	70-130
Toluene	102	97	5	25	70-130
Ethylbenzene	106	103	3	25	70-130
Chloromethane	85	88	3	50	70-130
Bromomethane	70	80	13	50	70-130
Vinyl chloride	112	110	2	25	70-130
Chloroethane	109	111	2	25	70-130
1,1-Dichloroethene	99	98	1	25	70-130
trans-1,2-Dichloroethene	101	96	5	25	70-130
Trichloroethene	92	96	4	25	70-130
1,2-Dichlorobenzene	95	93	2	25	70-130
1,3-Dichlorobenzene	97	93	4	25	70-130
1,4-Dichlorobenzene	96	92	4	25	70-130
Methyl tert butyl ether	89	102	14	25	70-130
p/m-Xylene	106	101	5	25	70-130
o-Xylene	98	93	5	25	70-130
cis-1,2-Dichloroethene	103	102	1	25	70-130
Dibromomethane	115	110	4	25	70-130
1,2,3-Trichloropropane	96	97	1	25	70-130
Styrene	110	106	4	25	70-130
Dichlorodifluoromethane	102	100	2	50	70-130
Acetone	118	106	11	50	70-130
Carbon disulfide	99	97	2	25	70-130
2-Butanone	101	100	1	50	70-130
4-Methyl-2-pentanone	79	74	7	50	70-130
2-Hexanone	98	81	19	50	70-130
Bromochloromethane	103	99	4	25	70-130
Tetrahydrofuran	85	92	8	25	70-130
2,2-Dichloropropane	95	95	0	25	70-130
1,2-Dibromoethane	100	106	6	25	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH LCS/LCSD ANALYSIS

Laboratory Job Number: L0503335

Continued

Parameter	LCS %	LCSD %	RPD	RPD Limit	QC Limits
Volatile Organics by MCP 8260B for sample(s) 01-05 (WG198048-1, WG198048-2)					
1,3-Dichloropropane	109	106	3	25	70-130
1,1,1,2-Tetrachloroethane	108	101	7	25	70-130
Bromobenzene	95	92	3	25	70-130
n-Butylbenzene	94	88	7	25	70-130
sec-Butylbenzene	93	88	6	25	70-130
tert-Butylbenzene	90	90	0	25	70-130
o-Chlorotoluene	103	98	5	25	70-130
p-Chlorotoluene	102	97	5	25	70-130
1,2-Dibromo-3-chloropropane	100	101	1	50	70-130
Hexachlorobutadiene	91	86	6	25	70-130
Isopropylbenzene	96	91	5	25	70-130
p-Isopropyltoluene	92	86	7	25	70-130
Naphthalene	95	96	1	25	70-130
n-Propylbenzene	100	95	5	25	70-130
1,2,3-Trichlorobenzene	95	96	1	25	70-130
1,2,4-Trichlorobenzene	90	90	0	25	70-130
1,3,5-Trimethylbenzene	97	93	4	25	70-130
1,2,4-Trimethylbenzene	102	99	3	25	70-130
Ethyl ether	91	96	5	25	70-130
Isopropyl Ether	98	98	0	25	70-130
Ethyl-Tert-Butyl-Ether	88	97	10	25	70-130
Tertiary-Amyl Methyl Ether	95	100	5	25	70-130
1,4-Dioxane	104	110	6	50	70-130
Surrogate(s)					
1,2-Dichloroethane-d4	115	112	3		70-130
Toluene-d8	99	98	1		70-130
4-Bromofluorobenzene	99	98	1		70-130
Dibromofluoromethane	107	107	0		70-130
Volatile Organics by MCP 8260B for sample(s) 06-07 (WG198134-1, WG198134-2)					
Methylene chloride	108	100	8	25	70-130
1,1-Dichloroethane	117	100	16	25	70-130
Chloroform	109	98	11	25	70-130
Carbon tetrachloride	110	98	12	25	70-130
1,2-Dichloropropane	107	99	8	25	70-130
Dibromochloromethane	102	96	6	25	70-130
1,1,2-Trichloroethane	105	100	5	25	70-130
Tetrachloroethene	108	97	11	25	70-130
Chlorobenzene	103	97	6	25	70-130
Trichlorofluoromethane	125	111	12	25	70-130
1,2-Dichloroethane	122	104	16	25	70-130
1,1,1-Trichloroethane	116	104	11	25	70-130
Bromodichloromethane	108	98	10	25	70-130
trans-1,3-Dichloropropene	97	91	6	25	70-130
cis-1,3-Dichloropropene	99	92	7	25	70-130
1,1-Dichloropropene	101	93	8	25	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH LCS/LCSD ANALYSIS

Laboratory Job Number: L0503335

Continued

Parameter	LCS %	LCSD %	RPD	RPD Limit	QC Limits
Volatile Organics by MCP 8260B for sample(s) 06-07 (WG198134-1, WG198134-2)					
Bromoform	96	92	4	50	70-130
1,1,2,2-Tetrachloroethane	97	92	5	25	70-130
Benzene	112	102	9	25	70-130
Toluene	104	100	4	25	70-130
Ethylbenzene	108	101	7	25	70-130
Chloromethane	95	93	2	50	70-130
Bromomethane	86	87	1	50	70-130
Vinyl chloride	119	110	8	25	70-130
Chloroethane	120	113	6	25	70-130
1,1-Dichloroethene	106	97	9	25	70-130
trans-1,2-Dichloroethene	107	103	4	25	70-130
Trichloroethene	104	91	13	25	70-130
1,2-Dichlorobenzene	97	93	4	25	70-130
1,3-Dichlorobenzene	97	95	2	25	70-130
1,4-Dichlorobenzene	96	93	3	25	70-130
Methyl tert butyl ether	112	102	9	25	70-130
p/m-Xylene	107	101	6	25	70-130
o-Xylene	98	93	5	25	70-130
cis-1,2-Dichloroethene	106	104	2	25	70-130
Dibromomethane	116	103	12	25	70-130
1,2,3-Trichloropropane	96	93	3	25	70-130
Styrene	109	103	6	25	70-130
Dichlorodifluoromethane	109	98	11	50	70-130
Acetone	95	84	12	50	70-130
Carbon disulfide	107	97	10	25	70-130
2-Butanone	93	74	23	50	70-130
4-Methyl-2-pentanone	73	62	16	50	70-130
2-Hexanone	82	69	17	50	70-130
Bromochloromethane	111	98	12	25	70-130
Tetrahydrofuran	102	93	9	25	70-130
2,2-Dichloropropane	104	94	10	25	70-130
1,2-Dibromoethane	102	96	6	25	70-130
1,3-Dichloropropane	106	95	11	25	70-130
1,1,1,2-Tetrachloroethane	105	102	3	25	70-130
Bromobenzene	97	93	4	25	70-130
n-Butylbenzene	93	90	3	25	70-130
sec-Butylbenzene	95	91	4	25	70-130
tert-Butylbenzene	95	91	4	25	70-130
o-Chlorotoluene	102	100	2	25	70-130
p-Chlorotoluene	102	99	3	25	70-130
1,2-Dibromo-3-chloropropane	102	90	13	50	70-130
Hexachlorobutadiene	91	89	2	25	70-130
Isopropylbenzene	96	93	3	25	70-130
p-Isopropyltoluene	93	90	3	25	70-130
Naphthalene	94	90	4	25	70-130
n-Propylbenzene	103	99	4	25	70-130
1,2,3-Trichlorobenzene	95	93	2	25	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH LCS/LCSD ANALYSIS

Laboratory Job Number: L0503335

Continued

Parameter	LCS %	LCSD %	RPD	RPD Limit	QC Limits
Volatile Organics by MCP 8260B for sample(s) 06-07 (WG198134-1, WG198134-2)					
1,2,4-Trichlorobenzene	92	90	2	25	70-130
1,3,5-Trimethylbenzene	98	96	2	25	70-130
1,2,4-Trimethylbenzene	102	101	1	25	70-130
Ethyl ether	105	104	1	25	70-130
Isopropyl Ether	104	96	8	25	70-130
Ethyl-Tert-Butyl-Ether	100	94	6	25	70-130
Tertiary-Amyl Methyl Ether	100	97	3	25	70-130
1,4-Dioxane	109	97	12	50	70-130
Surrogate(s)					
1,2-Dichloroethane-d4	126	112	12		70-130
Toluene-d8	103	100	3		70-130
4-Bromofluorobenzene	99	97	2		70-130
Dibromofluoromethane	113	104	8		70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0503335

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-05 (WG198048-3)							
Volatile Organics by MCP 8260B				60 8260B		0405 08:35	TT
Methylene chloride	ND	ug/l	5.0				
1,1-Dichloroethane	ND	ug/l	0.75				
Chloroform	ND	ug/l	0.75				
Carbon tetrachloride	ND	ug/l	0.50				
1,2-Dichloropropane	ND	ug/l	1.8				
Dibromochloromethane	ND	ug/l	0.50				
1,1,2-Trichloroethane	ND	ug/l	0.75				
Tetrachloroethene	ND	ug/l	0.50				
Chlorobenzene	ND	ug/l	0.50				
Trichlorofluoromethane	ND	ug/l	2.5				
1,2-Dichloroethane	ND	ug/l	0.50				
1,1,1-Trichloroethane	ND	ug/l	0.50				
Bromodichloromethane	ND	ug/l	0.50				
trans-1,3-Dichloropropene	ND	ug/l	0.50				
cis-1,3-Dichloropropene	ND	ug/l	0.50				
1,1-Dichloropropene	ND	ug/l	2.5				
Bromoform	ND	ug/l	2.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50				
Benzene	ND	ug/l	0.50				
Toluene	ND	ug/l	0.75				
Ethylbenzene	ND	ug/l	0.50				
Chloromethane	ND	ug/l	2.5				
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	ND	ug/l	1.0				
Chloroethane	ND	ug/l	1.0				
1,1-Dichloroethene	ND	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0503335

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-05 (WG198048-3)							
Volatile Organics by MCP 8260B continued				60 8260B		0405 08:35	TT
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	122.	%	70-130				
Toluene-d8	99.0	%	70-130				
4-Bromofluorobenzene	105.	%	70-130				
Dibromofluoromethane	113.	%	70-130				
Blank Analysis for sample(s) 06-07 (WG198134-3)							
Volatile Organics by MCP 8260B				60 8260B		0405 15:59	TT
Methylene chloride	ND	ug/l	5.0				
1,1-Dichloroethane	ND	ug/l	0.75				
Chloroform	ND	ug/l	0.75				
Carbon tetrachloride	ND	ug/l	0.50				
1,2-Dichloropropane	ND	ug/l	1.8				
Dibromochloromethane	ND	ug/l	0.50				
1,1,2-Trichloroethane	ND	ug/l	0.75				
Tetrachloroethene	ND	ug/l	0.50				
Chlorobenzene	ND	ug/l	0.50				
Trichlorofluoromethane	ND	ug/l	2.5				
1,2-Dichloroethane	ND	ug/l	0.50				
1,1,1-Trichloroethane	ND	ug/l	0.50				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0503335

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 06-07 (WG198134-3)							
Volatile Organics by MCP 8260B continued				60 8260B		0405 15:59	TT
Bromodichloromethane	ND	ug/l	0.50				
trans-1,3-Dichloropropene	ND	ug/l	0.50				
cis-1,3-Dichloropropene	ND	ug/l	0.50				
1,1-Dichloropropene	ND	ug/l	2.5				
Bromoform	ND	ug/l	2.0				
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50				
Benzene	ND	ug/l	0.50				
Toluene	ND	ug/l	0.75				
Ethylbenzene	ND	ug/l	0.50				
Chloromethane	ND	ug/l	2.5				
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	ND	ug/l	1.0				
Chloroethane	ND	ug/l	1.0				
1,1-Dichloroethene	ND	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0503335

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 06-07 (WG198134-3)							
Volatile Organics by MCP 8260B continued				60 8260B		0405 15:59	TT
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

Surrogate(s)	Recovery		QC Criteria
1,2-Dichloroethane-d4	121.	%	70-130
Toluene-d8	99.0	%	70-130
4-Bromofluorobenzene	103.	%	70-130
Dibromofluoromethane	111.	%	70-130

REFERENCES

60. Quality Assurance and Quality Control Requirements and Performance Standards for SW-846 Methods. MADEP BWSC. WSC-CAM-IIA (Revision 4), WSC-CAM-V C (Revision 2), WSC-CAM-IIIA (Revision 5). May 2004.

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.
ND	Not detected in comparison to the reported detection limit.
NI	Not Ignitable.
ug/cart	Micrograms per Cartridge.

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 it's 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.

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0503335

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0503335-01A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-01B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-01C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-02A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-02B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-02C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-03A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-03B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-03C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-04A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-04B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-04C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-05A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-05B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-05C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-06A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-06B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-06C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-07A	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-07B	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04
L0503335-07C	Vial HCl preserved	A	N/A	2.6 C	Y	Absent	MCP-8260-04

Container Comments

Container ID	Comments